

GROUNDS

FOR CHANGE

A USER'S GUIDE TO SCHOOLYARD
NATURALIZATION



THIRD EDITION



ACKNOWLEDGMENTS

The Calgary Zoo's "Grounds for Change" program began as a pilot in 1996. At that time, we researched many similar projects around North America and the world. Over time, we developed strong relationships with like-minded agencies such as *The Evergreen Foundation*, *Greening School Grounds*, *Tree Canada Foundation* and *Green Brick Road*. We also gained an incredible amount of knowledge from the brilliant Learning Through Landscapes program from Great Britain. As we worked with individual schools, we used elements of various programs to develop our vision of a successful naturalization project. We would like to acknowledge that we have examined some excellent resources and adapted them to our own specific needs. That said, if an item has been adapted from a particular source we have attempted to acknowledge the source. If we have omitted this information, it is not intentional.

We are extremely grateful to Linda George, a committed British Columbia naturalizer and creator of Greening School Grounds, for her assistance over the years with advice and educational materials. We have adapted many of her ideas into our manual. We owe thanks to the Calgary Zoo Master Gardeners, in particular Jeanie Bietz, Deb Boulton, Jodi Ouelette, Nancy Tice and Joan Tetrault for direct input into this manual. Countless other Calgary Zoo Master Gardeners have volunteered to create successful school projects. We have also had the privilege of working with some exceptional teachers, community volunteers and students as we developed our program. Your input has been invaluable. We would like to acknowledge and thank the following schools for their role in the development of this project: Altadore School, Ecole Edwards, Exshaw School, Ecole St. Luke, Ecole St. Pius, Ecole William Reid, Edgemont Elementary School, Hilhurst Community School, Lake Bonavista School, Louis Riel Elementary and Junior High School, Milton Williams Junior High, North Haven Elementary, Olympic Heights School, Riverbend School, Simons Valley School, St. Boniface School, St. William School, Sunnyside Community School and Wildwood Elementary School.

The schoolyard food gardening sections were compiled by Dawna Sagi. We would like to thank Dawna for her contribution to the third edition of the manual. With her research and work, Grounds for Change can support food gardening projects on school grounds.

The first edition *Grounds for Change: A User's Guide to Schoolyard Naturalization* was a publication of the Calgary Zoo, in partnership with Agrium, the Alberta Lottery Fund and the Calgary Community Lottery Board. The Alberta Ecotrust Foundation, the Shell Environmental Fund, Tree Canada, EcoAction and The Evergreen Foundation also generously provided funding for the project. Funds required for the second edition of the manual, re-issued in 2004, were generously provided by the Calgary Foundation. The current third edition, updated in 2012, was made possible by the funding contribution of Agrium.

The Agrium logo features the word "Agrium" in a bold, black, serif font. A green leaf-like shape is positioned to the left of the letter 'A', partially overlapping it.

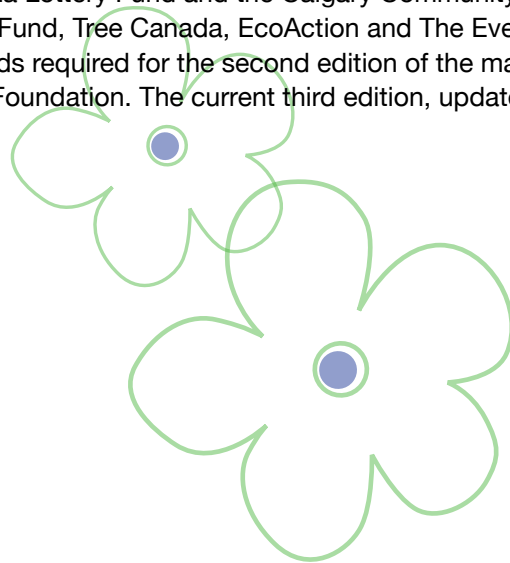


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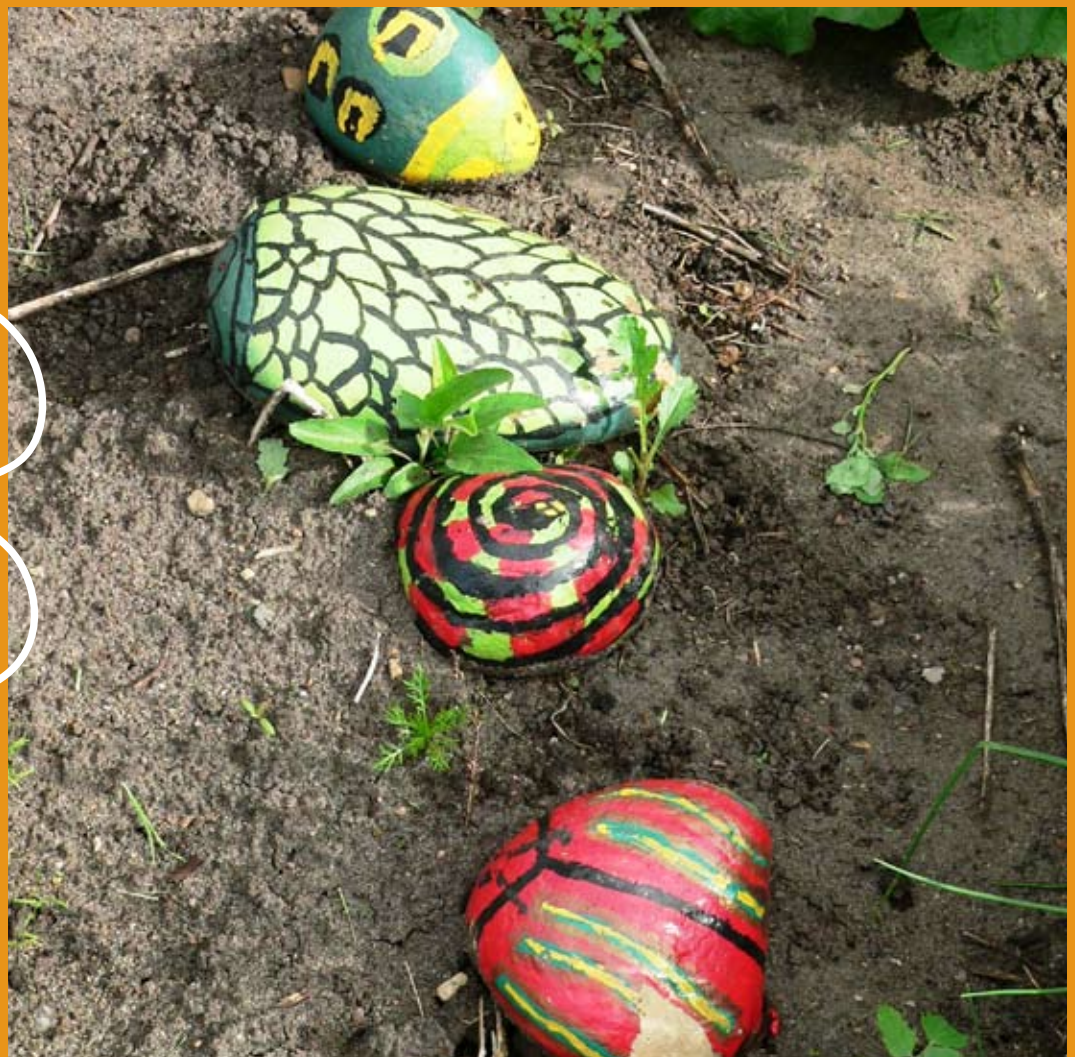
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GROUNDS FOR CHANGE



INTRODUCTION



GROUNDS FOR CHANGE: A USER'S GUIDE TO SCHOOLYARD NATURALIZATION

Dear Naturalizer:

Now more than ever, it is important to find opportunities to connect children with nature. In this digital age of computers, tablets and video games, it is essential to get our children outside, active and in tune with the nature that surrounds them. Allowing kids to explore, discover and connect with wildlife creates an appreciation for all living things and inspires the drive to protect it.

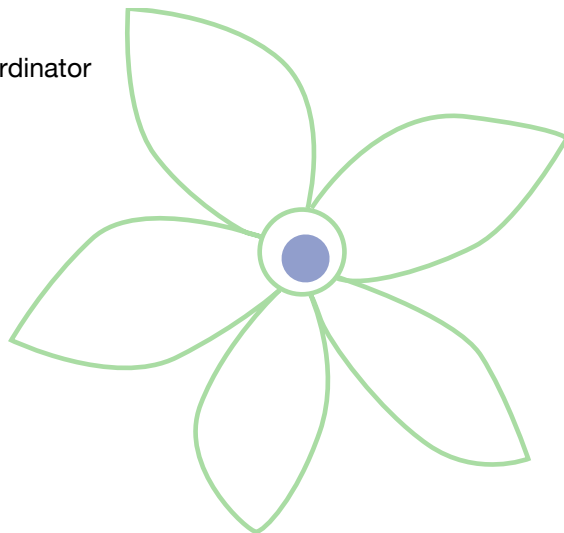
Schoolyard naturalization offers the opportunity for kids to experience nature at school. Adding up recess and lunch breaks, by the end of grade six, most students have spent almost 260 full days in their schoolyard (Cheskey, 1993). Restoring schoolyards to areas of natural habitat provides many possibilities for play, learning, and much appreciated shelter from the wind or sun.

Grounds for Change: A User's Guide to Schoolyard Naturalization was created by the Calgary Zoo as a hands-on manual for people working towards implementing any type of terrestrial naturalization project. The planning process presented is centered around student and community involvement. Through student involvement, children are empowered to take positive action in shaping their school environment and develop a sense of environmental **stewardship**. Restoring native plant landscapes sows seeds of hope and reminds teachers and children that they can work together with nature.

Over the years, interest and support for the concept of schoolyard naturalization has grown. With an increased need for environmental education within the curriculum, natural areas on school grounds have become more common among Calgary schools. Each time a schoolyard naturalization area is planted, more children can connect with nature, creating an affinity for stewardship and conservation. As Margaret Mead said, "Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has."

Enjoy your journey through the naturalization process, and don't forget to have fun!

Chloé McMillan
Grounds for Change Coordinator
ChloeM@calgaryzoo.com



“Authentic environmental commitment emerges out of first hand experiences with real places on a small, manageable scale..”

David Sobel, *Beyond Ecophobia*

MANUAL NOTES



Grounds for Change: A User's Guide to Schoolyard Naturalization is intended to provide school and community groups with a sense of the scope, process and potential of schoolyard naturalization projects. It is designed to encourage naturalization while ensuring that individuals embarking on these projects are aware of the commitment necessary for a successful naturalized site.

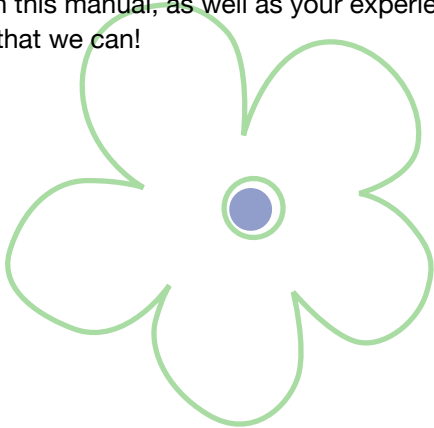
The text has been broken up into sections for ease of use. We encourage you to read the entire Process section as an introduction to the steps involved in the naturalization process. It is important to see the progression from inspiration to installation before you get caught up in the details. You may feel a little overwhelmed at first, but if you approach your naturalization project one step at a time, it will all fall into place. Please keep in mind that this is only a suggested sequence. As with any process, the steps may merge and overlap.

The Appendices provide more in-depth information on a variety of topics relevant to schoolyard naturalization, such as 'Design Tips for Schoolyard Naturalization', 'Native Plants' and 'Grant Proposals'. Also included are 'Plant Lists' to aid in the selection of plant material appropriate for your site. Any words that appear **bolded** in the body of the manual text are defined in the 'Glossary'.

Throughout the text we have identified possibilities for curricular links that would be appropriate for various steps in the process. These represent a very small sampling of the incredible array and number of education opportunities associated with naturalization projects. We hope they will spark your interest and imagination regarding the possibilities for curriculum enhancements.

The goal of this user's guide is to help and inspire you as you venture into schoolyard naturalization. It is encouraged that your school community executes as much of the process as possible to gain the maximum benefits of the project. However, throughout the manual you will find tips as to where, when, who and how to ask for expert help. Each section is followed by a listing of 'References and Resources'. This listing includes resources we have found valuable in compiling this publication including books, articles, studies, videos and websites. We have also included a short list of sources for native plant material, as well as contact information for the Calgary Zoo's schoolyard naturalization program.

Please feel free to provide the Calgary Zoo's schoolyard naturalization program, Grounds for Change, with any feedback you have on this manual, as well as your experiences with schoolyard naturalization. We are eager and available to help in any way that we can!



ABOUT THE AUTHORS

Two educators wrote *Grounds for Change: A User's Guide to Schoolyard Naturalization*. Sue Arlidge, BSc/BEd has been working in the field of environmental and ecology education for nearly 25 years. The mother of two active sons, Sue currently works as the School Program Coordinator at the University of Calgary's Biogeoscience Institute in Kananaskis, where she enjoys roaming the woods and streams with inquiry-minded students. Tian Everest, BSc, has worked as a researcher for both the Calgary Zoo's Horticulture and Conservation Research departments. She is currently the Stewardship Coordinator for the Calgary Zoo's Development Department. Both Sue and Tian coordinated the Zoo's Master Gardener Program as they piloted this naturalization process with Calgary area schools.

The second edition of the manual was edited for publication by Jane Reksten. Jane received a degree in Microbiology and Environmental Studies at the University of Victoria before moving to Alberta and completing the Diploma in Horticulture, Landscape Management at Olds College. After several years working in the landscape maintenance industry in Calgary, she accepted the position of Schoolyard Naturalization Project Leader at the Calgary Zoo. Five years later she became the Zoo's Botanical Education Coordinator. Currently Jane is the Manager, Botanic Gardens and Wetland Treatment Facility at Olds College.

Grounds for Change: A User's Guide to Schoolyard Naturalization third edition was edited for publication by Sonia Law, former Grounds for Change Coordinator at the Calgary Zoo. Sonia acquired her Bachelor of Science Major Zoology from the University of Manitoba and her Master of Science from the University of Calgary. The Grounds for Change Coordinator's role is to work with school communities to plan, create, and maintain naturalized areas on school grounds.



WHAT IS SCHOOLYARD NATURALIZATION?

Schoolyard naturalization is a process that encourages the return of natural environments to schoolyards. Naturalization involves replacing the traditional, high-maintenance, often **monoculture** lawn landscapes, with vegetation native to the local environment. Thousands of years of evolution have made native plants better adapted to local conditions. Once established, native plants require less water, pruning and other maintenance than most exotic or **introduced** plants. This approach to landscaping blends environmental concerns with an appreciation of nature allowing us to coexist with and understand nature in urban areas.

Naturalization is very different from beautification. Beautification projects create visually pleasing landscapes which are generally high maintenance and do not replicate the natural environment. Because they use primarily exotic or non-native plant species, beautification projects typically require large amounts of water, disease control and maintenance to achieve an attractive appearance. They also have less wildlife value than naturalized areas because they lack **diversity**, natural food sources and **habitat** requirements.

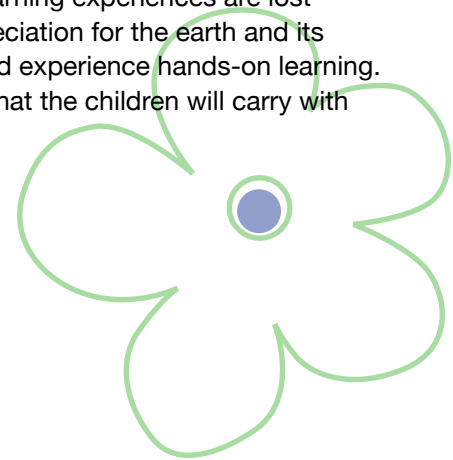
Schoolyard naturalization focuses on process rather than product. It is important that all participants learn the steps it takes to create a naturalized site. The planning process models community **stewardship**. The ultimate goal is for others to learn from the process, be inspired to recreate it in their own backyard, and gain a sense of stewardship for our environment.

The real benefits of schoolyard naturalization come when students are involved in every step. Yes, it is faster and easier for adults to do all the work, but the end result holds less meaning and many valuable learning experiences are lost with this approach. When students take the lead in the naturalization process, their appreciation for the earth and its ecosystems intensifies. Children become empowered as they make real life decisions and experience hands-on learning. This empowerment and sense of personal connection to the natural world is the legacy that the children will carry with them the rest of their lives.

“ In the end we will conserve only what we love. We love only what we understand, we will understand only what we are taught. ”

Baba Dioum

From a speech made by Baba Dioum in 1968 at the general assembly in New Delhi, India of the International Union for Conservation of Nature and Natural Resources.



ROLE OF THE CALGARY ZOO IN SCHOOLYARD NATURALIZATION

The mission of the Calgary Zoological Society is to engage visitors in enjoyable and unique experiences, connect our community with nature, and inspire actions which support conservation.

In addition to being a zoological attraction, the Calgary Zoo is also a Botanical Garden. The Zoo's educational and horticultural expertise, the Canadian Wilds native plant immersion exhibit and the involvement of Calgary Zoo **Master Gardener** Volunteers make it a natural facilitator of schoolyard naturalization projects.

We will guide you in:

- developing a project vision and curricular links
- completing a site inventory of the schoolyard
- determining a project timeline
- deciding on a project design process
- applying for appropriate grants or other funds
- ensuring the project will be implemented appropriately
- developing a maintenance schedule for the naturalized area
- utilizing the naturalized area as an outdoor classroom

The Zoo's role is to **FACILITATE** the process, not **IMPLEMENT** the project.

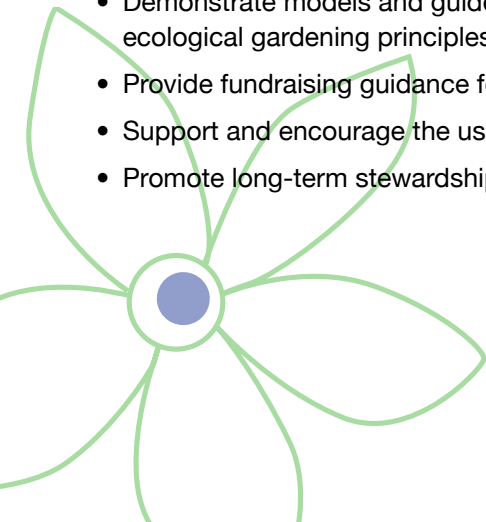
For many of these activities, we can provide workshops to the staff and naturalization committees at the appropriate steps in the process.

To further assist in implementing the projects, the Zoo welcomes school field trips to its Canadian Wilds exhibit that is centred on native plant design. We can provide teacher professional development, and we have compiled a library of local resources, donor information and educational resources.

Our support continues long after a naturalization project is planted. We provide resources and programming to teachers to make the best use of the natural area for teaching purposes. We also guide schools through maintenance issues, provide information regarding the management of invasive species, and promote stewardship of the naturalized site to ensure sustainability.

The Calgary Zoo's Schoolyard Naturalization Program Goals:

- Increase public awareness of the educational, ecological and social value of habitat creation and restoration on school grounds.
- Promote and assist with the organized and planned development of schoolyard habitat creation.
- Develop strong relationships with schoolyard naturalization stakeholders.
- Demonstrate models and guidelines for schoolyard restoration based on professional landscape design and ecological gardening principles.
- Provide fundraising guidance for schools involved in naturalization projects.
- Support and encourage the use of naturalized areas as outdoor classrooms.
- Promote long-term stewardship of natural areas.



RATIONALE FOR NATURALIZATION PROJECTS

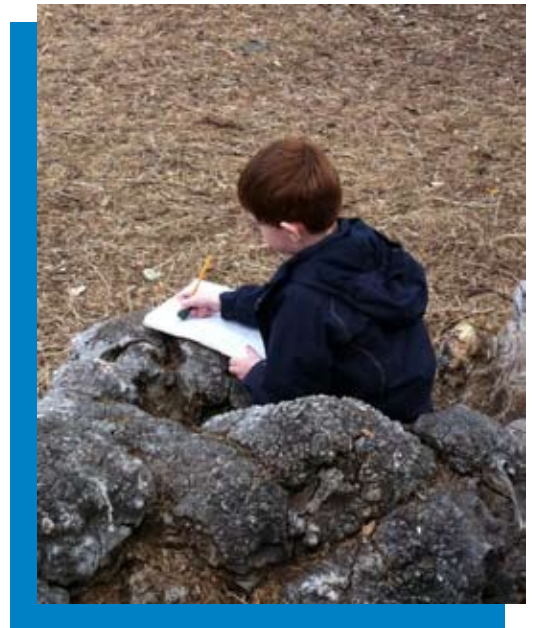
EDUCATIONAL BENEFITS

A naturalization area on school grounds provides an opportunity for hands-on learning steps from the classroom. The most direct curricular connections are related to science, but natural areas also provide links to social studies, math and provide inspirational spaces for reading, writing and art. In addition to curricular connections, exposure to natural environments can help children with concentration, awareness and observation skills.

Aside from providing the setting for an outdoor classroom, naturalization projects are areas for creative play, which allow children to use their imagination. This type of unstructured play has been recognized as an essential component of child development.

Educational benefits for students include:

- Access to a nearby, hands-on, cross-curricular educational environment.
- An opportunity to experience success, fun and accomplishment.
- A place to feed their innate human curiosity about the natural world.
- Opportunities for plant and animal monitoring programs.
- Study opportunities in biology, **ecology**, botany and other subjects.
- Hands-on experience with environmental learning rather than textbook learning.
- Exposure to important business skills, such as writing corporate letters and budgeting.
- Increased knowledge of local plant and animal communities.
- Opportunity to incorporate and integrate the natural environment into all areas of the curriculum.



ECOLOGICAL BENEFITS

Habitat destruction is one of the most significant threats facing the planet today. While naturalizing part of your schoolyard will not guarantee the continued survival of the grizzly bear or the right whale, it will provide critical habitat for smaller local animals. Few natural habitats exist in urban areas and your naturalized site may become an important source of food and shelter for over-wintering birds or provide **nectar** for butterflies. David Sobel in his book *Beyond Ecophobia* emphasizes the importance of teaching children about the nature that is close at hand before expanding their horizons to the wider global environment. “Children are disconnected from the world outside their doors and connected with endangered animals and **ecosystems** around the globe through electronic media” (Sobel, 1996). Schoolyard naturalization provides the opportunity to introduce children first hand to their local environment, providing the chance for prolonged observation and investigation. The process of naturalization also fuels **stewardship** among children. In this sense, your school’s naturalization project will encourage the learning and awareness that can lead to the continued survival of endangered species in the wild.

The following ecological benefits develop through schoolyard naturalization projects:

- Increased awareness of **native** plants, animals and their environment.
- Increased **biodiversity** on the restored site.

- Exposure to ecologically friendly gardening habits.
- Creative play environments that encourage interaction with the natural world.
- Opportunities for urban-based families to interact with wildlife.
- Reduction of air pollutants and traffic noise.
- Shelter from wind and harmful UV radiation.
- Opportunities to participate in 'plant rescues' to salvage plants threatened by development.
- Promotion of environmental stewardship.

SOCIAL BENEFITS

According to a significant body of research, a strong case can be made for schoolyard naturalization based on social benefits alone. Traditional school grounds foster aggressive behaviour as a result of sterile surroundings that lead to boredom and competition for limited resources. Enriched, diverse outdoor learning environments can reduce bullying, vandalism and littering by providing a range of options to stimulate imaginative play.

It has been found that students involved in an integrated learning program, develop better interpersonal and citizenship skills. As they find themselves in situations requiring decision-making, an environment of camaraderie and collaboration forms. They develop greater self-discipline, mutual respect and a sense of community. Students have fewer doubts that their studies are meaningful and they maintain a higher level of interest in their schoolwork.

Direct nature experiences are widely acknowledged to enhance environmental awareness. Such experiences are most effective if they are recurrent, frequent and qualitative, all of which are easily served through schoolyard naturalization projects. Regular contact and play in nature throughout early childhood fosters beneficial attitudes towards the environment and an affinity to love nature.

Schoolyard naturalization projects create the following benefits for both students and the environment:

- Increased opportunities for imaginative play through diversity of vegetation, places of refuge, etc.
- Creation of a landscape that is relevant, equitable and accessible to all students. Regular play equipment can only accommodate a small number of children and discriminates by age and psychomotor ability.
- Helps students build a sense of place.
- Private, relaxing places for children to be alone or with friends.

“ The best teaching occurs when the emphasis is less on imparting knowledge and more on joining the child on a journey of discovery. ”

David Sobel, *Beyond Ecophobia*



- Increased student ownership. Students develop pride that their actions do result in change.
- Opportunity for working more closely with the community.
- Regular contact with nature to enhance enjoyment and relaxation, and reduce stress levels.

Transforming an area of concrete or compacted grass into a naturalized space provides students with the real-life experience of landscape renovation and maintenance instead of textbook learning. They will experience the successes and disappointments of the process and will enjoy the finished project. Embarking on a naturalization project will benefit students and the school community in ways you would never imagine.

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- Children and Nature Network
<http://www.childrenandnature.org>
- Child and Nature Alliance of Canada
<http://www.childnature.ca/home>
- Grounds for Change
<http://seedssurvivor.com/grounds-for-change>
- International School Grounds Alliance
<http://www.greenschoolyards.org/home>

SCHOOLYARD VEGETABLE GARDENS

Healthy eating is an important topic to address with school children. In the younger years, students are developing eating habits that will stay with them the rest of their lives. Vegetable gardens on school grounds offer opportunities for students to discover where food comes from. An appreciation for food production is created as students are able to see the results of their time, energy, care and dedication to the garden. What is more rewarding than eating a carrot that you have started from a seed, watered and cared for?

When compared to a naturalization project, vegetable gardens require a large amount of dedication to maintain. Food gardens require regular watering and care throughout the growing season. However, the possible benefits of these gardens are enough to consider why all the work is worthwhile in the end.

EDUCATIONAL BENEFITS

A garden of any size provides a rich and diverse landscape in which to study science, mathematics, social studies and more. Students benefit from hands-on, real life experiences related to curriculum. By growing food and learning where food comes from, students growing up in an urban environment develop awareness of healthy eating and nutrition. Students can study the variety of products that come from different plants and what plants grow easily in their local environment.

ENVIRONMENTAL BENEFITS

Whether it is a vegetable in the garden or a majestic redwood, plants have the same requirements. By studying and nurturing plant life, students gain appreciation for the needs of all life and the interconnectedness of the world around them. By studying about gardens, the needs of plants, and the manner in which these factors tie together, students discover how human actions impact the world around us, both positively and negatively. Food gardens also provide the opportunity to promote environmentally friendly gardening practices and techniques.

SOCIAL BENEFITS

A school garden requires students of all ages and community members to work together. Gardens create a sense of community within the school and the surrounding area through volunteer help, summer maintenance and the sharing of rewards. Gardens are true lessons in cooperation and teamwork.

The time and energy that goes into a garden is visible through strong, blooming and productive plants. A sense of pride is generated as students harvest the bountiful vegetables into which they have invested their energy.

PLANNING A GARDEN

The steps required to plan a schoolyard garden are no different than those for a naturalization project. Grounds for Change promotes a 15 step planning process to ensure the project is well supported and sustainable. A food garden requires regular care, and therefore, necessitates a strong **stewardship** plan to make sure it is successful. To plan a schoolyard garden, follow the 15 Steps to Schoolyard Naturalization, or in this case, Vegetable Gardening. Additional information in regards to schoolyard food gardens can be found in Appendices 12 & 13.

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WEBSITES

Government of Alberta, Healthy U

www.healthyalberta.com/HealthyPlaces/554.htm

Green Thumbs Growing Kids

www.kidsgrowing.ca

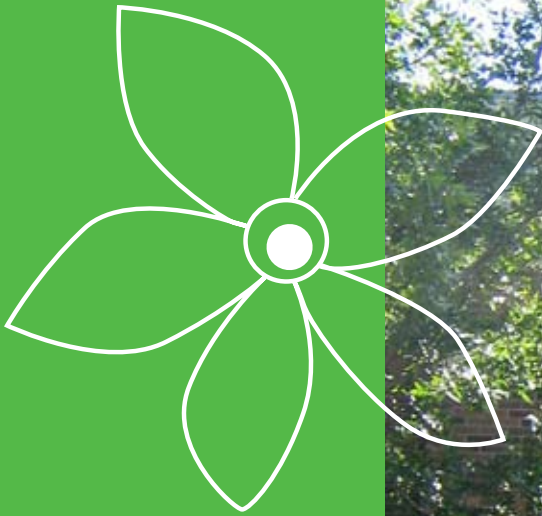


GROUNDS FOR CHANGE



PROCESS

15 STEPS TO SCHOOLYARD NATURALIZATION



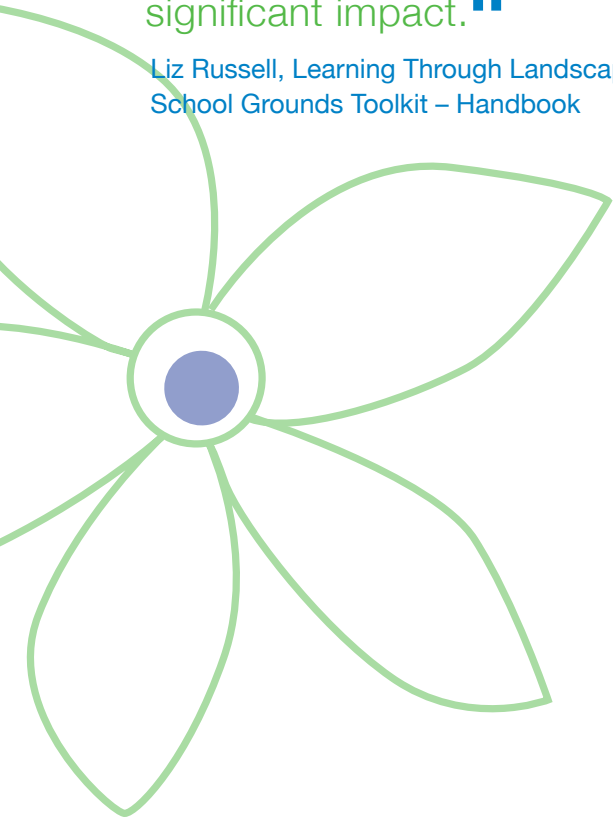
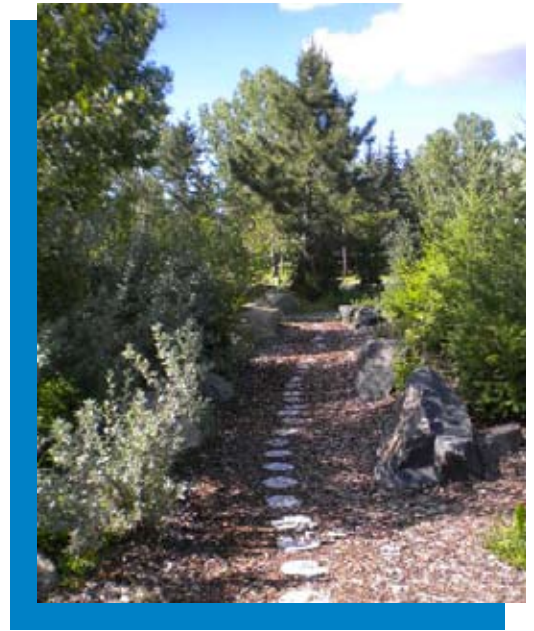
15 STEPS TO SCHOOLYARD NATURALIZATION

A In order to gain the maximum benefit of a schoolyard naturalization project, participants need to experience the steps required for a successful project. They need to understand how a hard-packed playing surface can be turned into something dynamic and alive. Only then will families be inspired to recreate this sort of natural landscape in their own yard.

The process of successfully creating a naturalized site on a schoolyard is quite complex. What does success look like? In our experience, no matter how big or small, a project is successful if students and the school community have taken an active part in the steps to create a naturalized site.

“ It’s not what you do, it’s the way you do it that has the most significant impact.”

Liz Russell, Learning Through Landscapes
School Grounds Toolkit – Handbook



VISION

Nurture

Evaluate, Monitor
and Utilize

Celebrate

Share Concept

Form Committee

Develop Vision
and Links

Obtain Approval

COMPLETION

Install

Prepare

Gather Donations

Identify Project Needs

DESIGN

Survey Schoolyard

Create Preliminary
Design

Select Site

Create Final Design

IMPLEMENTATION

VISION

1. SHARE THE CONCEPT

Schoolyard naturalization projects generally come about because one person believes it would be a good project for the school to consider. The first step to creating your naturalized site is to get your school community interested and involved in the process. After going through this handbook, arrange meetings for teachers, school and school board administration, students, parents and outside community members to begin discussions. In these meetings, consider using visual aids. Grounds for Change has an introduction to naturalization video available on the website (www.seedsurvivor.com/grounds-for-change) or on YouTube (<http://youtu.be/rr7U1NL-rb4>).

Discuss the **rationale** for the project, the benefits and the reasons for creating a naturalized site. Ensure everyone is aware of the process and principles behind the project, along with the long-term commitment necessary. You may want to invite knowledgeable speakers to these events. Consider the Zoo's Grounds for Change Coordinator or the project coordinator from a school that has gone through the process. Any background information you can provide to **stakeholders** at this point will be invaluable.

Before embarking on the rest of the process, be sure that you have agreement in principle from your school staff, administration and parent council that the project is worth pursuing. There will be many other points at which you will need approval from all stakeholders, but at this very early stage, without support for the concept, it is problematic to continue.

The most common issues and concerns leading to hesitations are those of maintenance, vandalism and increased workload for teachers. Be prepared to address these concerns as they are valid. Internal agreement on the purpose and practicality of the project sets the stage for a successful naturalized site. It is challenging for a school when a project is pushed forward by one group of stakeholders, who then have to gain the support of the other groups after the fact.

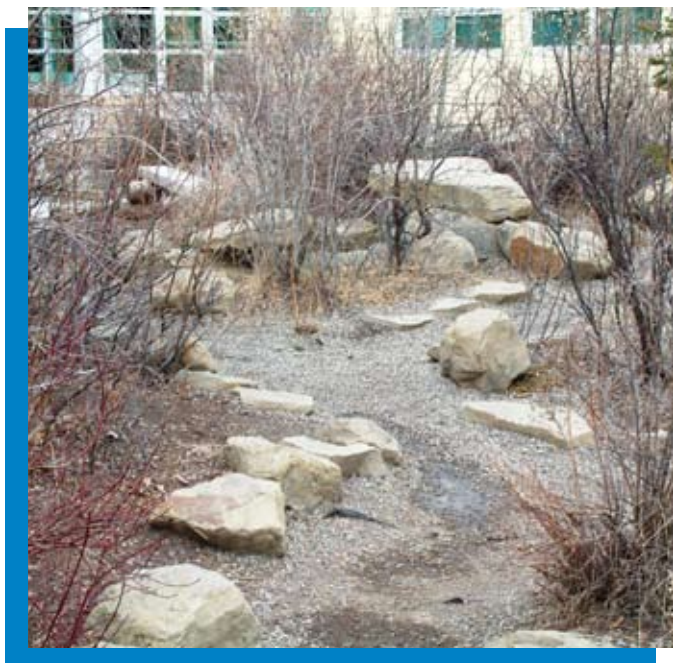
Be sure also to have approval in principle from the owner of the school property (this may need to be investigated, as each school may be different). If they object to the idea at this stage, there is no point in pursuing the idea further until this hurdle is overcome.

A word of advice that cannot be stressed strongly enough. Don't try to do it all by yourself. If you don't have enough interest or volunteers it's time to reassess.

2. FORM THE NATURALIZATION COMMITTEE

Now that you have developed a common vision based on your key goals and curricular links, it is time to branch out and involve others from the school and local community in your project. The long-term success of the project is reliant on having the support of a wide selection of people with a range of backgrounds and skills. Creating clear committee positions will greatly assist the flow of the project, thereby reducing the potential for critical details to fall through the cracks. Providing detailed job descriptions and establishing the time duration for each position helps people understand the commitment required and keeps the lines of responsibility clear. Some roles may be involved at all stages of the process, while others may be short-term and task oriented. Luckily, we find that school-based volunteers tend to seek both kinds of jobs.

The following list is just a suggestion as to how the roles may be identified, with examples of responsibilities. Some may require a subcommittee of two or more people.



COMMITTEE ROLES

PROJECT COORDINATOR

- Lead visioning activities.
- Work with staff and administration, develop goals, work plan and timeline.
- Organize meetings: determining the agenda and participants, setting the location, time and information to go out with agenda, organizing special equipment, refreshments and any childcare provision needed.
- Network with community groups and technical assistants.
- Coordinate workdays, clean-ups, planting days and construction.
- Provide suggestions for action plans.

RESOURCE COORDINATOR

- Research other successful local projects.
- Collect, evaluate and summarize published materials and videos.
- Accounting functions: write cheques, retain receipts, keep accurate books, keep track of **gifts-in-kind**, etc.
- Locate local materials and suppliers and coordinate delivery.
- Hire and communicate with any contract employees.

FUNDRAISING COORDINATOR

- Identify funding sources: foundations, government agencies, environmental agencies, local businesses and corporate programs.
- Plan school or community-based fundraising activities (i.e., engraved bricks, birdhouse auctions, plant sales, etc.).
- Write, submit and monitor grant proposals.
- Arrange to provide tax receipts to donors.

GRAPHICS COORDINATOR

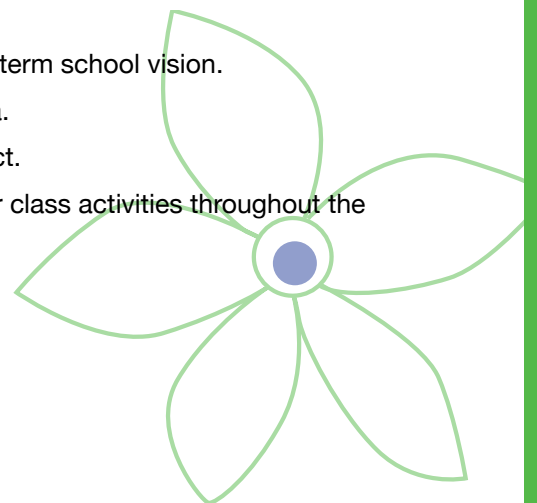
- Document project's progress with images, video and/or the school's website.
- Research styles and costs of permanent educational signs.

EDUCATION LIAISON (preferably a teacher)

- Facilitate school staff and administration in incorporating the project into long-term school vision.
- Review appropriate curriculum to identify potential links to the naturalized area.
- Evaluate and purchase curricular support materials for all aspects of the project.
- Work with naturalization committee to identify and coordinate opportunities for class activities throughout the planning process.
- Investigate opportunities for professional development relevant to the project.

HUMAN RESOURCE COORDINATOR

- Coordinate volunteer recruitment.
- Track volunteers hours.
- Make arrangements for volunteer recognition.



OUTREACH OR PUBLIC RELATIONS COORDINATOR

- Coordinate communication of the project to the community (flyers, posters, public meetings and notices in community newsletters).
- Handle media needs as required (press releases, interviews, etc.).

DESIGN COORDINATOR

- Assist Project Coordinator with visioning activities.
- Ensure a thorough site survey is conducted.
- Obtain any existing regulations and a **real property assessment** for the schoolyard.
- Liaise with school board representatives and/or property owners.
- Coordinate the development of a master design plan (may involve working with landscape designer).
- Work with committee to sequence phases and create a long-term timeline.
- Work with Resource Coordinator to develop a budget.

Where possible, use student assistance with public communications such as surveys, posters, volunteer recruitment notices and letters sent home with students.

At the very beginning of the project, start a binder to keep track of everything relevant to the project including all hours involved in the visioning, design, meetings and so on. This is very important, as you are able to use each moment of time spent on the project as a financial gift-in-kind against the grants you receive. Include contact lists of people involved, site plans design ideas, curriculum connections, etc. Have a section to keep any information gained at presentations or seminars.

DEVELOPING A WORKING COMMITTEE

The committee needs to establish a consistent meeting schedule. Monthly meetings may be sufficient, with more frequent meetings scheduled when the pace of the process picks up. Set a schedule that meets your needs and be consistent. Also take the time to decide on the overall decision-making process for the committee. Some groups succeed by taking minimal input and presenting multiple acceptable options for the stakeholders to vote on. Other committees involve all interested parties at virtually all the decision-making stages. The former is more streamlined and simple for the committee, while the latter encourages direct student involvement and contributions from all groups.

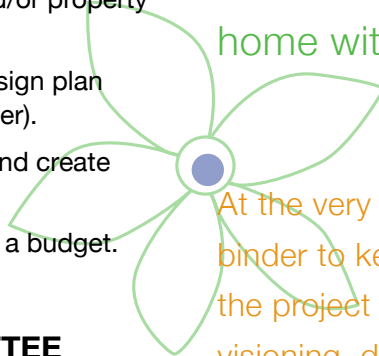
GROUND RULES FOR EFFECTIVE MEETINGS

Although these guidelines may appear a bit more formal than what you feel is necessary, they do help streamline the meetings and create the right environment for productive sessions.

