Saskatchewan
Learning

Forestry Studies 20, 30
Curriculum Guide

A Practical and Applied Art

Saskatchewan Education
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Introduction

Within Core Curriculum, the Practical and Applied Arts (PAA) is a major area of study that incorporates five traditional areas of Business Education, Computer Education, Home Economics Education, Industrial Arts Education and Work Experience Education. Saskatchewan Education, its educational partners and other stakeholders have collaborated to complete the PAA curriculum renewal. Some PAA curriculum guidelines have been updated; some components have been integrated, adapted or deleted; some Locally Developed Courses have been elevated to provincial status; and some new guidelines have been developed.

A companion *Practical and Applied Arts Handbook* provides background on Core Curriculum philosophy, perspectives and initiatives. The Handbook articulates the goals for PAA. It presents additional information about the PAA area of study, including guidelines about work study and related Transition-to-Work dimensions. In addition, the *Practical and Applied Arts Information Bulletin* provides direction for administrators and others regarding the implementation of PAA courses. Lists of recommended resources for all guidelines will be compiled into a PAA Bibliography and followed with periodic updates. An initial list of resources for Forestry Studies 20, 30 accompanies the curriculum guide.

Philosophy and Rationale

Forestry Studies 20, 30 provides an understanding of resources of benefit to students wishing to learn about various aspects of the forestry industry with particular emphasis on the Boreal forest of northern Saskatchewan. Students seeking employment in the forestry sector, in Saskatchewan or elsewhere, will benefit from the knowledge and skills acquired through Forestry Studies 20, 30. Career development concepts such as career exploration are integrated throughout the courses. The optional work study component in each course offers students, where appropriate opportunities exist, the chance to learn more about the forestry sector in a work-based environment.

Aim, Goals and Foundational Objectives

Aim

The aim of Forestry Studies is to provide students with a wide range of learning opportunities to gain an understanding and appreciation of the social, cultural, economic and environmental perspectives of forest resource use and management.

Goals

Awareness: To provide an awareness of the economic importance of forest resources to Saskatchewan, Canada and other countries.

Career Development and Employment: To explore careers and to help students develop employability skills related to forestry.

Ecology: To promote an understanding of environmental issues pertaining to forest resources, enabling students to develop a strong conservation ethic towards protecting these resources.

Heritage: To understand the cultural role of forests in shaping and defining the Canadian identity.

Personal Development: To demonstrate how appropriate social interactions between people with similar interests in preserving and protecting forest resources can lead to cooperative partnerships in resource management.

Research: To develop laboratory-based and field-based research skills related to the forest industry.

Foundational Objectives

Foundational objectives are the major, general statements that guide what each student is expected to achieve in the modules of the PAA curriculum guide. Foundational objectives indicate the most important knowledge,

skills, attitudes/values and abilities for a student to learn in a subject. Both the Foundational Objectives for Forestry Studies and the Common Essential Learnings (CELs) Foundational Objectives to be emphasized are stated in this document. Some of these statements may be repeated or enhanced in different modules for emphasis. The Foundational Objectives of the Core Modules of the Forestry Studies curriculum include:

- To develop an understanding of the social, cultural, economic and environmental significance of forests.
- To understand the important role of humans in the protection and preservation of natural environments.
- To acquire a life-long conservation ethic.
- To be familiar with the various forest ecosystems in Saskatchewan and Canada.
- To develop employability skills and explore employment opportunities in forestry occupations through a wide range of experiences.
- To investigate future educational and occupational requirements for careers in forestry.
- To recognize the value of making contributions to society.
- To analyze the interrelatedness of living and nonliving elements in forest ecosystems.
- To interact positively and effectively with others at a worksite.
- To demonstrate knowledge, skills and attitudes that are necessary for safe and environmentally responsible experiences in the forest.
- To understand the importance of safety in the workplace.
- To develop an understanding of the use of technology in forestry and to recognize the benefits and limitations of technology.
- To understand that good forestry practice is informed by the scientific process, proper research and development.

Common Essential Learnings Foundational Objectives (CELs)

The incorporation of the Common Essential Learnings (CELs) into the instruction and assessment of the Practical and Applied Arts (PAA) curriculum offers many opportunities to develop student knowledge, skills and abilities. The purpose of the CELs is to assist students with learning concepts, skills and attitudes necessary to make transitions to career, work and adult life.

The CELs establish a link between the Transition-to-Work dimensions and the Practical and Applied Arts curriculum content. The Transition-to-Work dimensions included in the PAA curricula are: apprenticeship, career exploration/development, community project(s), employability skills, entrepreneurial skills, occupational skills, personal accountability, processing of information, teamwork, and work study/experience.

The CELs are coded in this document, as follows:

COM	=	Communication
NUM	=	Numeracy
CCT	=	Critical and Creative Thinking
TL	=	Technological Literacy
PSVS	=	Personal and Social Values and Skills
IL	=	Independent Learning

Although certain CELs are to be emphasized in each module, as indicated by the CELs Foundational Objectives, other interrelated CELs may be addressed at the teacher's discretion.

Course Components and Considerations

Forestry Studies 20, 30 offer a wide range of topics to serve the needs and interests of students. Issues pertaining to a wide variety of stakeholders of forest resources are included.

Depending on local needs, teachers may select and organize the modules differently. Thematic and holistic presentations may be pursued through module integration. Many different possibilities exist for developing thematic presentations and exploring Forestry Studies in a holistic manner. Themes such as conservation, forest resource management, forest activities, career development and employment, experiencing the forest, and social perspectives are ways in which course modules can be selected and developed thematically.

Suggestions on how modules may be grouped together to arrange the courses of study around some specific themes are provided in the examples. Sample theme configurations follow. Other similar approaches are possible with additional themes. Core and Optional modules may be arranged according to thematic groupings or to take advantage of seasonal opportunities or work study arrangements.

Local needs, proximity of schools to forested areas and forest service providers, the ability of schools to network with community resources and the extent to which students will explore practical activities or employment opportunities will influence the way in which modules are selected and organized. Short, manageable modules, combined and integrated into a full course of study, give teachers a great deal of flexibility in designing the program specifically for their instructional environment and the needs of the students. Some job opportunities in the forestry sector present themselves at certain times of the year; late spring and early fall are opportune times for conducting field trips.

Some modules have prerequisites that are necessary for proper understanding of the material in the module. Students involved in a forestry work study are required to take Modules 9A, 9B, 9C, 10A and 10B prior to the placement.

The level of difficulty of the modules should be adapted to suit the needs of the learners. There are some modules that cover more advanced material. The addition of enrichment material to a module may increase the level of difficulty beyond what is required. Modules may be increased in difficulty if it would be appropriate to do so.

Work Study Component

The optional Work Study module in each course permits the student to apply academic and school-based learning to workplace settings in the community. The optional Work Study module provides students with the opportunity to apply classroom learning in a workplace setting and to investigate career development further. Numerous careers in forestry and forestry-related activities are found both in the public and in the private sectors. A community placement may be within the forestry industry. The Work Study Preparation and Follow-up Activities module must be covered, if the students have not participated in a work study module prior to going to a worksite. If students have completed a previous work study module in another course, less time needs to be spent in work study preparation, allowing more time for other modules. See the *Practical and Applied Arts Handbook* for detailed information under the "Work Study Guidelines". Students who have previously taken a work study module are expected to cover modules developed by Saskatchewan Labour found in the *Career and Work Exploration Curriculum Guide.* This includes Workplace Hazardous Materials Information System (WHMIS).

Opportunities exist for job shadowing, work experience and other career exploration activities. The optional Work Study module is 25 to 50 hours.

Portfolios

A personal portfolio is a valuable organizer of student projects and assignments. It encourages students to collect examples of their work as they progress through the various activities, labs and projects. Selecting particular items to include in a portfolio encourages students to reflect on what they have learned or accomplished and what they have yet to learn. Portfolio items may include: journal notes, drafts, photographs, audio or video tapes, computer discs, sketches and drawings, etc. Portfolios may be used for peer, teacher, self-assessment and as a format to present selected works to parents, post-secondary institutions or potential employers. In addition, the portfolio can demonstrate the link between home, school and community in a student's education. Each student should have a portfolio representing her or his work during the course.

The portfolio helps students:

- reflect on personal growth and accomplishment
- see links between home, school and community education and activities
- collect materials to prepare applications for post-secondary education and scholarship program entrance
- collect materials to prepare for employment applications
- focus on career planning.

The portfolio helps teachers:
- provide a framework for independent learning strategies for the student
- communicate student learning from one school year to another in a specific area of study
- identify career planning needs for students
- assess and evaluate the student's progress and achievement in a course of study.

The portfolio helps post-secondary institutions:
- determine suitable candidates for awards and scholarships
- evaluate candidates for program entrance
- evaluate prior learning for program placement.

The portfolio helps the community:
- reflect on the involvement in a student's education and the support offered to learners
- demonstrate the link between the home, school and community in education.

The portfolio helps potential employers:
- identify employable skills desired in future employees
- provide evidence of knowledge and skill development of potential employees.

Working Portfolio

Students collect work over time in a working folder. Each student should also keep a journal of observations, critiques, ideas and reflections as part of his or her working portfolio. Items in this portfolio may be used for the purpose of reflection, for peer, teacher and self-evaluation for ongoing and summative evaluations, and for documenting skill development and mastery.

Working portfolios may be used for purposes of conferencing between student and teacher, teacher and parent, teacher and teacher or student and student. When a teacher examines a student's portfolio in order to make a decision regarding student progress, the information it contains may become documented evidence for the evaluation.

A daily journal may also become a part of a working portfolio as a means of tracking the student's use of time and to record progress on ideas that are being developed. This will provide the student with a focus for self-directed or independent learning as well as an anecdotal record for part of the course evaluation.

Presentation Portfolio

To compile a presentation portfolio, students should select items from their working portfolio. The presentation portfolio should cover the range of students' experiences and should display their best efforts. The preparation of a presentation portfolio can be an assessment strategy. It is strongly suggested that students at the 30 level prepare a presentation portfolio suitable for submission to potential employers or post-secondary institutions.

Through collecting, selecting and reflecting, students are able to compile presentation portfolios that display their best collection of work.

Extended Study Modules

The extended study module is designed to provide schools with an opportunity to meet current and future demands that are not addressed by current modules in the renewed PAA curriculum.

The flexibility of this module allows a school/school division to design one new module per credit to complement or extend the study of existing pure core modules and optional modules. The extended study module is designed to extend the content of the pure courses and to offer survey course modules beyond the scope of the selection of PAA modules.

The list of possibilities for topics of study or projects for the extended study module approach is as varied as the imagination of those involved in using the module. These optional extended study module guidelines, found in the *Practical and Applied Arts Handbook*, should be used to strengthen the knowledge, skills and processes advocated in the Practical and Applied Arts curriculum in which the extended study module is used.

It is recommended that a summary of any extended study module be sent to the Regional Superintendent of Curriculum and Instruction to establish a resource bank of module topics.

For more information on the extended study module, refer to the *Practical and Applied Arts Handbook*.

Instructional Resources

To support the principle of Resource-based Learning, a variety of instructional resources have been evaluated and recommended for the teaching and learning of Forestry 20, 30. See the enclosed *Forestry 20, 30: An Initial List of Implementation Materials* for a list of annotated resources. Teachers should also consult the comprehensive PAA bibliography. The annual L*earning Resource Materials Update* may also provide information about new materials evaluated since the curriculum was printed.

To order materials, except videos, teachers may also consult the department's Learning Resources Distribution Centre (LRDC) catalogue. An online ordering service is available at lrdc.sasked.gov.sk.ca.

The online version of this Guide is accessible at www.sasked.gov.sk.ca/docs/paa.html. It will be "Evergreened", as appropriate.

Assessment and Evaluation

Student evaluation is an important part of teaching as it allows the teacher to report the successes and challenges of the student and the parent. Evaluation also provides valuable feedback about how a student learns best. It is important that teachers use a variety of evaluation strategies to evaluate student progress. Additional information on evaluation of student achievement can be found in the Saskatchewan Education documents *Student Evaluation: A Teacher Handbook*, 1991 and *Curriculum Evaluation in Saskatchewan*, 1991.

It is important that the teacher discuss the evaluation strategies to be used in the course, when the evaluation can be expected to occur and the weighting of each evaluation strategy and how it relates to the overall student evaluation. The weighting of the evaluation should be determined in relation to the amount of time spent and emphasis placed on each area of the course as suggested in the curriculum guide.

The Forestry Studies 20, 30 curriculum provides many opportunities for teachers to use a variety of instructional and evaluation strategies. Evaluation instruments used in the teaching of this course are included the *Practical and Applied Arts Handbook*. Sample copies of overall evaluation for the course, evaluation for general student skills and work study are included for teachers to adapt and use.

Here is a sample evaluation scheme:

Tests (written)	20%
Project work	15%
Homework and Assignments	10%
Classroom Presentations	5%
Work Study	25%
Final Examination	25%

Regular program evaluation could include a survey involving parents, students and employers to determine program effectiveness and needs for change, if any. Information specific to program evaluation is found in Saskatchewan Education's *School-Based Program Evaluation Resource Book* (1989) and the *Practical and Applied Arts Handbook*.

For more information about student evaluation refer to the *Practical and Applied Arts Handbook* (Saskatchewan Education) or *Student Evaluation*: A *Teacher Handbook* (Saskatchewan Education, 1991).

For information about program evaluation, refer to *Saskatchewan School-Based Program Evaluation Resource Book* (1989).

For information about curriculum evaluation refer to *Curriculum Evaluation in Saskatchewan* (Saskatchewan Education, 1991).

Module Overview

Module Code	Modules		Suggested Time (hours)
FRST01	Module 1:	Introduction (Core)	7-10
FRST02	Module 2:	Forestry Sector Careers (Core)	4-8
FRST03A,B	Module 3A, B:	Forest Ecology (Core)	4-6
FRST04	Module 4:	The Boreal Forest (Core)	12-15
FRST05	Module 5:	Forest Regions of Canada (Optional)	7-10
FRST06	Module 6:	Aboriginal Perspectives (Core)	7-10
FRST07	Module 7:	Management and Conservation (Optional)	10-12
FRST08	Module 8:	Parks and Protected Areas (Optional)	7-10
FRST09A,B,C	Module 9A, B, C:	Occupational Health and Safety (Optional))	4-6
FRST10A,B	Module 10A, B:	Labour Standards (Optional)	2-3
FRST11	Module 11:	Canada's Model Forests (Optional)	7-10
FRST12	Module 12:	Mapping (Optional)	7-10
FRST13	Module 13:	Forest Fire Management (Optional)	8-12
FRST14A, B	Module 14A. B:	Outdoor Wilderness Trip (Optional)	15-20
FRST15	Module 15:	Remote Sensing (Optional)	7-10
FRST16	Module 16:	Issues in Forestry (Optional)	7-10
FRST17	Module 17:	Marketing Forest Products (Optional)	15-20
FRST18	Module 18:	Measuring the Forest (Optional)	15-20
FRST19	Module 19:	Heavy Equipment (Optional)	10-15
FRST20	Module 20:	Light Equipment (Optional)	10-15
FRST21	Module 21:	Harvesting (Optional)	10-15
FRST22	Module 22:	Silviculture (Optional)	10-15
FRST23	Module 23:	Forest Health (Optional)	10-15
FRST24A,B	Module 24A, B:	Work Study Preparation and Follow-up Activities (Optional)	5-10
FRST25A,B	Module 25A,B:	Work Study (Optional)	25-50
FRST99A,B	Module 99A, B:	Extended Study (Optional)	5-20

Suggested Course Configurations

Module Code	Modules		Suggested Time (hours)
	Forestry Studies 20		
FRST01	Module 1:	Introduction (Core)	7-10
FRST02	Module 2:	Forestry Sector Careers (Core)	4-8
FRST03A,B	Module 3A, B:	Forest Ecology (Core)	4-6
FRST04	Module 4:	The Boreal Forest (Core)	12-15
FRST05	Module 5:	Forest Regions of Canada (Optional)	7-10
FRST06	Module 6:	Aboriginal Perspectives (Core)	7-10
FRST07	Module 7:	Management and Conservation (Optional)	10-12
FRST08	Module 8:	Parks and Protected Areas (Optional)	7-10
FRST09A	Module 9A:	Occupational Health and Safety (Optional)	4-6
FRST11	Module 11:	Canada's Model Forests (Optional)	7-10
FRST12	Module 12:	Mapping (Optional)	7-10
FRST13	Module 13:	Forest Fire Management (Optional)	8-12
FRST14A	Module 14A:	Outdoor Wilderness Trip (Optional)	15-20
FRST15	Module 15:	Remote Sensing (Optional)	7-10
FRST24A	Module 24A:	Work Study Preparation and Follow-up Activities (Optional)	5-10
FRST25A	Module 25A:	Work Study (Optional)	25-50
FRST99A	Module 99A:	Extended Study (Optional)	5-20
		Minimum	100 hours
	Forestry Studies 30		
FRST09B,C	Module 9B, C:	Occupational Health and Safety (Optional)	4-6
FRST10A,B	Module 10A, B:	Labour Standards (Optional)	2-3
FRST14B	Module 14B:	Outdoor Wilderness Trip (Optional)	15-20
FRST16	Module 16:	Issues in Forestry (Optional)	7-10
FRST17	Module 17:	Marketing Forest Products (Optional)	15-20
FRST18	Module 18:	Measuring the Forest (Optional)	15-20
FRST19	Module 19:	Heavy Equipment (Optional)	10-15
FRST20	Module 20:	Light Equipment (Optional)	10-15
FRST21	Module 21:	Harvesting (Optional)	10-15
FRST22	Module 22:	Silviculture (Optional)	10-15
FRST23	Module 23:	Forest Health (Optional)	10-15
FRST24B	Module 24B:	Work Study Preparation and Follow-up Activities (Optional)	5-10
FRST25B	Module 25B:	Work Study (Optional)	25-50
FRST99B	Module 99B:	Extended Study (Optional)	5-20
		Minimum	100 hours

Core and Optional Modules

Module 1: Introduction (Core)

Suggested time: 7 - 10 hours **Level:** Introductory
Prerequisite: None

Portions of this module may be delivered in a workplace setting.

Module Overview
This introductory module provides students with opportunities to develop an overview of the importance of forestry from social, cultural, economic and ecological perspectives. It establishes the rationale for teaching Forestry Studies 20 and 30, provides the context for learning and allows for motivation and the anticipation of further learning. Students will briefly explore employment opportunities available in the forestry sector, in Saskatchewan and beyond. They will develop an appreciation of differing forestry values among different people and special interest groups. Competing and conflicting forest uses need to be resolved cooperatively, for the benefit of all.

The introductory module will outline the connections between the various modules in Forestry Studies 20 and 30.

Foundational Objectives
- To develop an understanding of the social, cultural, economic and environmental significance of forests.
- To develop employability skills and explore employment opportunities in forestry occupations through a wide range of experiences.

Common Essential Learnings Foundational Objectives
- To explain how personal needs, wants, beliefs and actions may influence forest resources. (PSVS)
- To recognize that differences regarding forest values and uses should be resolved through cooperative partnerships. (PSVS)

	Learning Objectives	Notes
1.1	To illustrate ways in which humans and other living things depend on forests. (PSVS)	Research material and other forestry-related information can be obtained from a variety of sources. There is a great deal of good information available free of charge. See *Forestry Studies 20, 30: An Initial List of Implementation Materials* for resources. Contact Saskatchewan Environment and Resource Management (SERM). Staff there may provide assistance in locating resources and suggesting activities.
1.2	To recognize that there are a wide variety of perspectives on the importance of forests. (PSVS)	Parks and conservation areas offer interpretive events and nature trails. A class field trip to such a site may provide students with opportunities to understand and to appreciate forest ecosystems. A more intensive investigation of this topic may be developed by integrating Module 3 with this module. Obtain bibliographies and resource catalogs through national, provincial and regional forestry organizations. Refer to the list of Internet sites in the Forestry Studies bibliography for contact information.

