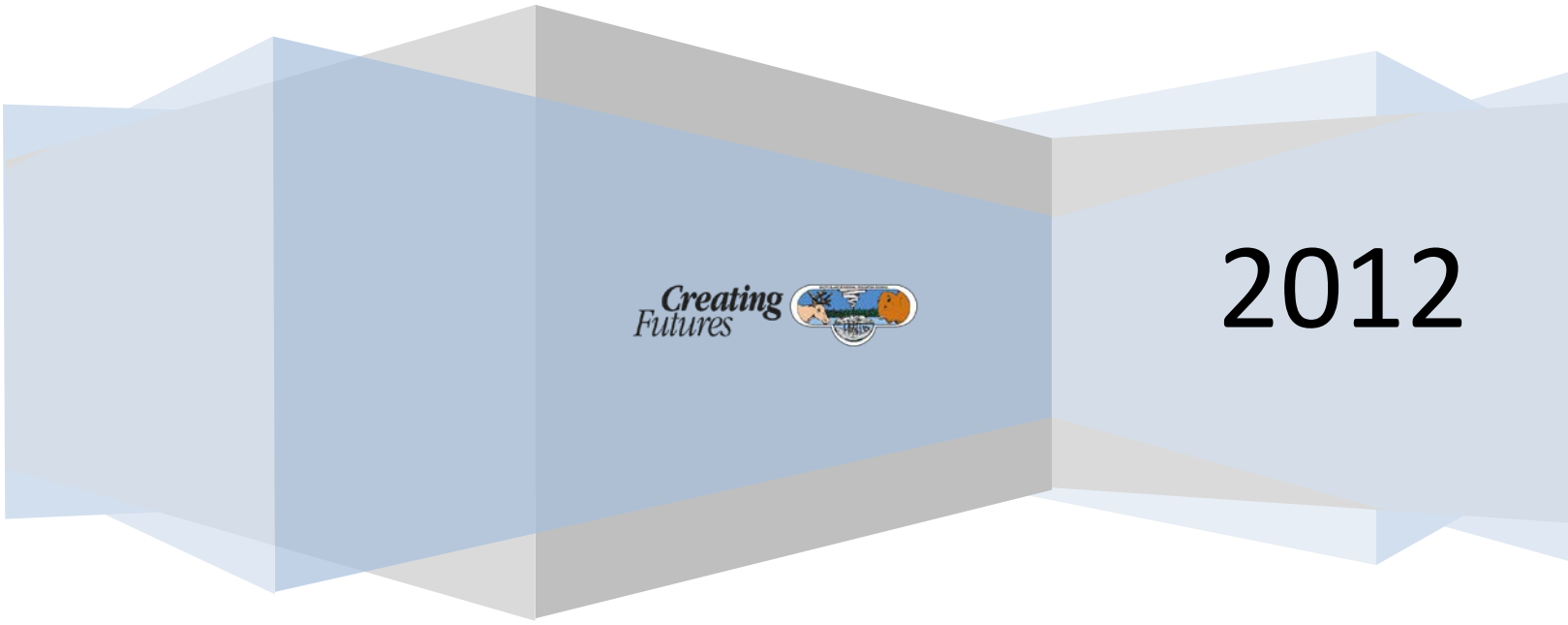
South Slave Divisional Education Council

Experiential Science 10

Curriculum Package

February 2012



Unit: Geology and Geomorphology (Emphasis: Nature of Science-40 hrs.)
Focusing Question: What geological processes shape the Earth around us and what are the results of these processes?

NWT Specific Outcomes	Achievement Indicators
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
GENERAL OUTCOME: STUDENTS WILL INVESTIGATE GEOLOGICAL TIME AND EARTH DYNAMICS	
Students will gain an understanding of geological time	• Constructing simple models to illustrate the relative time of the Earth's history and identify the major geological eras and key indicators. • Investigating and recording the local Aboriginal global perspective of the geological history of the Earth. • Investigating and demonstrating the processes and indicators used for dating rock and rock structures and discuss their limitations including o Relative-Age Dating (Principle of Uniformitarianism ("the Present is the key to the Past"); Principle of Original Horizontality; Principle of Superposition; Principle of Cross-cutting Relationships) o Absolute-Age Dating: (Radiometric dating (Carbon-14); Dendrochronology (tree rings); Seasonal climatic changes (varves); Distinctive sedimentary layers (key beds)) • Research and create a possible timeline of local geological events.
Students will gain an understanding of Earth dynamics	• Explain and illustrate or model the internal layers and boundaries of the Earth including: o Inner core o Outer core o Mantle o "Moho" discontinuity o Crust • Describe, explain and illustrate or model the evidence and technology used to study the dynamic forces of the Earth's: o Crustal plate activity and the Theory of Plate Tectonics, as it pertains to: (Continental drift from Pangaea to present day; Seafloor spreading and geomagnetic symmetry; Dynamic interactions and types of plate boundaries (divergent, convergent, transform); Plate motion and convection currents) o Volcanic activity and the formation, structure and composition of: (Magma (mafic, intermediate, felsic); Intrusions (pluton, batholith, stock, sill, laccolith, lopolith, dyke); Types of volcanoes (shield, cinder-cone, composite) based on: o iii.) Environment of formation o iv.) Material composition o v.) Internal and external structures o vi. Earthquake activity and the processes of investigating: (Forces of stress (compression, tension, shear) and how these produce faults (reverse, normal, strike-slip); Seismic waves (P, S, surface) and how they travel through different media; Measurement of seismic events (magnitude and intensity)) o Mountain building, as it pertains to: (Formation and the processes of building mountains (isostasy and isostatic rebound); Convergent boundary mountains (Oceanic-Oceanic, Oceanic-Continental, Continental-Continental); General types of mountains (Divergent, Uplift, Fault-Block, Volcanic) • Research and present information on traditional Aboriginal legends to explain Earth processes including volcanoes, earthquakes and mountain building.