Prepare for meetings in advance as everyone's time is valuable. Circulate an agenda a few days beforehand. For effective meetings all participants should consider the following.

For the Chairperson:

- Arrive early and set up room for meeting.
- Serve refreshments.
- Provide sign-in sheet for names, email addresses and telephone numbers.

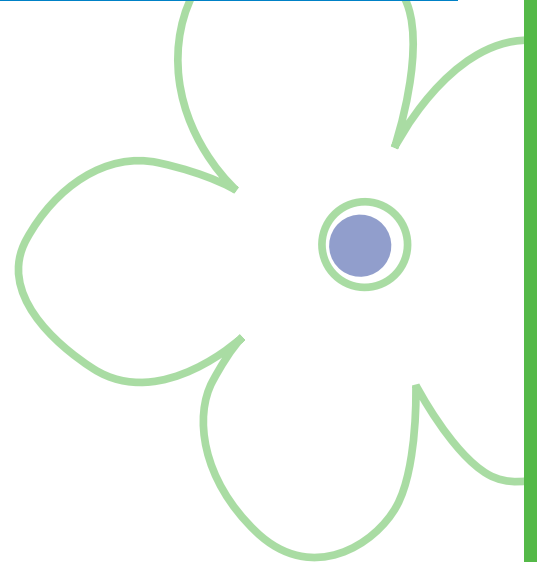
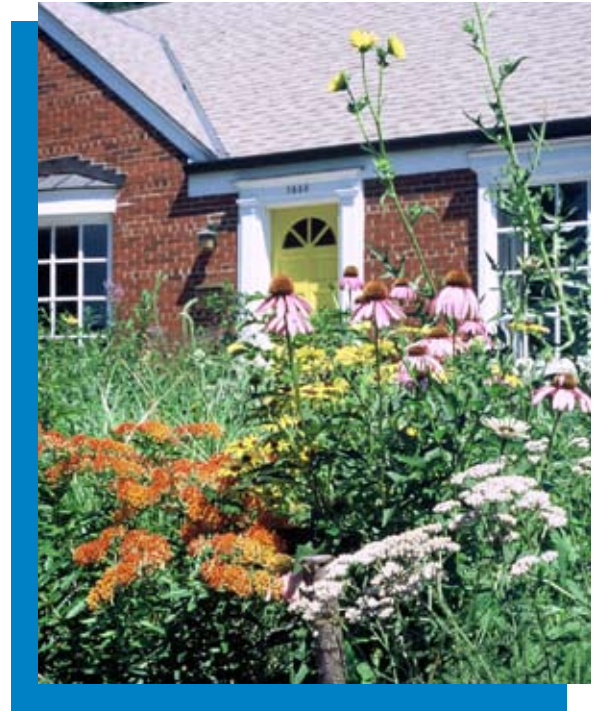


Attendance records and minutes should be kept, as they can be used to document activities for granting organizations

- Start on time.
- Have everyone introduce themselves, if necessary.
- Assign someone to keep minutes (these should be kept in a binder and sent to members after the meeting).
- Ensure people leave knowing their tasks.
- Set date, place and preliminary agenda for the next meeting.

For Committee Members:

- Prior to the meeting, take a moment to review minutes and prepare any resources or reports on action items.
- Arrive promptly.
- If necessary, send regrets prior to meeting when you are unable to attend and ask someone attending for a briefing.
- Speak your mind freely and ask question whenever necessary.
- Give everyone an opportunity to speak.
- Stay on topic.



3. DEVELOP VISION AND CURRICULAR LINKS

With agreement in principle that this project is one the school wants to undertake, the next step of the process deals with identifying specifically why stakeholders want a natural site. From the feedback acquired by all the stakeholders, a shared vision of the end product is developed. Schoolyard naturalization is most effectively realized through a process of participatory design. A participatory process involves working together in a spirit of mutual respect and acknowledging that each person brings something of value to the initiative. It is about inviting the school community, including its neighbours, to create a collective vision, to determine the agenda and to carry it out.

Schoolyard naturalization is a long process requiring numerous people from a variety of backgrounds involved in performing many different duties at many stages. In order to keep the project in perspective and to ensure the efficient integration of each phase, a common rationale and overall vision for the site must be developed. It may be tempting to rush this stage and just get the garden built, but please learn from other schools' errors and take your time. The visioning and planning stages are the most important parts of a successful project. Be sure you have a clear sense of the long-term goals of the project. When you have completed this stage you should be able to answer the following:

- What is the purpose of establishing the naturalized area(s)?
- What are the long-term educational, environmental and social goals of the project?
- What will the project physically look like when it is completed?



When developing the project rationale and vision be sure to involve everyone who will be affected, whether directly or indirectly. This ensures buy-in and a sense of ownership from everyone involved, which in turn promotes long-term success. Ask students, teachers and community members for feedback when envisioning an ideal schoolyard.

One tip from schools having gone through this process is to develop a written vision statement. A clear, concise document helps to keep the project on track during development as (seemingly inevitable) objections or “new ideas” come up. It can also be useful as an important means of helping new staff and volunteers, who become involved years later, familiarize themselves with the project.

EXPLORE YOUR RATIONALE

Consider very carefully why the school should undertake this project. Determine what it is about the project that gets stakeholders excited about naturalization. Is the intention to develop a more creative schoolyard, provide shade for the students, provide an outdoor classroom setting, or to attract wildlife? The previous section of this manual outlines many reasons schools decide to undertake naturalization projects including the social, educational and environmental benefits.

It is essential; however, to take the time to carefully consider the specific reasons for your individual school to embark on a naturalization project. Each school will have its own unique focus, and you might be surprised by the results.

Your rationale will help you in determining whether the site will be 'hands-on', with kids running and playing around on paths and rocks near plantings during supervised recess, or 'hands-off', with access restricted to specific activities under teacher supervision and where an experiment can be safely set up without being disturbed. From our experiences with other naturalization projects, we encourage you to consider a hands-on area for the first phase, with a possible hands-off site for a future phase.

VISION

Creating a vision for the project comes about by finding consensus among stakeholders. Each group will have different wants, needs and ideas that must be listened to and taken seriously. They will imagine different possibilities for an ideal school ground, what it should look like, and what you should be able to do there.

There are many ways to allow for this kind of input: surveys, questionnaires, voting systems and brainstorming sessions. The most important stakeholder at this point is the student body. As the primary user, we must take the time for discussion on its visions and ideas. Children need to see that the adults involved in the process respect their opinions, and take their input seriously. If children feel they have had direct input into the finished product, they will become careful users and protectors of the site. They will feel a sense of ownership and pride in what has been accomplished on the school ground. Suggestions for gathering this information can be found in Appendix 2, Sample Surveys.

IDENTIFY SPECIFIC CURRICULAR LINKS

Liz Russell (1999) states that "To be successful and sustainable and to improve your delivery of both the formal and informal curriculum, changes should relate to clearly identified needs and to the functions that you wish the school grounds to fulfil."

For naturalization projects to be successful, interaction of students with the process and with the completed landscape must be a priority. Ultimately, the goal is for teachers to regard the naturalized space as a teaching resource, designed to enhance their delivery of the curriculum. Not only is this necessary to realize the educational benefits of the project to their fullest, but it is the single most important element in ensuring the long-term sustainability of the site. In order for this to become reality, teachers must be integral to the planning process. Teachers will, not only connect the planning process to the classroom and the students, but will also provide the necessary input to make sure the site becomes the most effective teaching tool possible. For instance, if the grade 6 teacher is expected to teach the Science Unit Trees and Forests, that teacher should be consulted to determine which trees need to be incorporated into the design. Before this kind of detail can be explored, some of the more obvious links between the Alberta curriculum and the site (where the site can be used to enhance delivery of curriculum) should be outlined. Each faculty should spend some time brainstorming these connections, but the following sample of direct links between a naturalization project and the Alberta K-9 Program of Studies may be of assistance. For more details on the Alberta Curriculum see the Alberta Learning website at www.education.alberta.ca.

Develop and complete questionnaires on attitudes towards the schoolyard for students, staff, maintenance staff, parents and the community. This is a very useful tool to determine the desires of these groups and to compare attitudes before and after the project. This comparison provides a method of showing funders the positive changes that have come about from their support. This is also an excellent project for students to undertake. (See Appendix 2, Sample Surveys)

SCIENCE AND SOCIAL STUDIES, GRADES K-12

Soil – how it is formed; how it supports life; how it can be changed or amended; erosion and how to prevent it; how it holds water and nutrients; its component parts; soil structure and texture.

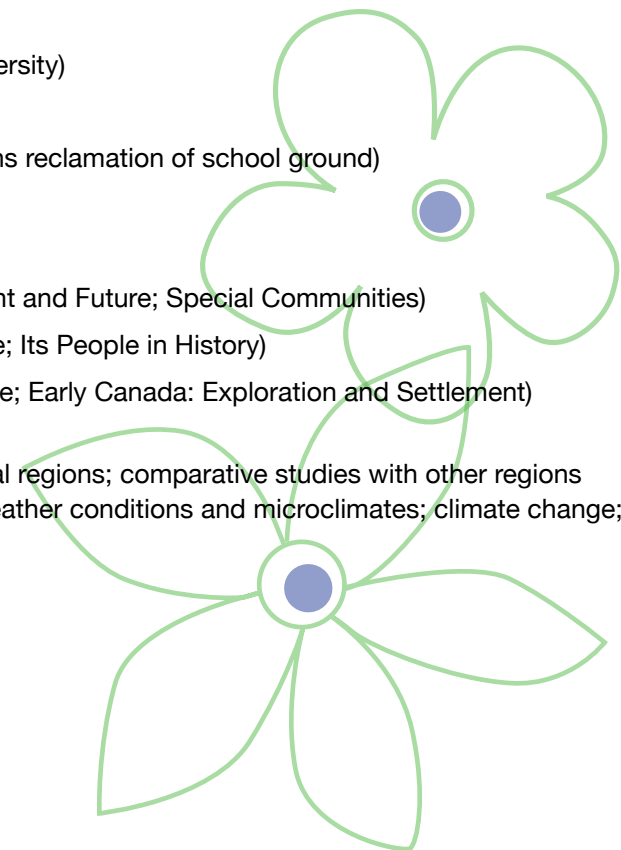
- Grade 1 Science (Needs of Plants and Animals)
- Grade 3 Science (Rocks and Minerals)
- Grade 4 Science (Plant Growth and Change)
- Grade 7 Science (Plants for Food and Fibre)
- Grade 9 Science (Environmental Chemistry)

Native Plants (and plants in general) – definition of a native plant; what conditions they need to grow; how they were used in the cultures of native peoples; the growth requirements of plants (soil, nutrients, light, water); plant structures and functions; reproduction and propagation (seeds, pollinators, vegetative methods); fertilizers and soil nutrients; plant varieties and breeding; resource management; monocultures; sustainability; plant tolerances/adaptations; chemicals essential to life; substrates and nutrients; binomial nomenclature; niches; photosynthesis; study and comparison with introduced species and how they interact; gene pool diversity; gene banks.

- Grade 1 Science (Needs of Plants and Animals; Seasonal Change)
- Grade 4 Science (Plant Growth and Change)
- Grade 6 Science (Trees and Forests)
- Grade 7 Science (Plants for Food and Fibre)
- Grade 8 Science (Cells and Systems)
- Grade 9 Science (Environmental Chemistry; Biological Diversity)
- Science 10 (Cycling of Matter in Living Systems)
- Biology 20 (Ecosystems and Population Change – mentions reclamation of school ground)
- Biology 20 (Photosynthesis and Cellular Respiration)
- Biology 30 (Population and Community Dynamics)
- Grade 3 Social Studies (My Community in the Past, Present and Future; Special Communities)
- Grade 4 Social Studies (Alberta: Its Geography and People; Its People in History)
- Grade 5 Social Studies (Canada: Its Geography and People; Early Canada: Exploration and Settlement)

Climate – how climate affects an ecosystem; Alberta's natural regions; comparative studies with other regions provincially, nationally and internationally; studies of local weather conditions and microclimates; climate change; seasonal changes (monitoring throughout the year).

- Grade 1 Science (Seasonal Change)
- Grade 2 Science (Hot and Cold Temperature)
- Grade 4 Science (Light and Shadows)
- Grade 5 Science (Weather Watch)
- Science 10 (Energy Flow in Global Systems)



Habitat – what animals need for habitat; how can it be provided (through plantings, building feeders, houses, providing water); what animals are found on school properties; study local wildlife species up close; habitat diversity; habitat loss

- Grade 1 Science (Needs of Animals and Plants; Building Things)
- Grade 2 Science (Small Crawling and Flying Animals)
- Grade 3 Science (Animal Life Cycles; Building with a Variety of Materials, Testing Materials and Designs)
- Grade 6 Science (Trees and Forests; Evidence and Investigation)
- Grade 9 Science (Biological Diversity)
- Biology 30 (Population and Community Dynamics)

Ecosystem Dynamics – associated wildlife; nutrient cycles; interconnection between species; energy cycling; matter recycling; food webs; pollutants; ecological succession; decomposition; how ecosystems are affected by the action of humans; environmental monitoring; how ecosystems are life-supporting; study of local ecosystems (example of local biomes); niches; limiting factors; comparison with other ecosystems.

- Grade 2 Science (Small Crawling and Flying Animals)
- Grade 4 Science (Waste and our World)
- Grade 6 Science (Trees and Forests)
- Grade 7 Science (Interactions and Ecosystems)
- Grade 9 Science (Environmental Chemistry; Biodiversity)
- Science 10 (Energy Flow in Global Systems)
- Biology 20 (Ecosystems and Population Change)
- Grade 4 Social Studies (Alberta: A Sense of the Land)
- Grade 5 Social Studies (Physical Geography of Canada)

Water – water quality; water conservation (**xeriscaping**).

- Grade 8 Science (Freshwater and Saltwater Systems)
- Grade 9 Science (Environmental Chemistry)

Restoration / preservation of natural spaces (in urban centres in particular) – threats to wilderness; endangered species; loss of habitat; inherent value of natural spaces; human impact on ecosystems; need for responsible decision making; human impact on species survival and variation within species; responsibility of society to protect the environment; role of governments at various levels.

- Grade 7 Science (Interactions and Ecosystems)
- Grade 9 Science (Biological Diversity)
- Biology 30 (Population and Community Dynamics)
- Grade 4 Social Studies (Alberta: Its Geography and People)
- Grade 6 Social Studies (Local Government)

Maintenance / Stewardship of a natural space – care for the environment; responsibility to the community and surroundings; invasive species, weeding; watering; replacing mulch; identifying and labelling plants.

- Grade 1 Social Studies (My World: Home, School, Community)
- Grade 6 Social Studies (Local Government)
- Grade 7 Science (Interactions and Ecosystems)

Community / History – improving quality of life in the community; learning about the history of the community; comparisons with other communities; communicating with neighbours; educating community on environmentally friendly gardening practices; cooperation with community members.

- Grade 2 Social Studies (A Community in the Past)
- Grade 4 Social Studies (The Stories, Histories and Peoples of Alberta)
- Grade 5 Social Studies (Histories and Stories of Ways of Life in Canada)

Beyond science and social studies, a naturalization project can be used to support many other subject areas.

Health / Physical Education – the site provides shelter from UV rays; quiet reflective places to sit; installation and maintenance provide opportunities for physical activity; access to fresh air; a well designed site can offer safe challenges for students to aid in developing gross motor skills; an associated vegetable garden can educate students on where food comes from, etc.

MATHEMATICS

The following strands are the core of the Mathematics curriculum:

Numbers (Number Concepts; Number Operations)

- Patterns and Relations (Patterns; Variables and Equations)
- Shape and Space (Measurement; 3-D Objects and 2-D Shapes; Transformations)
- Statistics and Probability (Data Analysis; Chance and Uncertainty)

As students progress through the grades, these subjects are addressed in increasing complexity. At any grade level, a naturalized outdoor space can be used as the setting and context for counting, measuring, calculating, graphing, predicting, data collection and analysis. What follows is a brief sampling of possible mathematics-related activities as they relate to the naturalized outdoor space:

- Measure growth of plants; chart the rate of growth; compare for different times of year, for different plants, in different growing conditions.
- Calculate volume of water transpired by a given leaf or needle; relate to surface area.
- Calculate rates of transpiration under various conditions.
- Calculate the volume of water needed to water a given area of the garden; calculate number of buckets needed.
- Sort leaves and other elements in the site according to shape, size, colour, texture.
- Create a grid system on the site and use for conducting various experiments and calculations.
- Measure the height of trees, the circumference of the trunk; measure the spread of the canopy; calculate percentage area of the school ground that has tree cover.
- Measure areas of different surfaces on the school grounds; compare concrete to **turf**, to mulch to vegetation cover, etc.
- Calculate species diversity in a given area; compare to different areas on school grounds.
- Place bird seed in a feeder and predict how long it will take to be consumed; how much will fall on the ground, etc.
- Calculate/estimate the number of leaves on a tree, then calculate the volume of all the leaves; calculate how much **compost** could be generated.



- Measure the volume of mulch needed to restore it to a certain depth; determine how much mulch has decomposed and at what rate.
- Create maps of the site, indicating compass directions.
- Measure and calculate rates of precipitation, soil **percolation**, and **infiltration**.
- Calculate heat units required for a particular plant to bud and flower.
- Construct climate graphs.

LANGUAGE ARTS, FINE ARTS (ART, DRAMA, MUSIC)

A naturalized space provides not only a location for reading, writing and drawing, but also inspiration and subject matter. Imagine students writing songs, poetry and stories about the garden and its inhabitants, drawing pictures of their favourite plants and performing dramatic plays based on characters in the garden. Plant materials make wonderful supplies for creating collages, leaf rubbings and prints, and potpourri.

LANGUAGE ARTS

- Write instructions regarding maintenance of the site (weeding, watering, re-planting).
- Garden record-keeping relating to growth, changes, activities, maintenance, etc.
- Write guided trail signs; lead guided walks.
- Using photos or drawings, write the story of a plant over the school year.
- Read books, poems, stories, etc. that are based on native plants and animals.
- Write poems, stories, haiku, plays based on the naturalized landscape, the emotions and experiences it inspires.
- Write articles for school or community newsletters sharing what is happening in the landscape.
- Document experiments that are taking place.
- Write detailed reports on the functioning of the naturalized space as an ecosystem, and articles explaining its value in an urban setting.
- Create and present plays and skits focusing on the naturalized site; base characters on the plants and animals found in the area.

ART

- Use the naturalized space to examine natural forms; natural forms as they relate to the environment; surface qualities (colour, texture, tone); observe patterns.
- Draw animals, plants and other elements found in the site.
- Create x-rays by holding leaves up to the light.
- Create texture rubbings using elements from the site.
- Document excursions, celebrations, events in the garden.
- Visually record experimentation and study done in the landscape (photography, drawing, video).
- Visually interpret a narrative or story about something that happens in the landscape; i.e., birds feeding, trees losing their leaves, students reading.
- Use found objects as print making materials.
- Create two and three dimensional assemblages from found materials.
- Study and analyze the individual character of natural objects, forms, conditions under which something is viewed; i.e., snow, rain, microscope; natural forms reveal different structures, e.g., skeletal, spiral, radial, etc.

Some activities and projects are cross-curricular; i.e., creating a plant guide brings in science (for the identification, naming and descriptions); social studies (uses of the plant by native peoples); mapping the location of the plant on the site (social studies); drawing the plant (fine arts) and writing the text for the guide book (language arts).

Plan to spend time in a workshop with the staff as they identify specifically how the process and finished project will integrate with the curriculum. To reach consensus, put teachers together in multi-grade groupings. Ask each team to identify and prioritize the elements to be considered. Have each team briefly report its rationale to the rest of the staff. It's hard to believe, but often the group reaches consensus with little conflict.

Then take the time to walk around the whole school site with the staff. With blank maps, brainstorm to roughly identify possible project areas with circles on the map.

PROJECT ELEMENTS TO CONSIDER

- outdoor classroom seating
- experimental garden
- vegetable garden
- community garden
- butterfly garden
- wildlife attracting garden
- hummingbird garden
- ecosystem garden (prairie, aspen, parkland, foothills)
- native wildflower demonstration garden
- compost bin
- peace garden
- nature trail
- greenhouse or **cold frame** project
- bird and bat feeding and nesting stations
- wildlife observation station
- weather station
- planting that illustrates biological diversity
- xeriscape planting
- bog garden
- climbing trees
- quiet, reflective spaces



REACHING CONSENSUS

Once the staff has identified the three most preferable project elements and their possible locations, compare the results with those gleaned from the other stakeholders. At this point it is up to the committee to find the common areas and elements. These suggestions can then be revisited with the stakeholder groups who can then provide feedback.

With many project elements on the wish list, it is best to break the project into phases. Start small, learn from your triumphs and mistakes, and build on successes. Schools often pick an outdoor classroom seating area and some sort of wildlife attraction planting as their two top priorities for their first phase. Remember that as you identify possible locations, you should remain flexible because you have yet to complete a **site inventory** of the schoolyard. For example, you might soon discover that the site you had chosen to become a prairie is not suitable for that type of planting as it is too shaded.

4. OBTAIN SCHOOLBOARD APPROVAL

REGULATIONS

To ensure that you are aware of the appropriate regulations, it is very important to first determine the school's jurisdiction. School properties may be owned by their school board or by private owners (as in the case of private schools). Other school properties are owned by the City of Calgary and managed by the City's Parks department. They may also be jointly managed by the City and the school board (commonly referred to as "joint use" properties). If your school is within more than one jurisdiction you must follow the regulations of all landowners.

The two major school boards in Calgary, the public Calgary Board of Education (CBE) and the Calgary Roman Catholic Separate School District (CSSD), have adopted written guidelines for naturalization projects and will provide you with copies. It is critical to include the input of your school board representative into your project. After referring to specific guidelines and legal information, you should contact the school board representative responsible for your site and begin an informal conversation about project options. Keep the lines of communication between the committee and the school board representative open. Build on the positive aspects of your project and be patient when things seem to take time. Remember that school staff tends to be mobile and the school board inherits each project's successes and challenges. Ultimately, it's the school board and/or other property owners that will grant or deny approval of your project.

APPROVAL

Assuming approval for the project in principle from the school board and/or other property owners, you will need to touch base with them at various times in the process (first when your preliminary designs are completed, and again when the final plans are drafted). At that point, the following information will need to be included in your submission. This information will be generated at various points of the planning process, but it is important to be aware up front of what the board and/or other property owner will be expecting.

Be prepared to submit:

- the **base map** of the existing schoolyard including buildings, playground equipment, sports fields, services, paved areas, existing vegetation, parking lots, etc.
- the identification of all existing features to be retained or removed
- the final design plan, drawn to **scale**, indicating and identifying all changes being made (trees, paths, benches, class seating, gardens, signs, compost bins, etc.)
- a plant list identifying plants by common and **botanical names**
- the work schedule for implementation
- a letter of approval from the school principal
- a monthly maintenance schedule and contact person

REFERENCES AND RESOURCES

Bell, Anne (Evergreen Foundation). *Grounds for Learning: Stories and Insights from Six Canadian School Ground Naturalization Initiatives*. Toronto, ON: Evergreen, 2001.

Cheskey, Edward D. *Habitat Restoration: A Guide for Pro-Active Schools*. Waterloo, ON: Waterloo County Board of Education, 1993.

Coffey, Ann. *Asking Children Listening to Children*. Ottawa, ON: Canadian Biodiversity Institute, 2004.

Evergreen. *All Hands in the Dirt: A Guide to Designing and Creating Natural School Grounds*. Toronto, ON: Evergreen, 2000.

Johnson, Katherine and Marti Ross Bjornson. *The Chicago School Garden Initiative: A Collaborative Model for Developing School Gardens that Work*. Glencoe, IL: The Chicago Botanic Garden, 2003.

For future steps in your process you will need a copy of the "real property assessment" or site blueprints.

These will normally indicate the setting of the school ground within the surrounding community, the outline of existing buildings, play fields, parking lots and perhaps some of the larger trees. Generally, some measurements are indicated. These can be obtained from the school board representative.

Russell, Liz. *Learning Through Landscapes School Grounds Toolkit - Handbook*. Winchester, Hampshire: Learning Through Landscapes, 1999.

VIDEO

Asking Children Listening to Children. Produced by Ann Coffey. Ottawa, ON: Canadian Biodiversity Institute, 2004

WEBSITES

Alberta Learning

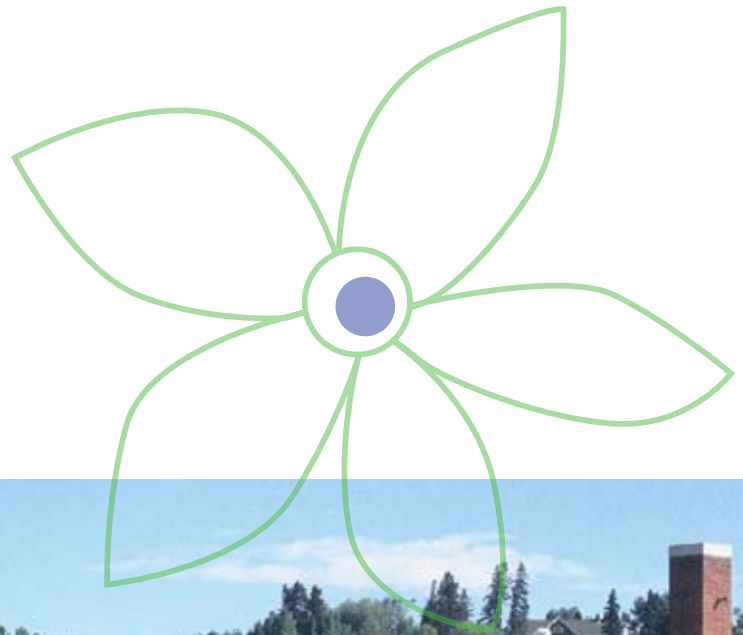
www.learning.gov.ab.ca

Grounds for Change

<http://seedssurvivor.com/grounds-for-change>

Canadian Biodiversity Institute

<http://www.schoolgrounds.ca>



DESIGN

The way a naturalized site is designed is what makes it unique. You may draw ideas and inspiration from other school gardens and naturalized spaces, but the end result should reflect the needs, wants and identity of the school. The design should be the manifestation of the rationale and vision of the project.

When undertaking a landscape design, one of the primary considerations is the client or the primary user. In the case of schoolyard naturalization, the client is the students. Wendy Titman, in the wonderful resource *Special Places, Special People*, discovered that children seek much from the outdoor element of their school property. She found that when children imagined their ideal school ground, they were seeking:

- **A place for doing** - which offered opportunities for physical activities, for “doing” all kinds of things, and which recognized their need to extend themselves, develop new skills, to find challenges and take risks.
- **A place for thinking** - which provided intellectual stimulation, things which they could discover and study and learn about by themselves and with friends, which allowed them to explore and discover and understand more about the world they live in.
- **A place for feeling** - which presented colour and beauty and interest, which engendered a sense of ownership and pride and belonging, in which they could be “small” without feeling vulnerable, where they could care for the place and people in it and feel cared for themselves.
- **A place for being** - which allowed them to “be” themselves, which recognized their individuality, their need to have a private persona in a public place, for privacy, for being alone and with friends, for being quiet in noise, for being a child.

Excerpted from *Special Places, Special People* by Wendy Titman.

To be able to offer these elements, we need to remove our adult bias and see things from a child’s perspective. We need to interpret their needs and find a way of delivering them. For this to be achieved, we need to let go of many of the typical concerns regarding landscape design. The design must also reflect any other goals the school has, whether it is to attract wildlife, provide opportunities for creative play, to add a diversity of plant material, or to represent a local ecosystem. These are the concepts that will drive the design program and may result in a finished product which looks very different from a typical backyard garden.

The limitations of creating a natural space on a school ground must influence the design program as well. These limitations may include:

- maintenance challenges
- watering limitations
- increased traffic and use
- a range of ages as users
- sensibilities of neighbours

In the Calgary area, some schools have taken the approach of mimicking, representing or recreating a local ecosystem, resulting in a site that has a very natural feel. Other schools have chosen to create a more traditional garden look that is populated strictly with native plants. In these cases, the prairie grasses and **perennials** are often segregated into separate beds, which makes maintenance much easier. If this approach has been chosen, try to stick to an informal theme or look rather than a structured, symmetrical formal approach.

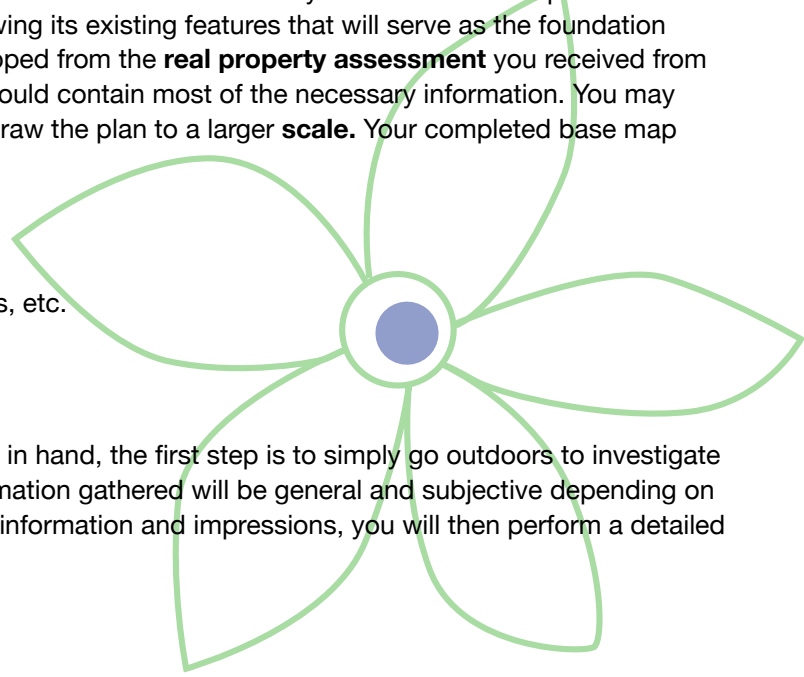


5. SURVEY THE SCHOOLYARD

To successfully redesign the schoolyard, you must be educated as to the existing conditions. This is achieved by carrying out a site survey or inventory. For this inventory to be effective and accurate you need a base map. This is a two-dimensional representation of the school grounds showing its existing features that will serve as the foundation for your final design drawings. The base map can be developed from the **real property assessment** you received from your school board representative or property owner, and should contain most of the necessary information. You may need to enlarge this with a photocopier or have a class re-draw the plan to a larger **scale**. Your completed base map should include:

- arrow indicating north
- property lines and dimensions
- any existing structures, sidewalks, driveways, parking lots, etc.
- all utilities
- existing planting beds

With copies of the base map and the applicable regulations in hand, the first step is to simply go outdoors to investigate the school grounds and perform a Site Appraisal. The information gathered will be general and subjective depending on the stakeholder's point of view. Once you have some basic information and impressions, you will then perform a detailed Physical Site Survey and Cultural Site Survey.



SCHOOLYARD APPRAISAL

With the project rationale and vision in mind, it is time to walk around the schoolyard to see what it has to offer. This exercise should be done with the school administration and staff, committee members, and any interested parties. You are looking for the obvious and making general observations. As you explore your schoolyard, consider the following questions and begin to make notes on your base maps.

HOW IS THE SCHOOLYARD SITUATED WITHIN THE NEIGHBOURHOOD?

The surrounding neighbourhood impacts the educational atmosphere of the school community. Look for things like heavy traffic intersections with a history of accidents, street lighting and convenience stores where troublemakers tend to hang out.

WHAT IS THE PHYSICAL CONDITION OF THE SCHOOLYARD?

Get a sense of the size of the property and lay of the land. Consider how water runs off after a rain and make note of surface materials. Pay attention to existing planting beds, vegetation and the general condition of the soil.

WHAT ARE THE CURRENT USES OF THE SCHOOLYARD?

Think about the current activities that take place within the school grounds; consider evenings, weekends, and holidays as well as school days. Make note of any community groups that use the grounds or access the classrooms as well as informal sports activities that occur on the fields. Pay attention to traffic flow, parking, places where people tend to gather, etc.

WHAT IS THE SCHOOLYARD'S POTENTIAL?

Consider how the features of the schoolyard might lend themselves to your vision. Is there bare earth for plantings, or is the schoolyard paved? Are raised beds a possibility? Can the existing vegetation be enhanced to provide versatile, native plantings? Can currently active play areas be improved? Are there entrances that need improving?

DETAILED SITE INVENTORY

With the impressions from the walk-about still fresh in your mind, you can begin to develop your detailed site inventory. The information required is best obtained through the use of both mapping exercises and lists or checklists (see Appendix 2, Sample Surveys). The desired end result is a detailed map of the schoolyard. This is essential for any

successful project. Although it may be tempting to tuck the naturalization project into any corner of the schoolyard, there are many factors to consider. **Exposure**, wind, soil and **drainage** are important for plant growth while traffic patterns, protection from the elements and **view lines** are important for human use. With so many issues to consider, it is often best to create a series of transparent overlays, one for each element of the survey, with the base map providing the basic framework. Each element can then be considered independently, or in combination with any other. This is an excellent cross-curricular project for students.

You can use the following guidelines to aid in asking the right questions for your site inventory, but each school is different. Take the time to create your own mapping exercises and checklists, and endeavour to have students complete as much of the inventory process as possible. This will increase the educational value of your project immeasurably while at the same time, create ownership on the part of students.

You may consider creating teams to investigate different aspects of the school ground; for example, a sun and shade team, a vegetation team and a history team. Each of these activities can be assigned to a specific class or grade, depending on the appropriate curriculum connections. Alternatively, each class group could be assigned an area of the school property that they study in great detail, carrying out all the necessary surveys.

PHYSICAL SURVEY

Map the Schoolyard

Map any hard objects not already shown on your base map such as any parking lots, driveways, sandboxes, play equipment, fences and pathways. Include the locations of any windows, gates, doors and exits. Make note of the various materials that are utilized such as cement, asphalt, gravel, or chain-link fencing.

Vegetation and Wildlife

Map all existing vegetation starting with trees and shrubs and including ground cover such as grass, **perennials** and weeds. Include measurements of the circumference of trees, the spread of the canopy, and percent coverage of trees and shrubs. This will allow you to see how you can fit the naturalized area in with the existing vegetation.

If attracting wildlife is one of your goals, conducting surveys on the present animal population will allow you to determine how successful you have been. Determine what animals (birds, insects, spiders, etc.) presently visit the schoolyard, in what numbers, where they are found and when. Students can conduct these surveys by watching for the animals themselves, or by looking for their signs such as droppings, evidence of feeding, webs or nests.

Slope and Aspect

The extent of the slope is important when considering factors such as drainage, erosion and planting techniques. It is not necessary to know the exact degree of the slope, just whether the slope is slight, moderate or severe. This is a good math exercise for students.

The **aspect** is the direction the slope faces. This is very important when choosing plants, as environmental conditions change greatly depending on the aspect leading to the selection of particular plant species over others.

Drainage of the Site

Some plants are adapted to very specific moisture and soil regimes while others can tolerate a range of conditions. The drainage patterns of your schoolyard will be affected by factors such as soil type, topography, and the position of surrounding buildings. Drainage can be determined by simple observation; for example, by monitoring how long it takes for an area to dry out in the spring or after a rain. Anecdotal information will be sufficient.

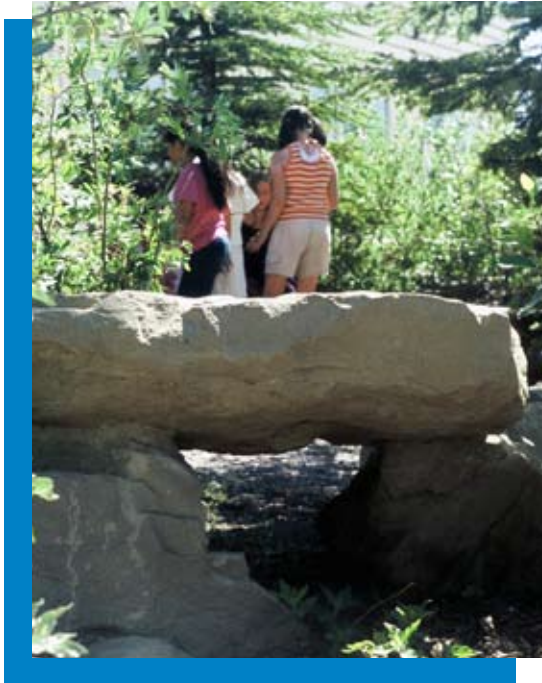


Soil Condition

Unless large amounts of soil have been removed or added, the soil type will likely be constant throughout the schoolyard. Most school sites have very poor, heavily compacted soil, and as Calgary soils tend to be high in clay, it is likely characterized by poor drainage.

Patterns of Light and Shade

The degree of sunlight an area receives directly affects the plant species that will grow there. Map the shadows cast by buildings and trees and note what time of the day the areas are shaded. This mapping can be a full year activity. Remember that many trees do not have leaves in the winter and early spring.



View Lines

There are views you will want to hide and ones you will want to keep. Bad views are hard to hide, but screening with trees and shrubs can go a long way to help. Adding elements with colour and form can distract the eye from undesirable views, and the use of curves in borders, plantings, and pathways creates a more natural flow.

CULTURAL SURVEY

History of the School Site

Researching the history of the schoolyard is an interesting project for students. By looking through old books, title abstracts, maps, and old photos and by interviewing older residents, students get a fascinating tour of local history. Examining pre-settlement vegetation and aboriginal uses of native plants brings awareness to the dramatic changes inflicted upon the landscape over the past hundred years. Students often gain a deeper appreciation of the project if it is placed within a historical context.

Social Uses of the School Site

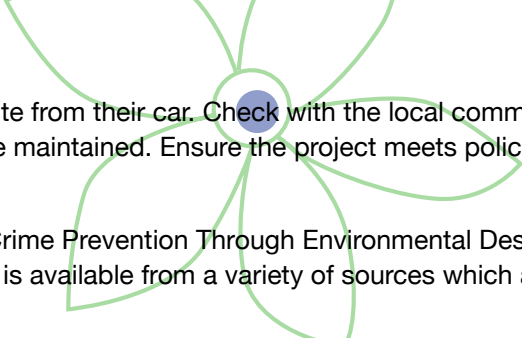
This needs to be a fairly detailed analysis, building on the information gathered in the initial Site Appraisal. It should be carried out over a period of a few days and at different times of the day. Perhaps each grade could be responsible for investigating a different area of use.

Some sample questions to consider include:

- Where do students (of different sexes and ages) spend time at recess, lunch, and before or after school?
- Where do Physical Education classes take place?
- Are there bare spots in grassy areas that indicate established foot-traffic patterns?
- Where do after school sport activities take place?
- Do community groups use the sport fields during off school hours?
- Where do spectators gather to watch sport activities?
- Where do the students and parents gather before and after school?
- Where do teachers take students for outdoor curricular activities?
- Where are the most popular play locations?
- Which areas are rarely used? Why?
- Is there wheelchair access that needs to be retained?

Safety Considerations

When developing a naturalized schoolyard, the safety of the children and community members who will use it is paramount. Ensuring the site is safe takes forethought and common sense. The Calgary Police have basic safety requirements for maintaining a clear sight line across the project that ensures police patrolling the neighbourhood are



able to easily survey the site from their car. Check with the local community liaison officer to determine any existing **sight lines** that need to be maintained. Ensure the project meets police guidelines and include this information on your site survey.

Utilizing the concepts of Crime Prevention Through Environmental Design (CPTED) can aid in keeping your school property safe. Information is available from a variety of sources which are included in the References and Resources list at the end of this section.

Vandalism

Make yourselves aware of any current vandalism concerns, both on the school property and within the surrounding neighbourhood. Any trouble areas close to or on the property should be indicated on your site survey, so they can be taken into consideration when you are designing your naturalized site. Ultimately, the best way to minimize vandalism of your project is to involve as many people as possible from the wider community, as well as your immediate school community in the planning and implementing of the project. By building ownership within the student body, vandalism caused by older children will decrease over time, as students from your school that grew up with the project move on to junior or senior high school.

6. CREATE PRELIMINARY DESIGNS

Now comes the exciting part as you begin to see your ideas materialize on paper. Your naturalization project will now start to seem much closer to becoming a reality. Creating a landscape plan can seem an overwhelming task at first. Hopefully by keeping some basic design principles in mind and by breaking the task into manageable pieces as outlined here, it can be a fun and rewarding process. We encourage you to read on with the idea of giving it a shot on your own.