	Learning Objectives	Notes
		Invite guest speakers to the classroom. People from different backgrounds who are involved in forestry-related occupations may be willing to speak to students. Provide an outline of what should be covered in a class presentation on forestry-related occupations. Glossaries of terms are available in the bibliography of forestry resources. Keep copies of these glossaries available for reference purposes. Information about the Boreal Ecosystem-Atmosphere Study project (BOREAS), an international study to investigate the role of the boreal forest in regulating atmospheric gases, can be found on the Internet. Further information about global warming and the role of forests in regulating carbon dioxide gas can be found in the bibliography of resources. Relevant Internet sites are listed in the foreword to the bibliography. Research international conferences on global warming. Show how "carbon sinks" are being used in the negotiations. Investigate the role that Canada has played in such conferences. Activities in a game format may be highly motivating for students. These would include things like board games, card games, and quiz show games. Contact other provincial forestry associations, government agencies and industry sources to obtain resource materials. Many of the ideas and issues presented in those sources are relevant to forestry in Saskatchewan.
1.3	To identify forest products and value-added products and services that are obtained through forestry.	Tours and field trips are excellent ways of learning more about forests and forestry-related occupations. Consider various businesses and companies near the local school that produce forest products or value-added products and services obtained through forestry. Make arrangements for students to visit these places. Students might be able to obtain work experience opportunities at such places. Ask students to include in their portfolios forest products, value added products and other services obtained through forestry in their community.
1.4	To observe employment opportunities and trends in the forestry sector.	Research employment and career development opportunities within the forestry sector. Contact provincial or federal employment agencies or forestry companies directly. Relevant Internet sites are listed in the foreword to the bibliography. Discuss career development opportunities for males and females who have crossed over traditional gender barriers. Use online sources to find useful information such as job banks, help wanted bulletins and employment statistics. The Government of Saskatchewan's "Career Information Hotline" services may also be contacted.

	Learning Objectives	Notes
		The Internet is a good means to find job opportunities related to forestry, and to recognize major trends and issues. Students might keep a scrap book or portfolio of forestry-related occupations. For each of the occupations, they should consider the education, training and experience required. The scrap book might be evaluated as a term project. Invite industry representatives to provide information about job opportunities and the employer's expectations of employees.
1.5	To recognize how social trends may affect forest resources and employment opportunities.	Examine how social trends have affected resources and employment opportunities in other sectors; for example, students may consider how resource extraction of non-renewable resources such as minerals impacts on a community over long periods of time. Emphasize that only through careful, planned management of a forest resource will it be a renewable resource that will not be depleted with use.
1.6	To recognize the significance of forests to different people. (PSVS)	Research the use of forest materials by aboriginal peoples. Investigate such things as properties of plants (medical/medicinal, edible, craft material), traditional building materials, housing materials and transportation materials and devices. Some suggestions for suitable instructional resources are included in the bibliography. Recognize the spiritual importance of forests to many different cultures. Consider the medicinal uses of forest products by different cultures. Find some examples of traditional medicines and of medicines that originate from natural sources. Contact a herbalist or a traditional healer to provide further expertise.
1.7	To describe the impact of individual attitudes, actions and lifestyles on forest resources.	Research case studies that illustrate the human impact on forests. In discussion groups, students may explore the impact of individual attitudes, actions and lifestyles on forest resources. Debate issues relating to forest resources and uses.
1.8	To understand the need to develop cooperative partnerships to sustain and manage forests. (PSVS)	Students should be invited to do independent research, to develop personal positions regarding forest use, and to share and debate those positions with other groups. This would allow them to recognize that the needs of different stakeholders are often in conflict, and that cooperation is needed to develop forest use strategies that consider the needs of those different groups. Use a role-playing and simulation activities to identify different positions and points of view in forest use and sustainable development.

Learning Objectives		Notes
		Working in groups, students might represent different stakeholders who have specific interests in forests. Present this in the form of a debate, a panel discussion or radio and television interviews. Students might be interested in finding out about Canada's Model Forests. Canada's Model Forest program is part of an international network of model forests for which the purpose is to ensure that forested areas are managed sustainably, and to improve the flow of economic, environmental, recreational, social and cultural benefits derived from the forest. The Prince Albert Model Forest Association in Saskatchewan is made up of representatives from a variety of different organizations that have an interest in the forest. To find out more about Canada's Model Forests or the Prince Albert Model Forest Association, contact the Canadian Forest Service or the Prince Albert Model Forest Association, Inc. Internet addresses are given in the bibliography. See also Module 11. Critique a newspaper or magazine article or a video documentary dealing with issues in forest management. In the critique, things to consider are the range of viewpoints and biases, the validity and reliability of the information presented and the recommended course of action. Attend a forest planning meeting in the community or any other civic meeting that involves forest issues. Prepare a report of the highlights of the meeting.
1.9	To propose personal strategies for using forests wisely that foster the attainment of social, cultural, economic and environmental goals.	Consider forest management strategies on a global perspective. Examine how various different countries are managing the earth's renewable forest resources. Look for ways of integrating this with Science, Social Studies, Christian Ethics and other issues-related courses.

Module 2: Forestry Sector Careers (Core)

Suggested time: 4 - 8 hours **Level:** Introductory
Prerequisite: None

Portions of modules in Forestry Studies 20 and 30 relating to skills within the industry may be delivered in the workplace setting.

Module Overview
Students examine existing and emerging career opportunities in the forestry sector. Concrete experiences are important to enhance understandings. Practical work experience in the forestry industry is one possible way in which they can obtain these insights. They could also research forestry occupations and engage in field-related activities or job shadowing to observe others who are employed in forestry. Understanding the applicable technologies, the related technical skills required and the educational and training requirements for the occupations in question are important considerations.

Foundational Objectives
- To understand the important role of humans in the protection and preservation of natural environments.
- To develop employability skills and explore employment opportunities in forestry occupations through a wide range of experiences.
- To investigate future educational and occupational requirements for careers in forestry.
- To recognize the value of making contributions to society.

Common Essential Learnings Foundational Objectives
- To recognize the strengths and limitations of technology. (TL)
- To appreciate that learning is a life-long endeavour. (IL)

	Learning Objectives	Notes
2.1	To describe past, present and emerging applications of technology in the forest industry. (TL)	Some ideas to consider are greenhouse and nursery operations, silviculture, harvesting technologies, wood production and utilization or biotechnology. Some examples of emerging applications of technology in the forest industry are new pulping procedures, effluent treatment and pollution control. To anticipate other emerging applications of technology in forestry, investigate different types of forest research being conducted in Canada and Saskatchewan in areas such as silviculture, harvesting systems, materials science, forest protection equipment, wildlife inventories, ecological studies and integrated resource management. List current and emerging technologies in the forest industry. Complete a research project on applications of technology in a sector of the forest industry.
2.2	To identify occupational opportunities within the forestry sector.	Make a file of forestry-related careers found in classified advertisements of newspapers or on the Internet.

	Learning Objectives	Notes
		Review national occupational profiles (NOC) for career information. Refer to the list of Internet sites in the bibliography. Invite guest speakers to the classroom. People from different backgrounds who are involved in forestry-related careers may be willing to come and speak to students. (PSVS) To research and plan for career development and employment opportunities within the forestry sector, contact provincial or federal employment agencies. In particular, examine career development and employment opportunities that extend beyond traditional gender barriers. Use the Internet to find useful information from job banks, help wanted bulletins and career statistics. The provincial "Career Information Hotline" services may also be contacted. Inquire about job opportunities available in the local community from employers involved in forestry. Summer employment for tree planters is available in many areas.
2.3	To predict ways that research, technology, social values and land use priorities may affect forest industries in the future. (TL)	Investigate applications of data banks and information systems in making forest management decisions. Find out what trends in forestry practices are emerging in other provinces in Canada, especially British Columbia, Alberta, Manitoba, New Brunswick and Ontario. (IL)
2.4	To engage in activities to investigate various occupational opportunities in the forestry sector. (IL)	Research occupational clusters and the range of occupational opportunities available within the forestry sector (e.g., forest inventory, forest biology or ecology, forest protection, forest harvesting, the forest products industry and forest management). Compare the goals and priorities of local agencies whose mandate is to conduct research related to forestry and forest ecosystems (e.g., individuals, corporations, universities and government agencies). Have students interview someone employed in the forestry sector. See examples of career research interview questions in Appendix B. Prepare an oral or written report summarizing the highlights of the interview. Students may maintain a file in their portfolios on careers in forestry. Include health, safety and equity issues as part of the research into jobs, occupations and careers in the forestry sector. Research the common types and frequency of injuries in specific sectors of the forest industry.

	Learning Objectives	Notes
2.5	Investigate one or more career paths in forestry or forestry-related fields.	Merge this objective with work-based learning activities and with Module 22, Work Study Preparation and Follow-up Activites and Module 23, Work Study. Access resources available from the forestry products industry, relevant government institutions and educational institutions. Consider assessing the social, economic, cultural and environmental advantages and disadvantages of a recent technology designed to enhance our utilization or management of forests. Have students investigate work environments at different places of employment. Have them list such things as schedules, physical requirements, necessary skills, wages, overtime, pay, meal breaks, family leaves, etc. Produce a report or a term project on this topic, including a full job description. Identify working conditions, starting salary and company benefits. Determine entry requirements and required competencies. Examine further education and training opportunities including on-the-job training that may be available. Explore opportunities for advancement. Consider potential opportunities for self-employment and entrepreneurship. Go on field trips to visit various potential places of employment related to forestry in the local community.

Module 3A: Forest Ecology (Core)

Suggested time: 4 - 6 hours **Level:** Introductory
Prerequisite: Module 1

Module Overview
It is important for individuals engaged in forestry-related activities, as well as the public at large, to have a basic understanding of ecological principles. There is a need to protect and maintain the diversity of life forms, and to protect endangered species and endangered areas. Forestry activities must be undertaken in ways to preserve, maintain and protect the quality of natural ecosystems. This not only helps to ensure the future of the forestry industry it is vital to the continued well-being of the entire planet. Human activity can play a major role in either safeguarding or destroying the environment, depending on what actions and values are exhibited. Students, increasingly becoming more aware of public concern for responsible environmental practices, are encouraged to investigate the role that the various stakeholders in the forestry industry are adopting towards responsible environmental practices. Teachers are encouraged to use natural forested areas to demonstrate practical applications of important ecological principles as much as possible.

Foundational Objectives
- To understand the important role of humans in the protection and preservation of natural environments.
- To analyze the interrelatedness of living and nonliving elements in forest ecosystems.

Common Essential Learnings Foundational Objectives
- To promote intuitive, imaginative thought and the ability to evaluate ideas, processes, experiences and objects in the context of the study of forestry. (CCT)
- To enable students to understand and use the vocabulary, structures and forms of expression that characterize the study of ecology. (COM)

	Learning Objectives	Notes
3.1	To understand the role of trees within a local forest ecosystem.	This module may be integrated with Module 7. Describe parts of the tree and their function (e.g., roots, trunk, leaves or needles and flowers). Refer to Wood Theory, Module 2A in the *Construction and Carpentry Curriculum Guide*. Some functions trees perform include gas exchange, water transport, nutrient cycling, carbon sequestering, soil conservation and providing wildlife habitat. Explain the idea of succession, as it pertains to forest ecosystems. Refer to the bibliography for Biology 20 for additional resources for this module.
3.2	To understand the life processes performed by trees and other forest plants.	Life processes include nutrient intake and transportation, photosynthesis, respiration and transpiration, reproduction and phrenology (leaf flushings, leaf fall, flowering and cone production). Infer interrelationships among tree structures, their functions and vital life processes that are performed.

	Learning Objectives	Notes
3.3	To identify living and nonliving elements within a local forest ecosystem.	Provide examples of living and nonliving elements within a local forest ecosystem (e.g., soil, land forms, climate [nonliving], flora and fauna and soil organism [living]). (COM) Explain key terms such as ecosystem, niche, habitat, biotic and abiotic. Construct posters and charts to illustrate major ideas. Posters are available from many sources. Use keys to identify tree damage due to biotic and abiotic factors.
3.4	To observe and describe the interrelatedness of living and nonliving elements within a local forest environment. (CCT)	For teacher professional development, consider attending workshops or an extended interpretive activity. Plan a summer wilderness experience for the forestry teacher and other staff members in the school. Illustrate relationships among soil, air and water characteristics and plant growth. Consider the interactions and dependencies among living organisms. Analyze food relationships among living organisms within a local forest environment (e.g., the role of producers, consumers and decomposers). (IL) Use webbing and concept mapping exercises to illustrate food chains and food webs. Investigate various forest harvesting practices and their impact on the environment. Research current industry practices. Consider the extent to which those practices show a regard for basic ecological principles. Invite a forester or an environmentalist to provide further background information. Investigate ecological changes that take place in a forested area after it has undergone a sudden change, such as harvesting or fire. Research differences in the ecology of new and old growth forests. Research the predicted and actual impact that global warming is having on the boreal forest. Use field guides as reference on field trips to forested areas. Examine the bibliography of recommended resources for a list of resources. Many videos on trees and on forestry are available.

Module 3B: Forest Ecology (Core)

Suggested time: 4 - 6 hours **Level:** Advanced
Prerequisites: Modules 1, 3A

	Learning Objectives	Notes
3.5	To observe and describe the interrelatedness of living and nonliving elements within a local forest environment. (CCT)	See the bibliography of resources for Biology 20. Compare the ecological niches of selected plant and animal species native to Saskatchewan. Illustrate the approximate range of one or more tree species throughout North America. Examine areas that have been altered as a result of glaciation. Show students the features and landforms that provide evidence of glaciation. The Cypress Hills Region is an extremely interesting area to study as it contains tree species unlike those found elsewhere in Saskatchewan and because it was not affected by the last period of glaciation. (IL) Illustrate how climatic variations in Saskatchewan influence plant growth. Also consider the effect of latitude and altitude on plant growth. Consider which of the principles of circular interaction of traditional aboriginal philosophy have an ecological focus. Possibilities for integration exist with Module 6. Give examples of symbiotic and competitive relationships among organisms. Where possible, identify a forested site near the local school where regular field excursions can be conducted. Plan a wide range of outdoor activities to familiarize students with the ecology of the site. Compare a local forested area to other forest regions of Saskatchewan. The CD-ROM Eco-Regions of Saskatchewan would be a valuable resource for the comparison. Investigate case studies dealing with ecological issues in forestry. Given a hypothetical or real situation illustrating human impact on the environment, have students work in groups to identify the issues and recommend possible solutions. Interview older members of the community or Elders to investigate how a local area has changed over the years. Identify which of those changes were due to human or other influences. (PSVS) See bibliography of resources for protocols and guidelines for working with elders. Investigate measures being used in Saskatchewan to control insects and disease. Refer to Pest and Disease Management in Module 13, *Horticulture 10, 20, 30 Curriculum Guide.*

	Learning Objectives	Notes
		Monitor forest practices through indicators. Glossaries of useful terms related to forestry are available references. Many conservation areas are available throughout the province. Inquire about such areas locally.
3.6	Understand the role of natural disturbances (such as fire) on the landscape and the forest.	Research how forest harvesting techniques are being conducted to mimic fire disturbances. Compare current and past harvesting techniques. Explain reasons why planned cutblocks should conform to irregular boundaries rather than large rectangles. Identify similarities and differences between natural forest fire disturbances and clearcutting techniques. Examine fire maps to identify the extent and locations of fires. Integrate with Modules 11 and 19.

Module 4: The Boreal Forest (Core)

Suggested time: 12 - 15 hours **Level:** Intermediate
Prerequisite: None

Module Overview
The boreal forest occupies roughly half of the landmass of Saskatchewan and approximately one third of the entire landmass of Canada. Throughout the Northern Hemisphere, it extends throughout vast regions of Canada, Europe, Russia and parts of Asia. It is arguably the most important forested region in the world, playing a major role in maintaining the balance of the earth's climate, and offering habitats to a wide diversity of living things.

The boreal forest serves many human needs, for a wide variety of stakeholders. The economic and aesthetic benefits it provides are vital to Canadians. Undeniably, the boreal forest has played an important role in shaping and defining the Canadian identity.

The boreal forest is facing serious environmental problems. Though protected somewhat because of its remoteness and isolation, scientists suggest that noticeable signs of forest decline may become apparent in the boreal region, if global warming occurs as predicted. The impact of such problems could have widespread global implications. Understanding such issues is necessary, to confront the challenge of finding solutions in the future.

Foundational Objectives
- To develop an understanding of the social, cultural, economic and environmental significance of forests.
- To acquire a life-long conservation ethic.
- To be familiar with the various forest ecosystems in Saskatchewan and Canada.

Common Essential Learnings Foundational Objectives
- To appreciate the important role of humans in the protection and preservation of natural environments. (PSVS)
- To grow as independent learners within the classroom and beyond. (IL)

	Learning Objectives	Notes
4.1	To understand the distinguishing characteristics of the boreal forest. (COM)	Emphasize that some of the main distinguishing features of the boreal forest are: a) a topography that was altered by several periods of glaciation b) a relatively short but warm growing season with long harsh winters c) forests that are regularly influenced by fire. Refer to the bibliography for additional resources for this module. Nature centres and interpretive tours provide many interesting insights about the boreal forest. Integrate with Module 5 and Module 13. Select some other forest region in Canada and do a detailed comparison with the boreal forest. Develop a timeline of activities and developments in the boreal forest since the end of the last period of glaciation.

	Learning Objectives	Notes
4.2	To appreciate the importance of the boreal forest as a carbon sink for removing carbon dioxide from the atmosphere, from both local and global perspectives.	Emphasize the important role of the boreal forest in removing carbon from the atmosphere and storing it in trees and other organic matter. Relate this to the greenhouse effect. Consider the influences that deforestation and fossil fuel consumption have on global warming. Understand what government agencies are doing to comply with international agreements on global warming.
4.3	To identify common plants and animals that live in the boreal forest. (IL)	Research common types of trees found in the boreal forest in Saskatchewan. Compare these to trees that are found in the boreal forest elsewhere in Canada. Examine how the dominant tree species and other vegetative patterns change in the boreal forest in a northerly direction. Develop a large mural illustrating the boreal forest zones in Saskatchewan and their distinguishing characteristics. Organize a "biome box" exchange with schools in different forest regions of Canada. Exchange samples of forest materials that are unique and distinctive to the local particular area with other schools. Various resources are available that will provide familiarity with the types of plants and animals found in different parks and protected areas. Integrate this with Module 8. Do tree identification activities. Make them fun and interesting. Have a variety of field guides available at the local school, for reference and for use during field trips and outdoor activities. Job shadow with trappers to learn about the catch and the operation of a trap line.
4.4	To investigate a wide variety of relationships between living and nonliving things in the boreal forest.	Many opportunities arise for integration with Module 3. Many possible connections exist with Biology, Native Studies, Social Studies and Wildlife Management. Make these connections whenever opportunities arise.
4.5	To explore environmental issues relevant to the boreal forest.	Gather current magazines, newspaper articles and newsletters dealing with forest issues that are relevant to the local community. Research the changes that have occurred as a result of human intervention in parks and other protected areas in the local community. Glossaries of terms are available in a variety of sources. Keep several of these available as reference material. Refer to the bibliography for Forestry Studies.