BUBBLE DIAGRAMS

Using your base map and detailed site survey, start thinking about where you would like to locate the various elements of your naturalization project. **Bubble diagrams**, or **functional diagrams**, serve to help establish a basic structure for the design. They should not include any details but should focus instead on goals. Each bubble or area that you draw on your map will represent a function or purpose; for example, one bubble may denote a seating area, while another indicates the location of a butterfly garden.

Place a sheet of transparent sketch paper over the base map and draw in the geometric arrangement of the areas or elements you have chosen, keeping in mind approximately how much space each of these require. Include areas for things such as traffic flow patterns you want to maintain, areas of field to keep available for sports, etc. Your base map should be covered with bubbles when you are finished.

FACTORS TO CONSIDER

When examining the base map and trying to place the bubbles, think about the requirements for each element with respect to the physical and cultural surveys. For example, you cannot put a prairie garden that requires full sun on the north side of the school building. You also do not want to place it in the middle of the playing field. You may find as you try to locate all the elements of your naturalization project that you have to change your ideas. Maybe you just do not have an area suitable for your prairie garden, so instead you have to turn to a shade garden. Be flexible. Adjust your plan according to the existing conditions of your site. Some things you can change, such as the quality of the soil. Other things, such as the shade cast by school buildings, cannot be altered.

Consider also if the site (or elements of the site) are accessible during lunch and recess, or restricted to supervised class visits. If one of the project goals was to increase the creative opportunities for children, the site must be accessible. If the goal was to provide a space to set up science experiments that need to be monitored undisturbed, then the site may be closer to the school, and available only during scheduled class time.

Another factor to take into consideration is that of vandalism. Schools have found that sites located in the back of the school, away from the main traffic flow and residences, are more likely to attract trouble-makers, especially at night. Projects that are located at the front of the school, or in a place that is highly visible by nearby homeowners, tends to attract less vandalism.

The availability of water is also of major concern. Sites located at the far reaches of the school property can be problematic to water with hoses.

Experiment with different arrangements of the project elements within the school property. You should create at least three or four of these drawings to give yourselves some options.

7. SELECT THE SITE

You now need to firm up plans for the naturalization project by deciding where the various elements will be located on the school ground. With several bubble or functional drawings completed, start by showing these to the committee, teachers and students to generate some feedback. Discuss the pros and cons of each of the various functional diagrams and make sure all parties involved have some input into the decision making process.

You should also begin thinking about how to divide your project into phases. Splitting the project up into manageable chunks will bring it into a scale that is easier to grasp, and will also make it simpler for budgeting and fundraising. You may decide to raise money for one phase at a time.

The functional diagram that you decide on should incorporate your vision, the site inventory and the needs of all stakeholders. It will illustrate the order and location of the various phases. This drawing should be shown to your school board representative or property owner before going any further.

8. CREATE FINAL DESIGN

The next step is to get down to the nitty gritty of formulating what the naturalized landscape will look like when it is finished. This is achieved by first creating a **concept drawing**, which will then evolve into the final design. You are working towards a final product that will provide all the information necessary to guide the installation of the landscape. It should be detailed enough that someone unfamiliar with the project could take the drawings and determine exactly what was being constructed.

Landscape design is an art that involves creating a plan that makes the best use of the space available in the most attractive and practical way, to meet the identified vision and goals. This section highlights some very basic principles to give you a sense of the process. See Appendix 4, Design Tips for Schoolyard Naturalization for a more detailed approach. If you would like to explore this topic in more depth there are a multitude of excellent books and references on landscaping and habitat restoration available. Visit your public library, take part in a workshop, or consult the list of References and Resources at the end of this section.

DEVELOP A CONCEPT DRAWING

This step involves selecting and arranging the hard and soft landscaping of the naturalization project. A concept drawing is more specific than the bubble diagrams, but still more general than your **final working drawing**. You might indicate where a grouping of **perennials** will be, then in your working drawing you will indicate the exact plant species being used, their number and their specific location.

Now is the time in your design process to consider adding elevation to your landscape. Take the opportunity to alter your flat schoolyard, and create interest through variation in topography. Raised beds and **berms** are effective methods of creating height, as well as enhancing drainage. This can be used to your advantage to not only create faster draining areas on the high points, but creating catchments in the low spots, allowing the growth of more moisture-loving plants.

Berms can be created by mounding up new topsoil, or more economically, by using old **topsoil** and **turf** stripped from the existing site which is then topped up with new topsoil. If you are using turf, all efforts must be made to avoid churning it up. The stripped **sod** must be carefully turned green side down at a point in the construction where it will not be disturbed again. Several schools have had to battle with grass re-establishing itself as this was not handled correctly.

Raised beds can be created with a variety of materials and can eliminate the need to remove compacted soil. They are; however, more expensive to build, depending on what materials are chosen. Remember to avoid chemically treated wood, and check with school board guidelines before making any decisions.

HARD LANDSCAPING

Hard landscaping refers to features in the landscape that are generally permanent, providing the structure or framework of the design. These include components such as rocks, logs, seating, pathways, retaining walls, fences and other built structures. Hard landscaping is often overlooked as people focus on plants. This approach inevitably results in disappointment because the completed project feels as if it is missing something. Hard landscaping anchors the site, providing a context for the plants. It is what you work your soft landscaping around. All of the hard landscape planning should be done before beginning the soft landscape design. As hard landscaping features are for more difficult to move than plants, take the time to carefully consider those elements.

Hard landscaping elements to consider include:

- logs safely anchored in the ground for seating or climbing
- **snags** to create bird habitat
- seating in the form of boulders, log rounds or industrial benches
- pathways (poured concrete, pavers, mulch, gravel)
- picnic tables
- **trellises, obelisks, archways or pergolas** to act as plant supports (make sure these are approved by the school board)
- cover for seating (again, check with the school board)
- raised beds (constructed with concrete blocks, wood retainers, etc.)
- permanent signage
- posts or supports for bird houses, bat houses

Calgary area schools have used all of these elements, as well as raised beds for vegetables and experiments, bridge-like structures, fences and gates, inukshuks, teaching rocks or tables, labyrinths, dry riverbeds, and sundials.

SEATING

Many schools have chosen to create an amphitheatre or outdoor classroom area using rocks or boulders for seating. A sandstone boulder approximately 65 centimetres x 50 centimetre x 50 centimetre (2 feet x 1.5 feet x 1.5 feet) seats one or two people, weighs approximately 300 pounds (136 kilograms) and costs around \$15. Such a boulder can be moved by bobcat and the cost for delivery by a truck carrying roughly ten such boulders would be about \$65. As a very rough estimate, a sandstone amphitheatre designed for a class of 35 students generally costs in the order of \$10,000.

Other kinds of seating used include moveable and permanent tree stumps, boulders set into the ground, picnic tables and benches.



SOFT LANDSCAPING

Soft landscaping refers to anything related to planting beds. At this stage, some of the beds will be dictated by the hard landscaping features. For any additional beds, decide on the size, shape and location. Now you are ready to decide how and where the plants will be arranged. Plants can generally be grouped into three categories: upper level or canopy, mid level and ground level. Take a look at nature to see how these levels are arranged. Begin by establishing the framework of larger trees to anchor the design to the surrounding landscape. Then select the intermediate and lower-growing trees, followed by shrubs and vines, and lastly choose the grasses, **annuals**, and **perennials**. When researching the plant material, be sure you have determined the maximum size the plant will reach at maturity, and plan accordingly. Remember to select plants that will create year-round interest in the site for students and local wildlife species.

There is much to be learned and many decisions to be made when choosing appropriate plant material for a naturalization project. Please take the time to read Appendix 5 through 8 in detail. Much of the basis for your plant choices will depend on the rationale, goals and objectives of the project. If the decision has been made to use purely native plants, be strong in your commitment. Do not let the designer or supplier talk you into substituting non-native species or cultivars, and beware of well-meaning donors who wish to give you their “favourite” plant.

OTHER FEATURES

Outdoor lighting may be an element that some people want to add. One thing to keep in mind is that for areas behind the school where vandalism may be a concern, lighting may actually make it a more attractive location. With lighting, individuals can see what they are doing, but no-one else can see them. Conversely, a project located in a highly visible area may benefit from lighting, as it draws attention to any unplanned use. Motion sensor lights may be a good alternative.

Irrigation is another feature that generally creates discussion and can be quite controversial. Irrigation systems can range from permanent systems on timers to a simple soaker hose that is turned on manually. Some schools have decided against a watering system, but have located an irrigation box close to the site so hoses do not have to stretch great distances. These options range in price from a few hundred dollars to several thousand dollars. Permanent systems also require long-term maintenance.

Philosophically, schools are trying to create a naturalized space that can survive and flourish with limited input. Native plants should not require supplemental watering once the site is established. To have a permanent irrigation system installed, which you hope will not be needed after the first few years, seems an extravagance, and rather flies in the face of the goals of the project. For some people the risk of losing plants and trees due to lack of water outweighs these concerns. But consider...if you are not feeling confident that there are enough volunteers willing to take a role in ongoing maintenance and watering, are you sure you have the support necessary to continue with the project?

Signage can be planned in the initial stages or may be incorporated at a later date. Some schools have included signs that educate the public as to the plants and ecosystems found in the site, while others thank the donors. Both purposes can be accomplished through the use of plaques, park-style signs, carved rocks or other forms of signage.

Edging of planting beds also raises some concerns. Generally, planting beds located next to turf require some sort of barrier to keep the grass from invading the beds and the soil or mulch from falling into the grass. Edging can be done by hand, but will need to be done as a regular part of the maintenance program. Some schools have installed logs or boulders on the perimeter of any beds, and others have used wood timbers. Black plastic edging is cheap and easy to install, but not very effective. A small number of Calgary schools have installed permanent concrete edging, which is easy to maintain, but expensive and not particularly natural in appearance. There is no perfect solution, and each school must decide how the issue will be handled. One approach at the design stage is to minimize the extent of bed-turf interface.

COMPLETE A FINAL WORKING DRAWING

The final step is to translate the concept drawing into a detailed plan, drawn to **scale**, that indicates and explains all the details of the naturalization project. It must describe the **hard landscaping** elements you are including, what they are made of, and where they are going to be placed. The final working drawing must also include the species of plants being used, how many, and where they are being planted. This final scale design plan will be used to calculate the quantities of soil, mulch, plants and other materials required. From this information, you will generate the final budget proposal. And finally, when it comes time to construct and plant the site, you will rely on this working drawing to direct your labourers and volunteers in all the relevant activities.

Again, make sure all interested parties have been shown the plan and have been allowed to comment. It is unlikely that the final plan will meet absolutely everyone's needs and satisfy absolutely everyone involved, but the feeling should be that the final product has strong support before proceeding. Then go over this final plan in detail with the school board representative or property owner.

GETTING HELP

The above steps may seem daunting at first. Remember that you are designing an informal, educational, naturalized area for your schoolyard and not a formal, precise landscape. It does not have to look perfect, nor necessarily professional. If you decide to tackle this process yourself, we have included more detailed information in Appendix 4, Design Tips for Schoolyard Naturalization. The Calgary Zoo also offers workshops to help with this process.

Many schools choose to involve a professional landscape designer or architect. Other schools striving to develop a completely natural landscape have chosen to seek help from a landscape ecologist, as they may bring a greater understanding of native plants and natural processes. Regardless, you may have already found an expert in your community that is willing to donate his or her skills and expertise, and may agree to perform the work for an **honorarium**.

If you decide to hire a designer or similar expert, you will need to raise money, or budget for his or her service. This cost can be anywhere from a few hundred dollars to three or four thousand dollars, depending on the scope of the project, and how involved you want them to be. Perhaps you provide them with your site inventory and vision for the project, and have them carry out the entire design process. Alternatively, you can provide the designer with your bubble or functional diagrams, and ask that they provide the final design details. If you decide to complete the design process yourselves, a professional designer may be able to assist you by pointing out any potential problems with your design, and helping you put together a detailed estimate of the costs involved. Estimating costs for the purposes of your budget and grant proposals can be a very complex process and having some expert help can be invaluable. The Zoo's Master Gardeners may also be able to facilitate some or all of these steps.

Regardless of who you recruit, be sure they understand clearly the rationale and goals of the project. Many designers may not be familiar with native plants or the concept of naturalizing, so be sure you explain your needs in detail.



Other possibilities for finding professional or trained help, whether for fee or by donation, include:

- Landscape Alberta Nursery Trades Association (LANTA)
- Alberta Association of Landscape Architects (AALA)
- educational facilities such as Olds College, Mount Royal University and the University of Calgary
- other professionals such as reclamation specialists, ecologists or people involved with habitat restoration

REFERENCES AND RESOURCES

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Titman, Wendy. *Special Places, Special People: The Hidden Curriculum of the School Grounds*. Learning Through Landscapes Trust. Crediton, Devon: Southgate Publishers Ltd., 1993.

WEBSITES

Alberta Association of Landscape Architects

www.aala.ab.ca

LANTA

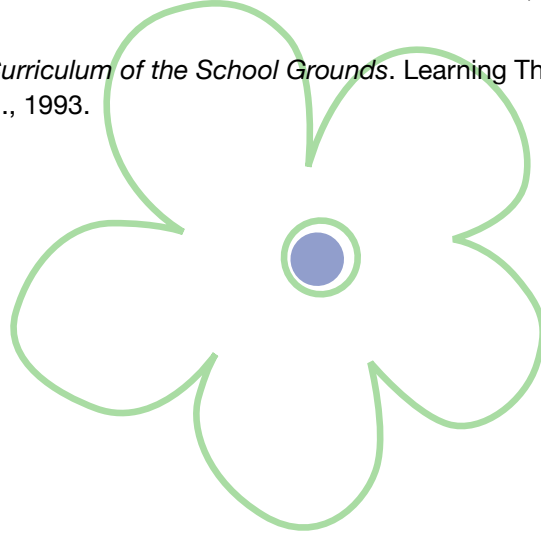
www.landscape-alberta.com

Canadian Biodiversity Institute

www.biodiversityonline.ca

Crime Prevention Through Environmental Design

www.calgarypolice.ca/community-cpted.html



IMPLEMENTATION

9. PROJECT NEEDS

With the design plan finalized on paper, you now need to seek the resources to make the naturalization project a reality. Before approaching funding agencies, you must have a clear understanding of your project vision, the resources required and the steps involved. This information must be assembled even before you can begin soliciting assistance, donations and volunteers from the school and surrounding community. It is time for your naturalization committee to produce a comprehensive **strategic plan**, and to put it down in writing.



DEVELOP A STRATEGIC PLAN

A strategic plan outlines your detailed approach or plan of action for the realization of your naturalized site. It will help you to orchestrate the procedure by ensuring that you have dealt with all the necessary elements. You need to plan out the process, the materials you will need, the tools and equipment required, and the labour necessary to carry out all the essential tasks. Involve as many people as possible when formulating your strategy and contact other schools that have installed naturalized sites to ensure nothing is missed. Ask lots of

questions and be very attentive to details. Take the time now to ensure that the day when forty-five trees arrive, you do not come to the horrible realization that you forgot to budget in the cost of a bobcat.

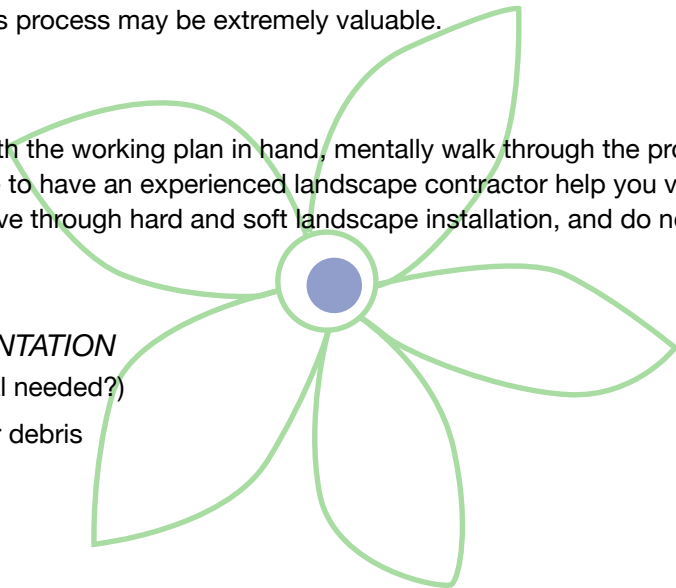
Based on experiences of other Calgary schools, there is an alternative to planting right away that may be worth considering. Wildwood Elementary (see the Case Study) was advised by experts to complete its **hard landscaping**, and then to leave the area fallow (broken up, but unplanted) for a growing season. This was a very difficult piece of advice to take, but most people were supportive when the rationale was explained. During the first growing season, everything was a weed, allaying volunteer's concerns that they were picking something that was intended to be there. They watered to encourage weed seeds to germinate, and then pulled everything green (without tilling or disturb the soil to avoid stirring up new weed seeds). As a result, they got a very good handle on the weed problem. As weeds are of primary concern in the maintenance of school sites, this process may be extremely valuable.

PROCESS OUTLINE

Get together with your naturalization committee and with the working plan in hand, mentally walk through the process of physically installing the design. You may find it valuable to have an experienced landscape contractor help you visualize the sequence of events. Start with site preparation, move through hard and soft landscape installation, and do not forget about clean-up.

BASIC STEPS IN NATURALIZED SITE IMPLEMENTATION

- remove sod and any other surface materials (disposal needed?)
- clear the planting area of any weeds, rocks and other debris



- perform any **grading** necessary
- construction or installation of any hard landscaping (i.e., benches, paths, rocks)
- add new soil and any **amendments** needed
- dig any large holes needed for more mature trees
- install remaining plant material
- water
- spread mulch
- clean-up

Now sit down and expand on all the above steps. Imagine what else will be going on amongst these activities, and add these to your process.

MATERIALS

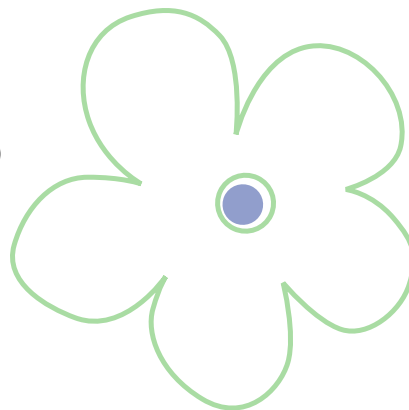
When you feel you have a good sense of the steps and activities involved, take your process outline and use it in conjunction with your working drawing to determine all the required materials. These include absolutely all the elements of your hard and soft landscaping.

TOOLS AND EQUIPMENT

Next, figure out all the tools and equipment you need to install your site. Think about what will be needed to spread the mulch, dig holes for grasses and perennials and water in the plant material. Keep in mind that there will be ongoing maintenance at the site for the foreseeable future, and take this into account for your planning. Having the proper tool for a job makes tasks easier and more efficient. Have tools that are both adult size and children size so everyone can participate. Consider asking your volunteers to bring their own, labelled tools for large events.

Some tools you may need include:

- shovels, spades, hand **trowels** and rakes
- watering hoses and sprinklers (in place prior to project)
- wheelbarrows (very helpful for moving small trees, rocks, roots, mulch)
- wire cutters (for balled and burlap-trees)
- secateurs (hand pruners)
- gardening gloves
- buckets and watering cans
- brooms



LABOUR

Once the process and material requirements have been established, they can be used to determine the nature and the quantity of labour (volunteer and otherwise) that is needed. How many people will it take to carry out all the planting you need? Do you have enough people to spread the mulch? What kind of expertise would you like to have on hand to supervise the activities? Have you identified one or two people as project managers? Will you be hiring any contractors?

Before you finish completing your **strategic plan**, bring your naturalization committee together for one last brainstorming session. Look beyond the obvious and think outside the box. Are there any other related activities you want to incorporate on your workdays? Musical entertainment? A media event? What about first aid equipment for workers? Food for volunteers? Refreshments for invited donors? Are you planning a ground breaking ceremony? Do you need daycare for the children of volunteers? You may not be able to finalize all the details at this early date, but by keeping them in mind, should an appropriate donor step forward, you have already given it some thought.

With the project needs established and your strategic plan in place, you can now begin the search for sources to meet these needs.

10. GATHER DONATIONS

Fundraising is often one of the more challenging tasks in creating naturalization projects. There is money available, but it takes time to figure out how to tap into the sources, and competition is increasing. It is essential to keep in mind that money is only one of the resources to seek. Donations of materials, labour and skills are equally important. Most schoolyard naturalization projects realize their goals by taking advantage of all types of assistance.

TAPPING INTO THE COMMUNITY

As you begin to plan and gather materials for the project, do not overlook the wealth of resources and knowledge within the school and surrounding community. A neighbour that is a landscape contractor and is willing to donate his or her time and equipment is as good as money, and many funding agencies like to see diversified support for the project.

Gifts-in-kind that match the support of an agency show that others believe in the project, which increases the likelihood of long-term success.

Send letters home with the students explaining the project and detailing the kinds of donations you are looking for. You may want to consider a notice in the school or community newsletter to reach a wider audience. Flyers could be posted or delivered door-to-door. Talk to the community association and invite community members to a student-hosted open house to explain the project and your needs. Consider grants, corporate sponsors, local businesses and services, government agencies, and local naturalist groups and clubs. It is often surprising to learn how many resources are available in the community and how eager people are to help. You may be surprised at what you will discover.

Many schools embark on their own fundraising efforts as well. Ideas include a garden-a-thon, walk-a-thon, auctioning off painted birdhouses, selling engraved bricks, asking people to sponsor a rock, tree or bench. All these activities are not only great for generating funds, but they act to foster community support and widen the impact of the schoolyard naturalization project.

TARGETING FUNDING ORGANIZATIONS

Be sure to begin the fundraising process early, as many funding agencies require three months or more to make their decision. Include in your project timeline any pre-proposal deadlines, proposal deadlines, and the date that funding decisions are made so you are not left scrambling to come up with money. When investigating possible funding organizations, make yourself aware of any relevant deadlines, and make note of the obligations and responsibilities placed on the grant recipient.

In order to select potential funding agencies, consider whether they are interested in this type of project and whether they have the ability to provide the resources you are looking for. Research the giving history of the potential supporters. Many companies and organizations outline their mission and giving policies on their websites. Review the published proposal guidelines. Once you have established which funders fit best, rank them. Among the top agencies, try to establish a contact person. Most companies and organizations have funding or grant administrators who serve as contact people. Send a letter of inquiry or speak directly with the contact person about the project to determine his or her interest. These are invaluable people to develop relationships with, as they can be very helpful in the proposal writing stage.

You may find someone who will volunteer his bobcat for a day, someone else may run a trucking company and are happy to haul the soil for the project, maybe someone owns a new housing development company and has excess rock they need to get rid of, or perhaps a family has an extra garden hose they can donate. Is there a community group that would be willing to volunteer its labour? Is there a teacher who would lead the innovation of curricular connections? Be specific in your request for volunteer tasks.

NATURALIZATION PROJECT INFORMATION CHECKLIST

Before writing your funding applications, be sure you have collected the following information (adapted from *Wild School Sites: A Guide to Preparing for Habitat Improvement Projects on School Grounds* by Paul Schiff and Cindy Smith-Walters):

- Map, inventory and photographs of the site recording the major natural and human features.
- Research on the site history, including the plants and animals that lived on the site before it was developed.
- Identification of the need for the project, and the project goals, objectives and outcomes.
- Explanation of the value of the project to students, the school, the community and the environment.
- Description of the methods and strategies you will use to accomplish the project goals and objectives.
- Indication of the resources needed to accomplish the plan, including a detailed budget.
- A working timeline and calendar, indicating priorities (in the event you do not receive full funding).
- Explanation of how you intend to communicate with the community.
- Outline of how you intend to monitor, evaluate, document, and assess the project's long-term success in terms of the stated goals and objectives.

WRITING THE PROPOSAL

A funding request needs to be tailored to each donor. Sending a generic application to a number of agencies is not advised. Some funding agencies have a formal application process while others do not, so be sure to check with the agencies you are applying to. If they do have application processes and forms, follow them exactly and clarify what information they are looking for in each section. Do not omit information that is specifically requested and do not supply additional information that is not requested. Depending on the length of the application, allow two weeks or more to write your proposal. Keep track of any hours spent on grant writing, as they qualify as a gift-in-kind.

Although each funding application is different, there are some common pieces of information that are generally required: an overview of the project, description and background of the organization, explanation of the rationale, goals and objectives of the project, the group's assets, timeline and work plan, detailed budget, proposed plan for evaluating the project, and relevant supporting materials. By this stage in the process you should have generated all the information needed to satisfy these requirements, but you will have to extract the precise pieces that each agency is asking for. See Appendix 3, Grant Proposals, for a detailed explanation of each of these components.

DONOR RECOGNITION

Thanking donors for their contributions, whether it was money, time, skills or equipment, cannot be stressed enough. Consider who the donor is and then determine what an appropriate recognition would be. Some donors like having a fuss made about them while others do not. Think about the funder's agenda; why have they given their support, and what do they hope to gain? Present them with several ideas so they can choose what suits them. Some donors have basic levels of recognition established. Be sure you meet these requirements and then go further. Remember, a personalized recognition carries much more impact. For example, if a donor has given money you could hold a public cheque presentation and invite the media. Personalize the experience by having the students accept the cheque and

When speaking with a representative from a funding agency, acknowledge that they are giving his or her time and skills and be thankful. When sending a letter of intent or proposal, follow-up with a thank you for considering your project. Even if turned down, send a thank you note to acknowledge his or her time. You never know when you will be knocking on his or her door again, so maintaining a good relationship is important.



thank the donor. You could invite donors on student-guided tours of the site and have students share their experiences with the project. Be creative in your recognition and involve the students. After all, the project is really about them.

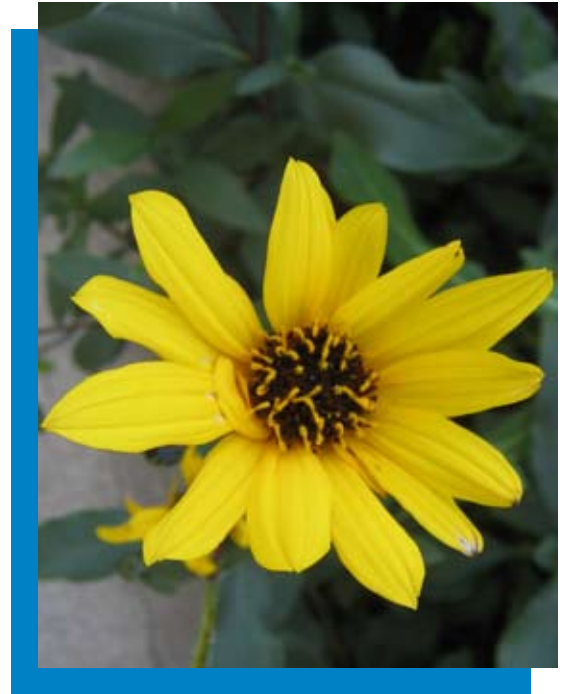
11. PREPARE FOR INSTALLATION

With funding and donations in place, planning must begin in earnest for the implementation of your naturalized site. Schools frequently plan the installation over several days. The initial days should be used for site preparation, re-grading, soil additions and/or **amendments**, hard landscape construction, and planting of any large trees (basically anything involving heavy labour or machinery). Subsequent days can be reserved for the planting of smaller trees, shrubs, perennials and grasses, and the application of mulch.

These work days can provide the opportunity to involve students, and perhaps their families, in the actual planting of the site. Schools find their own unique ways of organizing and planning these activities. Some choose to hold the planting on a school day, with each class coming out to plant and water its own plants (often giving them names). Others schools hold family events on the weekend. Both approaches have their strengths, but ultimately the goal is to directly involve as many students as possible in the actual, physical realization of the project.

Site Preparation and Tree Planting

- remove sod or other materials such as concrete and asphalt
- remove debris, rocks, etc.
- break up or remove any hard-packed soil
- perform any necessary hand weeding
- complete rough grading and distribution of soil and/or **turf** for the creating of contours or berms
- apply new soil and/or soil amendments
- mark location of new trees
- plant any larger trees
- haul away any unusable materials
- general clean-up of site



Use the detailed list generated from your strategic plan to ensure you have made arrangements to either purchase or have donated ALL the materials, equipment and labour you will need.

PLANTING DAYS

Mark the location of all plant material to be installed, using labels to identify the species.

- plant shrubs and trees accordingly
- mulch the site
- water, water, water
- clean-up
- celebrate!

Use your **strategic plan**, developed in the previous section, to finalize the sequence and timing of events for the preparation and installation of each phase. If, for instance, your first phase includes construction of a rock amphitheatre with shade trees surrounding it, you will need to have rock delivered at least a day prior to installation. If you have determined that the ground needs additional preparation this should be handled first. With your naturalization committee, walk through your strategic plan to ensure you have arranged the following:

- sources for all the materials, tools, heavy equipment and labour
- transport to the site
- timing for delivery
- suitable access to the site for any heavy equipment and/ or deliveries (often a school's perimeter fence has a gate, so you may need to see the caretaker about access)
- schedule for contractors and volunteers (when they are arriving and how long they will be staying)
- payment for materials, equipment and contractors (they need to be paid for ahead of time, on delivery, or will they be invoicing you at a later date - be aware that some money may be required ahead of time)
- storage for any materials arriving before the installation date

If you are using contractors, have they been formally hired? Ensure good communication with paid contractors concerning when and where to meet, time commitments, etc. If work is planned for a weekend, ensure you have any keys needed to open locked gates or gain access to water, etc.

Spend the week before the project coordinating and confirming the delivery sequence of supplies, volunteers and paid labour. This is your chance to trouble shoot any possible problems before they occur.



STORAGE

In the weeks before the project is implemented, materials such as mulch, logs, rock and various tools will likely begin to accumulate at the school. Keep in mind the many uses of the schoolyard and any safety issues that may arise from the storage of these materials. In many cases, snow fencing is considered a sufficient barrier, but check with the local school board to make sure further precautions are not required. Determine and mark with flagging tape where items will be stored if they are dropped off in advance. Leave these details as well as all committee phone numbers with the school secretary.

Also remember that you need a more permanent location for storage of any hoses and gardening tools that you have purchased for ongoing maintenance. Volunteers need easy access to this equipment, but a combination lock is probably a good idea.

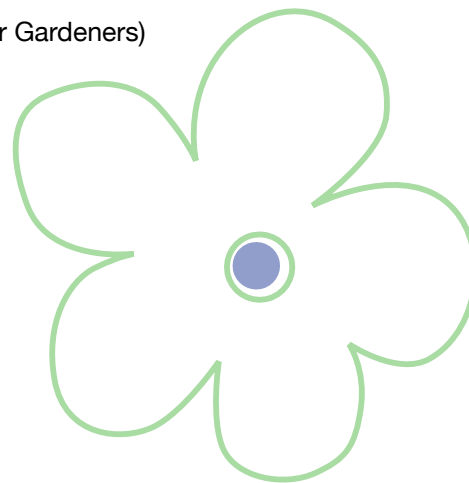
If plants are to be stored overnight, consider security, shelter from wind that might knock them over, and any necessary watering.

VOLUNTEERS

Even if you have decided to hire contractors for the heavier and/or the more technical aspects of your project, there are many ways to make use of enthusiastic volunteers. Volunteers come in many shapes and sizes and with a variety of skills. The greater the variety of activities you offer, the more people you will be able to involve. Make sure you give them specific tasks, for a specific amount of time. Plan for work shifts that last a maximum of three hours. Include children's tasks such as spreading mulch, water-bucket brigades, etc. When finalizing the volunteer schedule, include names, contact information, duties, time and duration of their shift. Consider having one person responsible for keeping tabs on your volunteers. Did they show up when they were supposed to, or do you need to ask someone to stay later?

Some suggested roles and duties for volunteers include:

- supervising the planting (experienced gardeners or Zoo Master Gardeners)
- planting and watering plant material
- mulch application
- waste removal and clean-up
- provision of childcare supervision or children's tasks
- serving refreshments
- taking photos and/or video
- attending to media requirements
- staffing a sign-in booth for volunteers
- first aid assistance



Check with your school board representative for any special insurance requirements that may be necessary for the week of the installation. Many schools already carry insurance that covers volunteers on the site, but check with the principal to be sure. Hired contractors generally have their own insurance through their business.

SCHOOLYARD PLANTING PLAN

Create a schoolyard planting plan package and make sure this accompanies someone to the site on your work days. The information it contains will prove invaluable if there is any trouble-shooting required, such as contacting the company delivering **loam** if it is not there when expected. Include the following information:

- a written project description
- the scheduled installation date and the alternate date (for weather delays)
- the final working drawing, including plant lists
- your strategic plan, detailing how the project installation will be implemented (who will be doing what, how and when)
- a comprehensive list of resources and materials (what, where from, how and when)
- the schedule of volunteers and their activities
- the name and contact information of the project manager, indicating whether they are a volunteer or paid contractor
- the written plan for ongoing maintenance (watering, weeding)
- any agreement signatures obtained for the project installation

Invite Alberta One-Call to relocate your utilities fourteen days prior to installation.

12. INSTALL THE SITE (PLANTING DAY)

If you have done your planning thoroughly, this is where it all pays off! The real work of implementing your naturalization site happens well before you actually break ground. You should be able to sit back and watch as your carefully laid plans are turned into reality.

Try to stick as much as possible to your strategy as outlined in your Schoolyard Planting Plan, but remain flexible. You never know what might be thrown your way.

Invite experienced gardeners, such as Calgary Zoo Master Gardeners, to demonstrate appropriate planting techniques and to verify planting locations. Make sure you plant according to the design plan. If a specific tree is five metres down the slope in the design, plant it there. Confirm the identification of each specimen and consider a future project to create more permanent labels.

See Appendix 9 for more details on planting techniques and Appendix 10 for details on mulch.

TIPS FOR WORK DAYS AT THE SITE

- clearly identify the project manager/coordinator to everyone taking part
- ensure that heavy vehicle access is cleared
- clearly identify the first aid station
- display a large, coloured and laminated planting plan
- Post Maintenance Schedule and Emergency Contact list
- keep track of the volunteers; have them sign-in and out
- ensure volunteers are clear about their duties
- make sure the kids are kept out of the way of heavy equipment
- keep track of all tools and equipment so nothing goes missing
- take lots of pictures
- identify a media liaison and someone to greet donors and special guests
- ensure participants take safety precautions during the construction and planting, and they are aware of the first aid available
- retrieve any tarps used to cover stored **mulch**, soil, etc.
- have everyone wear name tags
- identify a rest place in the shade
- demonstrate how to do each gardening task (assume nothing about the expertise of you volunteers)

Remember to have fun!

FUNDING ORGANIZATIONS

Alberta Ecotrust

www.albertaecotrust.com

The Evergreen Foundation

www.evergreen.ca

TD Friends of the Environment Fund

www.fef.td.com

Tree Canada Foundation

www.treecanada.ca/en



Alberta lottery Fund
<http://albertalotteryfund.ca>

Calgary Foundation
www.thecalgaryfoundation.org

EcoAction Community Funding Program
www.ec.gc.ca/ecoaction

FUNDRAISING RESOURCES

Evergreen. *All Hands in the Dirt: A Guide to Designing and Creating Natural School Grounds*. Toronto, ON: Evergreen, 2000.

Schiff, Paul, and Cindi Smith-Walters. *Wild School Sites: A Guide to Preparing for Habitat Improvement Projects on School Grounds*. Houston, TX: Council for Environmental Education, 1993.

Proposal Writer
<http://www.proposalwriter.com/grants.html>

VOLUNTEERS

Evergreen. *Hands for Nature: A Volunteer Management Handbook*. Toronto, ON: Evergreen, 2003.

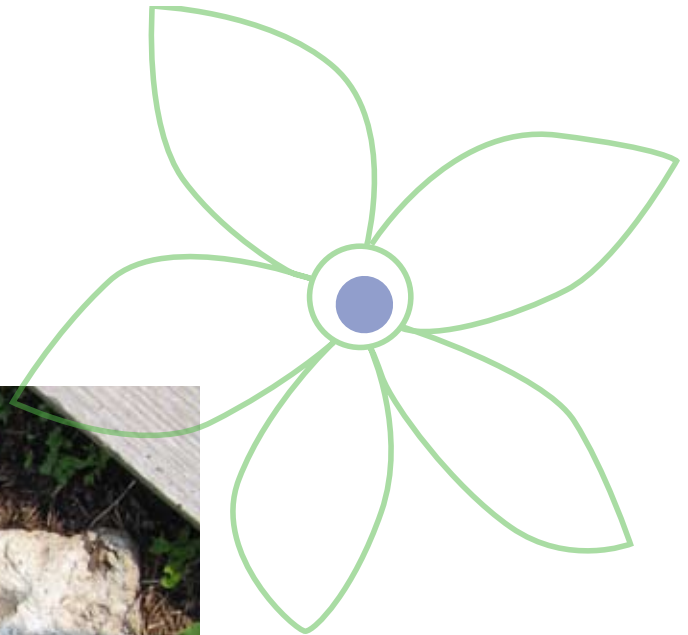
GOVERNMENT CONTACT INFORMATION

For information on becoming a registered society:

Service Alberta, Registries
<http://www.servicealberta.gov.ab.ca>

For information on registering as a charitable organization

Canada Revenue Agency, Charities and Giving
<http://www.cra-arc.gc.ca/chrts-gvng/menu-eng.html>



COMPLETION

13. CELEBRATE THE PROJECT

Once your schoolyard naturalization project is successfully installed, you need to pat yourselves on the back. You can be extremely proud of having worked your way through a very long, complex and challenging process. It is very important to recognize this achievement through some sort of celebratory event so that everyone acknowledges that you have created something special and valuable. Take this opportunity to make the public aware of your accomplishment.

CELEBRATE YOUR PROJECT'S SUCCESS

Your celebrating can begin on the day you break ground, if not sooner. Create a child-centered outdoor celebration that includes music, creative writing, singing, dancing and food. Make sure you invite the school community, neighbours, volunteers, school board officials, funders and other supporters of the project as this is a great way to recognize their contribution to your project. You will be amazed how many donors are excited by the possibility of visiting the site and meeting the school community!

Consider initiating an annual celebration, perhaps a May Day event, a harvest event, summer or winter solstice, or a spring tea for parents. The celebrating should not end simply because the final phase has been installed. Celebrate any new additions or improvements you decide to make to your site, even something as small as new bird houses.

PUBLICIZE YOUR PROJECT'S SUCCESS

Students can contact local newspapers, radio stations, and other media outlets to share in the process. Why not include your story on your school's website? Create a collage display of "before" and "after" photos, students' poetry, letters and drawings. Publish these creations in the school newsletter, and send copies to agencies and to the people who contributed to the project. Write thank you cards to ensure that the efforts of all volunteers, funders and donors of **gifts-in-kind** are acknowledged. Have an open house; ask students to prepare a guided tour and present thank you speeches. Brainstorm ideas for future fundraising that will also generate renewed publicity, such as celebrity birdhouses that can be auctioned off. Research and apply for any appropriate awards. What better way to let people know what your school has achieved than by receiving recognition for your efforts.

14. EVALUATE, MONITOR AND UTILIZE THE PROJECT

Now that the naturalized site is in place, it is important to find out if the landscape itself has been a success, and if it has had the impact you had anticipated. To do this, you will need to evaluate both the physical site itself, as well as its effect on the people involved, staff, students, parents and community members. Questionnaires and monitoring projects can help assess project success. Refer back to your original vision and rationale for the project to determine if you have met your goals. If not, where did you fall short, and can you make the necessary changes?

Often funding agencies require you to submit information gleaned from questionnaires and monitoring to verify the success of your naturalization project.

MONITOR THE PHYSICAL LANDSCAPE

Evaluation of the naturalized site should be done on an ongoing basis. Keep a long-term log or journal to record bloom dates, significant wildlife sightings, etc. Keep a "family photo album" of new plants and note the changes over time. Keep a weed log to help tell the weeds from the plants. Use information generated by the maintenance teams to aid in decisions about changes and improvements to the project. Keep accurate, thorough records of the maintenance activities to aid in future planning. Record any additions or removals from the garden. Pick a day once a month to have the naturalization committee walk around the garden and address any issues that arise.

Enjoy, share with the community and use your naturalized site for exploring, teaching and learning.

MONITOR THE IMPACT ON STAKEHOLDERS AND COMMUNITY

Ask before and after questions of all the stakeholders. It may be effective to circulate a questionnaire around the community. Monitor changes in behaviour, accidents, play patterns, learning opportunities, outdoor teaching, achievement, biological diversity, air and noise pollution levels, habitat created ... the list is endless. All monitoring activities are perfect activities for students to get involved.

Monitor teachers and their use of the garden with respect to the curriculum. Is there anything preventing them from using the site? Is it what they expected? Is there any way to enhance their use of the site? Keep a binder of activities that have taken place in the garden to share with current staff and help inspire new teachers. It may be helpful to bring in a guest speaker on curricular links, or someone to interpret the site for them. The Calgary Zoo's Grounds for Change staff can help link curriculum to the naturalized site. Contact the Grounds for Change Coordinator to schedule a professional development, meeting or site visit to discuss curricular connections.