Module 5: Forest Regions of Canada (Optional)

Suggested time: 7 - 10 hours **Level:** Intermediate
Prerequisite: None

Module Overview
There are eight distinct forest regions in Canada: Boreal, Subalpine, Montaine, Coastal, Columbia, Deciduous, Great Lakes/St. Lawrence and Acadian. The type and distribution of tree species in these regions differ widely. Students should be able to identify a few major tree species found in these areas, with more emphasis on those species that are found in Saskatchewan. Identification of trees, shrubs and non-woody plants is necessary. To understand the economic importance of forest products, students need to understand that different trees are used for particular applications because of the properties that they have that make them particularly well-suited for those specific applications. Integration of this module with Module 4, The Boreal Forest, is appropriate.

Foundational Objectives
- To be familiar with the various forest ecosystems in Saskatchewan and Canada.

Common Essential Learnings Foundational Objectives
- To obtain, process and convey information from a wide variety of resources. (IL)
- To utilize a variety of reading, writing, speaking and listening techniques for conveying information to others. (COM)

	Learning Objectives	Notes
5.1	To identify some common trees, shrubs and non-woody plants that grow in specific regions of Canada and Saskatchewan.	Prepare displays of local trees, shrubs and non-woody plants. Show such things as leaves, flowers or cones, twigs and bark, either for a single species or for a group of related species. Have students prepare flash cards that contain different leaves, flowers/cones, twigs and bark for different trees. Use these for classroom identification drills or for quizzes. Colour slides of trees in their natural habitats may also be used in similar ways. Use dichotomous keys and field guides for tree and understorey identification. Such activities are useful to perform on field trips in natural settings. Compare sketches of trees drawn by naturalists with sketches and drawings of trees drawn by artists. Have students look for similarities and differences and offer explanations for those similarities and differences. (CCT) Students interested in photography may take pictures of different trees in their natural habitats. Display the photos or slides so that other students can learn how to recognize trees by their shape and other distinguishing features. Use satellite data or aerial photography to examine forested areas. Look for signs of different types of vegetation in those areas. Consider reasons why different species are found in different places.

	Learning Objectives	Notes
		Invite a guest speaker to the class to explain how GIS and GPS systems work and how they are used in forestry. Research projects could be done on topics such as remote sensing, geographic information systems (GIS) and global positioning systems (GPS). See Module 15 for possible integration opportunities. Research material and other forestry-related information can be obtained from a wide variety of sources. There is a great deal of quality material available free of charge. There is a wide variety of information available on this topic in print form. Maintain a variety of current references in the local school's library. Organize a local "Tree Bee" contest. Like a spelling bee, different teams compete to see which ones can best identify trees by their features and characteristics. (COM)
5.2	To identify factors that enhance the development of forests and determine the distribution of living things within forest regions.	Compare trees that grow under different conditions. Identify as many differences as possible. If there are suitable forest locations near the school, use them as an extension of the regular classroom. Consider the factors that determine which species will grow in a particular area. Make connections with Module 3A.
5.3	To describe relationships between climatic factors and the growth of trees.	Obtain a core sample or a "tree cookie" showing the growth rings of a tree. Look for regions where there are signs of predominantly rapid or slow growth. Obtain meteorological data, and see if there appears to be a relationship between the amount of growth and such things as the length of the growing season, the amount of precipitation, average summer temperatures and so on. (CCT)
5.4	To locate and describe the forest regions of Canada.	Develop a large mural illustrating the forest regions of Canada. Develop overlays comparing the forest regions of Canada with major ecozones, soil types, average amount of precipitation, etc. As a matching activity, match trees with the forest regions in Canada where those trees are found. Draw symbols or pictures of the trees and place each one in an appropriate region of the mural described in the above. Organize a "biome box" exchange with schools in different forest regions of Canada. Such projects can be initiated by placing messages on educational bulletin boards, e-mail or discussion forums that teachers are likely to use such as SchoolNet. Exchange samples of forest materials that are unique and distinctive to the local area with

Learning Objectives		Notes
		other schools. Include samples of seeds, cones, bark, twigs, roots, needles and leaves of common trees in the biome. Other things to include in biome boxes might be pictures or sketches of some of the other kinds of plants and animals found in that area, rocks, prominent landmarks, topographical maps and so on. Each biome box can have clues labelled with the samples to assist students in identifying them. (A separate answer key should be available as well, but should be used only if required, or be held by the teacher until the identification activity has been completed.) If enough of these biome boxes can be exchanged with other schools from different regions of Canada, an excellent classroom resource will be available to all participating schools for minimal cost. Students should examine the biome boxes submitted from each school, and try to use the clues presented to locate the forest region in Canada where those schools are located. If there is sufficient interest, students may exchange addresses and e-mail addresses to correspond with students from those other areas, to learn more about their forests and their communities. Consider a "Grassroots" project to link classrooms in different regions. When local students are travelling to various regions of Canada (on summer holidays, for instance), encourage them to collect samples of leaves, needles, cones, bark and other material from trees. Over time, create a display of trees from different regions in Canada, using the materials collected by students. Collect and display photographs of different forested regions in Canada. On an outline map of Canada, locate the eight forest regions and the major tree species found in each. Develop a timeline of activities and developments in forestry in North America over time. (IL) Resources are available from other provincial forestry agencies and associations. Compare some of these to look for subtle and obvious differences in the types of forests that are found in different places.
5.5	To suggest reasons for the distribution of trees in natural regions in Canada and Saskatchewan.	Research historical information about the local community to determine the extent to which forests have changed during the years in which settlement took place. Identify some of the reasons why forested areas were removed or created. Develop an understanding of why tree planting has been a priority in some regions of Saskatchewan. Debate the pros and cons of clearing forested areas so that the land can be used for other things. (CCT) Using a map, locate regions of heavy concentration of a particular tree species. Gather information that helps to explain why the

species thrives in that area.

Module 6: Aboriginal Perspectives (Core)

Suggested time: 7 - 10 hours **Level:** Intermediate
Prerequisite: None

Module Overview
Forests mean different things to different people. Understandings and cooperative partnerships need to develop when differences of opinion exist. In this regard, it is important to understand and appreciate aboriginal perspectives regarding forests. As stewards of forests for thousands of years in Saskatchewan, aboriginal people recognized the need to find ways to coexist with nature in ways that are mutually beneficial. The survival of aboriginal people required a deep understanding and respect for maintaining harmony and balance in the natural world. It is not surprising as well that there is a strong relationship between the physical world and the spiritual world in aboriginal beliefs. Aboriginal people demonstrate a great deal of experience and wisdom on how to coexist with nature by applying sensible ecological principles over time.

The Saskatchewan First Nations and the Métis communities are made up of a variety of different groups, with unique linguistic, social and cultural diversity. Similarities can be found within that diversity. In this module, the forest values of these people may be considered collectively, or a more detailed examination may be conducted of one or more specific First Nations or Métis groups.

Foundational Objectives
- To develop an understanding of the social, cultural, economic and environmental significance of forests.
- To analyze the interrelatedness of living and nonliving elements in forest ecosystems.

Common Essential Learnings Foundational Objectives
- To value natural environments. (PSVS)
- To work cooperatively with others to achieve common goals. (PSVS)
- To participate in experiences that lead to independent exploration or requires students to go beyond classroom learning. (IL)

	Learning Objectives	Notes
6.1	To illustrate the interrelatedness of living and nonliving things within forest ecosystems.	Recognize that a holistic approach to understanding forests is compatible with ecological principles. Module 3 may be used to provide more in-depth elaboration of this objective. Explain where humans are located in the hierarchy of living and nonliving things in traditional aboriginal beliefs, and compare this to views offered by different cultures. Explain the importance of the circle as a dominant symbol for the cyclic, interrelated nature of all things. Investigate the origins of the Gaia Principle. Examine similarities to aboriginal perspectives about Mother Earth. (PSVS)

	Learning Objectives	Notes
6.2	To investigate historical and contemporary uses of forests by aboriginal people. (PSVS)	Compare historical and contemporary uses of forest by aboriginal people. Investigate petroglyph sites or archaeological sites in Saskatchewan. Compare traditional forest use by the Dene, Métis and Woods Cree people in Northern and Central Saskatchewan, with that of the Plains Cree, Saulteaux, Dakota, Nakota or Lakota further south in Saskatchewan. Obtain or make resin casts of projectile points that are replicas of those found at archaeological sites in Saskatchewan. Research information about the origins and uses of these projectiles. (IL) Traditional land use includes trapping and hunting. Investigate how these activities were conducted in the past and how they are currently being conducted. (IL) Additional resources may be available from local Band Councils and a wide variety of other agencies and organizations. Consider the unique resources and opportunities that are available in the local community for this module. Research the use of forest materials by aboriginal people. Some things to consider are the medicinal properties of plants, traditional building and transportation materials, plant materials used for crafts, edible plants, etc. Explain the spiritual importance of forests in aboriginal cultures. Explore contemporary cultural and economic activities related to forestry undertaken by First Nations and Métis peoples (e.g., Big River Sawmill, outfitting, ecotourism, Kitsaki developments, etc.)
6.3	To explain aboriginal principles pertaining to forests and other natural environments.	Useful videos and teachers' guides are available to support this topic. Relate this module to the ecological principles introduced in Modules 3A and 3B. Research the similarities and differences found in medicine wheels throughout North America. Speculate on reasons for the wide-spread use of medicine wheels and their different patterns. What suggestions does this raise concerning patterns of trade and travel among aboriginal people in North America? Discuss the significance of the circle in First Nations cultures. (CCT) Compare similarities and differences in the beliefs and cultures of several member groups of the Saskatchewan Indian Nations.

	Learning Objectives	Notes
		Invite an Elder to speak to students. Find out about the proper protocols for inviting the Elder, listening attentively to his or her remarks and then thanking the Elder with an appropriate gift, such as tobacco. (PSVS) Find out about the possibility of attending a sweat lodge ceremony or a sweet grass ceremony in the local community. Investigate the significance of these rituals in First Nations cultures.
6.4	To identify aboriginal perspectives related to multiple, contemporary, forest use issues.	Give examples to show the interactions between nonliving things, plants, animals, humans, Mother Earth and The Creator. Explain the hierarchical order of these in traditional aboriginal beliefs. Make connections with Module 3. Ask local Band Councils and other organizations to provide information regarding position papers or committee proceedings regarding aboriginal forest management issues. Inquire about publications that are available from a variety of co-management boards.
6.5	To examine how aboriginal principles and beliefs may influence a variety of current forest land use issues. (PSVS)	Look for possibilities for integration with Native Studies courses. Examine some modern forest use patterns of aboriginal people. Evaluate whether these practices are consistent with traditional aboriginal beliefs. Consider exploring related forestry issues such as treaty entitlements, land claims, collaborative partnerships, hunting and fishing rights, First Nations self-government or the use of reserve land for non-sanctioned activities. Investigate cultural differences regarding forest management issues. Investigate a case study on a forestry-related land use issue. Explain the considerations involved, as related to First Nations points of view. Identify the conflicting positions that may arise when First Nations perspectives are contrary to those expressed by other groups. Examine the underlying philosophical principles in those conflicting points of view. Examine how the Cree Principle, "Ma Maw Wechehetowin" (working together and helping each other) is being applied in forest management practices.

Module 7: Management and Conservation (Optional)

Suggested time: 10 - 12 hours **Level:** Intermediate
Prerequisite: None

Module Overview
Forests are extremely important in regulating the balance of nature. They provide many intrinsic and extrinsic benefits for humans and for other living things. They are vital ecosystems that are increasingly coming under pressure from human influence. Management and conservation strategies are needed to preserve these ecosystems for future generations. Collectively, stakeholders representing different and often conflicting interests need to work together cooperatively to ensure that forests continue to thrive. Using modern technology and the benefits of research, appropriate and effective forest management practices can be put into place.

Foundational Objectives
- To understand the important role of humans in the protection and preservation of natural environments.
- To acquire a life-long conservation ethic.
- To be familiar with the various forest ecosystems in Saskatchewan and Canada.
- To analyze the interrelatedness of living and nonliving elements in forest ecosystems.

Common Essential Learnings Foundational Objectives
- To appreciate the important role of humans in the protection, development and preservation of natural environments. (PSVS)
- To apply analytical thinking skills when examining complex problems. (CCT)
- To investigate the role of technology in practical applications. (TL)

	Learning Objectives	Notes
7.1	To show how forests have come under increased demands due to human influences.	Prepare a poster, collage or display that depicts different aspects of forest use. Visit forested sites in the local community. Use old maps, photographs and other historic information to examine forest use patterns of the past. Compare those to current forest use patterns. Satellite images over the past twenty years are available. Compare images from the early 1980s with images of the same area taken more recently. Examine what changes are evident in land use patterns, and compare the distribution and appearance of forested areas. Use this activity in conjunction with Module 15. Undertake a similar activity using aerial photographs. (TL)
7.2	To recognize that increased and conflicting demands on forests, and increased knowledge about forests and reforestation, have created a need to practise conservation and management strategies. (PSVS)	Explain principles related to integrated and multiple land conservation and management strategies. Research case studies involving conflicting land use issues. Investigate issues related to land use in the local community.

	Learning Objectives	Notes
7.3	To describe past and present uses of forests in Saskatchewan, in Canada and in other countries.	Local historical societies may have photographs or paintings showing early settlers involved in forestry operations. Other related information might serve as a useful resource for student research allowing them to compare past and present forestry activities. Similar information can be found in other public archives. Identify ways in which past forest use and management practices have affected the environment and the economy. (CCT) Elders may be able to provide insights on aboriginal perspectives of forest use and historical patterns in the ways in which forests have been used and managed. Visit a mature forest, a recent clear-cut area or an area currently under regeneration. Differentiate between these areas and make predictions regarding the areas in future years.
7.4	To investigate the roles of different interest groups in managing forest resources.	Identify the stakeholders. Some examples are government and politicians, the forest industry, the general public, First Nations and aboriginal groups, environmentalists, private business and chambers of commerce, recreational users, farmers and ranchers, woodlot operators and others. Investigate relationships between the needs of different forest users and the different uses of the forest. Invite guest speakers to the classroom. People from very different backgrounds who are involved in forestry-related careers and related interest groups may be willing to speak to students. Use a role-playing and simulation activity to look into issues of forest use and sustainable development. Working in groups, students could represent different stakeholders who have specific interests in forests. Students should be invited to do independent research, to develop personal positions regarding forest use and to share and debate those positions with other groups. This would allow them to recognize that the needs of different stakeholders are often in conflict and that cooperation is needed to develop forest use strategies that consider the needs of those different groups. (IL) Students might be interested in finding out about Canada's Model Forests. Canada's Model Forest program is part of international network of model forests whose purpose is to ensure that forested areas are managed sustainably, and to improve the flow of economic, environmental, recreational and cultural benefits derived from the forest. The Prince Albert Model Forest Association in Saskatchewan is made up of representatives from a variety of different organizations that have an interest in the forest. To find out more about Canada's Model Forests or the Prince Albert Model Forest Association contact

	Learning Objectives	Notes
		the Canadian Forest Service or the Prince Albert Model Forest Association Inc. Refer to the bibliography for Internet sites to contact these agencies. Opportunities exist to integrate this activity further with Module 11: Canada's Model Forests. Have students critique a newspaper or magazine article or a video documentary dealing with issues in forest management. In the critique, things to consider are the range of viewpoints and biases, the validity and reliability of the information presented and the recommended course of action. Use flowcharts to provide an overview of the processes involved in integrated resource management. Have students research specific uses and multiple demands placed on forested land, such as wood fibre production, wildlife management, grazing practices and land management, watershed protection, mining, recreational use and maintaining protected areas. (IL)
7.5	To relate concepts of sustainable development and sustained yield to practical strategies for managing forest resources. (COM)	Define and give examples of sustainable yield and sustainable development within contexts that are relevant to students. Have students research techniques used for reforestation and stand improvement. Have students examine legislation governing how forests are managed. This is a very complex objective. Many of today's planning processes are developed with these ideas in mind. Invite guest speakers in to discuss issues that pertain to these ideas. Research the topic in depth.
7.6	To explore an issue regarding sustainable development or sustained yield.	This topic is well suited for integration with Wildlife Management. Have students develop a position paper that outlines a responsible course of action for a stakeholder group. (IL) Have students participate in role-playing or simulation activities. Conduct research, develop a position and participate in debates. (CCT) There is a great deal of current literature available on this topic. Make inquiries regarding this in the local community. Have students examine long-term forest management plans that have been developed by forest companies in the local area. Identify components of those plans that are aimed at insuring the long-term sustainability of forest resources. Refer to the bibliography for relevant Internet sites.

	Learning Objectives	Notes
7.7	To develop consensus regarding a plan for the integrated use of a local forested area.	Use a role playing debate. Conduct research, generate alternatives and agree to a workable solution by consensus. Have students examine demands placed on forested regions of Saskatchewan, Canada and elsewhere in terms of industry perspectives, recreational land use, commercial land use, wildlife protection and environmental issues. Have students compare different uses of forested regions in terms of their advantages and disadvantages. Consider environmental, economic, cultural and social uses. Have students examine existing local management plans. Find some examples of specific resource management plans that have been developed in other areas of Saskatchewan. Contact forest companies about their long-term forest management plans. Information may be available on their websites. Refer to the bibliography. Emphasize that forests can and should serve many purposes.
7.8	To identify and describe major components of forest protection. (COM)	Research issues in forest protection pertaining to forest fire management, soil conservation, land reclamation and pest and disease control. Investigate measures being used in Saskatchewan to control insects and disease. Examine ways of integrating this with Module 23. Identify and describe symptoms of common forest pests and diseases. Complete a research project on major components of forest protection. Explain basic goals and techniques of forest fire management, soil conservation and land reclamation and pest control. Invite guest speakers to discuss the major components of forest protection, or plan field trips to places where these issues are being addressed. Cite reasons for protecting forest resources such as material and non-material benefits and environmental impact. Investigate the use of computer modelling for forest fire risk assessment. Opportunities for integration exist with Module 13. Identify examples of pest damage, soil erosion or fire damage locally. Collect and examine samples from affected trees. Research appropriate prevention or control strategies. (COM)

Learning Objectives	Notes
	Compare different methods of pest and disease control such as biological methods, forest management and chemical methods. Explain the fire triangle (heat, fuel and oxygen) and how to control a fire by removing one of the three components of the triangle. Various documents on this topic are available from government and industry sources. Contact the provincial government's forest ecosystem branch for more information.

Module 8: Parks and Protected Areas (Optional)

Suggested time: 7 - 10 hours **Level:** Intermediate
Prerequisite: None

Module Overview
Canada has many different types of parks and protected areas. These include national parks, provincial parks, regional parks, municipal parks, representative area networks, conservation areas, wildlife refuges and sanctuaries, historic parks and so on. These are special places, protected and maintained as places that form part of the distinct character of this country. They offer habitat for plants and animals and provide a wide range of services and forms of enjoyment for people.

The mandate, governance and management plans of each of these different types of parks and protected areas vary considerably. The intent of this module is to investigate special places such as these, to become familiar with the reasons why these places exist. Use opportunities available to make specific references to these unique places that are found throughout Canada and in local communities.

Not all students have a national or provincial park near their school. Make use of the parks, forests and protected places in the local community. Recognize their significance and appreciate the pressure that these areas experience when trying to satisfy a variety of needs and interests.

"Side by side with modern Canada lies the last battleground in the long drawn out bitter contest between civilization and the forces of nature. It is a land of shadows and hidden trails, lost rivers and unknown lakes, a region of soft-footed creatures going their noiseless ways over the carpet of moss, and there is silence, intense, absolute and all embracing." -- Grey Owl, "Tales of an Empty Cabin", 1923.

Foundational Objectives
- To develop an understanding of the social, cultural, economic and environmental significance of forests.
- To understand the important role of humans in the protection and preservation of natural environments.

Common Essential Learnings Foundational Objectives
- To value natural environments. (PSVS)
- To recognize the important role of humans in the protection and preservation of natural environments. (PSVS)

	Learning Objectives	Notes
8.1	To understand the mandate of Canada's national parks. (COM)	Contact Prince Albert National Park to find make arrangements for school tours. Obtain a summary of laws protecting Canada's national parks, such as the *National Parks Act*.
8.2	To identify several Canadian national parks and their distinguishing characteristics.	The Parks Canada website includes SchoolNet projects. Refer to the bibliography for Internet sites and resources related to parks and forestry. Compare two of Canada's national parks that contain extensive forest regions. Examine their distinguishing physical characteristics. Look for differences in their plant and animal diversity.

	Learning Objectives	Notes
8.3	To compare national parks to other parks and protected areas. (CCT)	Consider how the mandate, governance and management plans differ for national parks and other types of parks and protected areas. Utilize any parks and services available in the local community. Plan field trips to those areas. Make connections with other modules in Forestry Studies and look for ways of integrating other subjects. Identify differences in ecosystem protection, wildlife management, resource utilization, human activities and so on, in two or more types of parks and protected places.
8.4	To explore the range of human interests and values associated with Canada's parks and protected areas. (PSVS)	Compile a list of various different activities that people undertake in a specific park or protected area. For each of the activities listed, assess its impact. Have an Elder accompany the group on a forest tour. The Elder will be able to provide information about aboriginal perspectives of the forest. Banff National Park, one of Canada's most famous tourist attractions, is facing severe pressure from increasing human activity. Research the history of the park and the impact that human activity has had on it. Find out what measures are being taken to limit the extent to which that activity is affecting the integrity of the park. Find out if parks and protected areas in the local community are experiencing pressures as well. Parks, recreational areas and picnic sites that attract a large number of visitors require a more extensive infrastructure to service their needs. List some examples of the kinds of infrastructure needed and how this affects natural ecosystems. Research the life and conservation efforts of Archibald Belaney, also known as "Grey Owl". Grey Owl was one of Canada's first and foremost conservationists, gaining fame (and later notoriety) in the 1930s. His cabin, where he lived and wrote, is still maintained at Ajawaan Lake in Prince Albert National Park. (IL) Inquire about land tenure and residency policies in the national parks. Find out about archaeological investigations at national parks and other sites. Examine traditional uses of the land by aboriginal people. (PSVS) Make comparisons of renewable and non-renewable resource use in different types of parks and protected areas. Birds require special considerations for protected areas. Research a migratory species and find out what resting places are available between its winter and summer places of residence. Speculate on the impact of habitat loss.

	Learning Objectives	Notes
		Debate the management policies of parks and other protected areas. This module complements modules in Biology and Wildlife Management.
8.5	To investigate pressures being experienced by parks and protected areas.	Arrange for a field trip to a park in the local area. If the national park is too far away to visit, plan a field trip to a regional or provincial park, a wildlife conservation area, a heritage park or some other protected area where a forest is located. Visit nature centres and interpretive nature trails. Park interpreters or wildlife experts may be available in the area to accompany the group on an interpretive hike. Many possibilities for integration exist with this unit. For example, it can be integrated with Modules 2, 3, 5 and 13. Many pressures being experienced by Canada's national parks, provincial parks and other protected places have been self-inflicted, by policies and procedures that have been used in the past. Investigate this further to find examples that illustrate this point. Find out how policies have changed over time. Investigate some case studies in ecosystem management in Canada's national parks or other parks and protected places. Explore connections with Module 7. The planned or accidental introduction of exotic plants to an area, and the removal of native species from an area can cause a severe disruption of the ecological balance. Investigate the kinds of problems created when plants such as carragana or purple loose-strife have been introduced into areas where they had not existed before, or when animals such as wolves or bears have been moved from their natural territories. (PSVS) Archive information is available that illustrates the historical use of land in different areas. Conduct a case study to compare past and present use of an area, such as one of Canada's national parks, a provincial or regional park or some other protected area near the local community. Compare the ecology of old and new growth forests. Make connections with Module 3. Debate the expansion of park mandates to include such activities as commercial fishing, mining, wood harvesting or other commercial enterprises like outfitting and skiing. Research the changes that have happened as a result of human intervention on the Waskesiu and Kingsmere Rivers in Prince Albert National Park.

Learning Objectives	Notes
	Parks Canada releases information about the state of each of Canada's national parks. Find out which ones are experiencing the most and least amount of environmental pressure, and examine the reasons for the differences.

Module 9A: Occupational Health and Safety (Optional)

Suggested time: 4 - 6 hours **Level:** Introductory
Prerequisite: None

Module Overview
This module introduces the rights and responsibilities that workers and employers have for health and safety in the workplace and *The Occupational Health and Safety Act* as a major tool for maintaining the health and safety of workers. Through in-class, interactive learning activities, students will have the opportunity to develop the skills they need to act on their knowledge of their rights and their responsibilities for health and safety in the workplace.

Foundational Objectives
- To interact positively and effectively with others at a worksite.
- To demonstrate knowledge, skills and attitudes that are necessary for safe and environmentally responsible experiences in the forest.
- To understand the importance of safety in the workplace.

Common Essential Learnings Foundational Objectives
- To develop an awareness of the responsibility and need for safe workplace practices and procedures. (PSVS)
- To use language and terms specific to health and safety in industry, and express knowledge of the area using communication skills. (COM)
- To develop a positive disposition to the role of health and safety in the workplace. (IL)

	Learning Objectives	Notes
9.1	To recognize the impact of unsafe work practices and their effect on peoples' lives. (PSVS)	Use videos, case studies or presentations depicting real life scenarios to illustrate the impact of unsafe work practices in the forestry industry. For example, show a video showing "real people" and how their lives have been changed as a result of an injury or death. A discussion of the impact of an injury on the student's life and the lives of friends and families could follow the video. Emphasize that most accidents are preventable, if training and appropriate supervision is provided and if safe work practices and procedures are followed. Provide information on forest sector injury statistics in Saskatchewan, Canada and elsewhere in the world. Have students analyze data to identify trends and to project future injury occurrences.
9.2	To explain the purpose of *The Occupational Health and Safety Act* and *Regulations* and how they affect workplace practices.	
9.3	To identify employer and worker responsibilities.	See Saskatchewan Labour resources and the Ready for Work website. Refer to the bibliography.

	Learning Objectives	Notes
9.4	To understand three worker rights: • the right to know about workplace hazards • the right to participate in health and safety activities • the right to refuse unusually dangerous work.	Using informational brochures discuss with students the three rights. Information should include that workers have the **right to know** and be informed about workplace hazards and how to deal with them; the **right to participate** in health and safety activities in the workplace (e.g., become a member of the occupational health committee, report unsafe conditions and equipment to the supervisor, and participate in the identification of hazards); and the **right to refuse** work that the worker believes to be unusually dangerous. Students could visit a forest industry occupational health committee or a representative could visit the class. Students could tour a worksite or collect information from occupational health and safety committees.
9.5	To identify and discuss potential safety hazards in a forest industry workplace.	Once potential hazards have been identified, discuss how injuries could be prevented and who might have responsibility or a role to play in helping keep the home, school or industry workplace safe. Relate hazard identification and control to workers' **right to know** about hazards and how to deal with them and workers' **right to participate** in health and safety in the workplace.
9.6	To develop health and safety questions to ask employers.	Brainstorm a list of possible questions to ask employers such as: • When will I receive job safety training and orientation? • Are there any health and safety procedures I should follow? • What safety gear will I be expected to wear or provide? • Are there any risks or hazards I should be aware of in my job? • If I get hurt, who is the first aid person? • Where are safety notices posted? • What should I do in case of fire or another emergency? • Where do I find fire extinguishers, first aid kits and emergency assistance? • What should I do if I get injured or have an accident? • How can I contact my health and safety committee or representative? Discuss appropriate times to ask questions. Role play situations.

Module 9B: Occupational Health and Safety (Optional)

Suggested time: 4 - 6 hours **Level:** Intermediate
Prerequisite: Module 9A

Module Overview
This module provides opportunities for young workers to develop the skills they need to recognize and manage hazards in their workplaces of choice or interest, to participate in health and safety decision making in their workplaces and to explore, recognize and practise the circumstances and the procedure for refusing work they consider to be unusually dangerous.

	Learning Objectives	Notes
9.7	To be aware of agencies concerned with safe workplace practices in the forestry industry.	Discuss federal and provincial agencies that contribute to safe workplace practices; for example, Human Resources Development Canada, The Saskatchewan Human Rights Commission, the Saskatchewan Workers' Compensation Board, Saskatchewan Labour and provincial safety associations. Refer to the bibliography for Internet sites and other resources related to this topic.
9.8	To become familiar with the purpose, scope and structure of *The Occupational Health and Safety Act* and *Regulations*.	Saskatchewan Labour, one of the agencies concerned with safe workplace practices, administers *The Occupational Health and Safety Act*. Briefly review the purpose of health and safety legislation and regulations. Discuss the difference between legislation and regulations. Show students copies of the Act. Discuss the table of contents, index and other parts of the Act. In small groups, have students conduct a "search for information" activity, and identify all sections that are relevant to the forestry industry.
9.9	To identify worker and employer responsibilities in forestry industry workplaces.	Review worker and employer responsibilities in the workplace. Review case studies and hazard scenarios and determine the responsibilities of the worker and the employer.
9.10	To identify types of hazards in a forestry industry workplace.	Review the three main worker rights. Identify hazards as part of the information workers have a right to know. Define a hazard as any activity, situation or substance that can cause harm. Students can create hypothetical forestry workplace hazard scenarios they can present to classmates, for analysis of best course of action, discussion and decision.

	Learning Objectives	Notes
		Discuss the five hazard categories and identify forestry industry examples for each: • physical hazards; for example, excessive noise, heat or cold, electricity, moving machinery, dust and fibres. • chemical hazards; for example, paints, acids, cleaning supplies, vapors and fumes such as carbon monoxide, propane, oxygen and acetylene. • ergonomic hazards; for example, lighting, video display terminals, lifting and repetitive movements. • biological hazards; for example, mold, fungus, mildew, plants, bacteria and viruses, unclean washrooms, medical waste stored improperly, insect stings and animal bites. • workplace stress; this is restricted to harassment as defined under *The Occupational Health and Safety Act* and *Regulations*, Part III, Section 36. In the school, have students identify examples of the five types of hazards or identify situations where each type of hazard might be encountered. Forest firefighting presents a particular set of hazards that students should investigate.
9.11	To describe and use the steps to identify and control forestry industry workplace hazards.	Describe the three steps to recognize, assess and control hazards: • see it – what is the hazard? • think it – why is this a hazardous situation? How likely is it that someone will be hurt or killed? How serious is the risk? • do it - what can be done to control the hazard or to prevent an accident or injury? Discuss ways to control hazards: • eliminate the hazard – clean up spills, replace faulty equipment, substitute a safer chemical for a hazardous chemical. • reduce the risk to workers - use machine guards, noise enclosures, ventilation systems to dilute the concentration of a hazardous substance. Protect workers from the hazard through the use of safe work procedures, effective safety training, proper supervision or personal protective equipment. Using pictures, case studies or videos of forestry industry workplaces, ask students to identify potential hazards. Identify the type of hazard, assess the risk the hazard poses and identify how to control the hazard.

	Learning Objectives	Notes
9.12	To understand the right to participate in health and safety activities in the workplace. (PSVS)	Workers can participate in health and safety activities by reporting unsafe conditions or concerns, by becoming a member of the Occupational Health Committee or by becoming the health and safety representative. Have students research and report on the role and responsibilities of Occupational Health Committees (OHC) using the Internet, pamphlets, *The Occupational Health and Safety Act* and *Regulations* or interviews.
9.13	To understand the right to refuse work the worker believes to be unusually dangerous.	Outline the steps in a refusal to work. Review case studies and scenarios and decide if the worker has the right to refuse to work. There are laws that make fighting forest fires different than most other work. Students should be aware of their responsibilities and rights when in the vicinity of a forest fire.
9.14	To develop health and safety questions to ask an employer.	Review, revise and add to the questions developed in the Introductory Level activity. Discuss students' experiences asking questions in the workplace. Were their questions answered? Did they encounter any difficulties? Did they receive any health and safety orientation or training? Discuss appropriate times to ask questions. Role play situations.

Module 9C: Occupational Health and Safety (Optional)

Suggested time: 4 - 6 hours **Level:** Advanced
Prerequisites: Modules 9A, 9B

Module Overview
This module identifies how worker and employer rights and responsibilities for workplace health and safety (i.e., violence policy, hiring and orientation guidelines) are applied to specific workplaces and industries. Students will have the opportunity to engage in determining and designing health and safety policies and procedures specific to the workplace of their choice or interest.

	Learning Objectives	Notes
9.15	To understand how rights are applied in the workplace.	Right to Know: Review hazard identification process. Provide a generic workplace inspection checklist. With a cooperating employer or the school's Occupational Health Committee, have students conduct a partial workplace inspection to identify and assess potential hazards. Students will also make recommendations regarding control of identified hazards. Right to Participate: Organize an Occupational Health Committee (OHC) in the classroom. Role play various scenarios where an OHC would be called to act. Right to Refuse: Role play approaching the supervisor to report a refusal to do a task because of health and safety concerns. Have students plan how they would start the conversation, what their voice tone would be and so on.
9.16	Identify employer responsibilities with respect to hiring guidelines and prescribed workplaces.	Have students conduct research with respect to forest industry and job tasks that have age restrictions. Identify workplaces that are required to have a formal safety program, violence policy, occupational health committee or safety representative. Using resources available from the Occupational Health and Safety Division, Saskatchewan Labour, have students develop a safety program or violence policy for a specific forest industry workplace.
9.17	To explain health and safety regulations with respect to work placement or career in the forest industry.	Through informational interviews with workers, employers, family members or training centres, identify what health and safety regulations apply or what hazards exist in the forest industry and fighting forest fires. Discuss ways that the hazards are controlled in the workplace. Information about health and safety related to the forest industry can also be obtained through the Internet, safety associations and other Practical and Applied Arts curriculum guides.

Module 10A: Labour Standards (Optional)

Suggested time: 2 - 3 hours **Level:** Introductory
Prerequisite: None

Module Overview
Through in-class, interactive learning activities, this module introduces young workers to fair workplace practices and *The Labour Standards Act* as a major tool for promoting fair working conditions in Saskatchewan workplaces.

Foundational Objectives
- To interact positively and effectively with others at a worksite.
- To demonstrate knowledge, skills and attitudes that are necessary for safe and environmentally responsible experiences in the forest.
- To understand the importance of safety in the workplace.

Common Essential Learnings Foundational Objectives
- To develop an awareness of the responsibility and need for fair and cooperative workplace practices and procedures. (PSVS)

	Learning Objectives	Notes
10.1	To become knowledgeable about fair workplace practices.	Using a survey or question sheet, discuss the concept of fairness as it relates to the workplace. (CCT)
10.2	To identify how *The Labour Standards Act* promotes fair workplace practices.	Use a video, flashcards or a quiz to introduce the scope and provisions of *The Labour Standards Act*. It is the law that sets minimum standards for employing people in Saskatchewan. It includes areas such as: minimum wage, hours of work, public holidays, annual holidays, overtime, termination and permits. Discuss how collective agreements (unions) and employer and professional association policies build on or add to minimum labour standards. Investigate the labour situation in the Saskatchewan forestry industry.
10.3	To identify labour standards questions to discuss with an employer.	Brainstorm a list of questions to ask. Questions may include: • what is my schedule of work hours? • what is my wage? • how and when will I be paid? • what deductions will be made from my pay cheque? • who is my supervisor? Discuss appropriate times to ask these questions. Role play situations.

	Learning Objectives	Notes
10.4	To introduce the concept of applying strategies for addressing problems arising from unfair workplace practices.	Discuss types of conflict and methods to deal with conflict in the workplace. Using case studies, identify ways to address workplace disputes concerning areas such as not being paid overtime. If students are presently working, discuss issues that they may have encountered, whether they chose to address the concern, and if and how the concern was resolved. Provide information about community agencies to contact for more information or to clarify an issue related to labour standards. For additional information, refer to websites and other related resources in the bibliography.

Module 10B: Labour Standards (Optional)

Suggested time: 2 - 3 hours **Level:** Intermediate
Prerequisite: Module 10A

Module Overview
Through in-class, interactive learning activities, this module focuses on providing young workers with an opportunity to identify how *The Labour Standards Act* will impact the working conditions in the workplaces or industries of their choice or interest.

Foundational Objectives
- To interact positively and effectively with others.
- To secure, create and maintain work placements in a safe and healthy environment.

Common Essential Learnings Foundational Objectives (see Module 9A also)
- To develop an awareness of the responsibility and need for fair and cooperative workplace practices and procedures. (PSVS)

	Learning Objectives	Notes
10.5	To understand and appreciate the role of different agencies involved in the forest industry workplace.	Discuss federal and provincial agencies that contribute to fair workplace practices; for example, Human Resources Development Canada, The Saskatchewan Human Rights Commission and Saskatchewan Labour, Saskatchewan Federation of Labour and unions.
10.6	To describe employers' and workers' rights and responsibilities for promoting and maintaining fair workplace practices. (PSVS)	Use flashcards, case studies or quizzes to discuss employers and workers' rights and responsibilities with respect to fair workplace practices. Include topics such as: • overtime • meal breaks • work schedules • minimum callout • annual holiday pay • shift work • termination • age of employment • uniforms • public holidays • equal pay
10.7	To identify the labour standards that apply to the forestry industry work place.	Through informational interviews and surveys with workers, employers or family members, identify the labour standards that apply to the student's work placement, career interest or present place of employment. For additional information, refer to websites in the bibliography of resources.

Module 11: Canada's Model Forests (Optional)

Suggested time: 7 - 10 hours **Level:** Intermediate
Prerequisite: None

Module Overview
Canada's Model Forest Program is part of an international system of model forests whose main goal is to network and develop collective partnerships that will strive to find collaborative ways to consider management issues for forested areas. Under the auspices of Natural Resources Canada, there are model forests in every province of Canada. They serve as an example for other sectors of how social modelling can resolve conflict and develop understandings among different stakeholders who share interests in how forest resources will be utilized. Currently, model forests conduct extensive research to understand better the ecological impact of various forest activities. Acting from this solid knowledge base, model forest representatives are able to make informed decisions on how best to ensure the sustainability of Canada's forests. International meetings of model forest representatives are held regularly, allowing the sharing of vital information regarding common issues.

Foundational Objectives
- To understand the important role of humans in the protection and preservation of natural environments.
- To be familiar with the various forest ecosystems in Saskatchewan and Canada.

Common Essential Learnings Foundational Objectives
- To develop a life-long conservation ethic. (PSVS)
- To recognize that differences regarding forest values and uses should be resolved through cooperative partnerships. (PSVS)

	Learning Objectives	Notes
11.1	To recognize that the model forest program involves an extensive network of groups that share common interests in protecting forest resources. (PSVS)	Information about Canada's Model Forest Program is available at websites listed in the bibliography. The online version of this curriculum guide includes web links of available sites that have been evaluated favourably by teachers. Find out the extent of the area covered by the Prince Albert Model Forest. On a map of Saskatchewan, shade in the appropriate area and estimate its size. The area is defined by Prince Albert, Prince Albert rural, Big River, Montreal Lake, Christopher Lake, Prince Albert National Park, Weyakwin, Timber Bay, LaRonge and a few newer areas added recently. Make a list of the different groups represented by the Prince Albert Model Forest. For each group, develop a brief summary of the issues that are most likely to be of concern to them.
11.2	Identify the goals and objectives of Canada's Model Forest program.	The goals and objectives of Canada's Model Forest Program are prominently displayed on the Internet. Refer to the bibliography for the related Internet sites. The "evergreen" version of this curriculum guide contains the links at www.sasked.gov.sk.ca/docs/paa.html. Various forest services and agencies maintain bibliographies of model forest publications. Research material may be downloaded from the Internet. Links are available to many other related sites.