Think of ongoing improvements such as plant replacement, birdhouses, birdbaths, veggie patch, signage, more seating, containers or half barrels planted with annuals, etc. If no funds are left in the project account, consider a one-time special event, or fundraiser. A garden is truly never finished.

VANDALISM

The fear of vandalism is often a concern for schools. However, the instances of vandalism to naturalized sites are low, and the threat is far outweighed by the benefits offered to students, teachers and the community. Ideally, the issue of vandalism should have been addressed during the planning and design steps of the process. After the installation is completed, host events and ceremonies in the naturalized site that involve as much of the school community, its families and the wider community as possible.

Ask neighbours to keep an eye on the garden during the evenings, weekends and holidays. Consider posting a sign providing contact information in case of an emergency and provide close neighbours the same information. This gives everyone the message that the site is significant. Although there is no sure-fire way to prevent vandalism, there are many ways to discourage it.

- Include as many people as possible in the creation of the project to develop a sense of ownership and connection to the project. The more eyes and ears you have in the community, the more successful the project will be.
- Create clear boundaries defining the naturalized area.
- Put up signage to identify the site; this lets everyone know the site is special, is used frequently and is monitored.
- Consider installing interpretive signs to take advantage of any educational messages that are relevant.
- Keep the site maintained. Although naturalized sites require little maintenance once established, watering, weeding, litter removal and general upkeep, especially over the summer, gives the impression that the site is being used and enjoyed.
- Host an open house and invite everyone to bring something for the site, encouraging an expanded sense of ownership towards the site.
- Help ensure personal security by maintaining **sight lines** through the site.
- Encourage lots of activity on the site.
- Hold celebrations in the naturalized site, such as Earth Day, International Migratory Bird Day and special school celebrations.
- Ask the students to create and implement a neighbour watch program.



WHAT TO DO IF VANDALS STRIKE?

Vandalism is a crime that must be reported to the police, so be sure to contact the appropriate authorities. Clean up immediately and try to repair the damage as soon as possible. A site with one spray painted rock will likely attract the efforts of other spray paint artists. Show the vandals that you will not tolerate their actions and that you will remove their graffiti, replant plants, clean signs and replace structures. Counsel and continue to educate the students as it can be devastating to be a victim of crime. Offer students the time and space to express their emotions concerning the defacing of something they have worked so hard to create.

Remember, vandalism of naturalized areas is uncommon. Focus on why you are doing this project. Creating a natural area in your schoolyard is one of the most gratifying projects you will ever do for the school, students, teachers and community. Do not let the fear of vandalism deter you.

15. NURTURE THE PROJECT

Many schools make the mistake of assuming that their work is completed once the naturalized site is in place. Do not be deceived, as there is much that needs to be done on a long-term basis to ensure the ongoing success of the project. Stewarding the project into the future involves much more than simply looking after the upkeep of the existing physical site, it entails nurturing the people as well.

Maintenance is generally the number one concern when it comes to school projects (vandalism being number two). Most school boards have a policy that if an area is regarded as a weed site, it will be destroyed. As part of a **stewardship** plan, it is the one essential ingredient that cannot be ignored.

After a minimum of two years of regular watering and weeding, your garden should be well established. Naturalized areas do not normally need excessive care, but close attention still needs to be given to the area's on-going condition. It must be made clear that these are "low" maintenance projects, not "no" maintenance, and it's best to be prepared in advance for the work that needs to go into looking after them. Just like a home garden, the work is best done frequently, so that issues are addressed quickly and easily, rather than waiting until it becomes an overwhelming task.

INITIAL MAINTENANCE

The first two or three years of the project after installation are key, with the most critical time being over the summer when the weather is at its warmest and school is not in session. Ideally, weeding will not be a major concern if you have made efforts to avoid introducing them to the site by purchasing good quality topsoil, weed-free plant stock, seed, sod and well-composted manure.

When first installed, the site will need to be watered well for two to three years. The goal is to encourage the establishment of strong, deep roots. This will enable the plant to access moisture from a large area of soil, making it better equipped to survive periods of drought. To do this, new plantings should be watered thoroughly but infrequently. If watering is done too lightly and too often, the roots tend to stay close to the surface. Initial watering will most likely be done by hand. Watering in the longer term can be done in a variety of ways including the use of soaker hoses, more hand watering, or conventional sprinklers. After the plants are well established, no supplementary watering should be necessary.

ONGOING MAINTENANCE

Maintenance needs to be addressed to keep the character of the project intact, as natural spaces in urban areas are subjected to a variety of effects such as pollution, increased use, weeds and diseases. The approach; however, should be a fairly hands-off, in comparison to traditional home gardens. Regular maintenance is needed to address the basics issues of weeding, watering, pruning, pest and disease control, filling/cleaning bird feeders, birdbaths, etc. This should be done on a weekly or bi-weekly schedule over the growing season, supplemented with more intensive spring and fall clean-ups.

Long-term maintenance may involve replacing, adding, dividing or removing plants, maintaining signage, seating, fencing, replenishing **mulch**, and generally making repairs to any of the elements in the landscape.

STRATEGIES

Most schools plan community workdays in the spring and fall to look after the seasonal clean-up. When school is in session, ideally maintenance is performed by students. Perhaps each class is assigned an area to care for, or each grade level chooses a week in which they will care for the whole garden. Look for areas of the curriculum that could be met with maintenance activities. Some schools have a gardening or environment club that takes care of the site. Over the summer, maintenance will need to be carried out with family or community volunteers.



Be creative when looking for volunteers for your maintenance needs. Your community may have a gardening group that would be willing to help out, or there may be an avid gardener living nearby that could lend a hand. Investigate any local Scouts and Girl Guide groups that are often required to perform volunteer hours. Make sure you are not relying on one person. These maintenance tasks can require a significant time commitment, so you need a variety of people to depend on. Perhaps school families can adopt the gardens for week-long periods in the summer.

Make sure the naturalization committee receives regular updates and records. These will allow the committee to monitor the maintenance program to verify that it is adequate and successful. Records will also reveal if any changes need to be made to the maintenance regime. The committee also needs this information to evaluate the success of the project and arrange for any replacements, repairs or changes that need to be made to the landscape.

More detailed information on maintaining a naturalization project can be found in Appendix 11.

STEWARDED THE PROJECT

It is the activities that take place after the naturalization site has been installed that will determine its success and value. Your naturalized site must be embraced by the school community, becoming an integral part of the day-to-day operations. The site needs to be used by the teachers and students. They need to feel ownership of the project. Teachers will be more likely to use the site for teaching if they are aware of the many curricular links natural areas provide. Grounds for Change can assist with the ongoing education of teaching staff in regards to naturalization curricular links.

A naturalized site is constantly changing, and although this means it requires constant monitoring, it also means that there is always something fresh and new to observe and take advantage of. It will always offer opportunities for improvement, which again provides a chance to involve new people and introduce them to the site. It is important to keep your naturalization committee going in some form. You may not need to meet as often, but you still need the structure in place. Recruit new volunteers and committee members as others move on. Always have a three year plan in place, even if it just outlines the ongoing maintenance requirements.

Over the long-term, endeavour to maintain a high profile for the project, both within the school and in the surrounding community. Make it part of the plan for each year to address something new, celebrate something new, or find a new way to use the site. Keep the community up to date on changes, and plan annual events in the garden to encourage the continued success of the project.

FINAL NOTE

Having read through this manual, hopefully you now have a clearer idea of the process you are embarking on. Schoolyard naturalization is a wonderful, amazing journey and experience, but not one to take lightly. The process is neither quick nor easy, and there are no short-cuts. With this in mind, we encourage you to think big and start small. By taking small, manageable steps, you will be more likely reach your goal still filled with energy and enthusiasm.

This manual is by no means exhaustive, but instead provides the framework onto which you can build your own unique process. There are many other resources (books, experts, websites, other schools) that you can take advantage of along the way. Every naturalization project is different and unique which only adds to its value. Do not be afraid to put your own personal stamp on your process and naturalized site. We hope that you become as inspired and excited by schoolyard naturalization as we are. The Calgary Zoo wishes you the best of luck as you explore the possibilities of this process.

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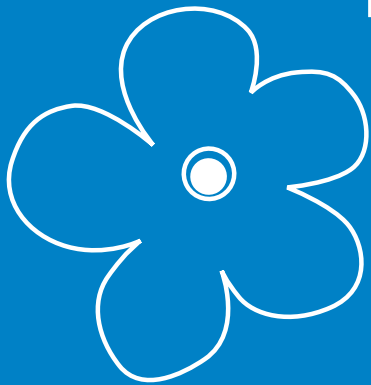
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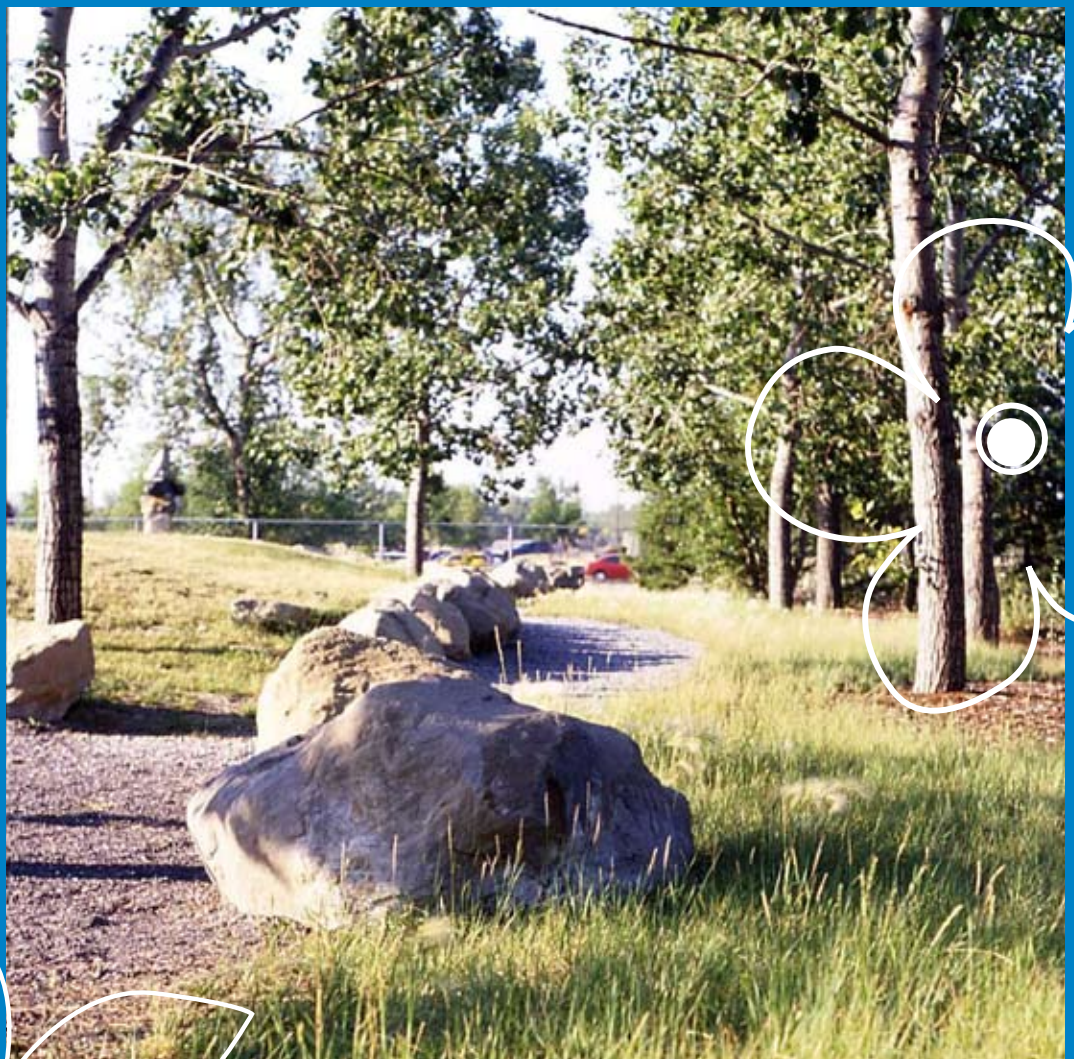
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GROUNDS FOR CHANGE



APPENDICES



APPENDIX 1

GLOSSARY

Aeration Exposure to air.

Aggregate(s) Clustered mass of individual soil particles varied in shape, ranging in size from a microscopic granule to a small crumb. Considered the basic structural unit of soil.

Amendments Materials added to the soil to aid plant growth by enhancing the soil quality, condition and productivity. For example, manure, compost or sand.

Annual Plant that lives for one season. Starting as a seed it sprouts, grows leaves, then produces flowers and seeds in one growing season. Also applies to plants that are perennials in warmer climates, but are treated as annuals in colder locations.

Aspect Direction that an object or location is facing; for example, a house facing south has a southern aspect.

Base map (also Base plan) Scale drawing indicating exact measurements, locations and orientations of the elements of a physical site. Usually shows building, roads, location of services, etc.

Berm Raised contour in the landscape constructed by mounding up organic material.

Biennial Plant that lives for two years. Starting as a seed it germinates and grows leaves in first the season, then produces leaves, flowers and seeds in second season.

Biodiversity Describes all aspects of biological diversity including species richness, ecosystem complexity and genetic variation.

Botanical name (also Scientific name) Combination of genus and species names (in Latin) that together identify one individual plant. Each plant has only one botanical or scientific name; for example, *Geum triflorum*.

Bubble diagrams (also Functional diagrams) Freehand drawings showing the location and space allocated to various desired functions of a landscape. Establishes possible organization of the project elements.

Cold frame A glass- or plastic-covered frame without artificial heat that is used to protect plants and seedlings outdoors.

Common name Plant name, often describing its appearance or use. Not as accurate as botanical names as one plant can have several common names, and two plants may share a common name. For example, “windflower” is used for both *Anemone multifida* and *Anemone patens*. Old man’s whiskers, three-flowered avens, and prairie smoke are all used as names for *Geum triflorum*.

Compost The end product of the process of decomposition. Mixture of decayed organic matter used for fertilizing and conditioning soil.

Concept drawing A progression of bubble diagrams; it is more specific, showing shape, size and location of hard and soft landscaping. It should be approved before being developed into a final working drawing.

Coniferous Describes a plant that produces cones; for example, spruce and pine trees. Different from the term “evergreen”. A plant can be evergreen without being coniferous, and vice versa.

Deadhead Remove finished flower blossoms. Prevents the production of seeds which can reduce the spread of the plant and promotes the production of more flowers.

Deciduous Falling off at a certain stage of development in the life cycle, or at the end of the season. Describes plants that lose their leaves (i.e., poplar trees and dogwood shrubs).

Diversity Variety, difference, distinctiveness.

Drainage How water moves through and gradually disappears from the soil. Soil can be described as being “well-drained”, or providing “poor drainage”.

Ecology Study of the interrelationships of plants, animals and all aspects of their environment.

Ecosystem Biological community of interacting organisms and their physical environment. Describes a discrete unit that consists of living and non-living parts interacting to form a stable system.

Edging Any non-biodegradable material (i.e., plastic, metal) installed in the ground to create a boundary between planting beds and lawn or other landscape areas.

Evergreen Retains green growth through more than one growing season. Describes plants that keep their leaves throughout the year (i.e., spruce and junipers, along with certain perennials).

Exposure In horticulture this term is used to describe the light conditions; for example, full sun, part shade, etc.

Fibrous Used to describe plant roots consisting of many individual fibers. Compare with “rhizomatous”.

Final working drawing Plan or design on paper, drawn to scale and providing all the information necessary to guide the installation of the landscape.

Foliage Mass of plant leaves in their natural form and condition.

Forb Herbaceous plant material excluding grasses (i.e., wildflowers).

Functional diagrams See “Bubble diagrams”.

Gifts-in-kind Donations that do not consist of money (i.e., a donation of plants or labour).

Grading Moving soil and organic material to create or alter contours in the landscape.

Habitat The natural home of plants and animals. The living place of an organism or community, characterized by its physical properties.

Hard landscaping Features in the landscape that are permanent such as paths, seating, fences, etc.

Herbaceous Used to describe a seed-producing annual, biennial or perennial that does not develop persistent woody tissue. All aerial parts die down at the end of a growing season.

Honorarium A voluntary payment for professional services provided instead of the normal fee.

Humus Decomposed organic matter, having lost all trace of the structure and composition of the vegetable and animal matter from which it was derived. Organic constituent of soil formed by the decomposition of vegetation.

Hydric Wet. Soil remains wet for most of the growing season.

Infiltration Downward entry of water into the soil.

Introduced (species) Species of plant or animal that is not native to the area but has been introduced from somewhere else.

Larval First stage of an insect after leaving the egg.

Loam Mellow soil rich in organic matter.

Master Gardener Gardeners with a specified amount of training and experience who’s mission is to provide information on gardening to the community.

Mesic Moist. Water removed relatively slowly in relation to supply.

Monoculture A plant community made up of only one plant species (i.e., farm crops, lawns).

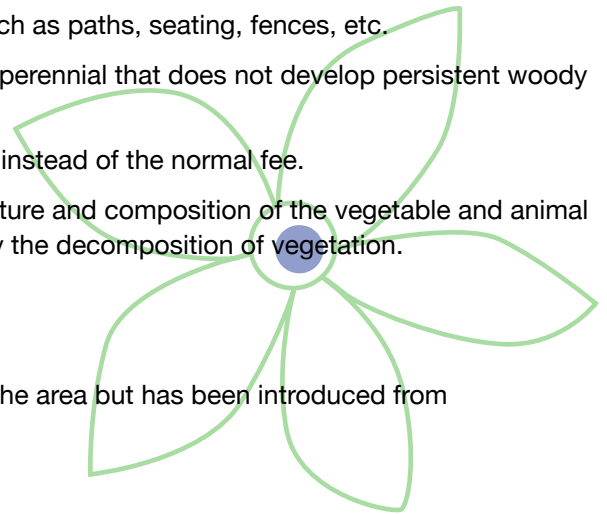
Mulch Any of a variety of organic or inorganic materials that are spread around plants to prevent moisture loss and discourage weed growth. Applied on top of the ground or soil.

Naturalize Adapt, grow and spread as though native. Generally applies to a species originally imported from another country that now behaves like a native, maintaining itself without further human intervention.

Nectar Sugary substance produced by plants, often consumed by birds and insects.

Obelisk Four sided pillar, usually tapering at the top.

Percolation Downward movement of water through soil.



Perennial Plant persisting for several years, dying back seasonally but producing new herbaceous growth from a persisting plant part (e.g., roots).

Pergola Structure consisting of vertical pillars supporting an open roof of cross beams (or trellis work), often creating a covered walk with plants trained over it.

Plug Plant seedling with roots surrounded by a small amount of soil the shape of a test tube.

Raised beds Area for growing plants that is enclosed (often with timbers, logs, retaining wall blocks, etc.) and above ground level, allowing for the growing medium to be precisely determined.

Rationale The fundamental reason or logic behind a project.

Real property assessment Legal drawings establishing the property boundaries, dimensions and location of existing buildings, drawn to scale.

Rhizomatous Describes a root system having the nature or habit of rhizomes. Normally describes a plant that spreads.

Rhizome Horizontally creeping underground plant stem that produces leaves above and roots below. Usually persists from season to season.

Scale Ratio of reduction, as on maps; for example, “one millimetre represents one metre”, or scale of 1 to 800”. Enables one to determine exact measurements on the ground by measuring on paper.

Sight lines A line extending from an observer’s eye to a viewed object or area. For schoolyard naturalization, the views from the road to the school must be unobstructed.

Site inventory Collection of facts about the present condition of the site elements including all existing features, topography, soil, water, use, views, etc.

Snag The standing part of a tree trunk that has snapped above ground level.

Sod Grass or lawn. Upper layer of grassland containing roots of grass and other herbaceous plants

Soft landscaping Anything relating to planting beds (i.e., plants, soil, compost, mulch).

Soil structure How the particles of sand, silt and clay are held together in stable aggregates. This influences plant growth by affecting the availability of oxygen, water, light, temperature and nutrients.

Soil texture Percentage of sand, silt and clay that makes up the soil sample. Organic material may be present, but is not included in the definition. These particles influence plant growth by affecting the availability of oxygen, water, light, temperature and nutrients.

Stakeholder Independent party with an interest in the project.

Stewardship, stewarding The careful and responsible of something entrusted to one’s care to ensure its ongoing success and integrity.

Strategic plan The tactics or proposal for executing a process.

Topsoil Fertile, good quality soil.

Trellis Lattice framework of light wooden or metal bars used as a screen and/or support for climbing plants.

Trowel Small hand digging tool.

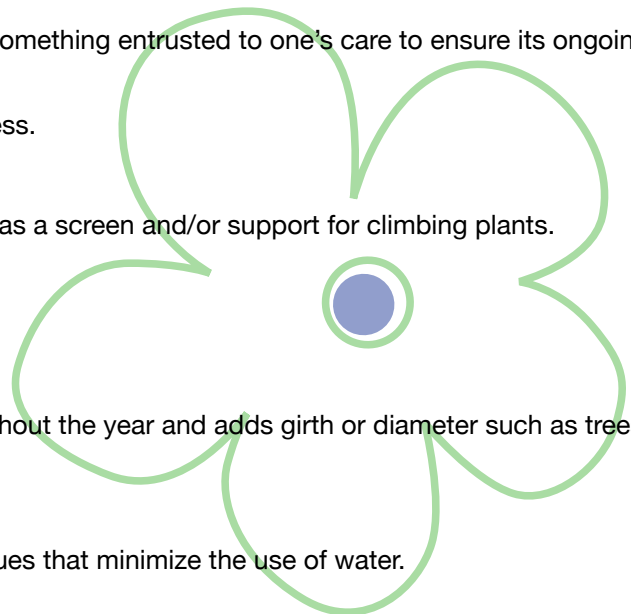
Turf Grass or lawn.

View lines Lines of vision within the landscape.

Woody Describes plants with a structure that persists throughout the year and adds girth or diameter such as trees and shrubs. Compare with “herbaceous”.

Xeric Dry. Water removed rapidly in relation to supply.

Xeriscaping Practice of gardening using plants and techniques that minimize the use of water.



APPENDIX 2

SAMPLE SURVEYS

INITIAL SURVEYS/QUESTIONNAIRES - VISION STAGE

These surveys are two fold - they should provide information concerning people's attitudes towards the school property, as well as provide an idea of some of the current uses of the site. Both types of questions will provide a baseline for comparison after the project has been installed. They should be designed with the different stakeholders in mind. Surveys can be answered on paper or the questions used to facilitate brainstorming sessions. Simple online surveys can also be created where results are automatically tabulated. Student can tabulate the results of written surveys (a great math activity).

What follows are some short examples to give you an idea of where to start.

FOR STUDENTS

Attitude

- Please describe your schoolyard with 5 descriptive words.
- How does the schoolyard make you feel? Why?
- What can be done outside to make you feel better?
- Where do you spend most of your time when you are outside? Why?
- Where don't you play? Why?
- Do you have a favourite place in the schoolyard? What makes it special?
- What is your least favourite thing about the schoolyard? Why?
- Do you think there are enough trees in your schoolyard? Explain.
- What wildlife have you seen in your schoolyard?
- Are there places to get out of the wind, rain and sun?
- Are there places that you think could be made more colourful?

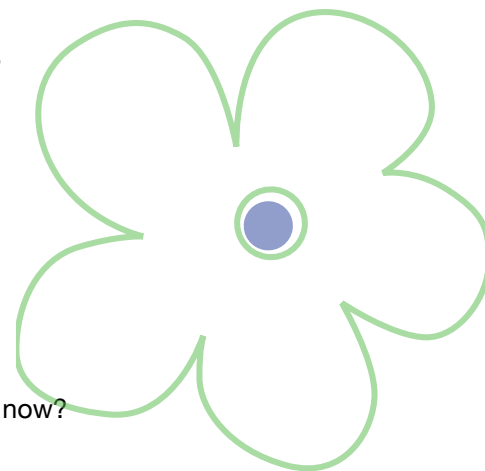
Activities

- What would you like to be able to do in the schoolyard that you can't do now?
- Is there enough for everyone to do what they like to do? Why? Why not?
- Are there any places where bullying takes place? Where?
- Are there any places in the yard that are not used very much? Why?
- Is there any shade on the school property? Where?
- Do you use the schoolyard with your teacher for lessons?
- Are there any safe places for smaller children who might be knocked down by bigger kids?
- How can the schoolyard be changed to make it better? Explain.

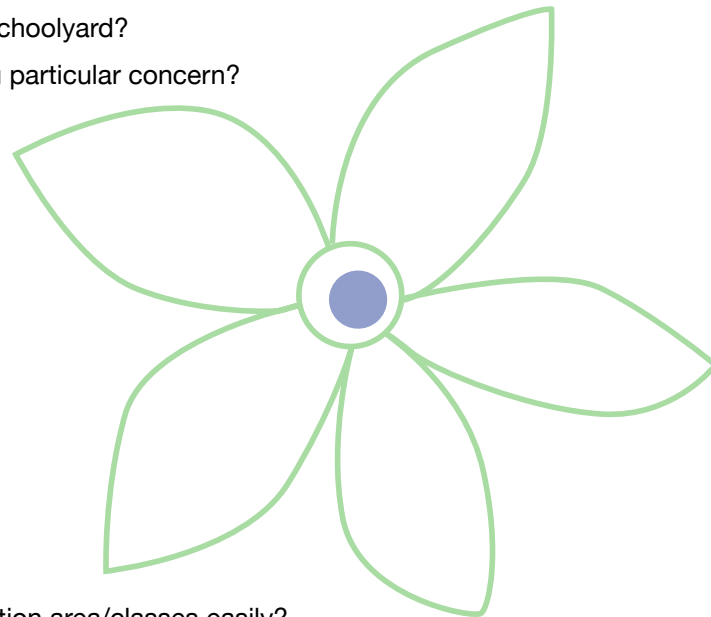
FOR PARENTS

Attitude

- What do you think of the school grounds?
- Describe the school ground with 5 descriptive words.
- Are there any parts you like? Why?



- Are there any parts you dislike? Why?
- Do you find the school site welcoming? Unwelcoming?
- Do you think first-time visitors could locate the office/ reception area/ classes easily?
- What do you think about the way the school grounds are maintained?
- Which parts of our school grounds do you think your children particularly like? Why?
- Which parts of our school grounds do you think your children particularly dislike? Why?
- What is your child's favourite activity when they are in the schoolyard?
- Is there anything about our school grounds that causes you particular concern?
- Can you wait for your children in comfort and safety?
- Is there enough shade for kids to play in?
- Are there quiet places for kids to sit?



FOR TEACHERS

Attitude

- What do you think of the school grounds?
- Describe the school ground with 5 descriptive words.
- Are there any parts you like? Why?
- Are there any parts you dislike? Why?
- Do you find the school site welcoming? Unwelcoming?
- Do you think first-time visitors could locate the office/reception area/classes easily?
- Which aspects of the grounds do you think are an asset?

Activities

- What parts of the school grounds do you use to teach? What subject area? What time of the year?
- Are there any supervisory issues presented by the school ground as it exists now?
- What would you like students to learn in a naturalized area?
- What would you like them to do?
- What curricular topics could be enriched by a natural space?
- What existing elements of the schoolyard might present opportunities for creating an educational setting?
- What other purposes might the naturalized area serve?
- What are your recommendations to improve the grounds so that they may be used more fully by the teaching staff?
- Would you be willing to devote class time to the maintenance of the grounds if outdoor classroom development and use were integrated into the curriculum?
- Are there any problems or constraints connected to your current use of the site for teaching?

SCHOOLYARD INVENTORY (OR SURVEYS) – PHYSICAL AND CULTURAL

The more general questions can be answered during a staff walk-around (site appraisal). More detailed questions need to be documented carefully and effectively.

A variety of means can be used to record the results of a schoolyard inventory.

- Checklists can be quick to fill out, but are time-consuming to prepare, and the responses may be limited.
- Questionnaires allow for more flexibility of responses, but are more time-consuming to fill out.
- Maps are extremely valuable for easily locating elements and conditions in a spatial manner.

Ideally some combination of all three will be the most effective. The following samples can be used to develop your own surveying process.

Sample Physical Survey Checklist

1. What type of planting/plants are there around the school?

- none flowers trees
 weeds shrubs vegetables

Other:

2. What is the general condition of the plantings, including turf?

- good fair poor

Comments:

3. What surfaces exist on the school site?

- gravel turf sand
 concrete soil asphalt
 red shale

Other:

4. What structures exist on the school site?

- school building portables gates
 picnic tables backstop storage units
 fences bleachers
-

Sample Physical Survey Activities and Mapping

- Locate and identify all existing vegetation, noting size and condition.
- Observe and indicate on maps any wildlife present (birds, bugs, worms, rabbits, etc.).
- Indicate any areas of slope, including the direction they face.
- Look for evidence of erosion and indicate on the map.
- Create maps of sun and shade areas (at different times of the day, over a period of weeks or seasons).
- Mark areas where water tends to collect.
- Mark areas where snow melts the fastest and the slowest.
- Map areas that are windy and sheltered.
- Mark on the map any views to be kept or to be screened.
- Visually evaluate the condition of the soil in different areas of the site and indicate on the map.
- Take soil samples and include this information on the map.
- Note any vehicle traffic including volume, time, direction and parking.

Sample Cultural Survey Checklist

1. What types of open space are there around the school?

- | | | |
|--|---|--|
| <input type="checkbox"/> asphalt play area | <input type="checkbox"/> basketball court | <input type="checkbox"/> sandlot |
| <input type="checkbox"/> dirt/grassy | <input type="checkbox"/> parking lot | <input type="checkbox"/> grass playing field |
| <input type="checkbox"/> wooded lot | <input type="checkbox"/> cement | <input type="checkbox"/> running track |
| <input type="checkbox"/> planting beds | <input type="checkbox"/> school garden | <input type="checkbox"/> ball diamond |
| <input type="checkbox"/> foot paths | <input type="checkbox"/> outdoor seating | <input type="checkbox"/> courtyard |

Other:

2. What is there around the schoolyard?

- | | | |
|---|---|---|
| <input type="checkbox"/> other schoolyard | <input type="checkbox"/> foot paths | <input type="checkbox"/> play equipment |
| <input type="checkbox"/> vacant lot(s) | <input type="checkbox"/> residential area | <input type="checkbox"/> park(s) |
| <input type="checkbox"/> street trees | <input type="checkbox"/> commercial area | |

Other:

3. Is there space reserved for organized outdoor activities? Yes No

If yes, what types of activities are accommodated?

- | | | | |
|---------------------------------|---------------------------------|------------------------------------|--|
| <input type="checkbox"/> recess | <input type="checkbox"/> sports | <input type="checkbox"/> free play | <input type="checkbox"/> phys ed classes |
|---------------------------------|---------------------------------|------------------------------------|--|

Other:

4. Are there other recreational spaces near the school? Yes No

Describe:

5. Is there adequate space for outdoor recreation? Yes No

6. Is the amount of available space adequate for the school's physical education needs?

- | | |
|------------------------------|-----------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No |
|------------------------------|-----------------------------|
-

7. Is there outdoor play equipment on the schoolyard? Yes No

Who is the equipment appropriate for?

- | | | |
|---------------------------------------|--|---|
| <input type="checkbox"/> all children | <input type="checkbox"/> some children | <input type="checkbox"/> none of the children |
|---------------------------------------|--|---|

Is the equipment accessible for physically challenged children?

- | | |
|------------------------------|-----------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No |
|------------------------------|-----------------------------|
-

8. Check any of the following potential or obvious safety hazards on your schoolyard:

- | | | |
|---------------------------------------|---|---|
| <input type="checkbox"/> unsafe drops | <input type="checkbox"/> deep holes | <input type="checkbox"/> torn fencing |
| <input type="checkbox"/> rodents | <input type="checkbox"/> secluded areas | <input type="checkbox"/> unregulated vehicular access |

Other:

Sample Cultural Survey Activities and Mapping

- Tracking use of the school ground is a great activity for students to carry out. They could create surveys for each other, or track activities on maps, perhaps using symbols to represent the different users. This monitoring should be done at different times of day, and preferably over an entire school year.
- Where do the students gather before and after school?
- Where do the parents gather before and after school?
- Where do the Physical Education classes gather for outdoor instruction?
- Where do the students spend time at recess? At lunch? (boys, girls, different ages).
- Where are the most popular creative play locations?
- What kinds of activities take place? (soccer, hide and seek, tag, etc.) In which places? Which kids?
- Where do spectators gather to watch sport activities?
- How do students travel across the school property? Is one gate used more than another? (look for areas of worn turf)

REFERENCES AND RESOURCES

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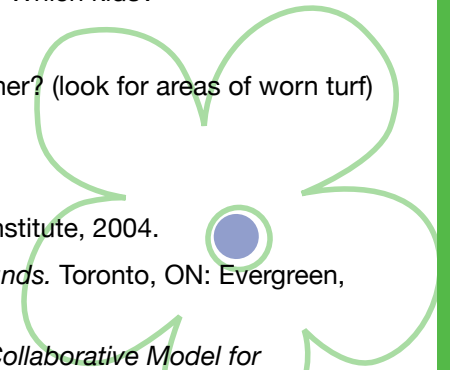
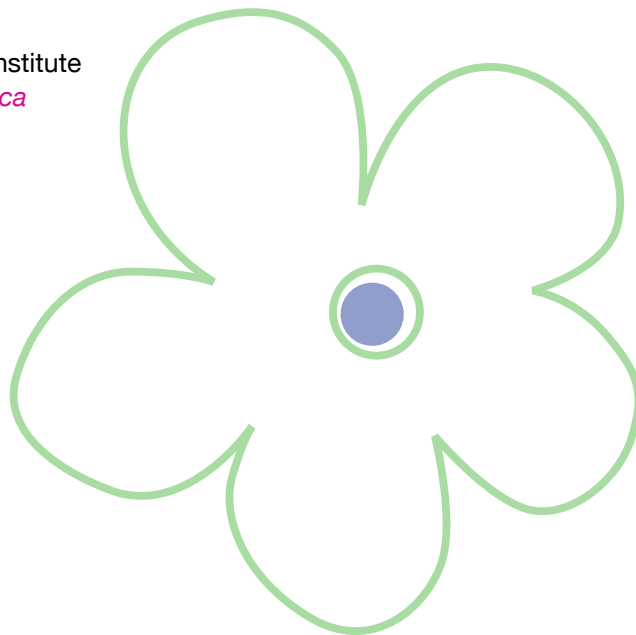
Russell, Liz. *Learning Through Landscapes School Grounds Toolkit - Handbook*. Winchester, Hampshire: Learning Through Landscapes, 1999.

VIDEO

Asking Children Listening to Children. Produced by Ann Coffey. Ottawa, ON: Canadian Biodiversity Institute, 2004

WEBSITES

Canadian Biodiversity Institute
www.biodiversityonline.ca



APPENDIX 3

GRANT PROPOSALS

COMPONENTS OF MOST PROPOSALS

Each funding submission should be tailored to a specific organization, but there many components that are requested by the majority of groups.

PROJECT OVERVIEW: This section should engage the reader and summarize the main elements of the project. Provide a clear, concise description of the type of naturalization project and the results sought.

BACKGROUND ON THE ORGANIZATION: Provide a clear explanation of the type of organization and its mandate, including mission, plans, activities, programs and achievements.

PROJECT RATIONALE: Describe why this project is felt to be necessary, and why your organization should be granted money. Include a statement of need or a statement of the problem. This should demonstrate a good understanding of the issues that the project addresses and how these issues impact the extended community.

PROJECT GOALS AND OBJECTIVES: Explain what the project is intended to accomplish. State the objectives of each goal in a clear and measurable manner. Explain how each objective will be reached.

To assist in supplying this information, use the following as a starting point:

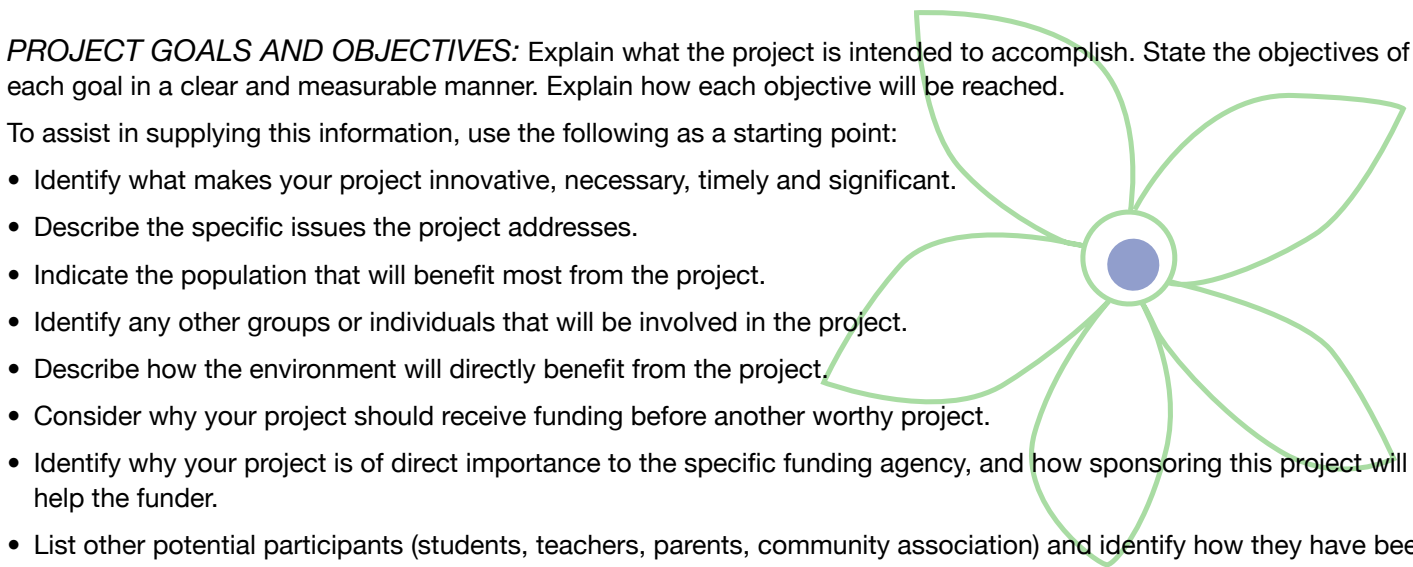
- Identify what makes your project innovative, necessary, timely and significant.
- Describe the specific issues the project addresses.
- Indicate the population that will benefit most from the project.
- Identify any other groups or individuals that will be involved in the project.
- Describe how the environment will directly benefit from the project.
- Consider why your project should receive funding before another worthy project.
- Identify why your project is of direct importance to the specific funding agency, and how sponsoring this project will help the funder.
- List other potential participants (students, teachers, parents, community association) and identify how they have been involved to date, and how they will be involved in the future.
- Ensure that you have identified any constraints that should be anticipated in implementing the project.

ASSETS: Describe the assets your organization brings to the table to ensure success of the project. List the personnel, including volunteers and facilities or equipment that make the organization a natural centre for the project. Include the level of volunteer support you can expect, computer and audio-visual equipment that will assist with the project, the presence of well established environmental clubs, and so on.

WORK PLAN AND TIMELINES: Outline how and when the project will be carried out, including projected start and finish dates, and proposed timelines for the various project phases.

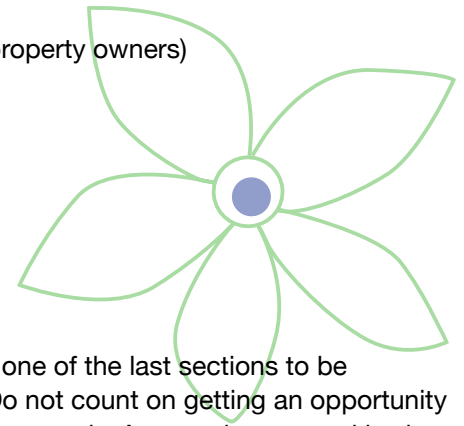
DETAILED BUDGET: Be sure to follow the format outlined by the funder. A project budget should report the total cost estimates related to the installation of your entire project, indicating other sources of anticipated revenue and where this revenue is targeted, as well as donations-in-kind. More information on preparing your budget can be found below.

PROJECT EVALUATION: Explain how the project will be evaluated to determine its impact. Describe how the objectives will be measured and how evaluations will impact the project as it proceeds.



Supporting Material: If funding agencies request specific supporting materials, be sure to include them. They may ask for:

- letters of support (from community and other stakeholders) or agreement (from property owners)
- student letters, drawings, poems, etc.
- copy of the landscape design plan
- proof of tax-exempt status
- photos of the site



KEY POINTS IN DEVELOPING A BUDGET

Budgeting is simply the process of translating the project plan into fiscal terms. As one of the last sections to be prepared, the temptation may be to slap it together, but this will not be sufficient. Do not count on getting an opportunity to amend an ill-prepared budget part way through a project. Invest the time to do it properly. A properly prepared budget indicates the ability of a group to successfully manage the project and its finances. It shows, in black and white, whether a project is practical or not, so make sure the numbers add up.