	Learning Objectives	Notes
		Refer to the related websites in the bibliography to locate publications dealing with model forests. Subscribe to the "Model Forest Network" newsletter. Model forest discussion forums are available on the Internet. Contact the Prince Albert Model Forest Association about its educational resources and research publications. A variety of video and print resources are useful for teaching Forestry Studies 20, 30. Explore how the consequences of human interaction, from stakeholders representing different ideologies, contribute to collaborative consensus-building in forest conservation efforts. Use role-playing and simulations to explore the consensus-building processes.
11.3	To investigate some of the programs and initiatives developed by Canada's Model Forests.	Point out that the international model forest program that now extends to many countries around the world was a Canadian initiative. Find out about obtaining newsletters published by the Prince Albert Model Forest Association. Refer to the Internet sites listed in the bibliography for contact information. Consider opportunities for integrating this module with other modules in Forestry Studies 20, 30. Inquire about summer employment opportunities for students with the Canadian Model Forest program. Training positions are available, allowing students to work with researchers and partner organizations.
11.4	To explore the research activities being conducted by model forest associations.	The Canadian Forest Service publishes periodic assessments about the health of Canada's Model Forest program. Obtain a copy of a recent report and investigate its findings. The Prince Albert Model Forest Association maintains a library of print and video resources, including summaries of research and development reports that have been conducted. Resources that may not be available locally are often accessible on an inter-library loan basis. Inquire through the local and regional library network. Investigate a model forest in another country. Find out about the kinds of activities it undertakes. Examine how the forests in that area are similar and different from those here.

Module 12: Mapping (Optional)

Suggested time: 7 - 10 hours **Level:** Intermediate
Prerequisite: None

Module Overview
Maps provide important information about forested areas. In forestry, they are especially useful for planning. In this module students learn how to interpret information from maps, and how to construct their own maps. Many enrichment activities are possible, exploring aspects of numeracy and the technology used to develop maps. Mapping activities and using compasses are skills that overlap in several other modules of Forestry Studies involving outdoor field activities.

Foundational Objectives
- To develop an understanding of the use of technology in forestry and to recognize the benefits and limitations of technology. (TL)

Common Essential Learnings Foundational Objectives
- To interpret lines, grids, symbols, scale and visual representations. (NUM)
- To translate and convey information orally or in written form from diagrammatic representations. (COM)

	Learning Objectives	Notes
12.1	To identify different types of maps.	Recognize different types of common maps such as base maps, topographic or contour maps, soil type maps, geologic maps, forest stand or type maps, or road maps. Prepare a portfolio of different maps, comparing the characteristics and uses of each. Focus on maps that pertain to the forestry industry. Natural Resources Canada and Saskatchewan Environment and Resource Management can be contacted to obtain maps. Refer to the list of Internet sites in the foreword to the bibliography.
12.2	To explain procedures used to create maps. (TL)	Aerial photography, satellite imaging and other remote sensing techniques could be mentioned briefly, or the topic could be expanded to incorporate Module 15. The historical development of cartography is an interesting topic to explore further. Use research projects to allow students to investigate information-gathering technologies and their application in mapping, such as satellite imagery and Global Positioning Systems (GPS). Describe components and applications of the National Topographic Grid System and the Western Grid Survey System. For students interested in exploring career development and employment opportunities in mapping, refer to Module 2.

	Learning Objectives	Notes
		Describe applications of different types of film used in aerial photography: black and white, black and white infrared, colour, colour infrared. Demonstrate applications of aerial photographs in the steroscopic viewing of topographic features. Explain how information from aerial photographs is used to construct two-dimensional maps. Investigate the use of digital imaging techniques in map making.
12.3	To obtain bearings from a map using a compass. (TL)	Develop an orienteering activity in which students are to start at a specific location and arrive at some unknown destination after pacing specified distances along given bearings. Evaluation may be based on how closely the designated arrival point can be located. Use a task checklist to determine if the task was completed. This activity is very important for those planning outdoor wilderness trips. Use it as a preliminary exercise for Module 14. Orient maps through inspection and with the use of a compass. Direction can be measured on the map using a protractor. Many orienteering activities can be found using the Internet.
12.4	To read and interpret maps, explaining the information conveyed. (NUM)	Become familiar with legends and symbols used on maps. Recognize the importance of scale in interpreting a map. Explore how features include the use of hachures, colours and tints, shading, grid lines, contour lines, elevations and relief, physical and cultural features, etc. In small groups, identify as much information as possible about a specific location on a map. As a group activity, this allows for recognition that there are many more important details provided on a map than are apparent initially. Locate a specific parcel of land on a map by using its legal survey description. Use maps to identify how ground conditions and cultural features have changed over time. Introduce the use of the international Modified UNESCO Classification system (MUC), using standardized conventions for land cover types. This classification system allows distinct land covers to be grouped into land cover classes, using a four-digit code. While other land classification systems exist, the MUC classification scheme is accepted internationally. Compare maps of soil types, climate conditions and types of vegetation. Look for patterns and relationships.
	Learning Objectives	Notes

12.5	To estimate and calculate distance and area. (NUM)	Use different scales to measure distances and areas. Compare maps that have different scales. Integrate these activities with mathematics, in topics such as calculating area, ratio and proportion and estimation.
12.6	To construct a map that provides information about a forested area. (TL, NUM)	Observe GIS in use by a local company or some other organization. Begin a series of mapping exercises with progressive levels of difficulty, starting with a simplified map of classroom, then mapping the interior of the school, and then outside the school to include a surrounding area. This will help to develop the idea of using an appropriate scale for each different map. Pace or measure the area to be mapped. Gather information regarding specific land and forest features. Determine the map scale. Prepare a legend. Plot major land and forest features. Create a topographical map of an area near the school. Consider possible ways of integrating this module with Wildlife Management, Photography and Drafting and Computer-Aided Design.

Module 13: Forest Fire Management (Optional)

Suggested time: 8 - 12 hours **Level:** Intermediate
Prerequisite: None

Module Overview
This module provides students with an introduction to forest fire management. They will learn about some of the main causes and types of fires and the role that forest fires play, particularly in the boreal forest. They will learn about fire prevention and detection strategies, as well as firefighting practices that are currently being used. Teachers are encouraged to seek out opportunities that may exist for practical field activities and work experience for students in this area. However, the dangerous nature of forest fire situations makes proper approval and consultation imperative.

Foundational Objectives
- To understand the important role of humans in the protection and preservation of natural environments.
- To analyze the interrelatedness of living and nonliving elements in forest ecosystems.
- To understand that good forestry practice is informed by the scientific process, proper research and development.

Common Essential Learnings Foundational Objectives
- To value natural environments. (PSVS)
- To investigate the role of technology in practical applications in forest fire management. (TL)
- To develop a life-long conservation ethic. (IL)

	Learning Objectives	Notes
13.1	To identify the main causes of forest fires.	Distinguish between natural and human causes of forest fires. Explain why naturally caused fires are often located in more remote and less accessible areas. Research the use of controlled-burn fires in land management practices. Why are they used? Debate the use of these procedures in Canada's national parks and in other types of parks and protected areas. Contact a park interpreter at Prince Albert National Park. Find out about the use of controlled-burns in fescue prairie grassland areas. Ask for information about the national park policy on fighting forest fires within park boundaries. Perform similar activities for other types of parks and protected places. Integration with Module 7 is possible. Explain the proper procedures for establishing and extinguishing campfires. See Module 3A for possible integration ideas.

	Learning Objectives	Notes
13.2	To distinguish among different types and different characteristics of forest fires.	Compare the characteristics of ground fires, surface fires and crown fires. Explain the different results of these types of fires and the different ways in which they must be fought. Identify immediate and long-term effects that different types of fires have on the ecology of the affected area. Refer to Module 3. Review fire history maps. Look for short-term and long-term fire patterns. Compare the frequency with which fires affect the boreal forest, compared to their impact on other types of forest regions in Canada (subalpine, montaine, coastal, Columbia, deciduous, Great Lakes/St. Lawrence and Acadian). See Module 5 for opportunities for integration. Research the impact that unintentional fires and intentional controlled-burn fires have on controlling plant diseases. Integrate this with Module 23. Obtain statistics about the number of forest fires and the extent of their impact over the past several years. Draw a graph to show a comparison of forest fire activity on an annual basis. On a map of Saskatchewan, label the areas affected by forest fires in a particular year. Calculate the approximate area affected. (NUM) Compare the total annual area affected by forest fires to the amount of area harvested annually. Research the impact of forest fires on wildlife. Explain the idea of succession, as it pertains to forest ecosystems affected by forest fires. See Module 3 for connections. See other resources as well. Research fire impact studies conducted by the Canadian Forest Service and other organizations. (IL) Two important dimensions to consider are the natural disturbance patterns created by fire and the values at risk. Foresters are now taking the lead in understanding how to mimic fire disturbance at the landscape level. Risks have to be assessed and evaluated regarding where the greatest need exists for protection against fire. If the local school happens to be in an area affected by a forest fire, conduct a long-term study of the impact on the area and the changes that gradually occur over time after the fire. (IL)

	Learning Objectives	Notes
13.3	To describe forest fire management strategies.	Ask students to list as many different fire management strategies as possible. Have them consider strategies for preventing human-created fires, as well as considering ways of minimizing the impact of naturally created fires. (PSVS) Contact industry representatives for their perspectives on forest fires. Evaluate modern and historic attitudes towards forest fires. Students may be interested in exploring career and employment opportunities in these areas. Inquire about courses, training and summer employment that are available using newspaper ads, Internet or local ads. Research regeneration strategies that are used in areas affected by fire. Find out some of the ways that affected areas are influenced by natural forms of regeneration and patterns of succession. Integrate this with Modules 19 and 20, Heavy Equipment and Light Equipment in Forestry Studies 30.
13.4	To explain methods used to detect forest fires.	Investigate some of the equipment that is in current use in forest fire management. Contact Saskatchewan Environment and Resource Management (SERM), Forest Fire Management Branch, for general information about forest fire management and available resources, and to find the nearest location of areas of interest to conduct field observations and tours. Inquire about infrared camera technology and how it used to detect and assess forest fires. Research the applications of remote sensing in firefighting. Consider the use of infrared sensing technology in the detection and monitoring of forest fire activities. See Module 15 for integration opportunities. Explore the Canada Centre of Remote Sensing website to study satellite images taken in areas during forest fire activity. The Internet address is given in the bibliography. Investigate ways that fire risk and impact can be assessed using remote sensing techniques.

13.5	To investigate important forest firefighting procedures. (IL)	Some procedures used include the use of firebreaks, ground attack firefighting, trenching, aerial bombing with water and chemical fire-retardants and controlled back-burning. Investigate equipment used in firefighting. This module may be integrated with Modules 19 and 20 in Forestry Studies 30 for a more in-depth examination of the equipment used. Find out about communication equipment used in firefighting. Investigate how the equipment works. Investigate the use of computer modelling for forest fire risk assessment. See Module 7. Investigate the type of aircraft used in firefighting and fire prevention. Inquire about the use of technology to monitor lightning activity in Saskatchewan. Explore employment opportunities in forest fire management and prevention. See Module 2 for integration opportunities. Invite guest speakers to the classroom. People from very different backgrounds who are involved in forest fire management and prevention occupations and related interests may be willing to speak to students. Refer to the bibliography for a variety of videos available on this topic.

Module 14A, B: Outdoor Wilderness Trip (Optional)

Suggested time: 15 - 20 hours **Level:** Intermediate
Prerequisite: Module 10

Module Overview
This module provides students with an opportunity to plan, prepare, conduct and conclude an extended outdoor wilderness trip in the forest. Ensuring that logistics of the trip are thought out carefully will help to make this a valuable experience for students. Careful planning and preparation are extremely important. Emphasis should also be placed on maintaining the safety and comfort of the participants at all times. It is extremely important to conduct the trip with a consideration for the environment. This module may be offered for a second time as Module 14B to provide an outdoor experience different than that in Module 14A.

Foundational Objectives
- To develop employability skills and explore employment opportunities in forestry through a wide range of experiences.
- To demonstrate knowledge, skills and attitudes that are necessary for safe and environmentally responsible experiences in the forest.

Common Essential Learnings Foundational Objectives
- To value natural environments. (PSVS)
- To assess situations individually and collectively, and develop strategies for dealing with those situations effectively. (CCT)
- To work cooperatively with others to achieve common goals. (PSVS)

	Learning Objectives	Notes
14.1	To identify, assess, avoid or respond to physical, psychological and physiological factors that may be imposed by the forest environment. (CCT)	During preliminary planning activities, carefully research particular terrain and conditions that will be encountered on the trip, such as lake and river ice, terrain conditions and other potential hazards. Consider wildlife that may be encountered, including bears, bees, ticks, mosquitoes, non-edible plants, allergens, etc. Refer to "Outdoor Experiences II" in Wildlife Management 10, 20, 30. Anticipate any changes in seasonal weather conditions that may affect personal and group safety. Have some means available to obtain assistance if an emergency arises. Notify others of the itinerary. Research information from a variety of sources including maps, aerial photographs, guidebooks, journals and local experts. Interpret route information by selecting reasonable destinations, estimating travel time and anticipating obstacles. A basic first aid kit should be available during the trip. Someone in charge of the group should be certified in administering first aid. Some basic understandings should include dealing with hypothermia, frostbite, fatigue, dehydration, as well as other basic first aid procedures. Identify students or parent chaperones who have first aid and CPR training who are going on the trip.

	Learning Objectives	Notes
		Students should be instructed on the procedures they are expected to follow if coping with adversities, such as getting lost or injured. (PSVS) Obtain permission beforehand, to ensure that an area may be used for its intended purpose, particularly on private land, or in national, provincial or regional parks. Parental permission should be obtained prior to the trip. Specific medical information should be obtained on things such as allergies, medical conditions, specific medications that students are taking and so on. Consult with physicians or public health officials if necessary, for specific information about medical situations that may arise on the trip. Plan for weather and seasonal conditions that may arise. Identify hazards peculiar to the area. Listen to weather and news reports and forecasts. Anticipate the possibility of unexpected events, such as early fall snowstorms or late frost. If possible, have some form of communication available to alert others in the event of an emergency. (CCT)
14.2	To list and explain necessary steps to take in emergency and survival situations in the forest.	The degree of remoteness and isolation of the area of the wilderness trip will determine the extent to which students will need to be briefed on unexpected contingencies. Regardless of the location, they should understand what to do if lost or separated from the group, and how to obtain first aid and emergency response to injuries. For more remote wilderness experiences, they should also be informed about other details. Some judgement must be used to determine the extent of the pre-trip preparations, depending on the location and the duration of the trip. (PSVS) Contact fire, first aid, ambulance and emergency services in the local area to see what resources they have to offer.
14.3	To select appropriate personal and group gear for outdoor forest activities. (CCT)	Students should be able to list the personal gear required, with consideration for maintaining body temperature, staying dry and providing protection from injury. Requirements for food, shelter and storage, travel and emergencies should also be anticipated.
14.4	To demonstrate safe use and appropriate care of specialized outdoor equipment, hand tools and outdoor fires. (PSVS)	Before the trip, demonstrate the correct use of specialized equipment and hand tools to students. This would include any equipment or tools that are unfamiliar as well as any others that require special care and handling; for example, knives, hatchets and axes, camp stoves and lanterns, saws, small engines, etc.

	Learning Objectives	Notes
14.5	To explain techniques used to plan, pack, carry and prepare foods and drinking water during outdoor forest expeditions.	A detailed menu should be planned to consider nutritional requirements, portability and preservation factors, food preparation techniques and the safe use of campfires and camp stoves. (CCT)
14.6	To explain techniques required for maintaining hygiene during outdoor forest expeditions.	Factors to consider include techniques for water purification and matters related to personal cleanliness and group hygiene.
14.7	To plan and conduct safe outdoor expeditions in the forest. (PSVS)	Develop contingency plans to be used in case of such things as extreme weather conditions, fire, flood, injury and illness and so on. For ideas on activities during the trip, refer to other modules for ways to integrate content.
14.8	To use different modes of travel to participate confidently in a variety of forest activities.	Some suggestions for different modes of travel include hiking, snowshoeing, cross-country skiing, horseback riding, backpacking, mountain biking, boating, canoeing and using all-terrain vehicles. Follow guidelines for safe travel in the forest. Inform responsible persons of the travel plans. Follow the travel schedule as planned. Use orientation and navigational skills. Identify potential hazards and take necessary precautions. Dress according to the mode of travel, weather and season. Watch for changes in current weather conditions. Apply knowledge and skills while en route, including map reading and compass skills, knowledge of terrain and route selection and mapping of key landmarks and directions. (TL)
14.9	To acquire and apply minimal impact skills while participating in outdoor forest expeditions. (PSVS)	Factors to consider are proper trail use, including the use of fires and stoves, tent size selection and firewood selection. Waste disposal techniques should include considerations of latrines, waste water disposal and garbage removal. Incorporate guidelines for environmental awareness into trip planning and preparations. Consider principles of ecotourism. Also take into consideration the carrying capacity of the area being used, and develop strategies for minimum impact land use. Explain some important principles of environmental ethics before the trip.
14.10	To identify and obtain appropriate supplies, equipment and personal gear for the trip. (TL)	What are the goals and objectives of the trip? What is its duration? What is the general schedule and agenda? What secondary goals and learning outcomes can be experienced during the trip or en route? Establish specific objectives for an outdoor wilderness trip.

		Develop a checklist of essential supplies and equipment to take on the trip. Double check the list for completeness and use it when packing. Conduct a pre-trip assessment of supplies, equipment and personal gear. Assess quality, quantity and condition of the equipment. If tents are being used, set them up beforehand and inspect them carefully. Obtain missing or speciality items.
14.11	To plan courses of action to cope with potential emergency situations in the wilderness.	Monitor the activities of wildlife in the area and take precautions to avoid dangerous situations. Rehearse typical emergency scenarios before the trip.
14.12	To set up a wilderness camp-site, following guidelines for comfort, safety and least possible environmental impact. (CCT)	Select the campsite considering site exposure and drainage, access to water and firewood, impact on flora and fauna and proximity to potential dangers. Erect a tent or lean-to, assemble other amenities, protect food from wildlife and spoilage and protect equipment from the elements. Follow minimal impact guidelines in establishing latrine location and toilet procedures, wash area and procedures, fire site and use and methods of garbage and waste water disposal. Comply with local, provincial and federal legislation relevant to activities that are undertaken. Follow appropriate procedures to break camp. Pack supplies, equipment and personal gear, take down the shelter, clean the site and do a circle tour of the site as a final inspection. Assume outdoor camp duties on a rotational basis. This would include such things as meal preparation, camp maintenance and hygiene. Use a checklist or a rating scale to evaluate participants as they perform their duties.
14.13	To demonstrate practical knowledge of wilderness travel.	Some relevant activities include: closed compass and skills in activities relevant to traverse; identification of trees, shrubs, vegetation and twigs; animal track and scat identification; demonstration of proper use of equipment; and survival skills. Many opportunities for module integration are possible. Consider, for example, integrating Module 12.
14.14	To conclude the wilderness trip and conduct a post-trip assessment.	Conduct a follow-up session to gather feedback and to evaluate the success of the activity. Ask participants to provide their personal impressions. Identify problems encountered and make recommendations regarding future trips. Self-evaluation and group assessment techniques are effective in obtaining feedback that will be useful in planning future trips. Student journal writing activities during the trip could be useful in evaluating the trip. Students could also complete a reflection guide or make anecdotal remarks about their outdoor experiences.

Module 15: Remote Sensing (Optional)

Suggested time: 7 - 10 hours **Level:** Intermediate
Prerequisite: None

Module Overview
Remote sensing has become an extremely important means of examining surface features on the earth. It started when someone decided to take a photograph from a hot air balloon in the nineteenth century. It was soon discovered that valuable information could be obtained using remote sensing. Today it is used in a wide variety of applications.

This module provides students with an introduction to remote sensing. Valuable information about the coverage and condition of forests can be obtained from remote sensing data. Remote sensing gives the big picture, so to speak, serving as a "macroscope" of the entire earth and its resources. Increasingly, remote sensing is being used in other ways, to explore celestial objects beyond earth.

Foundational Objectives
- To develop an understanding of the use of technology in forestry and to recognize the benefits and limitations of technology.
- To understand that good forestry practice is informed by the scientific process, proper research and development.

Common Essential Learnings Foundational Objectives
- To construct an abstract mental image from information conveyed diagrammatically or pictorially. (NUM)
- To translate and convey information from diagrammatic representations. (COM)
- To analyze and interpret data. (NUM)

	Learning Objectives	Notes
15.1	To differentiate between remote sensing and other ways of gathering information. (TL)	Emphasize that remote sensing is broadly defined as gathering information from afar. Aerial photography, satellite imaging and birdwatching through binoculars are all examples of remote sensing. Ask students to consider how travelling to Ottawa to visit the parliament buildings would provide information and experiences that are different than sending a remote probe to the same location to gather information. Offer this analogy to describe the strengths and limitations of remote sensing. Compare trips to Mars using a human-piloted spacecraft and a mechanical probe. Evaluate the advantages and disadvantages of each type of mission. Use brainstorm techniques to obtain many ideas. (CCT)
15.2	To suggest reasons why remote sensing is used.	Identify information available through remote sensing that may not be obtained in other ways. Consider information obtained by remote sensing that may be obtained better in other ways. (CCT) Have students research ways in which remote sensing is used in forestry.

	Learning Objectives	Notes
15.3	To recognize the nature of data obtained by remote sensing.	Compare remote sensing data with information obtained in some other way. This module can be integrated with Module 9. Research the electromagnetic spectrum or sensor technology used on satellites. Integration with Physics is possible.
15.4	To understand the particular characteristics of different remote sensing techniques. (TL)	Canada has two locations for receiving satellite data: in Prince Albert, Saskatchewan and in Gatineau, Quebec. If possible, arrange a tour of a satellite station. Students should observe the equipment used to track satellites and to receive and store the data the satellites send back to earth. The satellite station has information available to schools free of charge. Research the use of digital image recording and processing. Remote sensing data is available on the World Wide Web.
15.5	To compare data obtained using different remote sensing techniques. (NUM)	Compare remote sensing data obtained from various different technologies. Some examples to consider are aerial photographs, AVHRR, LandSat, NOAA, EOS, SPOT, RadarSat and other emerging technologies. The Canada Centre for Remote Sensing (CCRS) displays low resolution data on its website. It is an excellent resource for student use. Refer to the bibliography for Internet addresses. Examine natural colour composite images and compare them to false colour composite images. Compare the differences that become evident in vegetation when viewed with false colour composite images using data from the infrared region of the spectrum.
15.6	To explain how the limitations of resolution of remote sensing data affect interpretation. (TL)	Compare images taken from high altitude weather satellites and lower level vantage points. Consider why a low resolution image (about 1 km resolution) is suitable for weather information, but less suitable for examining forested areas. Examine satellite data on a computer. Find an area of particular interest. Zoom in until detail is no longer available. What is the limit of the pixel size? How does this affect the extent to which detail can be examined? (NUM) Discuss the importance of ground truthing in verifying data collected through remote sensing. Ask students to consider why military remote sensing data uses very high resolution. What kinds of surface details would be distinguishable with low, medium and high resolution?

	Learning Objectives	Notes
15.7	To interpret remote sensing data. (NUM)	Classify surface features such as forested areas, wetlands, bodies of water and cultural features that are in a remote sensing image. See Module 12 regarding the use of MUC for classifying distinct land covers. Identify the unique spectral signatures of specific surface features. Remote sensing computer software is available for educational use. It can be used to read and manipulate satellite images. Some software has the ability to compute image clusters, using supervised or unsupervised classification, allowing users to develop land cover thematic maps. (TL) There are tutorials and other useful information about remote sensing on the Internet. Obtain posters that contain satellite images. Investigate forest decline damage and how it can be detected from remote sensing data. Compare damage that can be detected with visible light and in the infrared region.

Module 16: Issues in Forestry (Optional)

Suggested time: 7 - 10 hours **Level:** Advanced
Prerequisite: None

Module Overview
Understanding current issues in forest management offers students an opportunity to recognize the complexity that arises when attempting to develop workable strategies for managing forest resources. Issues impact on many local stakeholders, and the decisions that arise may have environmental, social, economic and political consequences on a global scale. Such management issues are never easy. Many factors must be considered. Collectively, stakeholders representing different and often conflicting interests need to work together cooperatively to ensure that forests continue to thrive. Responsible decisions are often made within a political context that involves considerable debate. Individual and shared actions, as well as effective leadership, are needed to foster environmental stewardship. Many local issues are similar to those being considered in other parts of the world. The same issues often apply.

Foundational Objectives
- To understand the important role of humans in the protection and preservation of natural environments.

Common Essential Learnings Foundational Objectives
- To exhibit responsible and ethical actions in relation to the earth's resources. (PSVS)
- To develop a positive disposition to life-long learning. (IL)

	Learning Objectives	Notes
16.1	To identify different perspectives associated with current issues in forest management.	This module lends itself to integration with Module 7. Refer to Forestry Studies 20 and make connections with what students have already covered. Consider social, economic, cultural and environmental perspectives of issues related to forest management. Consider the immediate and long-term consequences of issues being investigated. Appraise possible alternatives for dealing with issues. Describe past and present trends in the consumptive and non-consumptive uses of forests. Gather appropriate resource materials prior to the beginning of this module. Refer to the bibliography or contact government agencies, environmental groups, industry representatives and other stakeholders. Recognize cultural differences regarding forest management issues. In some cultures, the notion of forest "management" is, in itself, unacceptable. Look for online sources, newspaper articles, documentaries and magazine reports dealing with issues in forest management. Critique them to consider the range of viewpoints and biases evident, the validity and reliability of the information presented, and the recommended course of action or conclusions presented.

	Learning Objectives	Notes
16.2	To analyze differing points of view regarding how and to what degree Canada's forests should be used. (CCT)	Invite representatives from different interests to share their views in a panel discussion. Identify the stakeholders. Some examples of interest groups are government and politicians, the forest industry, the general public, First Nations or other aboriginal groups, environmentalists, private business and chambers of commerce, recreational users, farmers and ranchers, woodlot operators and others. Develop a position paper that outlines a responsible course of action on a forest management issue for a specific stakeholder group. Integrate this topic with other modules and with other courses of study. Consider the use of dialectics and debates, examining issues from multiple viewpoints.
16.3	To identify positive and negative effects of forest industry development on people, industry and the environment.	Evaluate advantages and disadvantages of different forest harvesting practices such as clearcutting and selective harvesting. Research issues related to the expansion and management of Saskatchewan's forest industry. Some potential topics are access management, herbicide use in timber management, old growth management and the maintenance of biodiversity. (IL)
16.4	To illustrate how issues and trends involving Canada's forests may be similar to those in other parts of the world. (CCT)	Compare issues involving Canada's forests with similar issues in other parts of the world in terms of land use, the expansion of the forest industry, forest renewal processes, management of old growth forests, climate change and forest ecosystems or extensive versus intensive management. (PSVS) Complete a research project on an international forest issue. Provide an explanation of the issue, including the stakeholders involved and their respective points of view, a comparison of the issue with a related issue in Canada, and suggested strategies and actions for dealing with the issue at local and global levels. (IL) Consider the impact that the globalization of economies and resources is having on forests around the world. Investigate the use of protectionism and free trade agreements by some countries regarding the export of lumber and other forest products.
16.5	To assess global impacts of different uses of forests.	Compare the recreational and commercial uses of forests. Consider social and cultural differences, economic impact and environmental issues. Consider the role of forests as "carbon sinks" to minimize the impact of global warming. (PSVS) Make connections with these issues to Social Studies curriculum issues.

	Learning Objectives	Notes
16.6	To compare and contrast different philosophies, ethics and alternatives regarding forest resources and how best to ensure their health and sustainability. (PSVS, CCT)	Ask forest workers about their viewpoints on these issues. Assess the goals and objectives of forest conservation or preservation groups. Provide a summary of the goals and accomplishments of an environmental conservation group. Debate a global issue regarding the consumptive or non-consumptive use of forests. Conduct research, develop a position and support that position by participating in the debate. Participate in a twinning project with a school in another part of the world. Exchange information about forests. Discuss issues in forest management. Look for patterns and similarities. Internet is a good tool for twinning schools and students. Conduct research to develop a plan for the use of a forested region. Use a role playing and simulation activity to arrive at consensus in forest use and sustainable development. Use group work strategies to represent different stakeholders who have specific interests in forest resource management. Students should be invited to do independent research, to develop personal positions regarding forest use and to share and debate those positions with other groups. Recognize that the needs of different stakeholders are often in conflict, and that cooperation is needed to develop forest use strategies that consider the needs of the different groups. Through group consensus building, develop and present a shared agreement on a preferred course of action dealing with a forest management issue.
16.7	Develop responsible and ethical actions in relation to forest resources. (PSVS)	Consider individual actions, shared actions and leadership roles in forest management issues. Infer the long-range effects of the sustainable use of forests in Canada and other parts of the world. Investigate ways in which the public is invited to participate in local forest management decision making. Contact provincial and national forestry organizations for information about the brochures, pamphlets, booklets, posters and other resources available from them. Local industry representatives can identify other sources of educational materials that are available. Use the bibliography for this curriculum guide, the regional library and other similar supports to gain access to a wide variety of resources to support this curriculum. Visit websites from around the world that deal with issues related to forests.

Suggested time: 15 - 20 hours **Level:** Advanced
Prerequisite: None

Portions of modules in Forestry Studies 20, 30 relating to skills within the industry may be delivered in the workplace setting.

Module Overview
This module provides students with opportunities to examine commercial forest marketing practices, or to develop their own marketing projects of value-added or knowledge-intensive commodities. Practical applications enable students to explore career decisions and to enhance employability skills.

Foundational Objectives
- To develop an understanding of the social, cultural, economic and environmental significance of forests.
- To acquire a life-long conservation ethic.

Common Essential Learnings Foundational Objectives
- To investigate the role of technology in practical applications. (TL)
- To develop a positive disposition to life-long learning. (IL)
- To participate in activities and assignments on different points of view or alternative perceptions that support students developing their own perspectives. (CCT)

	Learning Objectives	Notes
17.1	To identify fibre and non-fibre products and services derived from Canada's forests.	Identify market-based products and services derived from Saskatchewan's forests (e.g., primary wood products, trapping, fishing and hunting, guiding and outfitting and tourism and recreational pursuits). Identify market opportunities that arise from product diversification and specialization, international trade and participation in a global economy. Consider psychological benefits and extra-market values derived from forests such as ecological values, aesthetic and spiritual values or bequest values for future generations. Identify major industries that require wood and wood products. Identify common products derived from a particular tree species. Consider new and emerging products and services like cattle food and methane gas production. (TL)
17.2	To classify and sequence the steps that are involved in producing a fibre commodity. (CCT)	Consider harvest and transportation, processing techniques, grading, packing and storage required in producing a commodity. Prepare an organizational chart illustrating the sequence of steps required to take a product through its various stages of preparation. Draw a poster that depicts what happens to a tree from stump to consumer. Visit a sawmill, a pulp and paper mill, a woodlot operation or a wood product distributor to discover traditional and new uses of wood.

Learning Objectives Notes

		Look at consumer trends and market values to assess future demands for forest products.
17.3	To identify materials and services that are required at each stage in the production of a fibre commodity.	Consider the range of forest products that could be derived from a specific site. Plan to avoid waste. Address environmental issues in marketing. (PSVS)
17.4	To recognize the characteristics of trees and other plants that contribute to their diversity.	Examine different grain patterns of wood. The grain shows more visibly if the wood is sanded and finished. Try to identify wood by its colour and its characteristic grain pattern. See how a particular wood stain changes the appearance of different types of wood. Make up samples of the same stain used on different types of wood. Samples may be available for display at lumber yards and building supply companies. Opportunities exist for integration with Construction and Carpentry 10, 20, 30. Identify products made from particular kinds of wood. What properties of those woods make them suitable for those applications? For example, investigate the types of woods used for marine applications, outdoor use, furniture and cabinets, newsprint, fine writing paper, cardboard, firewood, plywood and board lumber, wood carving, smoked meat preservation, woven baskets and so on. Compare building materials available from local tree species and those obtained from imported species. Can they be used interchangeably? If so, how do the prices of those materials compare? Are materials available locally always less expensive than those brought in from other places? This would be an interesting way for students to consider some of the economic factors that determine the price of goods found in the marketplace. Also consider influences of subsidies, transportation and manufacturing costs in different areas.
17.5	To identify social, economic, cultural and environmental factors that influence consumer trends and market demands for forest products and services.	Analyze trends in the consumptive and non-consumptive use of forests in Canada and Saskatchewan (e.g., recreation, trapping, logging, ecotourism, etc.) (CCT) Research recent applications of milling or pulp technology in the development of forest products and services. Conduct research on materials that are being recycled and the products that are produced from them. (IL) Analyze economic and environmental trade-offs that occur through reducing, reusing and recycling. For instance, consider reusable versus disposable diapers, reusable versus disposable cups, etc. For student projects, collect recyclable materials and attempt to make a useful product from them. For example, try making paper

Learning Objectives		Notes
		from recycled newsprint or packing material from recycled wood products. Consider some fads that have come and gone. What contributed to their popularity? Why didn't they last? Consider changes in the conservation ethic, consumer practices and recreational patterns that have emerged over time. Relate these changes with their impact on forest resources. Compile a personal inventory of possessions and material purchases made over a certain period of time. Categorize these as essential or nonessential items. For nonessential items, identify some reasons why they were purchased. Plan, conduct and assess a school-wide campaign to increase awareness of lifestyle, conservation and the environment. Establish goals, plan and conduct the activity, and assess the results. Maintain a daily journal of reflections and inferences regarding the impact of daily living activities on the forest environment. Consider leadership roles that individuals can take to promote social action. Identify some. Make an oral, written or visual proposal regarding one personal action that will affect forest ecosystems in positive ways. Encourage students to express their personal views and values. Ask students to prepare a personal contract expressing their commitment to environmental stewardship. Review the contract after a period of time to determine if the contract obligations have been met. Debate an issue regarding the impact of lifestyle on forest resources. Conduct research, develop a position and participate in the debate. Invite people representing different interest groups to judge the merits of the arguments in the debate. (CCT)
17.6	To formulate a plan for identifying new market opportunities, developing a forest product and managing the venture. (CCT)	Prepare multimedia promotional materials to market the products and services. Research the product or service that will be provided. See what other similar products or services are currently available. Make cost estimates as part of the marketing plan. Incorporate recycling technologies into the product or services offered. Consider the efficiency of production processes. Focus on value-added and knowledge intensive commodities derived from forest resources.

	Learning Objectives	Notes
		Consider the potential secondary marketing opportunities of other non-fibre forest resources such as berries, mushrooms and edible plants, while utilizing the fibre resource. Identify major components of the plan for the enhanced utilization or management of forests (e.g., goals and objectives of the plan, economic, political, scientific and related factors, methodologies and strategies, outcomes and types of data obtained, limitations of the plan or information that may be lacking or incomplete). Develop a website to promote and market the forest product.
17.7	To examine a commercial forest marketing enterprise, or engage in a marketing project of a value-added or knowledge intensive fibre commodity.	Resource texts pertaining specifically to marketing may provide additional helpful suggestions. Refer to the bibliography. Contact the Christmas Tree Growers in Saskatchewan for information about their business and their products. The bibliography lists relevant websites. Some examples of marketing projects that students could initiate are Christmas tree production, firewood production and delivery, decorative crafts, driftwood products, birch bark biting, woodworking projects, maple syrup extraction, Christmas wreath making, bonsai art, floatation products, wood carving, paper making, paper recycling, dry flora artwork, birch syrup production, pine sap extraction, turpentine manufacture, charcoal production, landscaping projects, wood preservation projects, peat production, fish and meat smoking and so on. There are virtually limitless opportunities to explore. Use term projects to allow extensive exploration of this topic. Look for ways of integrating it with other modules if additional time is required.
17.8	To investigate the relationship between supplier and customer in the marketing process. (IL)	Research what is meant by "just in time delivery." What are some potential advantages and disadvantages of this marketing strategy? Assess the impact that globalization is having on the marketplace. Develop a product prototype. Conduct a marketing survey to determine potential consumer reaction to the product.
17.9	To evaluate the marketing activity.	Conduct an analysis of customer satisfaction, using surveys or personal interviews and other forms of analysis. Identify potential ways that the marketing plan could be improved in the future. (CCT) Analyze balance sheets, income and expense sheets and other financial statements to determine the financial outcome of the activity. Integrate this activity with Accounting and Mathematics. (NUM)

Module 18: Measuring the Forest (Optional)

Suggested time: 15 - 20 hours **Level:** Advanced
Prerequisite: None

Portions of modules in Forestry Studies 20, 30 relating to skills within the industry may be delivered in the workplace setting.

Module Overview
This module provides students with opportunities to learn how to make measurements in the forest. They become aware of how the data obtained from those measurements may be used, and why it is important to collect the data as carefully as possible. These are important, practical skills that are used in forestry. Further activities involving the analysis and interpretation of data allow students to make sense of the information received; data collection is of little importance unless something useful can be done with the data once obtained. As is always the case when students are involved in activity-based learning, safety considerations in the field and in the workplace should be a primary emphasis. Opportunities may exist for providing students with work study or job shadowing experiences related to forest measurement.

Foundational Objectives
- To acquire a life-long conservation ethic.
- To develop an understanding of the use of technology in forestry and to recognize the benefits and limitations of technology.
- To understand that good forestry practice is informed by the scientific process, proper research and development.

Common Essential Learnings Foundational Objectives
- To access information. (IL)
- To recognize the strengths and limitations of technology. (TL)
- To understand how to compute, measure, estimate and interpret mathematical data, when to apply these skills and techniques and why these processes apply within the particular framework of forestry. (NUM)
- Realize the importance of using accurate and timely factual information in making informed decisions and judgements. (CCT)

	Learning Objectives	Notes
18.1	To explain the general goals and techniques of conducting forest surveys. (COM)	Suggest reasons for conducting a forest survey regarding the type of information gathered, and the questions that are answered or raised by the data. Distinguish between forest samples and forest populations. Describe basic techniques used to sample a forested area such as the layout of sample plots and data collection techniques. Practise these before actual fieldwork is conducted. Research the goals and techniques of conducting a forest survey. Address the reasons why forest surveys are conducted, the techniques used to sample a forested area, and how sample data are used to estimate forest populations.