Each funding agency will have different guidelines for budgets, including allowable expenses and formulas for calculating the value of items such as labour. The proposal writer must be aware of all such regulations and guidelines. Questions to ask the agency are:

- What are allowable direct costs?
- What, if any, indirect costs are allowed?
- Will the donor consider funding the entire project, or just a portion?
- Are matching funds required?
- Do **gifts-in-kind** qualify as matching funds?
- What are the allowable gifts-in-kind?
- What wage rates can be used to calculate the value of skilled and unskilled labour donated to the project?
- Can the budget be adjusted for unplanned developments once the project is approved?
- What are the budget reporting requirements?
- Is the budget going to accompany the narrative of the proposal, or will it be considered separately? If the budget is considered separately, add more details and narrative.

Identify the areas of cost associated with your project.

Budget categories might include:

- personnel (equipment operators, landscape designers)
- supplies and materials (plant material, soil, heavy equipment rental, fertilizer, rock, gardening tools, food, stationary)
- communication (phone calls, digital camera, educational books and videos, photocopying)
- insurance
- resources (guidebooks, videos, workshops)

Most donors want to know how the project will be sustained, financially after the grant money is spent. Some donors consider the ratio of administrative expenses to the costs of the actual work of the organization. For them, you should provide operating reports and financial statements. Typically, the ratio is 20% administration to the 80% item cost.

PROPOSAL CHECKLIST

Spend time re-reading your proposal to confirm all details have been considered. If the answer is yes to these questions, you should have a complete proposal that is ready to go.

- Was the granting agency contacted to describe the project and determine its interest in receiving a proposal?
- Were the guidelines followed, double-checking instructions regarding deadlines, format, headings, number of pages, enclosures, signatures, letters of support, etc.?
- Was the proposal sent before the deadline?
- Will everyone understand what was written? Is it clear, concise and simple?
- Is the project rationale clearly stated, including the emotional appeal?
- Does the funding proposal, as written, tell a good story?
- Does the proposal state the problem clearly, but then focus on the solution?
- Does the proposal show that the project success will be measurable?
- Is it clear what the grant will make possible?
- Have all the skills and resources required to implement the project been described effectively and efficiently?
- Does the budget make sense to everyone who sees it?
- From the perspective of the funding agency, does this proposal indicate the project as valuable to pursue?



APPENDIX 4

DESIGN TIPS FOR SCHOOLYARD NATURALIZATION

DESIGNING FOR CHILDREN

As was explored in the Design section, when it comes to outdoor spaces, the needs of children are unique from those of adults. For example, Wendy Titman in Special Places, Special People found that for children, seating created in a nook or cranny taking advantage of microclimate conditions was valued as places they could escape to. In contrast, seating that was exposed, such as a bench in an open spot, was viewed as something to play on.

Key concepts in creating outdoor spaces for children are diversity, manipulability and opportunities for privacy. In the area of creative play, children need places that stimulate all the senses and offer opportunities for safe challenges, as well as a chance to interact directly with plants and vegetation. In general, it has been determined that children value “found” or discovered spaces more greatly than those designed specifically with them in mind. When designing school grounds, we must leave room for these unscripted, exploratory experiences; some areas must be left more “undesigned”.

DESIGNING WITH NATURE IN MIND

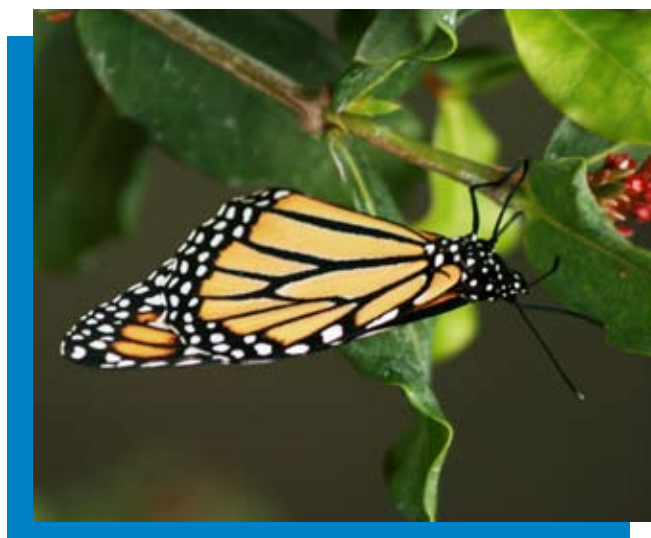
To replicate a piece of nature you must first get a feel for how nature arranges itself. Visit natural areas such as Fish Creek and Bragg Creek Provincial Parks, Sandy Beach, the Canadian Wilds exhibit at the Calgary Zoo, the ecological gardens at the Sandy Cross Conservation Area, and other nearby wilderness areas to experience local habitats. During natural area visits, observe the structure of natural systems such as prairie, aspen woodland, boreal forest and montane regions. Carefully observe how the plants, rocks, logs, topography and other features relate to each other in function and form.

MATURE SIZE OF PLANTS

It is very tempting to try to achieve an instant landscape by installing a large amount of plant material. An over-planted site looks wonderful for the first few years but will rapidly become an overgrown jungle. The plants will choke each other out as they compete, resulting in weak, unattractive plants and a maintenance nightmare. Space young plants out as if they were mature size so they are able to grow to their full potential. At first, the site will look sparse, but once the plants become established and begin to grow you will be glad you gave them plenty of space. You can determine the mature size of the plants by referring to the Plant Lists in Appendix 8 and by consulting plant lists or catalogues from local suppliers.

Remember to consider adding variations in topography through the use of berms or raised beds.

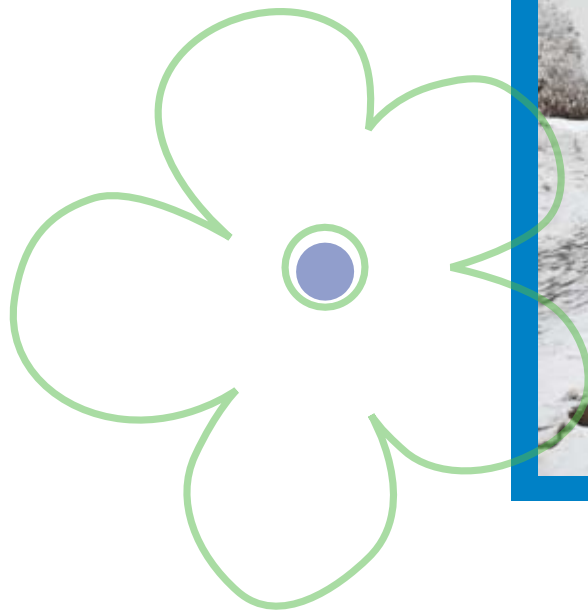
Try to re-create the feeling of the ecosystem you are modelling. When working with a small area, it is even more important to consider the views and select the plant species carefully to build the atmosphere of the natural system. Do not try to do too many things in a small space.



YEAR-ROUND INTEREST

In Calgary, most of the school year falls during the winter months when there are no leaves on the trees and the colourful beauty of the flowers has passed. It is, therefore, very important to find ways of creating winter interest. Begin by selecting plants with diverse shapes, colourful bark, winter berries or **evergreen** foliage. The red stems of red osier dogwood, the yellow stems of yellow twig willow, or the white papery bark of paper birch add interest and colour even in the dead of winter. Shrubs such as western mountain ash keep their bright red clusters of berries throughout the winter, adding colour and interest as well as attracting birds. Evergreens add dramatic shape, wonderful colour and texture to a winter schoolyard, while providing a great backdrop for the winter character of other plants. Grasses and **perennials** can be left standing over the winter to provide food for birds and to add more structure and texture to the winter garden. Keep winter interest in mind when choosing your **hard landscaping** elements as these features will become more prominent in the winter months and can look quite appealing with a coating of snow or frost.

Careful arrangements of plants, especially trees and shrubs, can be used to create microclimates. Look for opportunities to provide shade and create shelter-belts for protection from the wind.



APPENDIX 5

NATIVE PLANTS

WHAT ARE NATIVE PLANTS?

Native plants are those species that are naturally occurring or indigenous to a particular area. Some plant species, such as dandelions, may become naturalized, but are not native as they originated elsewhere and were brought here by human activity.

There is often much hair splitting as to how to define “native plants” (especially with funding agencies). For our purposes, native plants are those that grow within a 50 to 100 kilometre radius and 150 to 300 vertical metres of elevation of a particular location and were present before the arrival of Europeans. The plant stock you choose to buy should ideally be raised locally.

WHY USE NATIVE PLANTS?

Foremost is the fact that plants native to the local region have spent thousands of years developing techniques to survive in the existing climate and growing conditions. As a result of their adaptations to local conditions, native species will require less maintenance, provide a more dynamic landscape, provide more valuable and complex learning opportunities, and are more attractive to local wildlife.

If we look at Calgary as a particular example, native plant species are well suited to the soil conditions and do not require any additional fertilizers. They can handle Alberta’s low moisture levels in summer, and will only require additional water during the summer for the first two to three years until they are well established, provided that each plant has been planted in a site specific to its needs.

Plants native to this area are well adapted to our extreme climatic conditions. Calgary’s winter chinooks and summer snowstorms are hard on plants that have not evolved to deal with these bizarre climatic swings. Native plants will grow and establish faster than most non-natives, and are naturally resilient in the face of severe insect infestations and disease, making the need for pesticides and herbicides unlikely. Their tenacity also means they are able to overcome any initial foot traffic by children.

Native plants will also provide the most appealing food and shelter for birds, butterflies, insects and other wildlife, as they have evolved in harmony with each other. They are also important to the history of the prairies, as many native plant species have traditional medicinal, nutritional and cultural uses.

It is a great idea to regain diverse natural landscapes as an option to traditional manicured landscapes. However, it is important to utilize any existing non-native vegetation on the schoolyard. If there are mature trees and shrubs present, do not remove them because they are not native. Work your naturalization plan around existing vegetation if at all possible.

On a philosophical level, undisturbed areas of native vegetation are becoming more uncommon. With the increased development of Alberta’s landscape, using native plant species provides an “urban retreat” for our disappearing native plants.

DETERMINING APPROPRIATE NATIVE PLANT MATERIAL

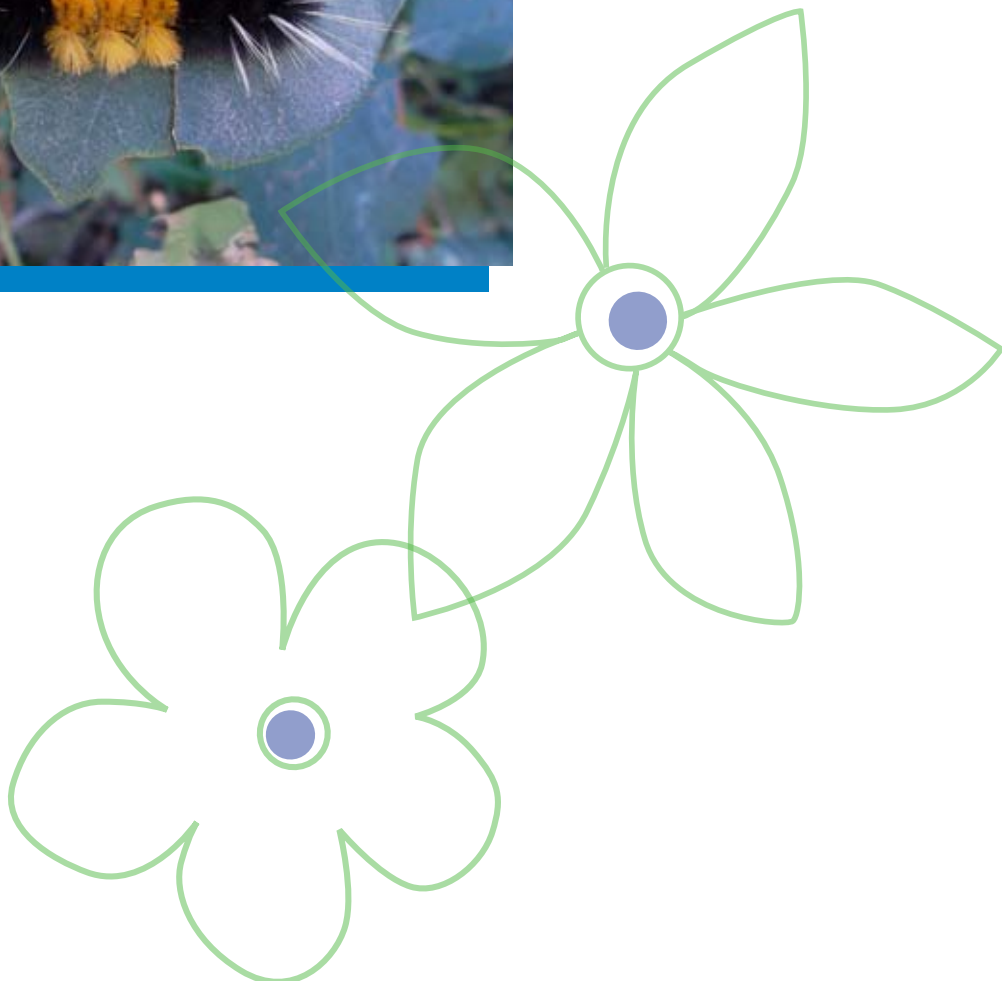
Consider the growing condition of the site when choosing the type of landscape or ecosystem to be replicated. These include factors such as site orientation, sunlight, topography, soil moisture and condition, and wind; all of which will have been investigated in the **Site Inventory**. With this information in mind, pick plants that fit the existing conditions rather than trying to change the conditions to accommodate the plants.

Using information on native plant communities can help you to compile appropriate plant lists. This can be done in two ways:

- Determine the growing conditions and assess the site based on the factors listed above. Decide which natural region fits the site conditions best (Grassland, Parkland and perhaps Rocky Mountain) and also fits the school’s vision, goals and objectives. Then use the Plant Lists as a starting point to select the plants best suited.
- Conduct a study of a nearby natural area with similar growing conditions to the school site. Students can identify native plants (using guidebooks, or with the help of a biologist or horticulturist) and decide which species should be planted in the school project.

It is also appropriate and acceptable to simply use native plant material to create your landscape, without trying to replicate a particular ecosystem. This may be considered less “authentic”, but is still be extremely valuable. This kind of a project would be a “native plant garden”, as opposed to an “ecosystem garden”.

For any research or planning related to native plants, be sure to use the scientific or Latin names. Each plant has only one accurate scientific name (i.e., *Geum triflorum*), but may have several **common names** (old man’s whiskers, prairie smoke). As well, one common name may be used for more than one plant, and may differ from region to region. This will become of particular importance when purchasing plants for the naturalized site.



APPENDIX 6

ECOSYSTEMS AND ECOSYSTEM GARDENS

Alberta is divided into six Natural Regions based on climate and vegetation characteristics, and these are further divided into Sub-Regions. Calgary lies on the border of Parkland Natural Region to the north and west, and the Grassland (or Prairie) region to the south and east. The Foothills and Rocky Mountain (or Montane) regions lie further to the west, as you approach the Rocky Mountains, and the Boreal Forest Natural Region lies to the north. To be more specific, Calgary sits on the border between the Foothills Fescue Grassland and Foothills Parkland Sub-regions. Generally speaking, plants that are found in these subregions would re-create most closely the naturally existing vegetation communities

PARKLAND

The Parkland ecosystem forms a broad belt across the prairie provinces between the warmer, dry Grasslands and the cooler, moister Boreal Forest to the north. It receives more precipitation than the prairies, has lower winter temperatures, fewer chinooks, better snow cover in the winter, and richer soil. Typified by gently rolling hills of grasslands interspersed with groves of trees, this rich region is home to a huge variety of species. The dominant tree types are aspen and balsam poplar, with smaller numbers of white spruce and paper birch. Shrubs associated with the groves include saskatoon, buckbrush, wild rose, wolf willow, chokecherry, willows, dogwood and beaked hazelnut.

The understory includes such flowers as aster, goldenrod, wild vetch, Solomon's seal, pea vine, violets, fairy bells, tall mertensia and cow parsnip



GRASSLAND

The Grasslands lie to the east and south of Calgary, and are characterized by low annual rainfall, high winds and warm winter Chinooks. The climate and poor soil favours grasses, but the rich variety of **herbaceous** material compensates for the lack of trees. Much of the grassland has been altered by agriculture, making this a highly endangered ecosystem. Plants commonly seen in the Grassland around Calgary include fescue grasses, oat grasses, lupines, sticky purple geranium, northern bedstraw and goldenrod. In the western part of this zone, as it merges with the Parkland, trees and shrubs such as poplar, chokecherry, currant and gooseberry are present.

These two ecosystems are excellent options for school ground naturalization in Calgary.

The ecosystems occurring just outside the Calgary area, the Boreal Forest and Rocky Mountain, may also be considered for naturalization projects. Greater care in plant selection is required for these regions, as many of the plants are not adapted to the challenges of the Chinook zone. There are; however, many plant species that overlap into the Grassland and Parkland regions.

ROCKY MOUNTAIN (MONTANE)

The Rocky Mountain region lies to the west of Calgary along the Bow River. This transitional zone in the foothills ranges from forested areas at the base of the Rocky Mountains to lowlands along river valleys. Forested areas are open and

interspersed with grassy areas. The montane area is characterized by extreme temperatures, low rainfall, and strong winds in winter and summer. Forests at the upper elevations consist largely of **coniferous** species including white and black spruce, pines and junipers. At lower elevations the forest is a **deciduous** mix of aspen, poplar and birch. The understory consists of shrubs, with wildflowers growing in their shade. Different species of grasses and **forbs** are found in the open grassy patches.

BOREAL FOREST

The Boreal Forest is the largest ecoregion in the province, located across the north of the province and stretching south between the Rocky Mountain and Parkland regions. It continues to reach across all of Northern Canada, making it the largest terrestrial ecosystem in the world. Winters are cold with summers ranging from warm in the south to quite cool in the north. Precipitation in the form of rain in the summer allows trees to flourish. The resulting tree cover in this region consists of slow-growing black spruce, bog birch and balsam poplar in the more poorly drained areas, and white spruce, aspen poplar and balsam fir in upland sites. Dry sandy areas are inhabited by plants quite different from those found in the wetter bogs and muskegs.

DETAILS FOR ECOSYSTEM GARDENS

What follows are details and descriptions for creating ecosystem gardens. Plants lists for each are found in Appendix 8.

GRASSLAND PLANTING

A prairie planting is best located on a sunny, well-drained site that receives a minimum of six hours of sunlight a day. Slopes will assist with drainage, and those that face south or west are best because they will be warmer and drier. A site that is exposed to winds is also desirable, as wind will spread pollen and dry the plants out after rainfall. The soil does not need to be too rich and may require no **amendments**.

Prairie plantings consist of both grasses and flowers (forbs), perhaps 50-50 of each (the dominance of the grasses distinguishes a prairie from a meadow which consists primarily of flowers). Many of the prairie flowers have deep tap roots which take time to establish but ensure the plant's survival (e.g., prairie crocus, lupine, gaillardia). For the first year or two, root growth will be emphasized over top growth, which may be limited.

Prairie plantings can be classified as **xeric** (dry), **mesic** (medium moisture) or **hydric** (wet). Determine which moisture regime your site falls into and choose plants accordingly. Some plants which are very aggressive should be excluded in the initial planting, and added only once the other plants are well established. Such plants include wild strawberry (*Fragaria virginiana*), wild blue flax (*Linum lewisii*), smooth aster (*Aster laevis*), yarrow (*Achillea millefolium*), goldenrod (*Solidago spp.*), silverweed (*Potentilla anserina*) and northern bedstraw (*Galium boreale*).

Site preparation is essential for the success of a prairie planting. All non-native weeds, especially grasses such as brome grass, quack grass and Kentucky bluegrass must be removed. Planting is best in late spring. The prairie may need to be mowed every few years to remove weeds and dead material. Fertilizing should not be necessary, and may in fact, aid in the growth of weeds and non-native grasses.

Paths through a prairie planting may consist of a mowed path if the planting area is large, bark chips or stone mulch. Bark chips will decompose and need to be replenished every two to three years. Stone or gravel paths may scatter under heavy traffic. Consider whether it is possible to line the paths with black plastic or landscape fabric to prevent weeds.

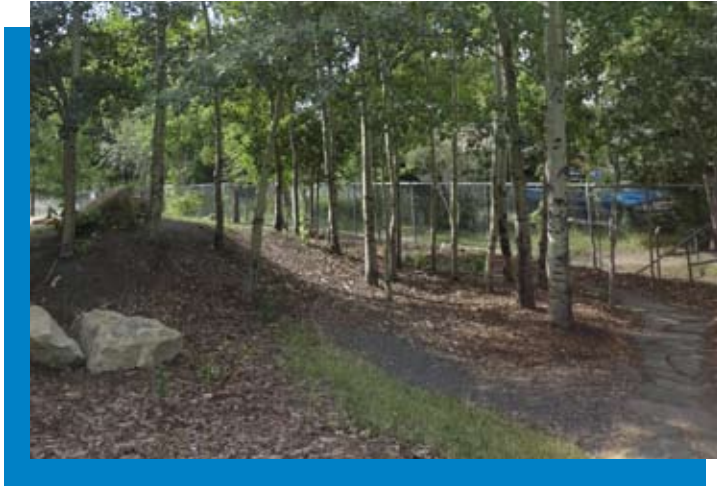
The primary maintenance in a prairie planting is to keep out **annual** and **perennial** weeds (clover, thistle, dandelions) and non-native grasses until the planting is well established. After this, ongoing maintenance likely will be required to keep out aggressive weeds such as sow thistle, goat's beard, Canada thistle and dandelions.



PARKLAND PLANTING (SEMI-SHADED)

A semi-shaded planting might be similar to a Parkland habitat, where a group of trees and shrubs alternate with more open grassy areas. Thus it has elements of both grassland and forest plantings, as the light intensity may range from full sunlight to shade.

A semi-shaded planting can be any size, consisting of only a single large tree in an open landscape, or a grove of trees and shrubs. Most of the native trees and shrubs will form dense thickets with time. If planting around existing trees, care must be taken not to disturb the roots. The roots of most trees are in the top 12 inches of soil in an area ranging from the trunk to at least as far as the canopy edge.



As with the prairie planting, paths can be made of wood chips, stone mulch or gravel. Site preparation similar to that for a prairie planting will be necessary, in that removal of weeds and non-native grasses is imperative. The primary maintenance task will be to keep out invading weeds and controlling those shrubs which are aggressive. Mulch will need to be periodically replenished.

PARKLAND PLANTING (SHADED OR WOODLAND)

The most important aspect of a woodland planting is the creation of different layers of vegetation: mature trees providing a continuous canopy of **foliage**; a middlestory of smaller trees, shrubs, and vines; and a groundcover of wildflowers growing in the dappled

shade. A woodland can take years to establish if mature trees are not present.

The site conditions must be carefully assessed, including light, moisture and wind (many woodland plants require protection from the wind). The soil may have to be amended by adding **compost**, decayed leaves, or peat moss so that it is rich in nutrients and **humus**. The soil must also have good moisture retention and friable texture. Clay soils tend to become over compacted and wet so will need amendment.

To help establish the woodland effect, old logs and stumps, split log benches, and wood chip paths or stepping stones can be added. To best emulate nature, the planting should not follow a rigid pattern, but plants should be planted in drifts. Wildflowers should be planted to mimic how they appear in nature. Some flowers appear in clumps, some are scattered. Repeat the same plants within the landscape, keeping the total number of species low, rather than using many different species.

EDGE PLANTING (BETWEEN PARKLAND AND GRASSLAND)

Vegetation edges occur wherever moisture, soil, slope or other environmental factors change abruptly, causing a difference in planting communities over a short distance. For example, close to a building the growing conditions may be shady and moist. Within a few metres, the conditions may change to windy and sunny. Plantings in such situations should reflect these changes.

In a naturalized planting the edge should not look artificial, such as a straight line of spruce or a hedge adjacent to closely mowed grass or a rectangular prairie planting. The edge can be softened or naturalized by blending the two plantings both horizontally and vertically. Horizontal lines which are meandering and irregular, as opposed to straight lines, will create a more naturalized look. Avoiding plants with uniform vertical heights and dominating vertical forms and choose those with horizontal branching habits.

Plants which will tolerate both sites can be placed at the edge to help blend the planting. For a woodland edge, take into account which direction the edge faces. If it faces south and west, more sun and drought tolerant plants can be placed at the edge. If facing north and east, more shade and moisture tolerant plants would be suitable.

ROCKY MOUNTAIN (MONTANE) AND BOREAL PLANTINGS

The Rocky Mountain and Boreal regions are more problematic to replicate in Calgary. Both are home to subregions typified by characteristics such as higher elevations, more northerly latitude, acidic or boggy sites, and rocky exposures. Plants that populate these areas require specific growing conditions that may be difficult for schools to provide. That being said, both the Rocky Mountain and Boreal regions are home to plants that also inhabit the Grassland and Parkland regions, as well as many plants that have been successfully cultivated in Calgary in the past. These are the plants that have been included in the plant lists.

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APPENDIX 7

WILDLIFE ENRICHMENT AND WILDLIFE GARDENS

The potential for attracting wildlife adds purpose and excitement to any naturalized site. Generally speaking, the colonization of new habitats will be more likely in proximity to established populations, but the following guidelines and principles will significantly increase the potential for success. Very few creatures survive in a mowed lawn environment. A wildflower/ native grass meadow, on the other hand, provides habitat for numerous birds, insects (and therefore bats), rodents and other creatures.

Wildlife you may be able to attract includes garter snakes, bees, beetles, spiders, bats, squirrels, mice, butterflies, moths and birds. A great research project for kids is to determine what kinds of birds, butterflies, insects, etc., they can attract to their naturalized site.

Nature is built upon a multitude of complex interdependencies. The more your site reflects the variety of the natural world, the better it will support birds and other wildlife.

ECOLOGICAL PRINCIPALS

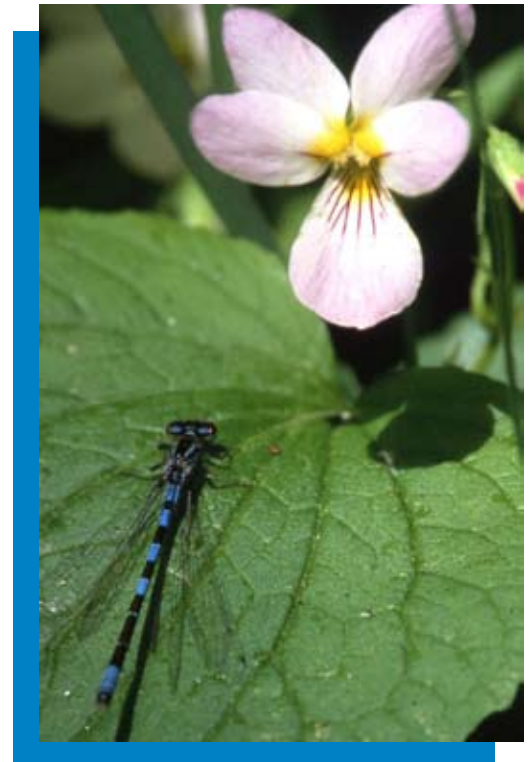
Space: Given the size of most school grounds, you have an amazing opportunity to provide a significant amount of space to attract local wildlife. Think in three dimensions; various kinds of wildlife use the area from the depths of the soil, to the tops of the trees, and everything in between. Keep in mind the size of habitat ranges required by different animals. This will help you to be realistic when considering the types of wildlife you hope to attract.

Food: Food for wildlife can be naturally occurring or supplemented by humans. Plant-based food includes **nectar**, berries and other fruit, seeds, nuts, leaves, buds, twigs, bird feed and suet, and animal-based food (e.g., If you get insects they will attract bats).

Shelter and Places to Raise Young: To create shelter, trees should be planted in clusters. Secured dead trees and snags are great for woodpeckers and cavity-nesting creatures. Elsewhere on the site, habitat can be created with nest boxes, bat boxes, dense shrubs and hedges, dry stone walls and rock piles, leaf litter, mossy logs and dead branches, wood and brush piles, long grass and wildflowers.

Water: All wildlife requires plentiful food and shallow, clean water located in a protected, sunny spot near shelter from weather elements and predators. Try to include an element of water, but note that neither major Calgary school boards allow ponds or water features. However, this does not preclude birdbaths or rocks with natural basins, or small mud puddles for butterflies. Although different species will have some specific needs, by applying the following principles to the design, the site will be more attractive to local wildlife species.

Diversity: A site designed to attract wildlife should display both structural and botanical diversity. Plan for a good mix of vegetation; **evergreen** and **deciduous** plants, **woody** and **herbaceous** plants, young and mature plants, tall and short species, nectar plants, seeds, nuts, berries, grasses and flowering plants. Look for opportunities to modify the existing flat landscape by adding **berms**, basins, logs, rocks, etc. These elements will add structural diversity in size, shape and materials.



If you can join your schoolyard to a nearby green space, you will create greenways or wildlife habitat by linking the two areas.

Layering: Plants naturally grow in many layers, providing diversity in habitat, particularly for birds, bats and other woodland creatures. To create layers, place the tallest trees at the edge, with smaller deciduous trees, tall shrubs, lower shrubs and ground cover towards the inside. Shelterbelts create great habitats.

Edges: Edges occur where one type of wildlife habitat meets another, where trees and shrubs meet a stream or meadow, or where grassland meets parkland. Even leaving a band of un-cut grass along a fence line can provide animals with food and shelter.

Native Plants: The best way to attract the “locals” is to provide them with native plants. Do not collect native plants from the wild. The destruction of natural habitat is the number one cause of declining animal populations. Instead, purchase native plants that are nursery propagated, native plant seed, or rescue native plants that are threatened by development.

WILDLIFE GARDENS

What follows are tips for the most popular wildlife gardens; those that attract butterflies and birds.

BUTTERFLY GARDEN

Butterflies have long fascinated people with their beautiful colours and magical transformation from earthbound caterpillars to winged adults. There are about 150 different species of butterflies in Alberta. For your area, you can attract them by providing food for adult butterflies (nectar), larvae or caterpillars. To feed caterpillars, you must be willing to tolerate some damaged leaves, etc.

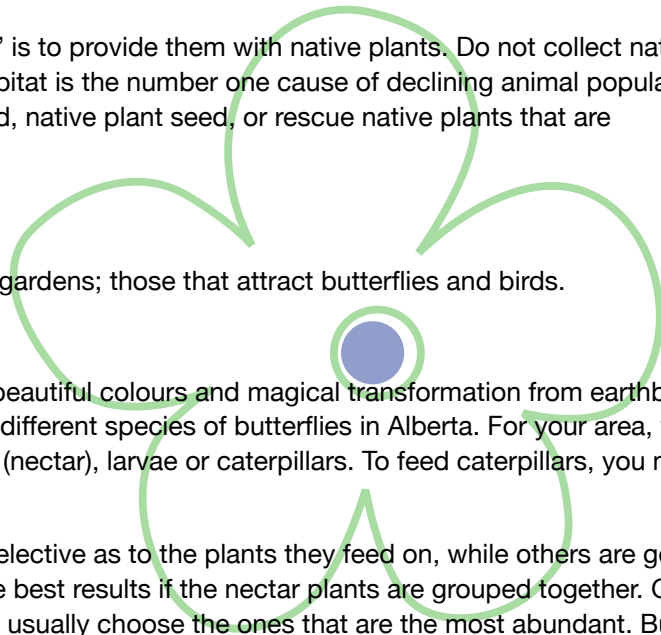
Grow nectar plants: Many butterfly species are selective as to the plants they feed on, while others are generalists, feeding on a wide variety of plants. You will get the best results if the nectar plants are grouped together. Given the choice of equally appealing flowers, butterflies will usually choose the ones that are the most abundant. Butterflies will frequent your site more often if there is a constant food source from nectar-providing flowers throughout the entire summer. Also, select nectar plants of varying heights, as smaller butterflies prefer lower flowering plants while larger butterflies generally prefer taller flowering plants. Researching the appropriate plant species for the local butterflies is a great project for kids. Butterflies prefer single, tubular-shaped flowers, especially in yellow, red or blue colours.

Grow food plants for caterpillars: If you want butterflies, you need to feed the caterpillars (the **larval** stage of butterflies) as well. They require a different menu than the adults. Caterpillars eat the leaves and sometimes the flowers and seeds of a variety of plants. They are often highly selective in their tastes and some species only eat one species of plant. By planting the appropriate larval food plants, you also attract female egg-laying butterflies. Determining which plants are used by the larval stage of local butterflies is also an excellent research project for students.

Choose a sunny location: Sun is extremely important for butterflies. Butterflies need sun to warm their bodies for flight, as they can only fly effectively when their body temperature is between 29 and 38°C. If the air temperature is lower, butterflies must bask in the sun until their body warms up sufficiently. Rocks and evergreens also absorb heat and provide a place for butterflies to bask.

Provide shelter: Locate your site where it is protected from the wind. This helps butterflies in two ways: the breeze does not cool them, and they do not expend extra energy fighting the wind as they feed, mate, and lay eggs. Warm, protected areas are especially important in the spring and fall when the nights are colder and it takes the butterflies longer to warm up. Butterflies winter in small woodpiles and hollow tree stumps. Wooden bird boxes without a hole and with no bottom provide shelter from predators for over-wintering butterflies.

Examples of shrubs and trees that support wildlife are gooseberry, juniper, saskatoon, raspberry, willow, poplar, mountain ash, wild rose and chokecherry. Many flowers are popular with wildlife such as annual sunflowers, columbine, coneflowers and aster.



Male butterflies are attracted to mud puddles, where they sip the nutrients necessary for the optimum functioning of their reproductive systems.

Not as much attention is paid to moths, but do not discard their importance in your naturalized area. A rotting fruit mixture attracts both butterflies and moths. Mash a banana with a blob of molasses, a spoonful of sugar and yeast. Let this sit in a warm spot for a couple of days and then smear the mix on a tree.

A butterfly garden will also attract other nectar eaters such as hummingbirds, bees and moths.



Think about forming wildlife-watching or bird-watching clubs with students.

Do not use pesticides or insecticides: Butterflies are insects, so any chemicals that kill insects will also kill butterflies. Remember, caterpillars are part of the butterfly life cycle and are easily killed with pesticides.

BIRD GARDENS

Food: Birds eat a wide array of things: seeds, fruit, flowers, leaves, nectar, insects, earthworms, invertebrates, amphibians, reptiles, fish, mammals and even other birds. It will be difficult to directly affect the amount of animal-based bird food on your site, but you can make your site more attractive to such animals by planting a variety of native plant groups. Try creating diversity with as many different food plants as possible. It will become important to allow the herbaceous plant material to stand over the winter, to allow birds to take advantage of this food source, and it may be necessary to supplement the plant material with bird feeders.

Water: Birds find water irresistible, especially the sound of moving water. Like all animals, birds need water for drinking but they also need water for bathing. Try using a very shallow birdbath. The sound of moving water can be created simply by hanging a bucket in a tree and punching a hole in it allowing water to drip out into a container from which birds can drink from and bath in. Remember to rinse out your birdbath regularly so birds have fresh, clean water. Place your birdbath where there is nearby shelter so the birds feel safe from predators and keep the bird bath depth to only a couple of inches. Birdbaths can be made out of any material and can be either hanging in a tree or on the ground. Be creative and have some fun.

Shelter and Nests: Birds need shelter from rain, snow, sun, wind and predators. Evergreens provide excellent shelter from rain, wind and snow. Deciduous trees and shrubs provide ideal protection from the summer heat by creating dappled shade and allowing the cool breeze to pass through as the birds rest on the branches. Birds also need trees and shrubs near feeders and water so they can make a quick retreat at the first sign of predators.

Birds need places to build nests and raise young. Different species nest in different habitats and in different locations within those habitats. Some birds nest on the ground amongst tall grass, others in shrubs with an appropriate branching structure. Some suspend their nests from drooping branches over open areas, while others use holes in dead trees. Therefore, you need many diverse nesting opportunities to attract a variety of nesting birds. Why not have the students research what types of habitats and where in those habitats, Calgary birds nest?

HUMMINGBIRD GARDEN

The ideal plants to attract hummingbirds are those with tubular or trumpet shaped flowers. Hummingbirds prefer large solitary flowers or loosely clustered blossoms that droop and

that are bright red, orange or hot pink in colour. The scent of the flower is not important, as hummingbirds depend on sight. They also eat soft-bodied insects (aphids, spiders, etc.). The reality of attracting hummingbirds within Calgary is your location. If you are within a few wing beats of the river, you can probably attract hummingbirds. It also helps if you can provide blooms all season long, from early May until late August or early September.

Plants lists for these gardens are included in Appendix 8.

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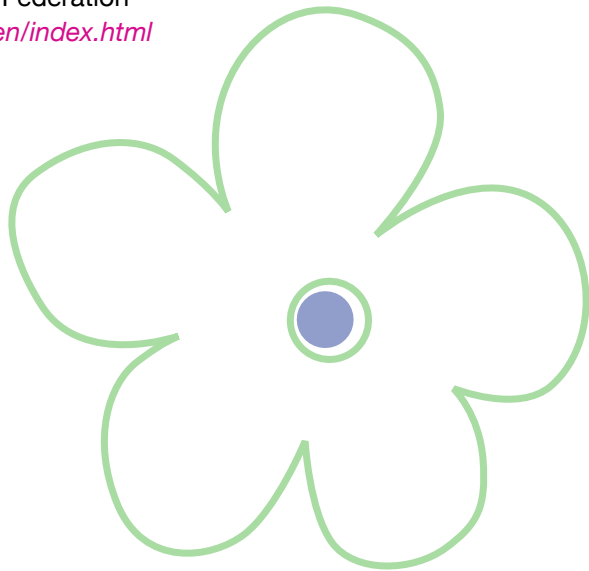
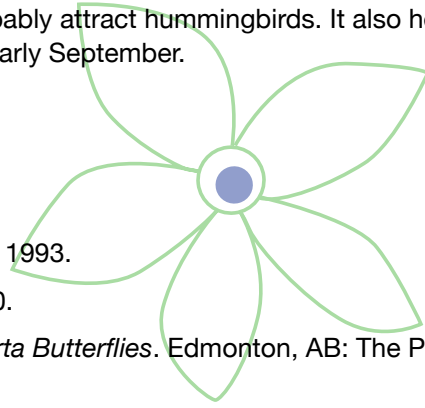
www.naturecanada.ca

National Wildlife Federation (USA) – Garden for Wildlife

www.nwf.org

Canadian Wildlife Federation

www.cwf-fcf.org/en/index.html



APPENDIX 8

PLANT LISTS

NATIVE PLANTS TO USE WITH CARE

TREES AND SHRUBS

Most native trees and shrubs will naturalize and spread to some degree. However, the following three are very aggressive and should be used accordingly: *Elaeagnus commutata* (wolfwillow), *Symphoricarpos occidentalis* (buckbrush), *Salix exigua* (sandbar willow) and wild rose species (*Rosa acicularis* & *Rosa woodsii*). Other shrubs with spreading growth habits have been noted as such in the plant lists.

Several shrubs have berries that are poisonous and so should be used with caution. *Sambucus racemosa* var. *melanocarpa* (black elderberry) berries are edible, while those of *S. racemosa* var. *pubens* (red elderberry) are poisonous when raw. It should also be noted that the bark, stems, leaves and roots of elderberries are considered poisonous. *Symphoricarpos alba* (snowberry) berries are also poisonous. All parts of *Prunus virginiana* (chokecherry) and *Prunus pensylvanica* (pin cherry) are poisonous, except the flesh of the cherry. The stones should not be consumed when eating the fruit. Any trees or shrubs with poisonous qualities have been indicated as such in the plant lists. It should be noted that all the above plants have been used in Calgary schools without incident.

GRASSES

Some grasses are bunch grasses, indicating a **fibrous** root system. These grasses grow into large clumps, discreet in size. Other grasses have a **rhizomatous** root system that allows the plant to spread over a large area through its aggressive roots. Grasses which spread by **rhizomes** can quickly overtake a site and should be used in small numbers, with caution, or not at all. Most of the wheat grasses (*Agropyrons* spp.) and sweetgrass (*Hierochloe odorata*) are rhizomatous grasses. As well, many of the non-native grasses, such as brome, quack grass and Kentucky bluegrass are also rhizomatous. It is essential to completely eradicate these non-native grasses before trying to establish native grasses. Non-native grasses must be prevented from invading native plantings, as they will take over.

PERENNIALS

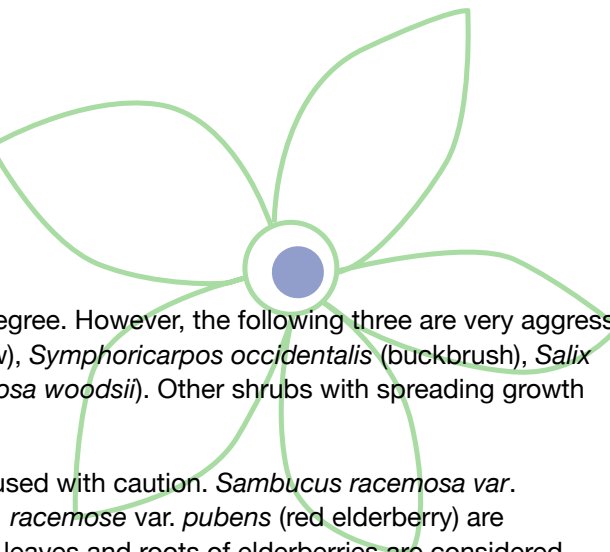
Some **perennials** are very aggressive, due either to rhizomatous root systems, their ability to set huge amounts of seed, or both, and can quickly overtake a site. Research the aggressiveness of the perennials you have selected before finalizing your plant list. If you want to add aggressive perennials, perhaps wait until the planting is well established and then add these plants. The following should be used with caution: *Epilobium angustifolium* (fireweed), *Achillea millefolium* (yarrow), *Helianthus annuus* (annual sunflower) and *Solidago* spp. (golden rod). Other perennials that have aggressive tendencies are marked as such in the plant lists.

Several wildflowers are poisonous and should be used with caution. Any of the **forbs** included in the plant lists and noted as being poisonous, are only mildly so. Large quantities would need to be consumed to cause any serious reaction. Many schools in Calgary have had these plants on their school properties with no incidents.

THEME GARDEN PLANT LISTS

These plant lists are intended to be used as a starting point for the selection of plant material for your naturalized site. They are not exhaustive, but instead have been compiled by choosing plants that are reliable in the Calgary area and are readily available from local native plant suppliers (see list at the end of this appendix). Because of the special circumstances that exist when working on school properties, there are some general exclusions to the lists:

- plants with significant thorns
- plants that require very specific soil regimes that are challenging to recreate, such as acidic or boggy conditions



Take advantage of the opportunity to investigate the various survival strategies of plants, such as spreading root systems and prolific seed production.

- water plants - because the school boards do not allow ponds, these plants are not included
- poisonous plants- with the exception of those that are considered only mildly poisonous and are commonly found on other school properties

Be aware also of nut allergies of students. For this reason, some Calgary area schools have decided not to include *Corylus cornuta* (beaked hazelnut) in their planting plans.

For **herbaceous** plant material, the height of the plant has been provided, but no width or spread has been given. In general, unless it is specifically noted that the plant creeps or spreads, grassland and parkland species tend to be fairly well behaved. They can be planted at a distance equal to their height (i.e., closer for smaller species, further apart for larger). For **woody** plant material (trees and shrubs), a width or spread has been given, but these should be used as a guideline only. The actual spread at maturity will vary greatly depending on the conditions at the site. The information provided on “Exposure” and “Soil/Moisture Conditions” indicates the preferred growing conditions of the plant. It has also been noted if the plant can handle extreme dry conditions by including “DT” to indicate drought tolerance. If no information is provided, the plant will generally survive in a wide variety of conditions. Legumes are identified because of their ability to fix nitrogen from the soil.



PLANT LISTS (SEE FOLLOWING PAGES)

WEBSITES

NATIVE PLANT SOURCES

The Alberta Native Plant Council

www.anpc.ab.ca

An excellent Native Plant Source Guide is available for downloading, listing information by supplier, services, and species.

ALCLA Native Plant Restoration Inc

www.alclanativeplants.com

Bow Point Nursery Ltd.,
Calgary, AB

www.bowpointnursery.com

GRASSLAND PLANTING

		HEIGHT	WIDTH	EXPOSURE full sun=FS shade=Sh part shade=PSh	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesic	WILDLIFE VALUE hummingbirds=HB birds=B butterflies=Bfly larvae=L	NOTES
SHRUBS							
<i>Artemisia cana</i>	segebrush	50-150 cm	1 m	FS	X, DT		silver leaves
<i>Comus stolonifera</i>	red twig dogwood	1-3 m	2.5 m	FS to PSh	M, H	L, B	synonym C. sericea; lower branches will root to ground
<i>Elaeagnus commutata</i>	silverberry, wolf willow	3 m	spreads	FS to PSh	X, M		spreads by stolons; may be aggressive
<i>Juniperus communis</i>	common juniper	1 m	3 m	FS	X, M, DT	B	blue, berry-like cones
<i>Juniperus horizontalis</i>	creeping juniper	10-40 cm	3 m	FS	X, DT	B	blue, berry-like cones
<i>Potentilla fruticosa</i>	stubby cinquefoil	70-100 cm	90 cm	FS	X, M, DT	Bfly	yellow flowers
<i>Rhus trilobata</i>	three lobed sumac, skunkbush	1-2 m	1.5 m	FS	X, M	B	good fall colour; spreads by rhizomes; yellow flowers; red fruit
<i>Ribes aureum</i>	golden currant	1-2 m	1.5 m	FS	M	Bfly, HB, B	yellow flowers; red fruit
<i>Ribes oxycanthoides</i>	wild gooseberry	1 m	1 m	FS to PSh	M, H	HB	white flowers; red-purple berries; dense prickles
<i>Rosa acicularis</i>	prickly rose	50-150 cm	spreads	FS	M, DT	B	pink flowers; prickles, Alberta's floral emblem
<i>Rosa arkansana</i>	prairie rose	20-45 cm	spreads	FS	X, M	B	pink flowers; prickles; single stem growth habit
<i>Salix bebbiana</i>	Bebb's willow, beaked willow	4 m	3 m	FS to PSh	M, H	Bfly, L	
<i>Symphoricarpos occidentalis</i>	buckbrush	50-150 cm	1 m	FS	X, M, DT	Bfly, B	pink-white flowers; white fruit; suckers readily, may be aggressive

GRASSES (all are bunch-forming except where noted)

<i>Bouteloua gracilis</i>	blue grama grass	10-40 cm	10-40 cm	FS	X, DT	B	may form thick mats by tillering; seed heads are curved
<i>Danthonia parryi</i>	prairie oat grass, parry oat grass	30-60 cm	30-60 cm	FS	X	B	densely tufted growth habit; resists trampling
<i>Festuca scabrella</i>	rough fescue	30-90 cm	30-90 cm	FS to PSh	M	B	synonym F. campestris; forms large, dense, tussocks
<i>Hierochloa odorata</i> (rhizomatous)	sweetgrass	30-60 cm	30-60 cm	FS to PSh	X, M, DT	B	spreads vigorously through deep rhizomes
<i>Koeleria macrantha</i>	June grass	20-50 cm	20-50 cm	FS to Sh	X, M, DT	B	significant silver-green seed heads
<i>Stipa comata</i>	needle and thread	30-80 cm	30-80 cm	FS	X, DT	B	synonym <i>Hesperostipa comata</i> ssp. <i>comata</i>
<i>Stipa richardsonii</i>	Richardson's needle-grass	50-100 cm	50-100 cm	FS	M	B	densely tufted growth habit
<i>Stipa viridula</i>	green needle grass	40-90 cm	40-90 cm	FS	X, M, DT	B	

FORBS (Wildflowers)		BLOOM TIME	BLOOM COLOUR	HEIGHT	EXPOSURE full sun=FS shade=Sh part shade=PSH	SOIL MOISTURE CONDITIONS drought (oleari)=DT X=eric H=hygric M=mesic	WILDLIFE VALUE hummingbirds=HB birds=B butterflies=Bfly larvae=L	NOTES
<i>Achillea millefolium</i>	common yarrow	Aug/Sept	white	70 cm	FS	X,M, DT	Bfly	spreads through seeds and rhizomes; may be aggressive
<i>Allium cernuum</i>	nodding onion	June/July	pink or white	10-50 cm	FS to PSh	M	HB; Bfly	bulb; self-seeds
<i>Allium textile</i>	prairie onion	June/July	white	5-30 cm	FS	X	Bfly	bulb
<i>Anemone cylindrica</i>	long-fruited anemone, thimbleweed	April/May	white	20-80 cm	FS	X,M		poisonous; woolly seedhead
<i>Anemone multifida</i>	cut-leaved anemone	April/May	yellow	10-50 cm	FS	M		poisonous
<i>Anemone patens</i>	prairie crocus, windflower	April/May	mauve	20-40 cm	FS	M		poisonous; blooms while snow still on ground
<i>Antennaria aprica</i>	low pusstoos, low everlasting	Aug/Sept	white	15 cm	FS	X		low, mat forming
<i>Antennaria parvifolia</i>	small-leaved pussytoes	Aug/Sept	white	10-25 cm	FS	X,M		low, mat forming
<i>Arnica chamissonis</i>	leafy arnica	June/July	yellow	20-80 cm	FS	M,H		
<i>Artemisia frigida</i>	pasture sage, prairie sage	June/July	yellowish	10-40 cm	FS	X, DT		silvery grey; aromatic
<i>Artemisia ludoviciana</i>	prairie sage	Aug/Sept	white	30-60 cm	FS	M		silvery grey; aromatic; spreads to form colonies
<i>Aster folcatus</i>	creeping white prairie aster	June/July	white	30-80 cm	FS	X,M		spreading; may form mats
<i>Aster laevis</i>	smooth aster	Aug/Sept	blue	40-100 cm	FS	M		
<i>Astragalus aboriginum</i>	milk vetch	June/July	white w purple	10-40 cm	PSh	X,M		poisonous; legume
<i>Astragalus crassicaarpus</i>	milk vetch	June/July	mauve	10-15 cm	PSh	X,M		poisonous; legume
<i>Astragalus missouriensis</i>	missouri milk vetch	June/July	blue/purple	20-100 cm	PSh	X,M		poisonous; legume
<i>Campanula rotundifolia</i>	common harebell, bluebell	June/July	blue/purple	20-40 cm	FS	X,M		
<i>Chrysopsis villosa</i>	hairy golden aster	Aug/Sept	yellow	20-50 cm	FS	X		synonym <i>Heterotheca villosa</i> ; brown flower centers
<i>Clematis integrifolia</i>	western white clematis	Aug/Sept	white	3-6 m	FS to PSh	M		semi-woody vine, aggressive climber
<i>Clematis verticillaris</i>	blue clematis	April/May	blue	2 m	FS to PSh	M		synonym <i>C. occidentalis</i> ; spreads in underbrush or climbs trees
<i>Cleome serrulata</i>	pink bee-plant	June/July	pink/white	30-80 cm	FS	X,M		annual; self-seeds
<i>Delphinium bicolor</i>	low larkspur	June/July	blue/purple	20-50 cm	FS	X,M		poisonous (especially the seeds)
<i>Erigeron glabellus</i>	smooth fleabane	June/July	blue or pink	10-50 cm	FS	M		may be a biennial
<i>Erigonum umbellatum</i>	umbrella plant	June/July	pale yellow/white	10-30 cm	FS	X, DT		
<i>Fragaria virginiana</i>	wild strawberry	April/May	white	5-25 cm	FS to PSh	M,H		spreads by stolons; aggressive but easy to control
<i>Gallardia aristata</i>	blanket flower, red-eyed Susan	June/July	yellow	30-60 cm	FS	X,M, DT		red flower centers
<i>Gallium boreale</i>	northern bedstraw	June/July	white	30-60 cm	Sh	M,H		spreads; aggressive but easy to control
<i>Geranium viscosissimum</i>	sticky purple geranium	June/July	rose-purple	20-90 cm	PSh	M,H		
<i>Geum triflorum</i>	old man's whiskers, prairie smoke	Aug/Sept	reddish-purple	20-40 cm	FS to PSh	X,M,H		woolly seedheads, evergreen ground cover
<i>Glycyrrhiza lepidota</i>	wild licorice	June/July	cream	30-100 cm	Sh	M,H		legume; spreads readily through rhizomes and seeds
<i>Hedysarum alpinum</i>	American sweet vetch	June/July	pink/purple	20-70 cm	FS	X,M, DT		legume
<i>Hedysarum boreale</i>	northern sweet vetch	April/May	reddish-purple	20-60 cm	FS	X,M, DT		legume
<i>Helianthus annuus</i>	annual sunflower	Aug/Sept	yellow	50-120 cm	FS	X,M		annual; self-seeds readily; red flower centers
<i>Heterotheca villosa</i>	see <i>Chrysopsis villosa</i>							
<i>Heuchera richardsonii</i>	alum-root	April/May	purplish	30-40 cm	FS	M,H		HB; Bfly
<i>Liatris punctata</i>	blazing star	Aug/Sept	purple/pink	20-60 cm	FS	X		Bfly; B
<i>Linum lewisii</i>	wild blue flax	Aug/Sept	blue/purple	20-70 cm	FS	X,M, DT		synonym <i>L. perenne</i> ssp. <i>lewisii</i> ; spreads aggressively by seed, but easy to control
<i>Lithospermum rudrale</i>	yellow puccoon, stone-seed	June/July	yellow	20-50 cm	FS	M,H		Bfly
<i>Lupinus argenteus</i>	silvery lupin	June/July	light violet	50-100 cm	PSh	X,M, DT		HB; Bfly; L
<i>Lupinus sericeus</i>	silky lupin, wild blue lupin	June/July	blue/purple	40-80 cm	PSh	X,M, DT		HB; Bfly; L

FORBS (Wildflowers)

		BLOOM TIME	BLOOM COLOUR	HEIGHT	EXPOSURE full sun=FS shade=Sh part shade=PSH	SOIL MOISTURE CONDITIONS drought tolerant=DT X-xeric: H-hygic M=mesic	WILDLIFE VALUE hummingbirds=HB birds=B butterflies=Bfly larvae=L	NOTES
Monarda fistulosa	wild bergamot, bee balm	June/July	rose or lilac	30-70 cm	FS	M	HB; Bfly	biennial, blooms in at night; fragrance attracts moths
Oenothera biennis	evening primrose	June/July	yellow	50-150 cm	PSh	M	Bfly; B	poisonous; low growing; legume
Oxytropis monticola	late yellow locoweed	June/July	yellow	30 cm	FS	X,M	B	poisonous; low growing; legume
Oxytropis sericea	early yellow locoweed	April/May	pale yellow	30 cm	FS	X	B	poisonous; low growing; legume
Oxytropis splendens	showy oxytropis	April/May	purple	30 cm	FS	X	B	poisonous; low growing; legume; silvery green leaves
Penstemon confertus	yellow beardtongue	June/July	yellow	10-50 cm	FS	M,H	HB; Bfly; B	
Penstemon nitidus	smooth blue beardtongue	June/July	blue	20-30 cm	FS	X	HB; Bfly; B	
Petalostemon purpureum	purple prairie clover	June/July	purple or rose	30-80 cm	FS	X, DT		very adaptable; legume
Potentilla anserina	silver weed	June/August	yellow	10-20 cm	PSh	M,H		synonym Argentina anserina; low ground cover, spreading rapidly through stolons
Potentilla gracilis	graceful cinquefoil, slender cinquefoil	June/July	yellow	30-70 cm	FS	M		
Primula incana	mealy primrose	June/July	white to lilac	10-40 cm	PSh	M		
Ratibida columnifera	yellow prairie coneflower	Long	yellow	30-50 cm	FS	X,M, DT	Bfly	short-lived perennial; self-seeds; flower has brown cone
Rumex crispus	veined dock, wild begonia, sorrel	April/May	greenish	10-40 cm	FS	X	L	spreads readily through seeds and rhizomes; don't consume in large quantities
Sisyrinchium montanum	blue-eyed grass	April/May	blue/purple	10-50 cm	PSh	M		
Solidago canadensis	Canada goldenrod	Aug/Sept	golden yellow	30-90 cm	FS	X,M, DT	Bfly; B	not an allergy problem; spreads aggressively through seeds and rhizomes, but easy to control
Solidago missouriensis	prairie goldenrod, Missouri goldenrod	Aug/Sept	yellow	30-50 cm	FS	X,M	Bfly; B	spreads aggressively through seeds and rhizomes, but easy to control
Thalictrum venulosum	western meadow rue, veiny meadow rue	June/July	greenish white	20-100 cm	Sh	M,H		synonym T. venosum; spreads aggressively through seeds and rhizomes, but easy to control
Thermopsis rhombifolia	golden bean	April/May	golden yellow	10-40 cm	FS	M		spreads aggressively through seeds and rhizomes, but easy to control; poisonous

PARKLAND PLANTING

	HEIGHT	WIDTH	EXPOSURE full sun=FS shade=Sh part shade=PSH	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygic M=mesic	WILDLIFE VALUE hummingbirds=HB birds=B butterflies=Bfly larvae=L	NOTES
TREES						
<i>Populus tremuloides</i>	20 m	8 m	FS	M, DT	B, Bfly, L	forms colonies through suckers from roots
<i>Prunus virginiana</i>	10 m	8 m	FS	M,H, DT	B, Bfly, L	poisonous except for flesh of berries; multi-stemmed

SHRUBS

<i>Amelanchier alnifolia</i>	3-6 m	2 m	FS to PSh	X,M, DT	B, L, Bfly	forms colonies through stolons
<i>Cornus stolonifera</i>	1-3 m	2.5 m	FS to PSh	M,H	L, B	synonym <i>C. sericea</i> ; lower branches will root to ground
<i>Corylus cornuta</i>	1-3 m	2 m	PSH	M	B	hard shelled nut
<i>Elaeagnus commutata</i>	3 m	spreads	FS to PSh	X,M	Bfly	forms thickets through rhizomes; silver leaves and berries
<i>Juniperus communis</i>	1 m	3 m	FS	X,M, DT	B	blue, berry-like cones
<i>Juniperus horizontalis</i>	10-40 cm	3 m	FS	X, DT	B	blue, berry-like cones
<i>Lonicera dioica</i>	1-3 m	1 m	FS to PSh	M	Bfly, L, HB	low-growing vine or tax shrub; yellow flowers; red berries
<i>Potentilla fruticosa</i>	70-100 cm	90 cm	FS	X,M, DT	Bfly	yellow flowers
<i>Prunus pensylvanica</i>	6 m	4 m	FS	M	L	poisonous except for flesh of berries
<i>Ribes oxycanthoides</i>	1 m	1 m	FS to PSh	M,H	HB	white flowers; red-purple berries; dense prickles
<i>Rosa acicularis</i>	50-150 cm	1 m	FS	M, DT	B	pink flowers; prickles; Alberta's floral emblem
<i>Rosa arkansana</i>	20-45 cm	50 cm	FS	X,M	B	pink flowers; prickles; single stem growth habit
<i>Rosa woodsii</i>	50-150 cm	1 m	FS	M, DT	B	pink flowers; prickles
<i>Rubus idaeus</i>	2 m	2 m	FS	M, DT	B	prickles; stems usually biennial
<i>Salix bebbiana</i>	4 m	3 m	FS to PSh	M,H	Bfly, L	pink-white flowers; white fruit; suckers readily; may be aggressive
<i>Symphoricarpus occidentalis</i>	50-150 cm	1 m	FS	X,M, DT	Bfly, B	

GRASSES (all are bunch-forming except where noted)

<i>Bouteloua gracilis</i>	10-40 cm	10-40 cm	FS	X, DT	B	may form thick mats by tillering; seed heads are curved
<i>Bromus anomalus</i>	30-60 cm	30-60 cm	FS	M, H	B	
<i>Bromus ciliatus</i>	50-100 cm	50-100 cm	FS to PSh	M	B	
<i>Festuca scabrella</i>	30-90 cm	30-90 cm	FS to PSh	M	B	synonym <i>F. campestris</i> ; forms large, dense, tussocks
<i>Hierochloa odorata (rhizomatous)</i>	30-60 cm	30-60 cm	FS to PSh	X,M, DT	B	spreads vigorously through deep rhizomes
<i>Koeleria macrantha</i>	20-50 cm	20-50 cm	FS to Sh	X,M, DT	B	significant silver-green seed heads
<i>Stipa comata</i>	30-80 cm	30-80 cm	FS	X, DT	B	synonym <i>Hesperostipa comata</i> ssp. <i>comata</i>
<i>Stipa viridula</i>	40-90 cm	40-90 cm	FS	X,M, DT	B	

FORBS (Wildflowers)

	BLOOM TIME	BLOOM COLOUR	HEIGHT	EXPOSURE full sun=FS shade=Sh partial shade=PSh	SOIL/MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesc	WILDLIFE VALUE hummingbirds=HB birds=B butterflies=Bfly larvae=L	NOTES
<i>Achillea millefolium</i>	Aug/Sept	white	70 cm	FS	X,M,DT	Bfly	spreads through seeds and rhizomes; may be aggressive
<i>Anemone canadensis</i>	June/July	white	20-70 cm	PSh	H		spreads to form large patches, somewhat poisonous
<i>Anemone cylindrica</i>	April/May	white	20-80 cm	FS	X,M		poisonous; woolly seedhead
<i>Anemone patens</i>	April/May	mauve	20-40 cm	FS	M		poisonous; blooms while snow still on ground
<i>Antennaria aprica</i>	Aug/Sept	white	15 cm	FS	X		low, mat forming
<i>Antennaria parvifolia</i>	Aug/Sept	white	10-25 cm	FS	X,M		low, mat forming
<i>Arnica chamissonis</i>	June/July	yellow	20-80 cm	FS	M,H		
<i>Artemisia frigida</i>	June/July	yellowish	10-40 cm	FS	X,DT		silvery grey; aromatic
<i>Artemisia ludoviciana</i>	Aug/Sept	white	30-60 cm	FS	M		silvery grey; aromatic; spreads to form colonies
<i>Aster ciliolatus</i>	June/July	white	20-100 cm	FS to PSh		B, Bfly, L	
<i>Aster foliolatus</i>	June/July	white	30-80 cm	FS	X,M	Bfly, L, B	spreading; may form mats
<i>Aster laevis</i>	Aug/Sept	blue	40-100 cm	FS	M	Bfly, L, B	
<i>Astragalus crassicaerpus</i>	June/July	mauve	10-15 cm	PSh	X,M	Bfly, L	poisonous; legume
<i>Astragalus dasyglottis</i>	June/July	purple	5-20 cm	FS to PSh	M	Bfly, L	poisonous; legume; low, forming large patches
<i>Astragalus striatus</i>	June/July	deep purple	20-40 cm	Sh	X	Bfly, L	poisonous; legume; low, good ground cover
<i>Campnula rotundifolia</i>	June/July	blue/purple	20-40 cm	FS	X,M		
<i>Chrysopsis villosa</i>	Aug/Sept	yellow	20-50 cm	FS	X	Bfly	synonym <i>Heterotheca villosa</i> ; brown flower centers
<i>Clematis verticillaris</i>	April/May	blue	2 m	FS to PSh	M	B	synonym <i>C. occidentalis</i> ; spreads in underbrush or climbs trees
<i>Cleome serrulata</i>	June/July	pink/white	30-80 cm	FS	X,M		annual; self-seeds
<i>Dodecatheon conjugens</i>	shooting star	magenta	10-20 cm	FS	MD		
<i>Epilobium angustifolium</i>	great fireweed	mauve-pink	1.5-3 m	FS	M	Bfly	forms extensive colonies through rhizomes
<i>Erigeron glabellus</i>	smooth fleabane	blue or pink	10-50 cm	FS	M	Bfly	may be a biennial
<i>Gallardia aristata</i>	blanket flower, red-eyed Susan	yellow	30-60 cm	FS	X,M,DT	Bfly	red flower centers
<i>Galium boreale</i>	northern bedstraw	white	30-60 cm	Sh	M,H		spreads; aggressive but easy to control
<i>Glycyrrhiza lepidota</i>	wild licorice	cream	30-100 cm	Sh	M,H		legume; spreads readily through rhizomes and seeds
<i>Hebysarum alpinum</i>	alpine hebsarum, American sweet vetch	pink/purple	20-70 cm	FS	X,M,DT	Bfly	legume
<i>Hebysarum boreale</i>	northern hebsarum, northern sweet vetch	reddish-purple	20-60 cm	FS	X,M,DT	Bfly, L	legume
<i>Heterotheca villosa</i>	see <i>Chrysopsis villosa</i>						
<i>Heuchera richardsonii</i>	alum-root	purplish	30-40 cm	FS	M,H	HB; Bfly	
<i>Linum lewisii</i>	wild blue flax	blue/purple	20-70 cm	FS	X,M,DT		synonym <i>L. perenne</i> ssp. <i>lewisii</i> ; spreads aggressively by seed, but easy to control
<i>Lupinus sericeus</i>	silky lupin, wild blue lupin	blue/purple	40-80 cm	PSh	X,M,DT	HB; Bfly, L	poisonous
<i>Monarda fistulosa</i>	wild bergamot, bee balm	rose or lilac	30-70 cm	FS	M	HB; Bfly	
<i>Oxytropis monticola</i>	late yellow locoweed	yellow	30 cm	FS	X,M	B	poisonous; low growing; legume
<i>Oxytropis sericea</i>	early yellow locoweed	pale yellow	30 cm	FS	X	B	poisonous; low growing; legume

FORBS (Wildflowers)		BLOOM TIME	BLOOM COLOUR	HEIGHT	EXPOSURE	SOIL/MOISTURE CONDITIONS	WILDLIFE VALUE	NOTES
<i>Achillea millefolium</i>	common yarrow	Aug/Sept	white	70 cm	FS	X,M, DT	Bfly	spreads through seeds and rhizomes; may be aggressive
<i>Anemone canadensis</i>	Canada anemone	June/July	white	20-70 cm	PSh	H		spreads to form large patches, somewhat poisonous
<i>Penstemon confertus</i>	yellow beardtongue	June/July	yellow	10-50 cm	FS	M,H	HB; Bfly; B	
<i>Petalostemon purpureum</i>	purple prairie clover	June/July	purple or rose	30-80 cm	FS	X, DT		very adaptable; legume
<i>Potentilla anserina</i>	silver weed	June/August	yellow	10-20 cm	PSh	M,H		synonym <i>Argentina anserina</i> ; low ground cover; spreading rapidly through stolons
<i>Potentilla gracilis</i>	graceful cinquefoil, slender cinquefoil	June/July	yellow	30-70 cm	FS	M		
<i>Primula incana</i>	mealy primrose	June/July	white to lilac	10-40 cm	PSh	M		
<i>Rumex venosus</i>	veined dock, wild begonia, sorrel	April/May	greenish	10-40 cm	FS	X	L	spreads readily through seeds and rhizomes; don't consume in large quantities
<i>Sisyrinchium montanum</i>	blue-eyed grass	April/May	blue/purple	10-50 cm	PSh	M		
<i>Solidago canadensis</i>	Canada goldenrod	Aug/Sept	golden yellow	30-90 cm	FS	X,M, DT	Bfly, B	not an allergy problem; spreads aggressively through seeds and rhizomes, but easy to control
<i>Solidago missouriensis</i>	prairie goldenrod, Missouri goldenrod	Aug/Sept	yellow	30-50 cm	FS	X,M	Bfly, B	spreads aggressively through seeds and rhizomes, but easy to control
<i>Thalictrum venulosum</i>	western meadow rue, veiny meadow rue	June/July	greenish white	20-100 cm	Sh	M,H		synonym <i>T. venosum</i> ; spreads aggressively through seeds and rhizomes, but easy to control
<i>Thermopsis rhombifolia</i>	golden bean	April/May	golden yellow	10-40 cm	FS	M		spreads aggressively through seeds and rhizomes, but easy to control; poisonous
<i>Viola adunca</i>	early blue violet	April/May	blue/purple	4-15 cm	Sh	M, H	L	low-growing; spreading by rhizomes

MONTANE PLANTING

	HEIGHT	WIDTH	EXPOSURE full sun=FS shade=Sh part shade=PSh	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesic	WILDLIFE VALUE hummingbirds=HB birds=B butterflies=Bfly larvae=L	NOTES
TREES						
<i>Juniperus scopulorum</i>	1-3 m	1.5 m	FS	X, DT	B	narrow, upright tree
<i>Larix lyallii</i>	25 m	6 m	FS	M, H		deciduous needles; may see <i>L. laricina</i> also
<i>Pinus contorta</i> var. <i>latifolia</i>	30 m	5 m	FS	X, M, DT	B	
<i>Populus tremuloides</i>	20 m	8 m	FS	M, DT	B, Bfly, L	forms colonies through suckers from roots
<i>Pseudotsuga menziesii</i>	40 m	8 m	FS	M		for open, rocky sites

SHRUBS

<i>Alnus crispa</i>	3 m	2 m	FS or Sh	H	L, B	shrubby, spreads through rhizomes
<i>Alnus tenuifolia</i>	8 m	4 m	FS	M	L	synonym <i>A. incana</i> ssp. <i>tenuifolia</i>
<i>Amelanchier alnifolia</i>	3-6 m	2 m	FS to PSh	X, M, DT	B, L, Bfly	forms colonies through stolons
<i>Arctostaphylos uva ursi</i>	50 cm	spreads	FS or Sh	X, M, DT	L	branches root to ground; forms mats
<i>Betula glandulosa</i>	2 m	1 m	FS to PSh	M	L, B	suckers to create new plants
<i>Betula occidentalis</i>	10 m	5 m	FS to PSh	M	L	multi-stemmed
<i>Comus stolonifera</i>	1-3 m	2.5 m	FS to PSh	M, H	L, B	synonym <i>C. sericea</i> ; lower branches will root to ground
<i>Elaeagnus commutata</i>	3 m	spreads	FS to PSh	X, M	Bfly	forms thickets through rhizomes; silver leaves and berries
<i>Juniperus communis</i>	1 m	3 m	FS	X, M, DT	B	blue, berry-like cones
<i>Juniperus horizontalis</i>	10-40 cm	3 m	FS	X, DT	B	blue, berry-like cones
<i>Lonicera dioica</i>	1-3 m	1 m	FS to PSh	M	Bfly, L, HB	low-growing vine or lax shrub; yellow flowers; red berries
<i>Lonicera involucrata</i>	2-3 m	2 m	FS to PSh	M	B, L, Bfly	pairs of red-purple flowers; purple-black fruit
<i>Potentilla fruticosa</i>	70-100 cm	90 cm	FS	X, M, DT	Bfly	yellow flowers
<i>Rosa acicularis</i>	50-150 cm	1 m	FS	M, DT	B	pink flowers; prickles. Alberta's floral emblem
<i>Rosa woodsii</i>	50-150 cm	1 m	FS	M, DT	B	pink flowers; prickles
<i>Salix bebbiana</i>	4 m	3 m	FS to PSh	M, H	Bfly, L	
<i>Sambucus racemosa</i>	1-4 m	2 m	FS to PSh	M	HB	two varieties with red or black fruit; plant parts other than fruit considered poisonous
<i>Shepherdia canadensis</i>	1-3 m	2 m	FS	MD, DT	B, Bfly	
<i>Sorbus scopulina</i>	1-4 m	3 m	FS to PSh	M	B	
<i>Spiraea betulifolia</i>	20-80 cm	80 cm	FS to PSh	X, M	Bfly, B	white flowers followed by orange-scarlet fruit
<i>Symphoricarpos occidentalis</i>	50-150 cm	1 m	FS	X, M, DT	Bfly, B	pink-white flowers; white fruit; suckers readily, may be aggressive

GRASSES (all are bunch-forming except where noted)		HEIGHT	WIDTH	full sun=FS shade=Sh part shade=PSH	MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesic	VALUE hummingbirds=HB birds=B butterflies=Bfly larvae=L	NOTES
Bromus anomalus	nodding brome	30-60 cm	30-60 cm	FS	M, H	B	
Bromus ciliatus	fringed brome	50-100 cm	50-100 cm	FS to PSh	M	B	
Danthonia parryi	prairie oat grass, parry oat grass	30-60 cm	30-60 cm	FS	X	B	densely tufted growth habit; resists trampling
Deschampsia caespitosa	tufted hair grass	20-120 cm	60-120 cm	FS	M, H	B	forms large, dense tufts
Festuca scabrella	rough fescue	30-90 cm	30-90 cm	FS to PSh	M	B	synonym F. campestris; forms large, dense, tussocks
Hierochloa odorata (rhizomalibus)	sweetgrass	30-60 cm	30-60 cm	FS to PSh	X, M, DT	B	spreads vigorously through deep rhizomes
Koeleria macrantha	Junegrass	20-50 cm	20-50 cm	FS to Sh	X, M, DT	B	significant silver-green seed heads
Poa alpina	alpine bluegrass	10-30 cm	10-30 cm	FS to PSh	X, M	B	
Stipa richardsonii	Richardson's needle-grass	50-100 cm	50-100 cm	FS	M	B	
Stipa viridula	green needle grass	40-90 cm	40-90 cm	FS	X, M, DT	B	densely tufted growth habit

FORBS (Wildflowers)		BLOOM TIME	BLOOM COLOUR	HEIGHT	EXPOSURE full sun=FS shade=Sh part shade=PSh	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygic M=mesic	WILDLIFE VALUE hummingbirds=HB birds=B butterflies=Bfly larvae=L	NOTES
<i>Achillea millefolium</i>	common yarrow	Aug/Sept	white	70 cm	FS	X, M, DT	Bfly	spreads through seeds and rhizomes, may be aggressive
<i>Allium cernuum</i>	nodding onion	June/July	pink or white	10-50 cm	FS to PSh	M	HB, Bfly	bulb, self-seeds
<i>Anemone cylindrica</i>	long-fruited anemone, thimbleweed	April/May	white	20-80 cm	FS	X, M		poisonous; woolly seedhead
<i>Anemone multifida</i>	cut-leaved anemone	April/May	yellow	10-50 cm	FS	M		poisonous
<i>Anemone patens</i>	prairie crocus, windflower	April/May	mauve	20-40 cm	FS	M		poisonous; blooms white snow still on ground
<i>Antennaria aprica</i>	low pushtoes, low everlasting	Aug/Sept	white	15 cm	FS	X		low, mat forming
<i>Antennaria parvifolia</i>	small-leaved pushtoes	Aug/Sept	white	10-25 cm	FS	X, M		low, mat forming
<i>Artemisia frigida</i>	pasture sage, prairie sage	June/July	yellowish	10-40 cm	FS	X, DT		silvery grey; aromatic
<i>Aster ciliolatus</i>	Lindley's aster, white aster	June/July	white	20-100 cm	FS to PSh	M	B, Bfly, L	
<i>Aster laevis</i>	smooth aster	Aug/Sept	blue	40-100 cm	FS	M	Bfly, L, B	
<i>Astragalus aboriginum</i>	milk vetch	June/July	white w purple	10-40 cm	PSh	X, M	Bfly, L	poisonous; legume; often reclining
<i>Astragalus missouriensis</i>	missouri milk vetch	June/July	blue/purple	20-100 cm	PSh	X, M	Bfly, L	poisonous; legume
<i>Campanula rotundifolia</i>	common harebell, bluebell	June/July	blue/purple	20-40 cm	FS	X, M		
<i>Castilleja lutescens</i>	yellow paintbrush	June/July	yellow	30-60 cm	FS to PSh	M		roots are semiparasitic; may be difficult to establish
<i>Castilleja miniata</i>	common red indian paintbrush	June/July	red	20-60 cm	FS to PSh	M		roots are semiparasitic; may be difficult to establish
<i>Clematis integrifolia</i>	western white clematis	Aug/Sept	white	3-6 m	FS to PSh	M	Bfly, B	semi-woody vine, aggressive climber
<i>Clematis verticillaris</i>	blue clematis	April/May	blue	2 m	FS to PSh	M	B	synonym C. occidentalis; spreads in underbrush or climbs trees
<i>Delphinium bicolor</i>	low larkspur	June/July	blue/purple	20-50 cm	FS	X, M	Bfly	poisonous (especially the seeds)
<i>Dodecatheon conjugens</i>	shooting star	April/May	magenta	10-20 cm	FS	MD		
<i>Epilobium angustifolium</i>	great fireweed	June/July	mauve-pink	1.5-3 m	FS	M	Bfly	forms extensive colonies through rhizomes
<i>Erigeron glabellus</i>	smooth fleabane	June/July	blue or pink	10-50 cm	FS	M	Bfly	may be a biennial
<i>Fragaria virginiana</i>	wild strawberry	April/May	white	5-25 cm	FS to PSh	M, H	B	spreads by stolons, aggressive but easy to control
<i>Gaillardia aristata</i>	blanket flower, red-eyed Susan	June/July	yellow w. red center	30-60 cm	FS	X, M, DT	Bfly	
<i>Gallium boreale</i>	northern bedstraw	June/July	white	30-60 cm	Sh	M, H		spreads; aggressive but easy to control
<i>Geranium viscosissimum</i>	sticky purple geranium	June/July	rose-purple	20-90 cm	PSh	M, H	Bfly	

FORBS (Wildflowers)

		BLOOM TIME	BLOOM COLOUR	HEIGHT	EXPOSURE full sun=FS shade=Sh part shade=PSh	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygroic M=mesic	WILDLIFE VALUE hummingbirds=HB birds=B butterflies=Bfly larvae=L	NOTES
<i>Geum triflorum</i>	old man's whiskers, prairie smoke	Aug/Sept	reddish-purple	20-40 cm	FS to PSh	X, M, H		woolly seedheads, evergreen ground cover
<i>Hedysarum alpinum</i>	American sweet vetch	June/July	pink/purple	20-70 cm	FS	X, M, DT	Bfly	legume
<i>Hedysarum boreale</i>	northern sweet vetch	April/May	reddish-purple	20-60 cm	FS	X, M, DT	Bfly, L	legume
<i>Heracleum lanatum</i>	cow parsnip	June/July	white	1-2 m	Sh	M	B, Bfly, L	
<i>Linum lewisii</i>	wild blue flax	Aug/Sept	blue/purple	20-70 cm	FS	X, M, DT		synonym L. perenne ssp. lewisii; spreads aggressively by seed, but easy to control
<i>Lithospermum ruderale</i>	yellow puccoon, stone-seed	June/July	yellow	20-50 cm	FS	M, H	Bfly	
<i>Lupinus argenteus</i>	silvery lupin	June/July	light violet	50-100 cm	PSh	X, M, DT	HB; Bfly; L	poisonous
<i>Lupinus sericeus</i>	silky lupin, wild blue lupin	June/July	blue/purple	40-80 cm	PSh	X, M, DT	HB; Bfly; L	poisonous
<i>Mertensia paniculata</i>	tail lungwort	April/May	blue	20-80 cm	Sh	M		
<i>Monarda fistulosa</i>	wild bergamot, bee balm	June/July	rose or lilac	30-70 cm	FS	M	HB; Bfly	
<i>Oxytropis monticola</i>	late yellow locoweed	June/July	yellow	30 cm	FS	X, M	B	poisonous; low growing; legume
<i>Oxytropis sericea</i>	early yellow locoweed	April/May	pale yellow	30 cm	FS	X	B	poisonous; low growing; legume
<i>Penstemon confertus</i>	yellow beardtongue	June/July	yellow	10-50 cm	FS	M, H	HB; Bfly; B	
<i>Penstemon nitidus</i>	smooth blue beardtongue	June/July	blue	20-30 cm	FS	X	HB; Bfly; B	
<i>Petalostemon purpureum</i>	purple prairie clover	June/July	purple or rose	30-80 cm	FS	X, DT		very adaptable; legume
<i>Potentilla gracilis</i>	graceful cinquefoil, slender cinquefoil	June/July	yellow	30-70 cm	FS	M		
<i>Sisyrinchium montanum</i>	blue-eyed grass	April/May	blue/purple	10-50 cm	PSh	M		
<i>Solidago canadensis</i>	Canada goldenrod	Aug/Sept	golden yellow	30-90 cm	FS	X, M, DT	Bfly, B	not an allergy problem; spreads aggressively through seeds and rhizomes, but easy to control
<i>Thalictrum venulosum</i>	western meadow rue, veiny meadow rue	June/July	greenish white	20-100 cm	Sh	M, H		synonym T. venosum; spreads aggressively through seeds and rhizomes, but easy to control
<i>Vicia americana</i>	American purple vetch	June/July	reddish-purple	30-100 cm	FS to PSh	M	Bfly	creeping or climbing through tendrils

BOREAL PLANTING

		HEIGHT	WIDTH	EXPOSURE full sun=FS shade=Sh part shade=PSh	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesic	WILDLIFE VALUE hummingbirds=HB birds=B butterflies=Bfly larvae=L	NOTES
TREES							
	Betula papyrifera	25 m	10 m	FS	M	B, L	peeling white bark
	Larix laricina	25 m	6 m	FS	M, H		deciduous needles; may see L. laricina also
	Picea glauca	30 m	6 m	FS to PSh	M	B	
	Populus balsamifera	20 m	10 m	FS	M, H	Bfly, L	found along streams in drier areas; shorter life-span
	Populus tremuloides	20 m	8 m	FS	M, DT	B, Bfly, L	forms colonies through suckers from roots