	Learning Objectives	Notes
		There are advantages to doing the layout of the sampling plot and transects, and conducting the field measurement activities following leaf-flush in the spring or prior to leaf drop in the fall. For this reason, the "window of opportunity" for school field activities is actually very narrow, amounting to only a few short weeks in each semester. Take this into consideration when planning modules involving outdoor field activities. Examine career development and occupational opportunities in forest measurement. Students may be able to obtain summer employment, gaining valuable practical experience assisting foresters or researchers.
18.2	To demonstrate an ability to follow appropriate safety practices to acceptable standards when gathering sample data in the forest. (PSVS)	Establish procedures to follow in forests to minimize the risk of students getting lost. Ensure adequate training and supervision when any equipment is used. Understand all safety requirements. Use competency-based assessment techniques. Observe that students have a proper understanding of safety. Wear certified head gear, safety boots, eye and ear protection and other protective clothing when using felling equipment such as pruning poles and chain saws. Develop a safety poster or a safety bulletin board for use in the instructional area. Invite a forester to explain forest safety considerations and the proper techniques for making measurements in the forest. Apply basic compass skills to establish direction in the forest; e.g., orient a map, establish and follow a bearing. See Module 12. Perform open and closed traverses in the forest using compass and chaining skills.
18.3	Demonstrate an ability to make forest measurements accurately and reliably. (NUM, TL)	Obtain permission beforehand, to ensure that an area may be used for its intended purpose. Locate the sample plot and transects in a uniform or homogeneous area, away from features that may skew the data. Identify the dominant (or co-dominant) species in the sampling area. Use dichotomous keys and field guides to identify major tree species, predominant forms of understorey vegetation, etc. Apply compass and chaining skills to establish boundaries for a sample forest plot. Relate this to pixel size of satellite image resolution in Module 15. Make the sampling plot the same size as the pixel size in the satellite data.

Learning Objectives		Notes
		Orient the plot so that two sides run along the satellite's track. (TL) Measure horizontal distance in the forest using pacing and chaining skills. Measure the diameter at breast height of trees (DBH) using a diameter tape, a Biltmore stick, tree callipers or other suitable equipment. Measuring circumference and then calculating diameter can integrate mathematics skills. (NUM) Measuring equipment can be expensive. Local forest companies may be interested in providing equipment and grants for educational purposes. Measure the height of trees and the height to live crown using a clinometer and measuring tape or other suitable equipment. Inexpensive clinometers and densitometers that can give accurate results can be constructed very easily. Investigate ways of doing this. (TL) Demonstrate techniques used to determine the age of trees. Increment borers and other measuring instruments may be available as field kits to schools. Equipment may also be available from other government or industry sources. Refer to the bibliography. Use short pieces of logs or "tree cookies" in the classroom for dendrochronology activities. Various resources can be found easily on this topic. Design techniques for sampling the forest region most suited to gathering the type of information required. (CCT)
18.4	To gather data regarding aspects of the fibre resource within a sample forest plot. (NUM, IL)	Some useful measurements are tree height, height to live crown, tree diameter, the number and distribution of species and the age and volume of trees. Consider using surveys and questionnaires in data collection. Sample fibre volumes in a forested region. Basal area determination to measure the stocking of trees can be performed easily using refractive prisms. The theory behind how the technique works may be beyond the scope and abilities of most students. Keep it enjoyable and interesting. When marking trees for repeated measurements from year to year, use aluminium nails and tree tags. Avoid using steel nails or nonbiodegradable flagging tape. Use a densitometer to determine the percentage of canopy cover and the percentage of understorey cover. This data is extremely useful for interpreting satellite images. (TL)

	Learning Objectives	Notes
		Investigate soil, water or wildlife characteristics and their population densities in the area as extension and enrichment activities. (IL) Take advantage of the opportunity to collect specimens for further lab study in the classroom. Check for any restrictions about removing material from certain areas. In the classroom, perform activities on the samples, such as determining the wet weight versus dry weight of leaves and needles, and examining morphological and anatomical characteristics of leaves and needles using microscopes. Assess the condition of the trees in the sampling plot. Use a Bole Assessment, or make generalized descriptions about the condition of the trees. (CCT) Explain the differences between random and systematic sampling techniques.
18.5	To record sample data in appropriate tables or charts. (NUM)	Develop data collection tables for field use. Practise filling in tables before doing the field work. Presentable charts can be developed on a computer, using spreadsheets, word processors or graphics programs. Include other relevant information in the data collection charts, such as the name of the group that filled in the chart, the location, the date and year when the data were collected, as well as any other pertinent information that may be useful later when analyzing and interpreting the results. Keep a permanent record of the data collected. It may be useful for change-over-time studies later. Have students practise data collection in pairs. One student can take the measurements while the other student records the results. (PSVS)
18.6	To interpret sample data to make inferences regarding tree populations and fibre values in the forest. (CCT)	Explain how sample data may be used to estimate fibre volumes and other non-fibre forest resources. Manipulate sample data as required to estimate fibre volumes. Extrapolate the data to estimate forest populations. (NUM) An estimation of available biomass is not only useful for harvesting considerations; examine the value of the information in understanding the ecology of the area. Consider the connections to Modules 3 and 8. Make inferences about the potential of the area for multiple land use activities, such as recreational use, harvesting or agriculture.

Learning Objectives	Notes
	If proper training and equipment are available, students can learn tree scaling. Research applications of timber cruise data in resource management for estimating total fibre volume, projecting future forest growth or planning harvest operations. (NUM) Research applications in data collection and storage using aerial photography, computer-based mapping systems and satellite imaging. Discuss the importance of ground truthing in verifying data collected through remote sensing. (IL) Recognize the role of forests in carbon sequestering.

Module 19: Heavy Equipment (Optional)

Suggested time: 10 - 15 hours **Level:** Advanced
Prerequisite: None

Portions of modules in Forestry Studies 20, 30 relating to skills within the industry may be delivered in the workplace setting.

Module Overview
This module is intended to provide students with opportunities to familiarize themselves with various types of heavy equipment used in the forestry sector and with equipment used in the manufacturing aspects of forestry.

Students should be able to understand the uses of the equipment with due consideration to safety. This module is not intended to be used to train students in the operation of heavy equipment. Such training involves more specialized skills, more time for training and much greater responsibility. The workplace setting may offer opportunities for students to acquire further familiarization with the uses of heavy equipment. Safety considerations should be emphasized for students who are engaged in activities near heavy equipment. There may be age or operator's license restrictions preventing students from operating some equipment, thus limiting their experience to observation.

Foundational Objectives
- To acquire a life-long conservation ethic.
- To develop employability skills and explore employment opportunities in forestry occupations through a wide range of experiences.
- To understand the importance of safety in the workplace.
- To develop an understanding of the use of technology in forestry and to recognize the benefits and limitations of technology.
- To understand that good forestry practice is informed by the scientific process, proper research and development.

Common Essential Learnings Foundational Objectives
- To develop students' abilities to meet their own learning needs. (IL)
- To recognize the strengths and limitations of technology. (TL)
- To adapt to technological change. (TL)

	Learning Objectives	Notes
19.1	To identify and describe heavy equipment and its uses in forestry. (COM)	For examples of light equipment, see Module 20. Include examples of heavy equipment used in harvesting, reforestation, firefighting, milling and pulping operations. Examples include skidders, tractors, delimbing and debarking machines, tree and stump removers, hoists and cranes, bulldozers, trenching equipment, front-end loaders, scrapers, power shovels, forklift trucks, transport trucks, mill saws, conveyor systems, rolling equipment, drying equipment, etc. Consider the types of equipment used in forestry manufacturing processes. Investigate the types of equipment found in steam plants, pulp mills, paper mills, plywood mills, sawmills and other forestry manufacturing operations. (TL)

	Learning Objectives	Notes
		Have students describe appropriate conditions and suitable applications for the use of heavy equipment.
19.2	To recognize the specialized skills and training required for operating and maintaining heavy equipment. (TL)	Students are not expected to develop any specialized skills in operating heavy equipment. Should they seek employment in the workplace, their employers must ensure that they wear the appropriate safety protection and have proper training and certification prior to using any such equipment.
19.3	To demonstrate an ability to meet all safety requirements to accepted standards. (PSVS)	Ensure adequate training and supervision when working near any equipment that is in use. Understand all safety considerations to acceptable levels of competency. Develop a safety poster or a safety bulletin board for use in the instructional area. Invite a guest speaker to describe safety in the workplace. Ensure adequate supervision while students are observing the use of heavy equipment. Find out what legislation in Saskatchewan pertains to issues dealing with health, safety and employment standards. Further safety information is found in the *Practical and Applied Arts Handbook*.
19.4	To assess the costs and benefits of the uses of heavy equipment compared to other means. (CCT)	Compare the use of hand tools, human labour and animals with the use of heavy equipment. Investigate historical forest harvesting practices. Compare the equipment used with more modern alternatives. Suggest some of the advantages and disadvantages of hand tools, human labour and animals compared to the use of heavy equipment. (IL) Prepare a mural illustrating the evolution of forest harvesting and processing equipment. Investigate technological innovations in equipment design and function. Do a cost versus benefit analysis based on the use of alternative types of equipment. Assess the relative advantages and disadvantages of using heavy versus light equipment to perform specific tasks.

	Learning Objectives	Notes
19.5	To examine ways of minimizing environmental damage. (PSVS)	Compare the environmental implications of the use of heavy versus light equipment to perform specific task. Consider the impact of heavy equipment and human presence on the environment. Recognize the increased impact that heavy equipment may have on the environment. Analyse the impact and disturbance on the environment of the equipment used in clear-cutting and selective logging. (CCT) Consider potential seasonal advantages, such as winter tree removal, or performing field operations during periods of dry surface conditions. Use brainstorming to invite students to offer suggestions regarding the environmental consequences of their actions. Invite specialists to discuss specific matters pertaining to environmental matters and sensitive issues. Find out about protected areas, threatened or endangered species, multiple land use areas, etc, especially those found in or near the local community. Consider the public relations problems associated with specific practices.

Module 20: Light Equipment (Optional)

Suggested time: 10 - 15 hours **Level:** Advanced
Prerequisite: None

Portions of modules in Forestry Studies 20, 30 relating to skills within the industry may be delivered in the workplace setting.

Module Overview
This module is intended to provide students with opportunities to familiarize themselves with, and to develop operating competencies in, the proper handling of small engines and light, motorized equipment used in forestry. They should be able to operate the equipment properly, with due consideration to safety and to perform routine maintenance on the equipment. The workplace setting offers many opportunities for students to develop these skills. In-school learning opportunities also present themselves. Safety considerations should be emphasized.

Foundational Objectives
- To acquire a life-long conservation ethic.
- To understand the importance of safety in the workplace.
- To develop an understanding of the use of technology in forestry and to recognize the benefits and limitations of technology.
- To develop employability skills and to explore employment opportunities in forestry occupations through a wide range of experiences.

Common Essential Learnings Foundational Objectives
- To develop students' abilities to meet their own learning needs. (IL)
- To recognize the strengths and limitations of technology. (TL)
- To adapt to technological change. (TL)

Learning Objectives		Notes
20.1	To identify and describe forestry equipment that would best be described as light equipment. (TL)	Examples include chain saws, hand saws, brush saws, axes, hatchets, portable electric generators, winches, light tilling and trenching equipment, augers, water pumps, wood splitters, light shredders, etc. Ask students to describe appropriate conditions and suitable applications for the use of equipment involving small engines. (CCT)
20.2	To demonstrate an ability to meet all safety requirements to accepted standards. (PSVS)	Ensure adequate training and supervision when any equipment is used. Understand all safety requirements to accepted levels of competency. Demonstration by instructor with student observation may be most appropriate for some types of equipment. Ask students to describe appropriate conditions and suitable applications for the use of light equipment. Use competency-based assessment techniques. Observe that students understand safety considerations to acceptable standards. Use approved containers for storing combustible materials. Wear certified head gear, safety boots, eye and ear protection and other protective clothing. Avoid confined spaces.

	Learning Objectives	Notes
		Develop a safety poster or a safety bulletin board for use in the instructional area. Trained speakers are available from government and industry/labour organizations. Invite a guest speaker to describe safety considerations in the workplace. Obtain supplementary resource materials from appropriate government agencies or industry representatives.
20.3	To exhibit an ability to transport, operate and store equipment properly. (TL)	Ensure adequate supervision while students are gaining proficiency in the use of equipment. Discuss the use of appropriate containers, packaging and cases for transporting and shipping equipment. Investigate regulations regarding training, use and licensing of specialized equipment. Ensure students abide by these regulations. (IL) Use rating scales, rubrics and checklists as evaluation strategies.
20.4	To perform periodic, routine inspections to ensure equipment is functioning properly and safely. (PSVS)	Develop and use a checklist of routine inspections. Ensure that inspection schedules are observed and followed.
20.5	To perform routine maintenance on equipment.	Students are not expected to develop specialized repair skills. Overhauling small engines is not required. Post a maintenance schedule. Ensure students are proficient with this maintenance before requiring them to perform maintenance tasks. Assign designated students to perform periodic maintenance tasks on a rotational basis. Routine maintenance of chain saws includes applying lubrication, sharpening chains or replacing filters and spark plugs. It does not include engine repair, replacing chains, replacing blades, repairing bushings, replacing bearings, etc. Small engine repair in *Mechanical and Automotive Curriculum Guide*, Module 23A contains information that may be valuable here.

	Learning Objectives	Notes
20.6	To consider alternatives to equipment currently in use.	Consider the impact of equipment and human presence on the environment. Investigate technological innovations in equipment design and function. (TL) Assess the relative advantages and disadvantages of using heavy versus light equipment to perform a specific task. If sufficient interest exists, do a cost analysis comparison based on the use of alternative types of equipment. (CCT) Museums in Saskatchewan often show examples of the evolution of machinery. Displays of equipment used in forestry operations are exhibited. Consider a field trip to a museum or heritage site that displays equipment and machinery.
20.7	To examine ways of minimizing environmental damage when using light equipment in the forest. (PSVS)	Recognize the long-term implications of the use of non-renewable resources. Recognize the impacts that equipment and human presence may have on the environment, such as destruction of sensitive understorey vegetation, potential erosion problems, destruction of habitats, abandonment of nesting areas, pollution problems associated with the use of petroleum products, excessive noise levels and so on. A basic understanding of ecology is desirable to gain a better understanding of these issues. See Module 3 for connections. Consider potential seasonal advantages, such as winter tree removal or winter wood splitting, field operations during periods of low average expected rainfall, periods of maximum available daylight and so on. Use brainstorming to invite students to offer suggestions regarding the environmental consequences of their actions. Invite specialists to discuss specific matters pertaining to environmental areas and sensitive issues. Inquire about protected areas, threatened or endangered species, multiple land use areas, etc. Consider the public relations problems associated with controversial practices.

Module 21: Harvesting (Optional)

Suggested time: 10 - 15 hours **Level:** Advanced
Prerequisite: None

Portions of this module may be delivered in a workplace setting.

Module Overview
In this module, students either use school-based or industry-based research on harvesting and processing of the fibre resource, or else they develop these skills and understanding through work study, or the module is covered by some combination of the two. It is assumed that students will have access to forest harvest areas or forest products industries, so that their research and field experience can be conducted experientially. During the delivery of this module, work study opportunities may be augmented with classroom instruction. The workplace component provides an opportunity to apply school-based learning, and further enhances school-based learning. Many employment and training opportunities are offered within the workplace setting.

Foundational Objectives
- To acquire a life-long conservation ethic.
- To develop employability skills and explore employment opportunities in forestry occupations through a wide range of experiences.

Common Essential Learnings Foundational Objectives
- To promote intuitive, imaginative thought and the ability to evaluate ideas, processes, experiences and objects in the context of the study of the environment. (CCT)
- To develop students' abilities to meet their own learning needs. (IL)

	Learning Objectives	Notes
21.1	To identify major components of a plan for harvesting the forest. (COM)	Discuss essential components of a forest harvest plan. If possible, use resource persons from government and industry. Consider when to cut, how much to cut, the method of harvest (e.g., clear cutting, shelter wood method), logging (e.g., conventional, mechanical), regeneration and environmental protection. Relate the concepts of allowable cut, sustained yield and multiple use to forest harvest practices. Refer to the bibliography for videos pertaining to relevant harvest planning.
21.2	To examine established plans for harvesting. (CCT)	Apply forest inventory information to identify trees for harvesting. Consider timber species, quality, volume and age. Examine the layout of the cutting area and landing sites. Plan for equipment access to the timber stand.

	Learning Objectives	Notes
21.3	To describe applications of different methods of forest harvest and regeneration.	Different methods of forest harvest include clearcutting, selective cutting and shelter wood cutting. Forest regeneration can be either natural or artificial. Compare these two methods. Discuss considerations in determining size and location of harvesting tracts.
21.4	To identify factors important in choosing suitable methods of harvest.	Consider the growth characteristics of a particular species, its intended utilization or the regeneration species. Select several sites that possess different timber characteristics. Physically examine the sites to determine the timber condition and harvesting considerations. Invite a forester to explain a pre-harvest silviculture prescription.
21.5	To describe and evaluate current applications of different methods of tree harvesting. (CCT, COM)	Some methods include clearcutting, using seed trees or manipulating growing conditions to favour particular species. Compare the advantages and disadvantages of different methods of harvesting trees. Engage in field activities to observe practices used to establish a stand of trees or to manipulate growing conditions to favour particular species. Consider different perspectives on harvesting techniques expressed by different interest groups. Invite a forester to discuss Forest Ecosystem Classification (FCC).
21.6	To identify environmental concerns to be addressed through harvest plans. (PSVS)	Protect sensitive areas, consider the impact on downstream values and anticipate landslide and erosion. Consider plans for establishing roads and landings needed for the harvesting operation. Have students work with a local landowner in reclaiming an eroded forest area. Volunteer time to work with an organization that has a particular interest in forests. Browse through the websites of forestry-related special interest groups. Find out about their philosophies and their major objectives. Refer to the Internet section of the bibliography. Contact public office holders or candidates and ask for their views regarding forest management and environmental protection.

	Learning Objectives	Notes
		Have students write a letter to a government official, an industry representative or an environmental organization expressing support or concern regarding action taken on a forestry issue. Critique the responses received.
21.7	To describe the mechanics of harvesting trees. (COM)	Identify stages in the harvesting procedure from stump to mill: falling, bucking and delimbing, skidding, loading and hauling. Investigate the use of feller bunchers and on-site chipping. Where possible, plan for field-based instruction that will enable students to follow the tree from harvest to finished product. Discuss the scheduling of equipment and estimated completion date for harvest operations. Research techniques and equipment used to fell, buck and delimb trees in a forest harvest operation. (IL) Have students orally describe the procedures to follow in felling, bucking and delimbing a tree. (COM) Research techniques and equipment used to transport logs from stump to landing site in a forest harvest operation. Research techniques and equipment used to transport logs from landing site to mill in a forest harvest operation. Compare the use of horses and mechanical skidders to transport logs. Compare traditional and mechanical harvesting methods. Research techniques used in slash disposal and site rehabilitation following logging operations in a forest area.
21.8	To demonstrate an ability to meet all safety requirements competently. (PSVS)	Demonstrate the correct use of machines and equipment. Observe carefully when students are working in an unfamiliar environment. Use competency-based assessment techniques. Observe that students are fulfilling safety requirements to acceptable standards. Observe individual effort and interpersonal interactions during the learning process. Consider relevant safety legislation. Contact Occupational Health and Safety for manuals on logging, chain saws and log transport. Prepare a poster or a display of safety regulations pertaining to sawmills or pulpmills.

	Learning Objectives	Notes
21.9	To identify major categories of forest products and give examples of each. (COM)	Major categories are: pulp and paper, lumber, veneer and plywood, board products and chemical and medicinal products. Give an example of a forest product and categorize it. Use guest speakers from the forest industry.
21.10	To examine processes involved in log utilization at a sawmill or fibre utilization at a pulp-mill.	Research techniques used in fibre utilization and product formation. (IL) Make lists of different occupations required in the operation of sawmills and pulpmills. For each occupation, identify the training and experience required. Explore potential employment opportunities. Contact industry representatives to make arrangements for tours, use videos or to obtain other relevant information. Research the use of lasers in sawmills. Additional information supporting this topic is available from pulp and paper companies and associations. Contact local forest companies for information about tours of sawmills, pulp and paper mills, seed orchards, etc.