SHRUBS

	green alder	3 m	2 m	FS or Sh	H	L, B	shrubby; spreads through rhizomes
	river alder	8 m	4 m	FS	M	L	synonym A. incana ssp. tenuifolia
	Saskatoon, service berry	3-6 m	2 m	FS to PSh	X, M, DT	B, L, Bfly	forms colonies through stolons
	bearberry	50 cm	spreads	FS or Sh	X, M, DT	L	branches root to ground; forms mats; evergreen
	river birch	10 m	5m	FS to PSh	M	L	multi-stemmed
	red twig dogwood	1-3 m	2.5 m	FS to PSh	M, H	L, B	synonym C. sericea; lower branches will root to ground
	beaked hazelnut	1-3 m	2 m	PSh	M	B	hard shelled nut
	twining honeysuckle	1-3 m	1 m	FS to PSh	M	Bfly, L, HB	low-growing vine or lax shrub; yellow flowers; red berries
	bracted honeysuckle	2-3 m	2 m	FS to PSh	M	B, L, Bfly	pairs of red-purple flowers; purple-black fruit
	pincherry	6 m	4 m	FS	M	L, B	poisonous except for flesh of berries
	wild gooseberry	1 m	1 m	FS to PSh	M, H	HB	white flowers; red-purple berries; dense prickles
	prickly rose	50-150 cm	1 m	FS	M, DT	B	pink flowers; prickles, Alberta's floral emblem
	Wood's Rose	50-150 cm	1 m	FS	M, DT	B	pink flowers; prickles
	wild red raspberry	2 m	2 m	FS	M, DT	B	prickles; stems usually biennial
	Canada buffaloberry	1-3 m	2 m	FS	MD, DT	B, Bfly	
	low-bush cranberry	1-2 m	1 m	FS to PSh	M	B	white flowers; red fruit; good fall colour
	high-bush cranberry	4 m	3 m	PSh	M	B	white flowers; red fruit; good fall colour

GRASSES (all are bunch-forming except where noted)

	Bromus anomalus	30-60 cm	30-60 cm	FS	M, H	B	
	nodding brome	50-100 cm	50-100 cm	FS to PSh	M	B	
	fringed brome	20-120 cm	60-120 cm	FS	M, H	B	forms large, dense tufts
	tufted hair grass	20-50 cm	20-50 cm	FS to Sh	X, M, DT	B	significant silver-green seed heads
	June grass						

FORBS (Wildflowers)		BLOOM TIME	BLOOM COLOUR	HEIGHT	EXPOSURE full sun=FS shade=Sh part shade=PSH	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesic	WILDLIFE VALUE hummingbirds=HB birds=B butterflies=Bfly larvae=L	NOTES
<i>Achillea millefolium</i>	common yarrow	Aug/Sept	white	70 cm	FS	X,M, DT	Bfly	spreads through seeds and rhizomes; may be aggressive
<i>Anemone multifida</i>	cut-leaved anemone	April/May	yellow	10-50 cm	FS	M		poisonous
<i>Anemone patens</i>	prairie crocus, windflower	April/May	mauve	20-40 cm	FS	M		poisonous; blooms while snow still on ground
<i>Aster ciliolatus</i>	Lindley's aster, white aster	June/July	white	20-100 cm	FS to PSh	M	B, Bfly, L	
<i>Astragalus dasycloctis</i>	purple milk vetch	June/July	purple	5-20 cm	FS to PSh	M	Bfly, L	poisonous; legume; low, forming large patches
<i>Astragalus striatus</i>	ascending purple vetch	June/July	deep purple	20-40 cm	Sh	X	Bfly, L	poisonous; legume; low, good ground cover
<i>Campanula rotundifolia</i>	common harebell, bluebell	June/July	blue/purple	20-40 cm	FS	X,M		
<i>Chrysopsis villosa</i>	hairy golden aster	Aug/Sept	yellow	20-50 cm	FS	X	Bfly	synonym <i>Heterotheca villosa</i> ; brown flower centers
<i>Clematis verticellaris</i>	blue clematis	April/May	blue	2 m	FS to PSh	M	B	synonym <i>C. occidentalis</i> ; spreads in underbrush or climbs trees
<i>Disporum trachycarpum</i>	fairy bells	June/July	white	30-80 cm	PSH	M		red berries later in season; creeping rhizomes
<i>Epilobium angustifolium</i>	great fireweed	June/July	mauve-pink	1.5-3 m	FS	M	Bfly	forms extensive colonies through rhizomes
<i>Erigeron glabellus</i>	smooth fleabane	June/July	blue or pink	10-50 cm	FS	M	Bfly	may be a biennial
<i>Fragaria virginiana</i>	wild strawberry	April/May	white	5-25 cm	FS to PSh	M,H	B	spreads by stolons; aggressive but easy to control
<i>Galium boreale</i>	northern bedstraw	June/July	white	30-80 cm	Sh	M,H		spreads; aggressive but easy to control
<i>Geranium richardsonii</i>	Richardson's geranium	April/May	purple	40-80 cm	FS to PSh	M		
<i>Geranium lanatum</i>	cow parsnip	June/July	white	1-2 m	Sh	M	B, Bfly, L	
<i>Heterotheca villosa</i>	see <i>Chrysopsis villosa</i>							
<i>Heuchera richardsonii</i>	alum-root	April/May	purplish	30-40 cm	FS	M,H	HB; Bfly	
<i>Lilium philadelphicum</i>	western wood lily	June/July	orange/red	30-80 cm	FS to PSh	M		bulbs; may not be available
<i>Mertensia paniculata</i>	tall lungwort	April/May	blue	20-80 cm	Sh	M		
<i>Oenothera biennis</i>	evening primrose	June/July	yellow	50-150 cm	PSH	M	Bfly; B	biennial; blooms in at night; fragrance attracts moths
<i>Smilacina stellata</i>	star flowered Solomon's seal	April/May	white	20-80 cm	Sh	M,H		synonym <i>Malianthemum stellatum</i> ; spreads through rhizomes to create mats
<i>Solidago canadensis</i>	Canada goldenrod	Aug/Sept	golden yellow	30-90 cm	FS	X,M, DT	Bfly	not an allergy problem; spreads aggressively through seeds and rhizomes, but easy to control
<i>Solidago missouriensis</i>	prairie goldenrod, Missouri goldenrod	Aug/Sept	yellow	30-50 cm	FS	X,M	Bfly	spreads aggressively through seeds and rhizomes, but easy to control
<i>Thalictrum venulosum</i>	western meadow rue, veiny meadow rue	June/July	greenish white	20-100 cm	Sh	M,H		synonym <i>T. venosum</i> ; spreads aggressively through seeds and rhizomes, but easy to control
<i>Vicia americana</i>	American purple vetch	June/July	reddish-purple	30-100 cm	FS to PSh	M	Bfly	creeping or climbing through tendrils

BUTTERFLY PLANTING

Nectar Sources

	HEIGHT	WIDTH	EXPOSURE full sun=FS shade=Sh part shade=PSh	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesic	NOTES
TREES					
<i>Populus tremuloides</i>	20 m	8 m	FS	M, DT	forms colonies through suckers from roots
<i>Prunus virginiana</i>	10 m	8 m	FS	M,H, DT	poisonous except for flesh of berries; multi-stemmed
<i>Populus balsamifera</i>	20 m	10 m	FS	M, H	found along streams in drier areas; shorter life-span

SHRUBS

<i>Amandanchier amifolia</i>	3-6 m	2 m	FS to PSh	X,M, DT	forms colonies through stolons
<i>Elaeagnus commutata</i>	3 m	spreads	FS to PSh	X,M	forms thickets through rhizomes; silver leaves and berries
<i>Lonicera dioica</i>	1-3 m	1 m	FS to PSh	M	low-growing vine or lax shrub; yellow flowers; red berries
<i>Lonicera involucrata</i>	2-3 m	2 m	FS to PSh	M	pairs of red-purple flowers; purple-black fruit
<i>Potentilla fruticosa</i>	70-100 cm	90 cm	FS	X,M, DT	yellow flowers
<i>Prunus pensylvanica</i>	6 m	4 m	FS	M	poisonous except for flesh of berries
<i>Ribes aureum</i>	1-2 m	1.5 m	FS	M	yellow flowers; red fruit
<i>Salix bebbiana</i>	4 m	3 m	FS to PSh	M,H	
<i>Salix discolor</i>	10 m	4 m	FS	H	
<i>Salix exigua</i>	3 m	2 m	FS	H	spreads by rhizomes to form colonies
<i>Salix lutea</i>	2-4 m	2 m	FS	H	
<i>Shepherdia canadensis</i>	1-3 m	2 m	FS	MD, DT	
<i>Spiraea betulifolia</i>	20 - 80 cm	80 cm	FS to PSh	X,M	white flowers followed by orange-scarlet fruit
<i>Symphoricarpos occidentalis</i>	50-150 cm	1 m	FS	X,M, DT	pink-white flowers; white fruit; suckers readily, may be aggressive

FORBS (Wildflowers)

	BLOOM TIME	BLOOM COLOUR	HEIGHT	EXPOSURE full sun=FS shade=Sh part shade=PSH	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mescic	NOTES
<i>Achillea millefolium</i>	Aug/Sept	white	70 cm	FS	X.M, DT	spreads through seeds and rhizomes, may be aggressive
<i>Allium cernuum</i>	June/July	pink or white	10-50 cm	FS to PSh	M	bulb, self-seeds
<i>Allium textile</i>	June/July	white	5-30 cm	FS	X	bulb
<i>Asclepias speciosa</i>	April/May	white	2 m	FS	M, H	spreads by rhizomes to form large patches; poisonous when raw
<i>Aster falcatius</i>	June/July	white	30-80 cm	FS	X.M	spreading; may form mats
<i>Aster laevis</i>	Aug/Sept	blue	40-100 cm	FS	M	
<i>Astragalus aboriginum</i>	June/July	white w purple	10-40 cm	PSh	X.M	poisonous; legume
<i>Astragalus crassicaepus</i>	June/July	mauve	10-15 cm	PSh	X.M	poisonous; legume
<i>Astragalus missouriensis</i>	June/July	blue/purple	20-100 cm	PSh	X.M	poisonous; legume
<i>Chrysopsis villosa</i>	Aug/Sept	yellow	20-50 cm	FS	X	synonym <i>Heterothea villosa</i> ; brown flower centers
<i>Clematis linguistifolia</i>	Aug/Sept	white	3-6 m	FS to PSh	M	semi-woody vine, aggressive climber
<i>Cleome serrulata</i>	June/July	pink/white	30-80 cm	FS	X.M	annual, self-seeds
<i>Delphinium bicolor</i>	June/July	blue/purple	20-50 cm	FS	X.M	poisonous (especially the seeds)
<i>Delphinium glaucum</i>	June/July	purplish	1-2 m	FS	M	poisonous (especially the seeds)
<i>Echinacea angustifolia</i>	June/July	purple	60 cm	FS	X, DT	not native in AB, but in other prairie provinces; great for butterflies
<i>Epilobium angustifolium</i>	June/July	mauve-pink	1.5-3 m	FS	M	forms extensive colonies through rhizomes
<i>Erigeron glabellus</i>	June/July	blue or pink	10-50 cm	FS	M	may be a biennial
<i>Erigonum umbellatum</i>	June/July	pale yellow/white	10-30 cm	FS	X, DT	
<i>Gaillardia aristata</i>	June/July	yellow	30-60 cm	FS	X.M, DT	red flower centers
<i>Geranium viscosissimum</i>	June/July	rose-purple	20-90 cm	PSh	M,H	
<i>Hedysarum alpinum</i>	June/July	pink/purple	20-70 cm	FS	X.M, DT	legume
<i>Hedysarum boreale</i>	April/May	reddish-purple	20-60 cm	FS	X.M, DT	legume
<i>Helianthus annuus</i>	Aug/Sept	yellow	50-120 cm	FS	X.M	annual, self-seeds readily; red flower centers
<i>Heracleum lanatum</i>	June/July	white	1-2 m	Sh	M	
<i>Heterothea villosa</i>						
<i>Heuchera richardsonii</i>	April/May	purplish	30-40 cm	FS	M,H	
<i>Liatris punctata</i>	Aug/Sept	purple/pink	20-60 cm	FS	X	
<i>Lithospermum ruderale</i>	June/July	yellow	20-50 cm	FS	M,H	
<i>Lupinus argenteus</i>	June/July	light violet	50-100 cm	PSh	X.M, DT	poisonous
<i>Lupinus sericeus</i>	June/July	blue/purple	40-80 cm	PSh	X.M, DT	poisonous
<i>Monarda fistulosa</i>	June/July	rose or lilac	30-70 cm	FS	M	
<i>Oenothera biennis</i>	June/July	yellow	50-150 cm	PSh	M	biennial; blooms in at night; fragrance attracts moths
<i>Pensilemon confertus</i>	June/July	yellow	10-50 cm	FS	M,H	
<i>Pensilemon nitidus</i>	June/July	blue	20-30 cm	FS	X	
<i>Ratibida columnifera</i>	Long	yellow	30-50 cm	FS	X.M, DT	short-lived perennial; self-seeds; flower has brown cone
<i>Solidago canadensis</i>	Aug/Sept	golden yellow	30-90 cm	FS	X.M, DT	not an allergy problem; spreads aggressively through seeds and rhizomes, but easy to control
<i>Solidago missouriensis</i>	Aug/Sept	yellow	30-50 cm	FS	X.M	spreads aggressively through seeds and rhizomes; but easy to control
<i>Vicia americana</i>	June/July	reddish-purple	30-100 cm	FS to PSh	M	creeping or climbing through tendrils

BUTTERFLY PLANTING

Larval Food

		HEIGHT	WIDTH	EXPOSURE full sun=FS shade=Sh part shade=PSH	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesic	NOTES
TREES						
<i>Betula papyrifera</i>	paper birch	25 m	10 m	FS	M	peeling white bark
<i>Populus balsamifera</i>	balsam poplar	20 m	10 m	FS	M, H	found along streams in drier areas; shorter life-span
<i>Populus tremuloides</i>	trembling aspen	20 m	8 m	FS	M, DT	forms colonies through suckers from roots
<i>Prunus virginiana</i>	chokecherry	10 m	8 m	FS	M, H, DT	poisonous except for flesh of berries; multi-stemmed

SHRUBS

<i>Alnus crispa</i>	green alder	3 m	2 m	FS or Sh	H	shrubby; spreads through rhizomes
<i>Alnus tenuifolia</i>	river alder	8 m	4 m	FS	M	synonym <i>A. incana</i> ssp. <i>Tenuifolia</i>
<i>Amelanchier alnifolia</i>	Saskatoon, service berry	3-6 m	2 m	FS to PSh	X, M, DT	forms colonies through stolons
<i>Arctostaphylos uva ursi</i>	bearberry	50 cm	spreads	FS or Sh	X, M, DT	branches root to ground; forms mats
<i>Betula glandulosa</i>	bog birch	2 m	1 m	FS to PSh	M	suckers to create new plants
<i>Betula occidentalis</i>	river birch	10 m	5 m	FS to PSh	M	
<i>Cornus stolonifera</i>	red twig dogwood	1-3 m	2.5 m	FS to PSh	M, H	synonym <i>C. sericea</i> ; lower branches will root to ground
<i>Lonicera dioica</i>	twining honeysuckle	1-3 m	1 m	FS to PSh	M	low-growing vine or lax shrub; yellow flowers; red berries
<i>Lonicera involucrata</i>	bracted honeysuckle	2-3 m	2 m	FS to PSh	M	pairs of red-purple flowers; purple-black fruit
<i>Potentilla fruticosa</i>	shrubby cinquefoil	70-100 cm	90 cm	FS	X, M, DT	yellow flowers
<i>Ribes aureum</i>	golden currant	1-2 m	1.5 m	FS	M	yellow flowers; red fruit
<i>Salix bebbiana</i>	Bebb's willow, beaked willow	4 m	3 m	FS to PSh	M, H	
<i>Salix discolor</i>	Pussy Willow	10 m	4 m	FS	H	
<i>Salix exigua</i>	Sandbar Willow, Coyote Willow	3 m	2 m	FS	H	spreads by rhizomes to form colonies
<i>Salix lutea</i>	Yellow Twig Willow	2-4 m	2 m	FS	H	

GRASSES (all are bunch-forming except where noted)

<i>Bouteloua gracilis</i>	blue grama grass	10-40 cm	10-40 cm	FS	X, DT	may form thick mats by tillering; seed heads are curved
<i>Bromus anomalus</i>	nodding brome	30-60 cm	30-60 cm	FS	M, H	
<i>Festuca scabrella</i>	rough fescue	30-90 cm	30-90 cm	FS to PSh	M	synonym <i>F. campestris</i> ; forms large, dense, tussocks
<i>Koeleria macrantha</i>	Junegrass	20-50 cm	20-50 cm	FS to Sh	X, M, DT	significant silver-green seed heads
<i>Stipa comata</i>	needle and thread	30-80 cm	30-80 cm	FS	X, DT	synonym <i>Hesperostipa comata</i> ssp. <i>comata</i>
<i>Stipa richardsonii</i>	Richardson's needle-grass	50-100 cm	50-100 cm	FS	M	
<i>Stipa viridula</i>	green needle grass	40-90 cm	40-90 cm	FS	X, M, DT	

		BLOOM TIME	BLOOM COLOUR	HEIGHT	EXPOSURE	SOIL MOISTURE CONDITIONS	NOTES
<i>Asclepias speciosa</i>	showy milkweed	April/May	white	2 m	FS	M=mesic	spreads by rhizomes to form large patches; poisonous when raw
<i>Aster ciliolatus</i>	Lindley's aster, white aster	June/July	white	20-100 cm	FS to PSh	M, H	
<i>Aster falcatus</i>	creeping white prairie aster	June/July	white	30-80 cm	FS	X, M	spreading; may form mats
<i>Aster laevis</i>	smooth aster	Aug/Sept	blue	40-100 cm	FS	M	
<i>Astragalus aboriginum</i>	milk vetch	June/July	white w purple	10-40 cm	PSh	X, M	poisonous; legume
<i>Astragalus crassicaarpus</i>	milk vetch	June/July	mauve	10-15 cm	PSh	X, M	poisonous; legume
<i>Astragalus missouriensis</i>	missouri milk vetch	June/July	blue/purple	20-100 cm	PSh	X, M	poisonous; legume
<i>Erigonum umbellatum</i>	umbrella plant	June/July	pale yellow/white	10-30 cm	FS	X, DT	
<i>Fragaria virginiana</i>	wild strawberry	April/May	white	5-25 cm	FS to PSh	M, H	spreads by stolons; aggressive but easy to control
<i>Hedysarum boreale</i>	northern sweet vetch	April/May	reddish-purple	20-60 cm	FS	X, M, DT	legume
<i>Helianthus annuus</i>	annual sunflower	Aug/Sept	yellow	50-120 cm	FS	X, M	annual, self-seeds readily; red flower centers
<i>Heracleum lanatum</i>	cow parsnip	June/July	white	1-2 m	Sh	M	
<i>Lupinus albus</i>	silvery lupin	June/July	light violet	50-100 cm	PSh	X, M, DT	poisonous
<i>Lupinus sericeus</i>	late yellow locoweed	June/July	blue/purple	40-80 cm	PSh	X, M, DT	poisonous
<i>Oxytropis monticola</i>	early yellow locoweed	June/July	yellow	30 cm	FS	X, M	poisonous; low growing; legume
<i>Oxytropis sericea</i>	early yellow locoweed	April/May	pale yellow	30 cm	FS	X	poisonous; low growing; legume
<i>Rumex venosus</i>	veined dock, wild begonia, sorrel	April/May	greenish	10-40 cm	FS	X	spreads readily through seeds and rhizomes; don't consume in large quantities
<i>Thermopsis rhombifolia</i>	golden bean	April/May	golden yellow	10-40 cm	FS	M	spreads aggressively through seeds and rhizomes, but easy to control; poisonous
<i>Viola adunca</i>	early blue violet	April/May	blue/purple	4-15 cm	Sh	M, H	low-growing; spreading by rhizomes

FORBS (Wildflowers)

BIRD PLANTING

TREES		HEIGHT	WIDTH	EXPOSURE full sun=FS shade=Sh part shade=PSh	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesic	NOTES
<i>Betula papyrifera</i>	paper birch	25 m	10 m	FS	M	peeling white bark
<i>Juniperus scopulorum</i>	Rocky Mountain Juniper	1-3 m	1.5 m	FS	X, DT	narrow, upright tree
<i>Picea glauca</i>	white spruce	30 m	6 m	FS to PSh	M	forest and parkland
<i>Pinus contorta</i> var. <i>latifolia</i>	lodgepole pine	30 m	5 m	FS	X, M, DT	
<i>Populus tremuloides</i>	trembling aspen	20 m	8 m	FS	M, DT	forms colonies through suckers from roots
<i>Prunus virginiana</i>	chokecherry	10 m	8 m	FS	M, H, DT	poisonous except for flesh of berries; multi-stemmed

SHRUBS

<i>Alnus crispa</i>	green alder	3 m	2 m	FS or Sh	H	shrubby; spreads through rhizomes
<i>Amenanchier alnifolia</i>	Saskatoon, service berry	3-6 m	2 m	FS to PSh	X, M, DT	forms colonies through stolons
<i>Betula glandulosa</i>	bog birch	2 m	1 m	FS to PSh	M	suckers to create new plants
<i>Cornus stolonifera</i>	red twig dogwood	1-3 m	2.5 m	FS to PSh	M, H	synonym <i>C. sericea</i> ; lower branches will root to ground
<i>Corylus comuta</i>	beaked hazelnut	1-3 m	2 m	PSh	M	hard shelled nut
<i>Juniperus communis</i>	common Juniper	1 m	3 m	FS	X, M, DT	blue, berry-like cones
<i>Juniperus horizontalis</i>	creeping Juniper	10-40 cm	3 m	FS	X, DT	blue, berry-like cones
<i>Lonicera dioica</i>	twining honeysuckle	1-3 m	1 m	FS to PSh	M	low-growing vine or lax shrub; yellow flowers; red berries
<i>Lonicera involucrata</i>	bracted honeysuckle	2-3 m	2 m	FS to PSh	M	pairs of red-purple flowers; purple-black fruit
<i>Prunus pensylvanica</i>	pincherry	6 m	4 m	FS	M	poisonous except for flesh of berries
<i>Rhus trilobata</i>	three lobed sumac, skunkbush	1-2 m	1.5 m	FS	X, M	good fall colour; spreads by rhizomes; yellow flowers; red fruit
<i>Ribes aureum</i>	golden currant	1-2 m	1.5 m	FS	M	yellow flowers; red fruit
<i>Ribes oxycanthoides</i>	wild gooseberry	1 m	1 m	FS to PSh	M, H	white flowers; red-purple berries; dense prickles
<i>Rosa acicularis</i>	prickly rose	50-150 cm	1 m	FS	M, DT	pink flowers; prickles; Alberta's floral emblem
<i>Rosa arkansana</i>	prairie rose	20-45 cm	50 cm	FS	X, M	pink flowers; prickles; single stem growth habit
<i>Rosa woodsii</i>	Wood's Rose	50-150 cm	1 m	FS	M, DT	pink flowers; prickles
<i>Rubus idaeus</i>	wild red raspberry	2 m	2 m	FS	M, DT	prickles; stems usually biennial
<i>Salix bebbiana</i>	Bebb's willow, beaked willow	4 m	3 m	FS to PSh	M, H	
<i>Salix discolor</i>	Pussy Willow	10 m	4 m	FS	H	
<i>Salix exigua</i>	Sandbar Willow, Coyote Willow	3 m	2 m	FS	H	spreads by rhizomes to form colonies
<i>Salix lutea</i>	Yellow Twig Willow	2-4 m	2 m	FS	H	
<i>Sambucus racemosa</i>	elderberry	1-4 m	2 m	FS to PSh	M	two varieties with red or black fruit; plant parts other than fruit considered poisonous
<i>Shepherdia canadensis</i>	Canadian buffaloberry	1-3 m	2 m	FS	MD, DT	
<i>Sorbus scopulina</i>	western mountain ash	1-4 m	3 m	FS to PSh	M	
<i>Spiraea betulifolia</i>	white meadow sweet	20 - 80 cm	80 cm	FS to PSh	X, M	white flowers followed by orange-scarlet fruit
<i>Symphoricarpos occidentalis</i>	buckbush	50-150 cm	1 m	FS	X, M, DT	pink-white flowers; white fruit; suckers readily, may be aggressive
<i>Viburnum edule</i>	low-bush cranberry	1-2 m	1 m	FS to PSh	M	white flowers; red fruit; good fall colour
<i>Viburnum opulus</i>	high-bush cranberry	4 m	3 m	PSh	M	white flowers; red fruit; good fall colour

BIRD PLANTING

TREES		HEIGHT	WIDTH	EXPOSURE full sun=FS shade=Sh part shade=PSh	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesic	NOTES
<i>Betula papyrifera</i>	paper birch	25 m	10 m	FS	M	peeling white bark
<i>Juniperus scopulorum</i>	Rocky Mountain Juniper	1-3 m	1.5 m	FS	X, DT	narrow, upright tree
<i>Picea glauca</i>	white spruce	30 m	6 m	FS to PSh	M	forest and parkland
<i>Pinus contorta</i> var. <i>latifolia</i>	lodgepole pine	30 m	5 m	FS	X, M, DT	
<i>Populus tremuloides</i>	trembling aspen	20 m	8 m	FS	M, DT	forms colonies through suckers from roots
<i>Prunus virginiana</i>	chokecherry	10 m	8 m	FS	M, H, DT	poisonous except for flesh of berries; multi-stemmed

SHRUBS

<i>Alnus crispa</i>	green alder	3 m	2 m	FS or Sh	H	shrubby; spreads through rhizomes
<i>Amelanchier alnifolia</i>	Saskatoon, service berry	3-6 m	2 m	FS to PSh	X, M, DT	forms colonies through stolons
<i>Betula glandulosa</i>	bog birch	2 m	1 m	FS to PSh	M	suckers to create new plants
<i>Cornus stolonifera</i>	red twig dogwood	1-3 m	2.5 m	FS to PSh	M, H	synonym <i>C. sericea</i> , lower branches will root to ground
<i>Corylus cornuta</i>	beaked hazelnut	1-3 m	2 m	PSh	M	hard shelled nut
<i>Juniperus communis</i>	common Juniper	1 m	3 m	FS	X, M, DT	blue, berry-like cones
<i>Juniperus horizontalis</i>	creeping Juniper	10-40 cm	3 m	FS	X, DT	blue, berry-like cones
<i>Lonicera dioica</i>	twining honeysuckle	1-3 m	1 m	FS to PSh	M	low-growing vine or lax shrub; yellow flowers; red berries
<i>Lonicera involucrata</i>	bracted honeysuckle	2-3 m	2 m	FS to PSh	M	pairs of red-purple flowers; purple-black fruit
<i>Prunus pensylvanica</i>	pincherry	6 m	4 m	FS	M	poisonous except for flesh of berries
<i>Rhus trilobata</i>	three lobed sumac, skunkbush	1-2 m	1.5 m	FS	X, M	good fall colour; spreads by rhizomes; yellow flowers; red fruit
<i>Ribes aureum</i>	golden currant	1-2 m	1.5 m	FS	M	yellow flowers; red fruit
<i>Ribes oxycanthoides</i>	wild gooseberry	1 m	1 m	FS to PSh	M, H	white flowers; red-purple berries; dense prickles
<i>Rosa acicularis</i>	prickly rose	50-150 cm	1 m	FS	M, DT	pink flowers; prickles; Alberta's floral emblem
<i>Rosa arkansana</i>	prairie rose	20-45 cm	50 cm	FS	X, M	pink flowers; prickles; single stem growth habit
<i>Rosa woodsii</i>	Wood's Rose	50-150 cm	1 m	FS	M, DT	pink flowers; prickles
<i>Rubus idaeus</i>	wild red raspberry	2 m	2 m	FS	M, DT	prickles; stems usually biennial
<i>Salix bebbiana</i>	Bebb's willow, beaked willow	4 m	3 m	FS to PSh	M, H	
<i>Salix discolor</i>	Pussy Willow	10 m	4 m	FS	H	
<i>Salix exigua</i>	Sandbar Willow, Coyote Willow	3 m	2 m	FS	H	spreads by rhizomes to form colonies
<i>Salix lutea</i>	Yellow Twig Willow	2-4 m	2 m	FS	H	
<i>Sambucus racemosa</i>	elderberry	1-4 m	2 m	FS to PSh	M	two varieties with red or black fruit; plant parts other than fruit considered poisonous
<i>Shepherdia canadensis</i>	Canadian buffaloberry	1-3 m	2 m	FS	MD, DT	
<i>Sorbus scopulina</i>	western mountain ash	1-4 m	3 m	FS to PSh	M	
<i>Spiraea betulifolia</i>	white meadow sweet	20 - 80 cm	80 cm	FS to PSh	X, M	white flowers followed by orange-scarlet fruit
<i>Symphoricarpos occidentalis</i>	buckbrush	50-150 cm	1 m	FS	X, M, DT	pink-white flowers; white fruit; suckers readily, may be aggressive
<i>Viburnum edule</i>	low-bush cranberry	1-2 m	1 m	FS to PSh	M	white flowers; red fruit; good fall colour
<i>Viburnum opulus</i>	high-bush cranberry	4 m	3 m	PSh	M	white flowers; red fruit; good fall colour

HUMMINGBIRD

		HEIGHT	WIDTH	EXPOSURE full sun=FS shade=Sh part shade=PSh	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesic	NOTES
SHRUBS						
Lonicera dioica	twining honeysuckle	1-3 m	1 m	FS to PSh	M	low-growing vine or lax shrub; yellow flowers; red berries
Ribes aureum	golden currant	1-2 m	1.5 m	FS	M	yellow flowers; red fruit
Sambucus racemosa	elderberry	1-4 m	2 m	FS to PSh	M	two varieties with red or black fruit; plant parts other than fruit considered poisonous

		BLOOM TIME	BLOOM COLOUR	HEIGHT	EXPOSURE full sun=FS shade=Sh part shade=PSh	SOIL MOISTURE CONDITIONS drought tolerant=DT X=xeric H=hygric M=mesic	NOTES
FORBS (Wildflowers)							
Allium cernuum	nodding onion	June/July	pink or white	10-50 cm	FS to PSh	M	bulb; self-seeds
Allium textile	prairie onion	June/July	white	5-30 cm	FS	X	bulb
Asclepias speciosa	showy milkweed	April/May	white	2 m	FS	M, H	spreads by rhizomes to form large patches; poisonous when raw
Delphinium glaucum	tall larkspur	June/July	purplish	1-2 m	FS	M	poisonous (especially the seeds)
Heuchera richardsonii	alum-root	April/May	purplish	30-40 cm	FS	M,H	
Lilium philadelphicum	western wood lily	June/July	orange/red	30-60 cm	FS to PSh	M	bulbs; may not be available
Lupinus argenteus	silvery lupin	June/July	light violet	50-100 cm	PSh	X,M, DT	poisonous
Lupinus sericeus	silky lupin, wild blue lupin	June/July	blue/purple	40-80 cm	PSh	X,M, DT	poisonous
Monarda fistulosa	wild bergamot, bee balm	June/July	rose or lilac	30-70 cm	FS	M	
Penstemon confertus	yellow beardtongue	June/July	yellow	10-50 cm	FS	M,H	
Penstemon nitidus	smooth blue beardtongue	June/July	blue	20-30 cm	FS	X	

APPENDIX 9

PURCHASE AND INSTALLATION OF PLANTS

SEEDS OR PLANTS

In general, unless you are dealing with very large areas, **plugs** for grasses and flowers are preferable to seeds and seeding. By using plugs, you are installing a plant that already has a fairly well developed root system. This means that the plant will become established sooner, and will, therefore, bloom sooner. Plugs are also easier to plant, and much easier to distinguish from immature weeds when they are in the ground.

PURCHASING TREES

TYPES OF PLANTING STOCK

Nursery stock is sold in many forms: seedlings or whips, bare root (BR), in plastic or fibre pots, as well as balled and burlap (B&B). Although it is tempting to purchase the largest plants you can get, this is not usually the best approach. Besides being very expensive, large plants do not handle being transplanted as well as small plants. Large plants have a lower transplant survival rate and often do not grow for many years as they adjust to their new surroundings. Seedlings or whips may seem insignificant to start with, but are generally stronger, healthier, and adapt to the new conditions of your site much better than more mature plants. Within five to seven years, these little plants will be the same size as the 10 to 14 foot balled and burlap plants that were transplanted at the same time. However you purchase your plants, it is very important they are planted promptly. Do not let them dry out in the sun or wind.

If you are purchasing seeds, ensure that they are derived from local plants. Do **NOT** purchase the “canned wildflower” gardens that are seen at garden centres. Many of the seeds are quick-growing annuals and perennials that are not native to Alberta.

Starting plants from seeds provides a wonderful classroom activity and learning opportunity.



	How they are Sold	Advantages	Disadvantages
Seedling / Whip	Bare root or container.	Inexpensive; healthier and stronger than balled and burlap.	Small so can be easily trampled; area should be marked; consider staking.
Bare Root (BR)	Roots in a moisture-holding medium such as peat.	Less expensive; easy to handle; roots adapt easily to existing soil.	Roots prone to desiccation if not kept moist during transplanting; keep moist and protected with mulch or wet soil.
Balled and Burlap (B&B)	Field grown at nursery, then dug out to sell; roots contained in a ball of soil, wrapped with burlap, cloth, chicken wire. **Most common form to purchase large trees.	Less expensive than large container specimens or tree-spade transplant; can provide instant landscape.	Harder to handle than BR due to weight of soil ball; generally a poor way to purchase trees as up to 90% of their roots can be lost when dug out from the nursery soil.
Container Stock	Roots in container with soil.	Slightly easier to handle than B&B; better survival rate than BR stock; good for amateur planters.	Same as for B&B; circling roots very common; root problems likely if plant has outgrown the pot.
Tree Spade Transplant	With roots in native soil; cost includes moving and planting.	Useful for large trees or when nursery is close to the site; instant landscape.	Expensive; tree may lose much of its roots when removed.

Adapted from ***Growing Greener Cities: A Tree Planting Handbook*** by Gary Moll and Stanley Young. Venice CA: Living Planet Press, 1992.

How to Select Healthy Plants

Avoid the following:

- pots with thick roots coming out of the base or found on the surface of the pot
- split containers
- plants with obvious signs of pests and diseases
- shrivelled leaves or cankered stems
- leafless leggy stems
- pruning cuts that show drastic cutback, one-sided growth, discolouration and undersized leaves
- dry soil and wilting leaves
- dense weed growth around the base of a tree



INSTALLATION

Plants are remarkably resilient; however, the survival rate of your plants will be greatly increased by following some simple guidelines for installation.

TREES

Mark it: Mark the perimeter of the planting area. This should be three to five times the width of the root-ball to give the roots plenty of room to spread out. They will extend at least to the drip line of the branches.

Prepare it: Use a shovel, rototiller or bobcat to loosen, amend and thoroughly mix the soil in the entire planting area. If you only amend the area right around the roots the tree will not send roots out into new soil. Even if you have raised beds or **berms** with new topsoil, you will likely be digging deep enough to hit the hard-packed playing surface, so using a rototiller may save time and prevent a myriad of blisters and backaches.

There are conflicting opinions on soil **amendments** and fertilizers. If you choose to use a transplant fertilizer, just be sure it does not come into contact with any exposed roots. Mix it with the soil or water it in later. Native plants and in particular prairie plants, grow in lean soil conditions, so it may not be appropriate to amend the soil. That being said, the soil found on school grounds is generally of such poor condition that a certain amount of organic matter would not be inappropriate.

Dig it: Dig a hole as deep as the root-ball. If you are planting a bare root plant, create a small peak in the centre of the hole so the roots do not collapse under the plant. The tree should be planted at exactly the same depth it was growing in the container or in the ground. You should see a slight flare where the trunk stems meet the roots, which indicates where the soil line should be.

Free it: Remove the plant from its container. Massaging or rapping the sides of the container with your hand will help to loosen the plant. If your plant has been in the container too long you may need cut the container to remove the plant. Check to see if the roots have grown in circles within the confines of the container. If so, try to disentangle and spread out the roots. If the roots are too thick to disentangle by hand, cut and free them. Encircling or “girdling” roots will strangle the tree in later years.

Many large balled and burlap trees come with a metal cage around the root-ball. This cage can be left on, but make sure the roots are not wrapped around the cage and take the time to carefully spread the roots out through the cage. When planting a plant, remove the burlap after freeing the root ball from any metal cage around it. Although burlap decomposes in the soil, if any part of the burlap reaches the surface it will act as wick and rapidly remove moisture from the soil around the plant. If the plant is very large, you will cause more damage trying to remove the burlap, so just be very careful to ensure the burlap is completely buried.

Place it: Place the plant in the prepared hole. When moving the plant, if possible, lift it by the root-ball. Lifting a heavy plant by the stem can cause damage. Spread the roots out as much as possible, and make sure the plant is straight and vertical.

Fill it: Back fill with the soil you removed to dig the hole. If planting a B&B plant that you are leaving the burlap on, pull the burlap away from as much of the root-ball as you can and spread it away from the root-ball. Water thoroughly as you back fill to remove air pockets and soak the root-ball.

More conflicting opinions surround the creating of a moat around the plant. Mounds of soil are often created to prevent the water from running off the surface, keeping it around the root zone. Some feel that this creates a water basin encouraging the roots to stay in this area. Once the area has been **mulched**, this problem is generally avoided, although for plants on a slope, it may still be beneficial.



Unwrap it: Remove any wrapping around the trunk.

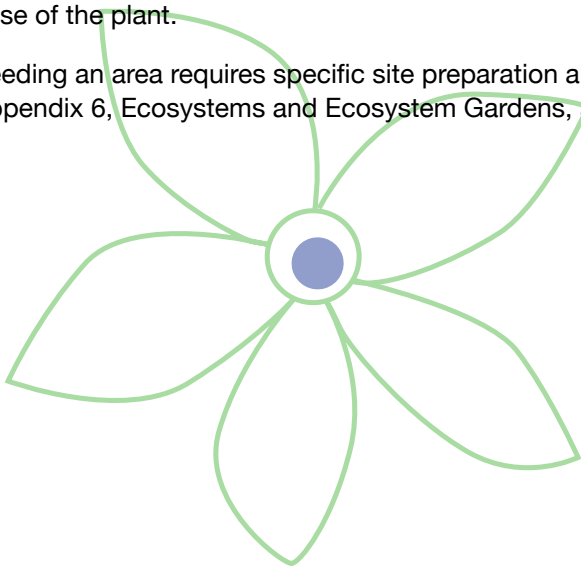
Water it: Use water, not your feet, to settle the soil. This prevents over packing, and ensures that the roots can breathe. Water deeply. Be sure the root-ball gets well watered, as the root-ball is different from the soil around it.

Mulch it: If the decision has been made to mulch, do not apply it any closer than 15 cm (6 inches) from the tree trunk. Mulch applied too close can promote decay and insect damage.

Do not stake it: Historically, young trees were always staked, but this can restrict the tree's natural movement in the breeze, thereby preventing stem development and the formation of a strong trunk. It is best not to stake or tie your tree unless wind is a severe problem. If you do stake, make sure the stakes are flexible, so the tree can sway in the wind. Secure them with ties of fabric or rubber that will not damage tree bark, and remove them after one year. If wire, string or protective tape is left on the tree, it can damage the trunk.

Planting instructions for shrubs, **perennials** and grasses are basically the same, although you will be dealing almost exclusively with plants in containers. You will still need to prepare a hole 1 1/2 times the width of the root-ball and the same depth as the root-ball, but with new topsoil, this should be easy to hand dig. Some people recommend bone meal or a transplant fertilizer (high in phosphorous) be added to the prepared hole at planting time, but with new soil, especially if it has a good amount of organic matter, this may not be necessary. Make sure the hole is prepared such that the plant will be sitting just slightly below the depth of the pot, then remove the plant from its container. If the roots are matted or have started circling, cut them with a trowel or spade and free them with your fingers. Fill with soil around the plant, firming it gently with your hands, then water to settle the soil, and spread mulch close to, but not touching, the base of the plant.

Seeding an area requires specific site preparation and planning. For more information, see the references listed in Appendix 6, Ecosystems and Ecosystem Gardens, and consider consulting a restoration specialist.



APPENDIX 10

SOIL AND MULCH

SOIL

Soil is the critical vertebra in the backbone of the naturalization project. If the soil is poor, plants will not thrive regardless of how healthy they were to begin with. From your **site inventory**, you should have a good feel for the quality of your soil and whether it has to be replaced and/ or amended.

VISUAL APPEARANCE OF SOIL

- Observe what is growing on the site. Do plants and weeds grow well, or is the surface vegetation eroded, leaving dry, exposed dusty soil?
- What is the colour of the surface soil? Is it sour looking (bluish-greyish) or healthy dark brown?
- Is there moss growing on the surface?
- Is the surface waterlogged or dry? If water forms puddles on the surface, the soil may be a poor-draining clay soil. If water leaves dust-covered spots, it may be a silty soil. If water drains quickly, most likely it is a sandy soil.

TEST THE SOIL TEXTURE

Soil is made up of four components: mineral particles, organic matter, water and air. The soil texture describes the proportion of mineral particles of various sizes found in the soil. Sands are the coarsest material and feel gritty. Silts are smaller particles and hold nutrients that plants can absorb. Clays are the smallest particles and feel sticky when wet. What follows is a challenging exercise and should be reserved for older students.

- Take a small sample of soil from the top 15 cm, add a few drops of water and rub into a ball.
- Does the soil remain in a ball when squeezed? If not, add a little more water. Does the soil sample still fall apart easily and feel very coarse and gritty when rubbed into the palm of your hand? If the soil will not remain in a ball, it is a sandy soil. These soils will drain quickly, but are usually low in organic matter and low in fertility.
- Make the ball of soil into a snake by squeezing and rolling the sample between your thumb and forefinger. If the snake breaks before it is 5 cm long and feels slippery and silky (but not gritty or gluey) when rubbed in the palm of your hand it is a silty soil. These soils will reduce to dust when dry soil is being broken up, and feels powdery when dry.
- Does the soil snake get more than 5 cm long without breaking? Does the soil stick together like wet putty or glue? Does it feel very smooth and sticky when rubbed into the palm of your hand? If so, it is a clay soil. These soils are often high in nutrients, but do not drain well and may hold too much water and not enough air. Clay soils will stay in hard lumps when dry soil is being broken up.

ALTERNATE SOIL TEXTURE TEST

- Take a soil sample from the top 15 centimetre of the hole. Crush the sample and put it in an empty 2 litre clear plastic pop bottle, add water and shake. Let it sit for a couple of hours. The soil will settle into layers of sand, silt, clay and organic matter. The coarsest material (sand) will be at the bottom, silt next, then clay and organic matter on top.

Not all soil is created equal. It's worth the effort to start with healthy, weed and debris-free soil. Some plants, particularly prairie plants, may actually thrive in poor soil. Research plants and then consider the soil preparation required. You may decide to create areas of different soil conditions to create different growing conditions for different plants. Perhaps create an area of rich, moist soil for shade plants, and an area of leaner, faster draining soil for xeric plants.

- What is the dominant layer? Does this result agree with the result from the other texture test?
- How much organic matter is present?
- Repeat this experiment with soil samples from home or from various parts of the schoolyard.

TEST FOR ORGANIC MATTER

- Take a dry soil sample and moisten with a few drops of water using an eyedropper. If the soil flattens to nothing, there is likely little organic matter. If the soil stays together when wet, there is some organic matter in the soil. How well the sample stays together is an indication of the amount of organic matter.
- The colour of the soil is also an indication of the organic matter content. The darker the colour, the more organic matter is in the soil.

SOIL CHEMISTRY

The ideal pH for plant growth is 6.5 to 7.5. Outside this range, certain nutrients are bound to the soil and cannot be absorbed by the plants. Calgary soil tends to be alkaline at 8.2-8.5 pH but can be lowered through the addition of large amounts of organic matter. Soil pH can be determined with a simple test kit available from most garden supply stores.

SOIL STRUCTURE

Soil structure refers to the way in which the various components of soil are grouped together; that is, how the particles are held together in stable **aggregates**. Soils with good structure will have adequate spaces between mineral particles to allow good water movement, air exchange and root penetration. Soils on schoolyards or parks that have become over compacted will have poor structure, leaving spaces too small for water and air movement and root penetration.

Turn a shovel full of soil onto the surface. Break the soil apart with the shovel. Are there still clusters or clumps of soil that remain bound together? If so, the soil has good structure. The clumps will remain intact even when the soil is wet and likely the soil will have both good drainage and good **aeration**. Does the soil disintegrate into many small sized components? If so, the soil has poor structure.

HOW MUCH SOIL?

To calculate how much soil is required, you need to know the area to be covered and how deep it is to be covered.

Make all your measurements in metres, and use the following formula.

Volume of soil (in cubic metres) = length x width x depth

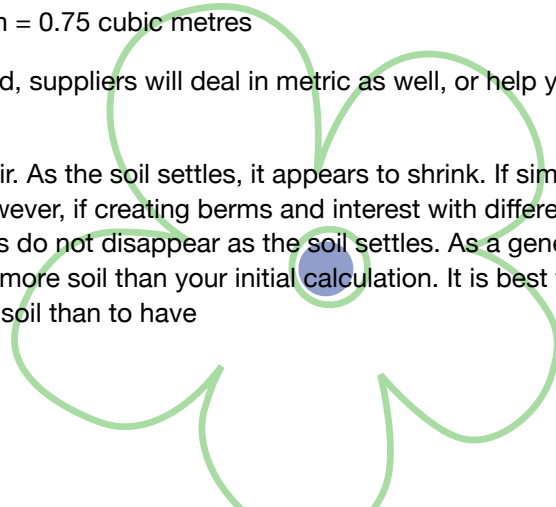
For example, an area that is 3 metres long, by 2.5 metres wide, with a required depth of 10 centimetres:

Volume of soil (in cubic metres) = 3.0m x 2.5m x 0.10m = 0.75 cubic metres

Although soil is sold most commonly by the cubic yard, suppliers will deal in metric as well, or help you with the conversions.

When the soil arrives, it will be light, fluffy and full of air. As the soil settles, it appears to shrink. If simply laying down a flat layer of soil, shrinkage may not be a concern. However, if creating berms and interest with different elevations, soil shrinkage must be accounted for so elevation features do not disappear as the soil settles. As a general rule of thumb, soil shrinks by about 25% as it settles, so order 25% more soil than your initial calculation. It is best to round soil quantities up, as it is easier to find a place for excess soil than to have to re-order.

For a rough estimate of soil pH, try a vinegar test. If you add vinegar to a sample and it fizzes, free lime is present in the soil. Free lime is associated with alkaline soil (high pH) and will affect the plant's ability to absorb nutrients from the soil. You can amend with organic matter or treat with chelated iron (available alongside fertilizers in garden supply stores).



Area = length X width. If you have irregular, rounded shapes, you will have to be a little more creative in your calculations. This is a great problem solving activity for students. Ideas: divide the area up into smaller, more regular shaped pieces (circles, triangles, rectangles, etc.). Use a piece of string to trace around the area, and then turn the string into a shape you can easily measure.

Soil gets muddy when wet and blows away when dry. If the soil has to sit for any time, consider making the effort to tarp it.

Loam or garden loam is the best soil to purchase in Calgary. The “top soil” that is sold is often mixed with subsoil. As Calgary soils tend to be high in clay, you will end up with heavy soil that compacts quickly as kids play on it. Composed of approximately one-third sand, loam does not compact as easily and has better drainage. Screened loam may be more expensive, but has the advantage of having all of the rocks, large clumps of soil, and most importantly, vegetative structures of weeds removed. Be aware that almost all looms contain weed seeds, especially from weeds such as pennycress, flix weed and dandelions. These will begin to germinate soon after spreading, and may continue to appear even during the second growing season.

MULCH

Mulch is simply a layer of material covering bare ground or soil. It is often used in low-maintenance gardens for a variety of reasons, the most valuable being the prevention of weed growth. A ten centimetre (4 inch) layer of mulch blocks the sunlight needed for weed seed germination. Because mulch is a loose substrate, the few weeds that do come up are easy to pull. The other major benefit of using mulch is moisture retention. Mulch preserves the moisture content of the soil by reducing soil temperature in the summer, and by acting to reduce exposure to drying winds, all of which means less water needs to be applied to your landscape.

Other benefits include:

- Soil temperature regulation - mulch keeps the soil cooler in the summer, warmer in the winter, and a more constant temperature during chinook winds.
- Erosion prevention - mulch keeps the soil from wind and rain, and from sloughing down slopes as children run and play.
- Makes plantings look more natural than bare soil.
- Improved **soil structure** - as organic mulch decomposes, it adds to the soil fertility.

If an area is being seeded or if a prairie ecosystem is being recreated, mulch is often not recommended. It may prevent seeds from germinating by limiting the amount of light required, and in prairie plantings, the mulch may alter the conditions such that the planting is not successful. For each project, the decision will depend on different factors.



TYPES OF MULCH

The choice of mulch material depends on the desired look and budget. Materials can be divided into organic (derived from plant and animal sources) and inorganic (derived from non-living materials, such as rocks).

ORGANIC materials have the advantage of breaking down and adding **humus** and nutrients to the soil. In this process; however, the micro-organisms responsible for decomposition need nitrogen, which they take at the expense of plant roots. To limit this effect, try to locate older mulch that is further along in the decomposition process.

Wood chips, either **coniferous** or **deciduous**, are often free from on arborist or a tree pruning company. Just be careful to confirm that the chips are not coming from a diseased or insect infested tree. They may be bright coloured when new, but will fade to a natural grey tone. Deciduous chips are generally more child friendly than coniferous chips as there are no needles from the trees or sap to stick to the children's clothing. Coniferous mulch is an excellent choice for lower traffic areas and for around plants which are sensitive to alkaline soils.

Bark mulch is attractive, but somewhat expensive, and is available from garden centres and landscape supply companies.

Leaves, straw, lawn clippings; there are many other organic materials that will improve the soil while helping to keep an attractive, low maintenance, low water site. Whatever type of mulch is selected, consider whether the mulch itself is a seed source for weeds, such as hay.

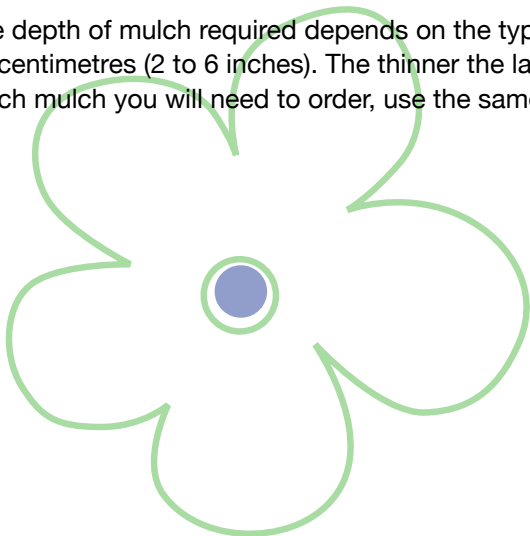
INORGANIC materials break down far more slowly, but do not provide the nutrient benefits of organics. They can also tend to look less natural.

Gravel can be as attractive as mulch, especially in xeric (dry) settings. Stone mulches come in a variety of colours, but natural grey-tone is the most attractive in naturalized settings. Unfortunately, stone mulches are not as child friendly as some of the other types of mulch. Check the CBE and CSSD guidelines to determine what size of gravel can be used.

Landscape fabric and black plastic are not recommended as mulch. Neither is very attractive, so are best used in combination with another type of mulch as a cover (such as wood chips). If this method is used; however, a thinner layer of top mulch can be used. Both are difficult to use with planting beds because holes must be created for the plants to emerge through. These materials also easily shift or are torn as children play, reducing their effectiveness. Black plastic also causes the soil to become excessively hot and greatly reduces water permeation.

HOW MUCH MULCH?

The depth of mulch required depends on the type of planting, and the purpose of the mulch. Depth can range from 5 to 15 centimetres (2 to 6 inches). The thinner the layer, the more frequently it will need to be replenished. To calculate how much mulch you will need to order, use the same method as for ordering soil. Shrinkage is not a concern with mulch.



APPENDIX 11

MAINTENANCE

SPRING CLEAN-UP

A spring clean-up should be scheduled when the weather is warm enough; early May is generally a good bet. Activities will include:

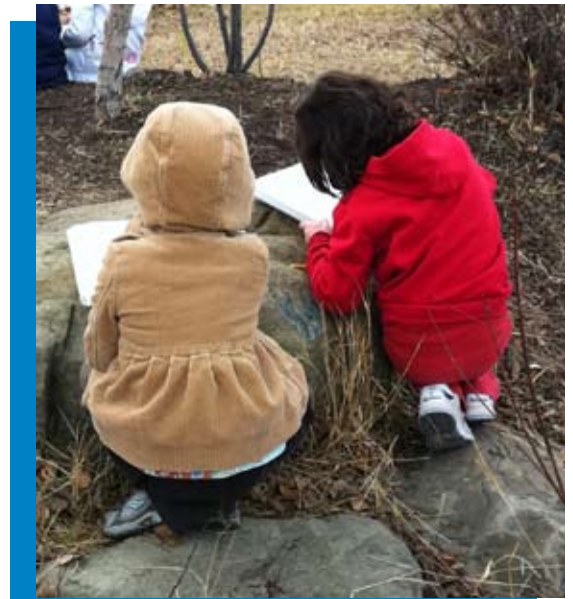
- cutting back the dead material on **perennials** (raking over low-growing plants will achieve this)
- early season weeding (which will make summer weeding much more manageable)
- redistribution and replenishment of **mulch** as needed
- cleaning up of vegetable or experimental gardens
- rake up any cuttings or leaves from the fall (you may choose to leave these on the ground, or they can go into the **compost**)

FALL CLEAN-UP

Schedule a fall clean-up for anytime after the first hard frost; early October is a good guideline.

Activities will include:

- Cutting back perennials with the exception of **evergreen** and semi-evergreen plants, and those that provide food for wildlife over the winter (i.e., those with seeds and berries).
- Teachers may want to take some of these materials for use in art projects.
- Spread cuttings on the ground to act as mulch over the winter, to be raked up in the spring, or left as litter on the ground to decompose.
- Tackle any remaining weeds, especially perennial ones.
- Put away any pots or other elements that may be damaged in the harsh winter conditions.



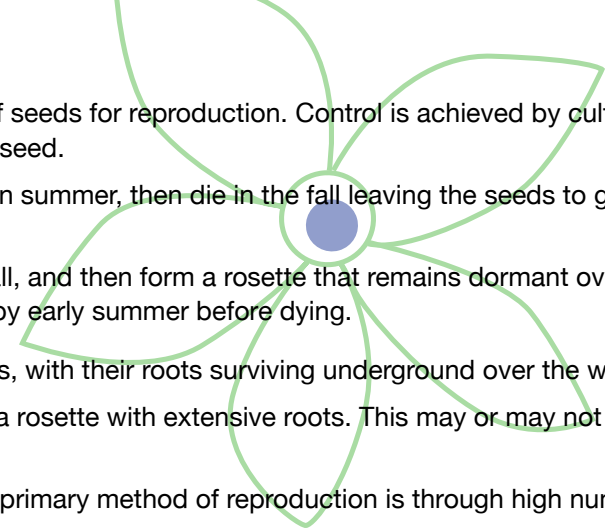
WEEDS

Why weed? Weeds tend to be aggressive and will outpace your desired plant material. They may directly compete with your plant material for resources such as nutrients and water. Weeds also reduce the natural appearance of the area, compromise its educational value, and may draw criticism from administration and the surrounding community.

When tackling weeds in the naturalized site, identification is the first step. With this knowledge, you can determine its life cycle, how to eradicate it, and its designation under the Alberta Weed Control Act. There are some great resources available to assist in this, as listed at the end of this section. Researching weeds can be a great learning opportunity for students, as many were brought over by settlers because of their aesthetic, medicinal, nutritional or cultural attributes.

Under the Alberta Weed Control Act, weeds are given designations (Restricted, Noxious, or Nuisance) depending on the extent of their spread in the province. Most of the weeds schools encounter are nuisance weeds, but check the Alberta Government, Agriculture and Rural Development website for a description of the Weed Control Act and listings of weeds and their designations. For restricted weeds, and in some cases noxious weeds, a weed inspector can insist that they be controlled.

By knowing and understanding the life cycle of a specific weed, your efforts to get rid of them can be much more efficient. As well, life cycles of weeds and their reproductive strategies, fit directly with areas of the Alberta curriculum.



Annual Weeds: These weeds rely on high numbers of seeds for reproduction. Control is achieved by cultivating their weak roots and removing any flowers before they set seed.

- Summer annual weeds set high numbers of seeds in summer, then die in the fall leaving the seeds to germinate the following spring.
- Winter annuals germinate in late summer or early fall, and then form a rosette that remains dormant over the winter. In spring, this rosette has a head start, setting seeds by early summer before dying.

Perennial Weeds: Perennials live more than two years, with their roots surviving underground over the winter.

- Simple perennials germinate in the spring, forming a rosette with extensive roots. This may or may not flower, but in its second year it will set seed.
- Although these weeds continue to overwinter, their primary method of reproduction is through high numbers of seeds.
- Creeping perennials can reproduce from seeds, but rely more heavily on specialized vegetative structures (roots, rhizomes). This means that any piece of root left after digging can result in a new plant. These weeds are notoriously difficult to eradicate.

Biennial Weeds: Biennial weeds live for two growing seasons. They germinate in spring, form a rosette with extensive roots that stays dormant over the winter, resumes growth in the spring, and dies at the end of the season. These weeds also rely on heavy seed production for reproduction.

Ideally, few weeds will become established in the installation of the site. Prevent introduction by purchasing screened, good quality topsoil, and choose weed-free plant stock, seed, sod and use only well-composted manure. Weed growth can be prevented by using mulches. A healthy, vigorously growing plant stand that limits the amount of exposed soil, will also prevent weeds.

When weeds are present in the site, manual control is used to attack the reproductive parts (seeds, and/or vegetative structures). For annual weeds, mowing or **deadheading** to prevent seeds works well, as does cultivating, especially when the weeds are young. For perennial weeds, handpulling is the best method, but the entire root system needs to be dug out. Be sure not to put these weeds into the compost.

PESTS AND DISEASES

Because we are dealing with what should be considered a “natural” area, we should aim for a “hands-off” approach. We might leap to treat aphids in an ornamental garden, but we may choose to leave them alone here. A healthy ecosystem brings in beneficials (i.e., ladybugs) as well. As with weeds, identification is the first step, then you can decide how to act. The best prevention method is healthy plant material, as pests/diseases target weak or stressed plants. Prevent plant stress by keeping them well watered. Control may involve hand picking or pruning (best to identify the problem first). Certain pests will weaken the plant, which then may be susceptible to other threats. Problems some schools encounter include birch leaf miner, spruce gall adelgid, black knot, aphids, hypoxylon canker and powdery mildew.

PRUNING

Pruning should be a very limited activity. If you have planned the garden well and planted for the mature size of the **woody** plant material, no pruning for size should be necessary. Pruning should only be done for the health of the plant or if safety issues arise. Prune to remove dead, diseased or damaged branches.

REFERENCES AND RESOURCES

Alberta Agriculture, Food and Rural Development. *Weed Seedling Guide*. Edmonton, AB: Alberta Agriculture, Food and Rural Development, 1996.

Bubar, Carol, Susan McColl and Linda Hall. *Weeds of the Prairies*. Edmonton, AB: Alberta Agriculture. Food and Rural Development, 2000.

APPENDIX 12

VEGETABLE GARDENS

Although the planning process for a food garden is similar to a naturalized area, there are additional factors to consider. Selecting plants that can be harvested in the early summer or fall may be advantageous, as students are away for the summer months.

The following are important questions that can help make many critical decisions about garden type, placement and layout:

- How much available space do you have to work with?
- Who will be working in the garden? How many people at once?
- Who will take care of and maintain the garden?
- How much time do you have to dedicate to the garden?
- What vegetables do those looking after the garden want to eat?

SIZE

Size will depend on many things. How much available space do you have? How much time do you have to devote to the garden? A large garden obviously needs more space and more organized maintenance than a smaller plot. It may be a good idea to start small and get bigger in time. The kinds and amounts of plants also determine how large a garden should be.

PLANT CHOICES

Determine what you want to do with the plants you grow. If the goal is to eat them, make sure that the plants selected are those that will be eaten by those working in the garden, which can be challenging with students. Make sure the plants you selected will grow in Calgary's climate.

Cool season vegetables prefer to grow in the spring and fall, in daytime temperatures as low as 5°C. These plants can be planted on average two weeks before that last spring frost date (around May 20). They can be replanted in mid-summer to have a fall harvest. Examples of these are beets, broccoli and lettuce.

Warm season vegetables require day time temperatures above 15°C. They are intolerant of frost and should be planted after May 20. Examples of these include squash, corn and peppers.

Other factors to consider when choosing the plants for your garden are planting distances (between plants and between rows), the amount of food you want to produce, time to maturity, and any special requirements (e.g., climbing plants).

For more information and plant recommendations, see Appendix 12.

SITE

Vegetables need good quality light, soil, heat and water. They need between 8-10 hours of sunlight daily, or at least 6 hours. These should be during the hottest part of the day, when the light quality is strong. The best orientation is a plot that faces south, southeast or southwest.



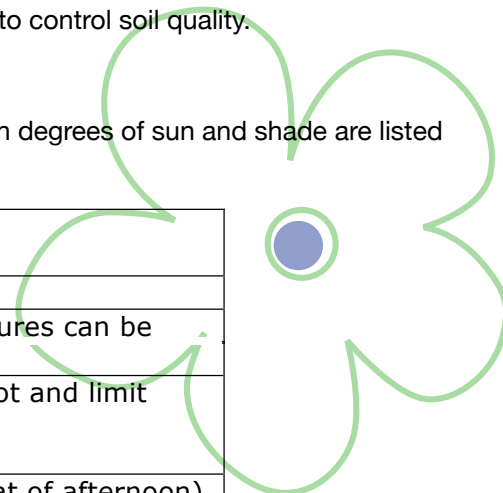
The site should maximize sun and minimize wind. Raised beds can help soil warm up faster and stay warmer than the ground below. Cold air can collect at the bottom of hills or in low pockets, which may adversely affect vegetable growth.

Access to natural water should be maximized (i.e., the garden should not be sheltered by roofs or trees), and supplemental water will be needed. It will be very helpful if the garden is near a hose or other outdoor water source. Deep, well-drained, fertile soil is ideal. Raised beds also provide the opportunity to control soil quality.

SUN

Different plants have different needs of intensity, length and quality of light. Seven degrees of sun and shade are listed below:

Degrees of Sun and Shade	Description
Full sun	Direct sun for at least 8 hrs a day
Full sun with reflected heat	Heat reflected from building, wall, etc.; temperatures can be very hot; limits plant choices
Morning shade with afternoon sun	Southwest and west reflected light can be very hot and limit plant choices
Morning sun with afternoon shade	An ideal site for many plants (avoids extreme heat of afternoon)
Filtered shade	Dappled shade, such as under trees; protects understory plants
Open shade	Open sky above, but direct light blocked by nearby building or structure; only more shade tolerant plants will grow
Closed shade	Under a canopy, such as deck or covered patio; only the most shade-tolerant plants will grow



LAYOUT

Due to the level of compaction on most school sites, raised beds provide an easy way to create deep, workable beds with less equipment and money than trying to create an in-ground bed. Raised beds provide better drainage and warmer soil temperatures. They can also be raised high enough to accommodate wheelchair users or those who have trouble bending. Typically a raised bed can be between 10-100 cm. Varying the height of different beds can be aesthetically pleasing.

Raised beds can be constructed out of construction lumber, brick, allan block or other materials. Do not use treated lumber for your vegetable garden as chemicals can leach into the soil.

Whether the bed is in-ground or raised, make sure that you can access all parts of the bed from the sides (a width of about 1.5 meters if accessed from two sides), or be sure to incorporate aisles/pathways for maintenance, harvest, etc.

Container gardening is also a great option for schools. Containers can be easy to access, attractive, warmer than surrounding soil, and have good drainage. Any container can be used as long as it is large enough and drains well. Due to decreased nutrients (simply due to decreased volume of soil) containers may require more fertilizer. Some ideas for containers include barrels, plastic buckets, stacks of tires or old garbage cans.

PLANTING

CROP ROTATION

Plants species behave differently and impact the garden in different ways. Crops that are heavy feeders remove a lot of nutrients from the soil (e.g., beets, spinach, potatoes, corn). Light feeders, such as carrots and onions, do not require as many nutrients. Beans and peas are soil builders that add nutrients to the soil. It is generally good to rotate crops from heavy feeders to light feeders to soil builders.

SUCCESSIVE PLANTING

Successive planting means planting multiple times. You can either plant a crop directly after the harvest of the last one, or you can plant one crop a few weeks after the first, thus staggering the harvest. This prevents having piles of potatoes or carrots ready for harvest all at once.

INTER-PLANTING

Inter-planting is planting more than one crop in a row. Small compact plants can be planted between taller ones, or those that tolerate shade (like lettuce) under other plants. Plants that germinate quickly can be helpful to have next to others that take more time to break through the soil (such as radishes and carrots).

COMPANION PLANTING

Inter-planting that pairs plants based on their relationships is called companion planting. Some plants may contain chemicals that repel pests or add nutrients to the soil, which is beneficial for other plants. A successful companion planting is corn, beans and squash. Corn provides a natural structure for beans to climb, beans fix nitrogen on their roots to improve the soil, while squash provides ground cover to prevent weeds and keep the soil from drying out.

DIRECT OUTDOOR SEEDING

Direct seeding avoids any transplant shock. Extra seeds can be planted and thinned out later. Some may not germinate, and some may be eaten by various animals. Plant the seeds at the appropriate depth indicated on the seed package, and far enough apart (unless thinning later). Cover with soil, firm the soil slightly and water. Mark the rows somehow (popsicle sticks, labels, etc.). Leftover seeds can usually be stored for two years, but there may be decreased viability. Keep seeds in a sealed container in the dark, between about 4-10° C.

TRANSPLANTS

Most crops can be started as transplants, and some plants such as beans, corn and peas actually perform better through this method of planting. Schools may opt to start seeds indoors to extend the gardening activities earlier in the school year (typically late February or early March). Determine when the transplants can be moved outdoors, and count backwards to find out when you should start it indoors.

When getting ready to move the plants outdoors, the transplants must be hardened off. This means they gradually get used to being in outdoor conditions (with fluctuating temperatures, direct sun and wind) rather than the stable indoor environment. If possible, reduce their indoor temperature and water about one week ahead of transplanting. Move them outside, once the temperature is above 16°C, but only for one hour each day. Start in the shade, and gradually expose them to sunshine. By the end of the week they can be left outside all day and night (as long as there is no risk of frost). Plant them as soon as weather permits.

MAINTENANCE

WATERING

Check soil moisture regularly and irrigate when the top 5-10 cm of soil is dry. Try to deliver water to the soil and avoid foliage. Watering in the morning is best. Soil **amendments** and mulch may help decrease the amount of water required.

SOIL QUALITY

Soil should be cultivated to remove any large clumps and break up the surface of the soil for water penetration. In the spring or fall the garden can be cultivated, which is also a great time to add soil amendments.

The addition of organic matter will help with **soil structure**, but may not provide all the necessary nutrients. A manufactured fertilizer may increase nutrients, but will not improve the structure and workability of the soil. Veggie gardeners may need to consider both kinds of additions to the soil to maximize results.

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WEBSITES

Green Thumbs Growing Kids
www.kidsgrowing.ca

Soil Sensor
<http://www.soilsensor.com>

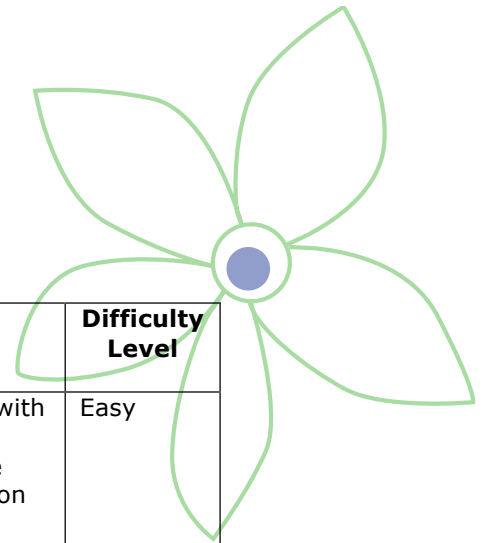
Kids Gardening
www.KidsGardening.org



APPENDIX 13

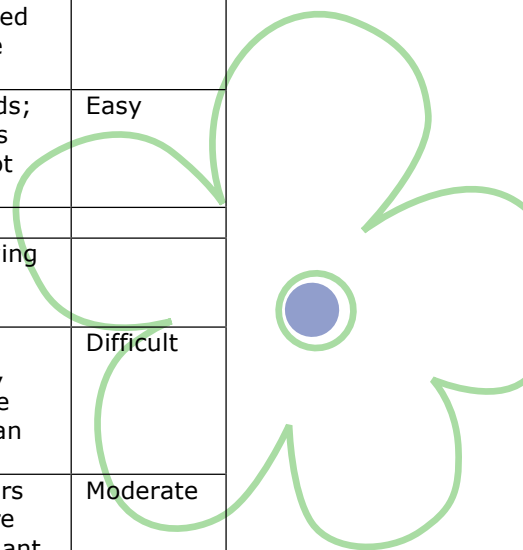
APPENDIX 13

RECOMMENDED CROPS FOR CALGARY, ALBERTA



Plant	Exposure	When to Plant	Start Indoors/Outdoors	Other Notes	Difficulty Level
Lettuce	Sunny to part shade	Indoors 4 weeks before last frost. As soon as soil can be worked, can be sowed outdoors in early April	Direct	Often co-planted with radishes to help spacing and make crop visible early on in season; can be planted in later summer to make fall harvest	Easy
Spinach	Sunny	As soon as soil can be worked, early April	Direct	Need to keep planting throughout season for a good crop	Moderate
Arugula (Rocket)	Sunny to part shade	As soon as soil can be worked	Direct		
Mustard		As soon as soil can be worked	Direct		
Chard	Sunny to part shade	As soon as soil can be worked	Direct or Seedling	Keep soil moist (2.5-4.0 cm water per week)	
Carrots	Sunny	As soon as soil can be worked, as early as early April; replant in mid-summer for fall harvest	Direct	Workable soil allows carrots to grow longer.	Easy
Radishes	Sunny to part shade	As soon as soil can be worked, late April or early May; replant in mid-summer for fall harvest	Direct	Keep reseeding	Easy
Beets	Sunny to part shade	As soon as soil can be worked, late April or early May; replant in mid-summer for fall harvest	Direct	Workable soil allows beets to grow bigger.	Easy
Turnips	Sunny to part shade	As soon as soil can be worked, early April; replant in mid-summer for fall harvest	Direct	Workable soil allows turnip to grow bigger.	Easy

Potatoes	Sunny to part shade	Plant when soil above 10 C. Seed pieces 4-5 cm in size	Direct or Seedling	Cut seed potatoes into pieces, with at least one eye to each piece. Hill around base, breaking off bottom leaves for more potatoes.	Easy
Collards	Sunny to part shade		Seedling (avoid transplants older than 6 wks)	Benefits from fertilizer	Moderate
Kale	Sunny to part shade	As soon as soil can be worked, late April or early May	Seedling	Benefits from fertilizer	Moderate
Cauliflower	Sunny	As soon as soil can be worked	Seedling	Benefits from fertilizer	Moderate
Beans	Sunny to part shade	After last frost to mid-summer	Direct or Seedling	Stake poles, not mesh, near a fence for pole beans.	Easy
Peas	Sunny to part shade	As soon as soil can be worked; avoid overcrowding	Direct or Seedling	Use netting or chicken wire for climbing varieties, not poles.	Easy
Onions	Sunny	Plant sets outdoors as soon as soil can be worked	Seedling	Plant varieties that like long days in Calgary (14-16 hrs daylight); pick seed heads to promote bulb growth	Moderate
Green Onions	Sunny	Plant sets outdoors as soon as soil can be worked	Seedlings	Keep free of weeds; poor root systems therefore does not compete well	Easy
Garlic	Sunny	Fall	Seedling		
Leeks	Sunny	Indoors, 10-15 weeks before last frost	Seedling	Need a long growing season	
Cucumbers	Sunny to part shade	May to June (temps above 13 C)	Seedling	Stress (too much/little water, poor soil, extreme heat and wind) can reduce flowering	Difficult
Tomatoes	Sunny to part shade	May to June; avoid early plantings	Seedling	Plant seeds indoors 8-10 weeks before last frost. Transplant 1 week after last frost. Stake early on.	Moderate
Peppers	Sunny	May to June; avoid early planting	Seedling	Temps should be consistently above 13-15 C before planting	Moderate
Squash	Sunny to part shade	May to June	Seedling	Need a lot of space.	Moderate



Asparagus	Full sun	As soon as soil can be worked	Seedling	Likes a lot of organic matter. May take years to establish crop (3 yrs).	Difficult
Rhubarb	Full sun, no reflected heat	Transplant in the fall if center of plant dies out	Seedling (dividing)	Large spreading growth, needs space; remove old stalks from base, allow new stalks to grow	Easy
Corn	Sunny	Around last spring frost (seed)	Direct or Seedling	Needs long growing season to produce good ears. Spacing impacts growth.	Moderate
Chives	Sun to part shade	May to June	Seedling	Perennial	Easy
Oregano	Sun	May to June	Seedling	Well-draining soil, lots of sun. Seeds not recommended.	Moderate
Mint	Sun to part shade	May to June	Seedling	Grows well, can be invasive.	Easy
Rosemary	Sun	May to June	Seedling	Well-draining soil, lots of sun. Seeds not recommended.	Moderate
Sage		May to June	Seedling		
Thyme	Sun	May to June	Seedling	Well-draining soil, lots of sun. Seeds not recommended.	Moderate
Basil	Sun		Seedling	Well-draining soil, lots of sun. Seeds not recommended.	Moderate
Cilantro (Coriander)	Sun		Direct or Seedling	Well-draining soil, lots of sun. Seeds not recommended.	
Dill	Sunny to part shade	As soon as soil can be worked, or in fall	Direct	Some varieties up to 5 feet tall.	Easy
Parsley	Sunny to part shade	Indoors 10 weeks before last frost As soon as soil can be worked	Direct		Easy
Borage		May to June	Direct		
Calendula		May to June	Direct		
Nasturtium		May to June	Direct		
Sunflower	Full sun	May to June	Direct	Lots of sun, heat, and water. Children love!	Easy
Strawberries				Possible ground cover. Animals often eat fruit before harvested. Protect with netting if desired.	
Raspberries				Grows well, can be invasive. Requires pruning. Perennial.	

CASE STUDY

WILDWOOD

STATS

Wildwood Elementary School (K-6)
Calgary Public School Board
Inner-city
400 students

RATIONALE/VISION

Rationale: The Wild Woods was developed as an outdoor learning area and as a natural setting for other activities such as reading and creative writing.

Vision: To develop and maintain one area of the schoolyard to serve as an outdoor learning area, and a natural setting for other activities such as reading and creative writing.

The idea was to use native plants to represent a selection of Alberta's Natural Regions. A smaller portion of the area was to be set aside to use as a vegetable garden and as an experimental area where non-native plants may be used for science projects, to attract wildlife, or for other similar activities.

SITE DESCRIPTION

The site measures approximately 45 metres by 25 metres, and is located on the north side of the school property. The boundary is 10 metres from the school building, and is bounded to the north and east by a chain-link fence. The ground outside the fence slopes down to a road, and only the edge of the site is readily visible to nearby neighbours.

The original space was a level portion of the schoolyard covered with turf grass. It was rarely used by students because of its location away from the main playground and school entrances.

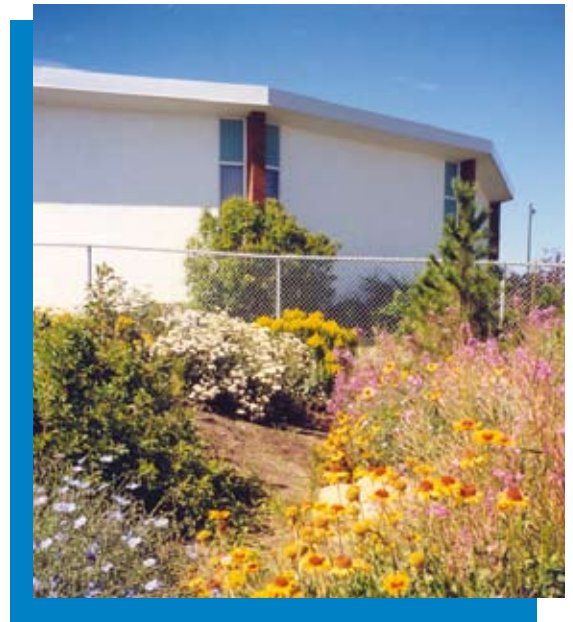
PROCESS

Planning continued for almost two years after the original committee was formed. During that time, the committee focused first on developing a vision, then on fundraising and finally on design. The committee considered development of a formal, written vision statement crucial to long-term success of the project. The vision statement has been used to familiarize new teachers and parent volunteers with the project, and to maintain consistency in the direction of development.

During the planning phase, the committee interviewed several professional horticulturists and retained two professionals, a landscape ecologist and a restoration ecologist. Those individuals provided invaluable advice on design, landscaping techniques, plant selection and maintenance. A landscape architect was retained to develop formal plans that were used in funding applications and as a blueprint for landscaping.

After landscaping was complete, but before any seeding or planting was done, the entire site was left fallow for one full growing season and the spring of the second to allow weeds in the new topsoil to germinate and be removed. Knowing that every plant was considered a weed during that phase made volunteers much more comfortable with weeding (plants could be removed without concern of mistaking native species). Plants included trees, shrubs, wildflowers which were planted as plugs and grasses which were seeded.

A fundamental philosophy has been to involve students in each step of the process. Classroom projects included design competitions, naming the space, and writing letters of thanks for supporters. In addition to curriculum-based studies in the Wild Woods, students are brought to the area each year to plant wildflower plugs to build a sense of ownership and participation.



TIMELINE

Ground breaking - May 1998 phase I installed (Montane)

Construction May 1998, planting through June

June 1999 - Phase II Aspen Parkland, Mixed-grass Prairie

2000 to 2007 addition of the Prairie natural region

2008 boulder amphitheatre

FINAL PROJECT DESCRIPTION

The Wild Woods was designed to include a Natural Area and a Garden Area. The Natural Area (80%) is divided into three sections to correspond with specific Natural Regions of Alberta, including the Rocky Mountain, Parkland, and Grassland natural regions. The Garden (20%) was included to allow planting of vegetable, non-native ornamental plants and wildlife-attracting plants as an experimental area to be used for science projects, student experiments and other activities. In all, over 80 species of trees, shrubs, wildflowers and grasses have been added.

The edge of the natural area grades into the adjacent schoolyard. Curved edges, large rocks and plantings are used to avoid creating a hard line between the Natural Area and the schoolyard. Pathways are wide enough to allow children to move freely within the Natural Area. Benches and boulders to encourage quiet reading, and a permanent sign recognizing the volunteers and sponsors have been included.

The project is used as an outdoor classroom for a variety of subjects and projects. An amphitheatre was added to the site in 2008 to accommodate outdoor teaching and lessons in the natural area.

BUDGET

The initial budget of about \$15,000 was apportioned as follows:

Consulting/Design 15%

Hard Landscaping 38%

Plant Material 37%

Gardening Supplies 5%

Maintenance (e.g., weeding) 5%

An additional \$9,000 has since been used primarily for plant material used for annual plantings. Budget for the design, materials and construction of the sandstone amphitheatre was \$13,000.

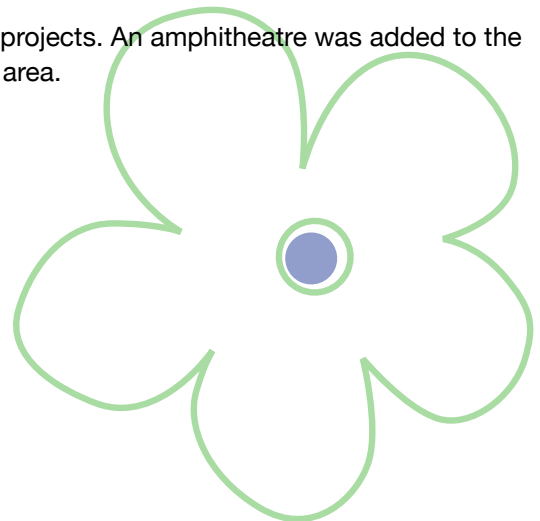
DONORS

Wildwood School Council, Wildwood Community Association, Wildwood Community Lunch Program, Terrestrial & Aquatic Environmental Managers Ltd., Shell Environmental Fund, Norseman Construction, Friends of Wildwood School Society, Friends of the Environment Foundation, Evergreen Foundation, Davison Worden, Boy Scouts of Canada Stewardship Program, Belaire Energy Corporation, and Alberta Sport, Parks & Recreation Foundation.

FOLLOW-UP

The Wild Woods at Wildwood Elementary has been, and continues to be, an important area for the students and the community. A Spring clean-up is scheduled every year for Wildwood families to familiarize, maintain and take ownership of the area.

Every spring, the grade one classes plant the vegetable garden. The harvest takes place the following fall when the students are in grade two, and the vegetables are used to make stone soup.



Over the course of three years, grade fours developed “The Wild Woods Guide” for visitors to the natural area. A resident artist, Laura Yearwood, taught and inspired students to paint the plants they researched in medium watercolours.

Wildwood Elementary has been a participant of the GroundWorks program offered by the Calgary Zoo’s Grounds for Change Program. GroundWorks is a year round training and support program designed to encourage use of the natural area for teaching. In all seasons, students are engaged in a wide range of curricular activities from math to social studies in the Wild Woods.