Module 22: Silviculture (Optional)

Suggested time: 10 - 15 hours **Level:** Advanced
Prerequisite: None

Portions of this module may be delivered in a workplace setting.

Module Overview
Silviculture may be defined as the science and art of growing and tending forest crops to obtain more and better benefits from forests, including (but not exclusively limited to) wood. It is a specialized yet diverse branch of the forest sector that is becoming increasingly important. Major components of silvicultural systems include stand establishment, stand management, harvesting and re-establishment in harvested or fire damaged areas. Individual tree species and specific ecozones have unique ecological requirements that determine suitable silvicultural practices.

The study and practice of silviculture requires an understanding of basic and advanced concepts in biology. Specialized practitioners of silviculture require advanced education and training; however, many other employment opportunities exist in silviculture. It is recommended that the delivery of this module be adjusted based on the students. The module is only intended to provide students with an overview of silviculture, though some students may be provided with opportunities to explore the topic in more detail. Discretion should be used, here and throughout the course, concerning the extent to which science-related concepts are introduced and used, so that the module delivery does not become overwhelming for students.

Foundational Objectives
- To acquire a life-long conservation ethic.
- To understand that good forestry practice is informed by the scientific process, proper research and development.

Common Essential Learnings Foundational Objectives
- To assess situations individually and collectively, and develop strategies for dealing with those situations effectively. (CCT)
- To recognize that differences regarding forest values and uses should be resolved through cooperative partnerships. (PSVS)
- To experience a variety of activities and topics that lead to independent exploration. (IL)

	Learning Objectives	Notes
22.1	To contact appropriate services for information regarding seed and seedling availability, sites for tours and available equipment.	Investigate the relative effectiveness and success rates of spot seeding techniques used with and without prior site preparation. Grow container plants. Alder works well for this activity. Perform laboratory investigations or Science Fair projects to determine how growing conditions are altered by modifying such things as soil pH, moisture levels, available sunlight, amount of available carbon dioxide and so on. The potential exists for many suitable and imaginative science projects. Refer *to Horticulture 10, 20, 30 Curriculum Guide* for more information. Natural methods include naturally supplied seeds or vegetative reproduction, and artificial methods are planting bare-root and container seedlings, or broadcasting seeds.

	Learning Objectives	Notes
		Perform activities involving cone collection, seed extraction and seed germination. Compare cone collection, seed extraction and seed germination techniques for different species. Conduct research to investigate how seedlings are conditioned prior to being shipped out for use. (IL)
22.2	To compare the advantages and disadvantages of natural and artificial methods of regeneration. (CCT)	Consider these advantages and disadvantages in relation to major components of silviculture: stand establishment, stand management and harvest. Conduct laboratory or field-based investigations that demonstrate regeneration techniques. Use observation-based checklists for field investigations. Conduct research to investigate the role of fire in the boreal forest. Integration opportunities exist with Module 13 in Forestry Studies 20. Invite a professional forester to explain silviculture practices.
22.3	To explain techniques for site preparation and the care and planting of seeds and seedlings.	Consider the use of prescribed burnings as a site preparation technique. Investigate the use of scarification for site preparation. Find out about seed banks and seed storage. Investigate the long-term viability of frozen seeds. (IL) Seedlings are available from different sources. Have students locate sources. Participate in tree planting activities. Plant trees on the school grounds, in approved community areas or as a school fundraising project. Participate in Arbour Day. Consider a small tree planting contract for 25,000 or more trees, if the students are keen to do this. Funds earned could be put to use for other outdoor wilderness experiences. This could be a work study project for the entire class.

	Learning Objectives	Notes
22.4	To explain intermediate stand tending techniques. (COM)	Intermediate stand tending techniques include cleaning, spacing, thinning, pruning, fertilizing and protecting. Students may observe and practise these techniques in local areas. Distinguish between intensive and extensive stand management practices. Compare nutrient requirements of young and mature stands.
22.5	To identify safety practices and policies relevant to site preparation, tree planting and stand tending. (PSVS)	Investigate regulations regarding regeneration requirements in harvested areas.
22.6	To investigate a research program designed to improve silvicultural practices. (IL)	Some research examples include genetic manipulation, geographic information systems and harvesting operations. Visit a nearby tree nursery, greenhouse or reharvested area. Contact government and industry sources for harvesting guidelines. Given access to current publications on harvest methods (e.g., clearcutting, seed tree, shelterwood, selection) complete a research project on the benefits and costs of different methods of harvest for the major Saskatchewan tree species. Investigate the use of techniques such as manipulated pollination and grafting to produce seed stock. Contact industry representatives for information about seed orchards. Examine what changes are evident in land use patterns, and compare the distribution and appearance of forested areas. This activity may be used in conjunction with Modules 4 and 15. Consider using case studies. Examine how natural environments have changed as a result of demographic influences.
22.7	To compare and contrast the ecological requirements and the silvics for two or more Saskatchewan tree species. (CCT)	Research growth and harvest relationships as well as appropriate methods of harvesting specific tree species. Relate appropriate harvest methods to individual tree species. (IL) Explore forestation practices used in Saskatchewan, for such diverse reasons as to diversify the economy, to provide shelterbelts, to offer wildlife habitat protection, to decrease erosion, to increase biodiversity and to produce landscape alterations.
22.8	To explore silviculture as an occupation within the forestry sector.	Investigate career development and occupational opportunities in the forestry sector pertaining to silviculture. Discuss entry level employment opportunities.

Module 23: Forest Health (Optional)

Suggested time: 10 - 15 hours **Level:** Advanced
Prerequisite: None

Portions of this module may be delivered in a workplace setting.

Module Overview
Investigating and maintaining forest health includes an examination of natural and human-caused problems that occur in forested areas. In this module students will examine some of the reasons for forest decline, and methods that can be used to rejuvenate forests that are experiencing difficulties.

Foundational Objectives
- To understand the important role of humans in the protection and preservation of natural environments.
- To acquire a life-long conservation ethic.
- To understand that good forestry practice is informed by the scientific process, proper research and development.

Common Essential Learnings Foundational Objectives
- To understand the importance of research techniques in investigating forest health. (TL)
- To assess situations individually and collectively, and develop strategies for dealing with those situations effectively. (CCT)
- To value natural environments. (PSVS)

	Learning Objectives	Notes
23.1	To identify the factors that can affect the health of forests and cause forest decline. (CCT)	Consider both natural and human-related factors. Investigate forest disturbances that have occurred in other countries. Suggest the global implications of large-scale deforestation. Some causes include disease, insect damage, improper harvesting and regeneration methods, drought, flooding, drainage disruption, air pollution, soil erosion, chemical pollution, climate change, various biotic factors and acid rain. Identify ways that insects and tree diseases spread from one place to another. Good resource materials are available on this topic from a variety of sources. Check the Forestry Studies bibliography.
23.2	To recognize symptoms of forest decline. (COM)	Identify a variety of indicators that can be used to assess forest health. Recognize symptoms of disease and insect damage in trees. Identify disease cycles in tree species. Research common tree diseases in the boreal forest. Obtain maps of forest insect infestations from government, industry and environmental protection sources.

	Learning Objectives	Notes
		If students have covered Module 15 in Forestry Studies 20, they can refer to the use of infrared imaging techniques for identifying forest decline symptoms. (TL) Identify characteristics of healthy and unhealthy forests.
23.3	To recognize methods used to improve forest health. (PSVS)	Investigate the relationship between tree age and disease. Examine methods used to control the spread of common tree diseases such as Dwarf Mistletoe and Dutch Elm Disease. Identify prevention methods for safeguarding forest health.
23.4	To recognize the impact of forest health on wildlife and habitat. (PSVS)	Research an important forest indicator species. Investigate the costs associated with forest damage. Consider hidden costs such as lost revenue through tourism or a reduction in job opportunities as well. Make connections with Module 3. Consider how ecological diversity is influenced by forest health. Investigate local forested areas. Contact a forester to speak to the class about this topic.

Module 24A, B: Work Study Preparation and Follow-up Activities (Optional)

Note: Module 24 Work Study Preparation and Follow-up Activities is 5 to 10 hours. If students have participated in a work study module in a previous Practical and Applied Arts course, a review of this module is still required but less time is needed.

Suggested time: 5 - 10 hours **Level:** Introductory/Advanced
Prerequisite: None

Module Overview
Students will prepare for work study in the community. Expectations for the student, the teacher and the employer should be discussed. During follow-up, students will reflect on work study experiences.

Foundational Objectives
- To develop workplace skills, knowledge and attitudes that may lead to successful employment.
- To understand how skills acquired in school may transfer to the workplace.

Common Essential Learnings Foundational Objective(s)
- To demonstrate skills and attitudes that contribute to the development of positive human relationships. (IL, PSVS)

	Learning Objectives	Notes
24.1	To be aware of the expectations of each of the partners in the work study component.	In order to establish a successful working relationship with all the partners involved in the workplace, it is important to define the expectations of each partner. For a list of roles and responsibilities of the business, personnel, manager, teacher monitor, school, parent and student, see the Work Study Guidelines for the Practical and Applied Arts included in the *Practical and Applied Arts Handbook*.
24.2	To determine the factors that may affect the student's contribution in the workplace. (CCT)	Brainstorm a list, then verify through experience. The list may include previous work experience, volunteer work, teamwork activities and extra-curricular participation within the school.
24.3	To build good communication skills for the workplace. (COM, PSVS)	Discuss verbal and non-verbal communication. List some ways in which negative and positive non-verbal communication may be displayed. Encourage students to role play ways of demonstrating effective techniques of verbal communication on the job when giving or receiving instructions and resolving conflict. Use case studies, and divide the students into groups to role play how effective communication may be used to resolve conflict on the job. Emphasize the Employability Skills Profile (from the Conference Board of Canada) and compare them to the Common Essential Learnings of Saskatchewan's curriculum. Make the direct link between skill development in this course and the needs of employers. Development of skills and documentation of the skills leads to employment using those skills.

	Learning Objectives	Notes
24.4	To develop a resumé that may be forwarded to a potential employer.	The student will develop a resumé using the correct format. (IL) The resumé may be used to introduce the student to the employer of a workplace site prior to an interview. Teachers are encouraged to work with other staff members to ensure resumé preparation is taught. Resumé writing is covered in *English Language Arts 20 and A30*, *Information Processing 10, 20, 30* and *Career and Work Exploration 10, 20, A30, B30* curriculum guides. Students should save the resumé and update it as changes need to be made and as references are added. Skills that have been developed can also be added to the updated resumé.
24.5	To create a student guide in preparation for an interview.	Students should develop their resumés and update them during the course, as work placement references are accumulated. A discussion with students about the benefits of a portfolio of sample work is appropriate at this time. A personal website that highlights the student's skills and training might be created and referred to in the resumé. If students have already completed a resumé and cover letter in another course, the teacher may do a review and encourage students to update their information. Each student should submit a résumé for teacher approval prior to going to an interview or directly to the workplace.
24.6	To determine student guidelines in preparation for an interview. (COM)	Through a classroom discussion or in groups, students should compile a "guide" for job interviews. After the students formulate their guide, the teacher may prompt them for missing items. Outline and describe the three stages of an interview. Point out to students at which stage of the interview each of the guidelines previously discussed will be used. The **greeting** involves an introduction between the student and employer. Discuss or demonstrate how this should be done. The **exchange** is the longest part of the interview where the employer asks a series of questions and engages in a dialogue with the student about information on the resumé and other matters relating to the job. A student's portfolio may be examined by the employer as part of the exchange. The **parting** provides closure to the interview and may be just as important as the greeting. Explain how this may be done. Provide the students with a list of questions frequently asked by employers or ask students to make a list. Students may role play the stages of the interview.

	Learning Objectives	Notes
24.7	To discuss the post interview.	After the student has completed the interview with the employer, do a follow-up activity. Review the interview with the student using the three stages above as points for discussion.
24.8	To develop a procedural guide for the work site.	Discuss the following work site items with students: • transportation • hours of work • absence and tardiness • procedures for conflict resolution • role of the student, teacher and workplace supervisor • dress code • job description • school and employer expectations.
24.9	To relate feedback from the work placement.	Students provide feedback about work placement including: location, type of business, duties, most rewarding experience, most difficult situation and how they handled it. Note: It is recommended that each student send a thank you note or card to the employer upon the completion of each work placement. If more than one placement has been made in the course, follow-up activities must be completed after each placement. Ensure that students understand these guidelines by asking students to describe each of these items. Note: Look for opportunities to introduce and reinforce ideas about Labour Standards, Occupational Health and Safety and WHMIS. Use the *Career and Work Exploration Curriculum Guide*, the *Practical and Applied Arts Handbook*, and other resources recommended in the accompanying bibliography.

Module 25A, B: Work Study (Optional)

Suggested time: 25 - 50 hours **Level:** Introductory/Advanced
Prerequisite: Module 24

Module Overview
Students will be placed in the community working with a mentor and/or a supervisor. They may have the opportunity to learn to use software, to practise previously learned skills and to learn skills not being taught at their school. Students will be engaged in experiential activities in the workplace.

Foundational Objectives
- To provide students with experience in the forestry industry that will enable them to make informed career decisions.
- To foster employability skills related to the forestry industry.
- To integrate classroom learning with work-based learning.

Common Essential Learnings Foundational Objectives
- To engage in a work study experience and develop entry level workplace skills that may lead to sustainable employment. (PSVS)
- To expand career research beyond the classroom setting. (IL)

For more information about implementing work study in schools, see the Work Study Guidelines for the Practical and Applied Arts included in the *Practical and Applied Arts Handbook*. Teachers need to use or design appropriate learning objectives for this module; for instance, to demonstrate ability to follow a "Training Plan". The training plan for the student should be designed to relate to the objectives of the course modules chosen in collaboration with the cooperating employer. See Appendix B in this guide.

Note: *Career and Work Exploration 10, 20, A30, B30 Curriculum Guide* will be released in fall 2001. Consult Saskatchewan Labour for content about Labour Standards, Occupational Health and Safety and WHMIS. If several work study opportunities are offered, they will add more depth to the next experience.

Module 99A, B: Extended Study (Optional)

Note: The extended study module may be used only once for each 100 hour single credit course. It is important to record the title of the extended study module on the recordkeeping chart. Record 99A for the first extended study module offered in the course series Forestry Studies 20 and 99B for the second extended study module offered in Forestry Studies 30.

Suggested time: 5 - 20 hours **Level:** Introductory/Intermediate/Advanced

Module Overview
Evolving societal and personal needs of society, advances in technology and demands to solve current problems require a flexible curriculum that can accommodate new ways and means to support learning in the future. The extended study module is designed to provide schools with an opportunity to meet current and future demands that are not addressed in current modules in the renewed PAA curriculum.

The flexibility of this module allows a school/school division to design **one new module per credit to complement or extend the study of pure, core and optional modules** configured to meet the specific needs of students or the community. The extended study module is designed to extend the content of the pure courses and to offer survey course modules (see page 8) beyond the scope of the available selection of PAA modules.

The list of possibilities for topics of study or projects for the extended study module approach is as varied as the imagination of those involved in using the module. These optional extended study module guidelines should be used to strengthen the knowledge, skills and processes advocated in the Practical and Applied Arts curriculum.

For more information on the guidelines for the Extended Study module see the *Practical and Applied Arts Handbook*.

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Appendix A: Sample Recordkeeping Chart

Student Name: _____

Student Number: _____

Module Code	Module		Hours	Date	Teacher Initial
Forestry Studies 20					
FRST01	Module 1:	Introduction (C)			
FRST02	Module 2:	Forestry Sector Careers (C)			
FRST03	Module 3:	Forest Ecology (C)			
FRST04	Module 4:	The Boreal Forest (C)			
FRST05	Module 5:	Forest Regions of Canada (O)			
FRST06	Module 6:	Aboriginal Perspectives (C)			
FRST07	Module 7:	Management and Conservation (O)			
FRST08	Module 8:	Parks and Protected Areas (O)			
FRST09A	Module 9A:	Occupational Health and Safety (O)			
FRST 11	Module 11:	Canada's Model Forests (O)			
FRST 12	Module 12:	Mapping (O)			
FRST 13	Module 13:	Forest Fire Management (O)			
FRST 14A	Module 14A:	Outdoor Wilderness Trip (O)			
FRST 15	Module 15:	Remote Sensing (O)			
FRST24A	Module 24A:	Work Study Preparation and Follow-up Activities (O)			
FRST25A	Module 25A:	Work Study (O)			
FRST 99A	Module 99A:	Extended Study (O)			

Forestry Studies 30					
FRST09B	Module 9B:	Occupational Health and Safety (O)			
FRST09C	Module 9C:	Occupational Health and Safety (O)			
FRST10A	Module 10A:	Labour Standards (O)			
FRST10B	Module 10B:	Labour Standards (O)			
FRST14B	Module 14B:	Outdoor Wilderness Trip (O)			
FRST16	Module 16:	Issues in Forestry (O)			
FRST17	Module 17:	Marketing Forest Products (O)			
FRST18	Module 18:	Measuring the Forest (O)			
FRST19	Module 19:	Heavy Equipment (O)			
FRST 20	Module 20:	Light Equipment (O)			
FRST 21	Module 21:	Harvesting (O)			
FRST22	Module 22:	Silviculture (O)			
FRST 23	Module 23:	Forest Health (O)			
FRST24B	Module 24B:	Work Study Preparation and Follow-up Activities (O)			
FRST25B	Module 25B:	Work Study (O)			
FRST 99B	Module 99B:	Extended Study (O)			

C = core module
O = optional module

Note: When the Extended Study, Work Study Preparation and Follow-up Activities and Work Study modules are studied for the first time, record the module number and the letter A (Extended Study Module 99A). If the module is used at another level, the module is recorded using the letter B (Extended Study Module 99B).

It is recommended that this document be printed on school letterhead.

Appendix B: Career Research Interview Questions

Adapted from *Business Education A Curriculum Guide for the Secondary Level Accounting 10, 20, 30* (Saskatchewan Education 1992).

Interview someone who currently works in this occupation.

The assignment may be completed independently, in pairs, in small groups or by whichever method is chosen by the student(s) and teacher. The teacher should encourage students to use a variety of resources to gather information about the career that they are researching. The student may use letters, the Internet, phone or a personal interview to gather information.

After the students have discussed different career paths, students may prepare a short journal writing explaining why they are interested in the occupational area they are about to investigate.

Students may proceed to develop a list of questions to collect the information they require to help them understand more about the career cluster or occupation they have chosen.

The following list of questions may be included in the students' interview project.

1. What is your job title?

2. What are the normal duties on your job?

3. What are some of the things that you enjoy about your job?

4. Are there any things about your job that you dislike? What are those things?

5. Does your company have a dress code for employees? What is considered suitable?

6. How often is working overtime required in your job?

7. Do you have to work nights or weekends?

8. What aptitudes and abilities are needed to succeed in your occupation?

9. What are the post-secondary education and training requirements to enter and advance in your career?

10. Can you give an approximate starting salary for someone just starting out in your occupation? How much does the average person earn after five years? After ten years? What types of employee benefits, such as sick leave or dental plans, do workers in your career usually receive?

11. Do you think the demand for workers in your career will increase or decrease over the next five years? Why?

12. What changes have you seen over the past 5-10 years in this occupation?

13. What are the advantages and disadvantages of entering and being in your occupation?

14. Is there any advice you would give to a young person making career decisions?

After the interview session, students may summarize the information they received and draw a conclusion as to whether they would like to learn more about this occupation.

Students may brainstorm different ways to present their career research to the class. Presentation ideas may include:

- oral presentation
- software supported oral presentation
- written report
- creating a website with links to career information
- role playing a student interviewing a career cluster professional
- role playing a professional promoting his/her occupation or career cluster at a career fair.