EXPERIENTIAL SCIENCE 10

Unit: Geology and Geomorphology (Emphasis: Nature of Science – 40 hrs.)

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NWT Specific Outcomes	Achievement Indicators
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
GENERAL OUTCOME: STUDENTS WILL INVESTIGATE MINERAL AND ROCK FORMATION AND THEIR CLASSIFICATION AND IDENTIFICATION PROCESSES	
Students will gain an understanding of minerals and rocks	• Reviewing the basic structures of atoms, elements, molecules and compounds. • Investigating common minerals (including the six basic rock-forming minerals) through laboratory activities and field studies to: o Define a mineral o Describe the origin of minerals from various sources including: (Magmatic (hydrothermal solutions); Metamorphism; Weathering and decomposition) o Use the known physical properties of minerals to identify and recognize mineral samples in the laboratory and in the field including: (Color; Lustre; Streak; Hardness; Crystal habit; Cleavage; Fracture; Specific gravity; Magnetism) o Describe and model the basic crystalline structure that exist in minerals and identify representative examples of: (Isometric (cubic); Tetragonal; Hexagonal; Orthorhombic; Monoclinic; Triclinic) o Research and describe the major mineral groups based on chemical composition: (Silicates, Carbonates, Oxides. Sulphides) o vi. Construct a basic field guide of common minerals to be used for field identification activities.
Students will gain an understanding of minerals and rocks - **CONTINUED**	• Investigating common rocks through laboratory activities and field studies to: o Define a rock. o Differentiate between a rock and a mineral o Describe and model the three basic rock types: (Igneous, Sedimentary, Metamorphic) o Compare and contrast the rock types in terms of their: (Texture, Composition, Mode of formation) o Relate the basic rock types to the rock cycle. o vi. Use physical properties to identify and classify common rock samples.
Students will gain an understanding of igneous rocks	• Reviewing the three general compositions of magma as: o Mafic o Intermediate o Felsic • Investigating, through laboratory and field studies, how the crystallization process and cooling rates relate to the appearance of a sample of igneous rock. • Classifying representative samples to construct a basic field guide and collection of igneous rocks as: o Intrusive (plutonic) o Extrusive (plutonic) • Researching and describing the known economic mineral deposits in Northern Canada associated with igneous rocks (e.g. kimberlite – diamond deposits).

EXPERIENTIAL SCIENCE 10

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It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Students will gain an understanding of sedimentary rocks	• Explaining, describing and modelling the processes and formation of sedimentary rocks, including: o Erosion o Deposition o Compaction o Lithification o Bedding o Fossil formation • Classifying representative sedimentary rocks to construct a basic field guide and collection of sedimentary rocks as: o Clastic (fine, medium, coarse grained) o Chemical (evaporates or organic). • Researching and describing the known economic mineral deposits in Northern Canada associated with sedimentary rocks (e.g. Pine Point deposit).
Students will gain an understanding of metamorphic rocks	• Explaining and illustrating the formation processes and how the effects of heat, pressure and exposure time result in different textures in metamorphic rocks which are: o Foliated o Non foliated (Un-foliated) o Porphyroblastic (recrystallized) • Classifying representative samples, through laboratory and field studies, to construct a basic field guide and collection of metamorphic rocks. • Researching and describing the known economic mineral deposits in Northern Canada associated with metamorphic rocks (e.g. Shear zone-hosted gold deposits in Yellowknife)
Students will gain an understanding of how local Aboriginal groups utilize minerals and rocks	• Researching using a variety of methods, including discussions with Elders or other subject matter experts, how minerals and rocks are used for shelters, tools, utensils, and games. • Researching how minerals and rocks are used for artwork and ornamentation by local artisans.
Students will gain an understanding of weathering and erosion processes	• Illustrating, explaining and demonstrating in the laboratory or field: o Mechanical weathering (Temperature (frost wedging); Pressure (exfoliation) o Chemical weathering (water (hydrolysis); Oxygen (oxidation); Carbon dioxide; Acid precipitation (leaching) o Variables that affect the rate of weathering (Climate; Rock type and composition; Surface area; Topography) • Defining the terms “erosion” and “deposition” to describe the process of erosion and discuss the role of gravity in the process. • Describing the forces of erosion including: o Running water o Wind o Ice (seasonal ice and glaciers) o Plants, animals, and humans • Explaining the processes and illustrating or modeling soil development and composition and, through field or lab experiments interpret a soil profile. • Comparing and contrasting weathering and erosion and relate both processes to the rock cycle.

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It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
GENERAL OUTCOME STUDENTS WILL INVESTIGATE GLACIAL AND PERIGLACIAL (ice) PROCESSES AND RELATED LANDFORMS	
Students will gain an understanding of glacial and periglacial processes	• Explain and illustrate the processes of glacial formation including: o An Aboriginal explanation and historical accounting of glaciation o Define the term "glacier" o Establish the connection between glaciers and the hydrologic and rock cycles o Define the transformation from snow to glacial ice o Investigate the mechanical properties of ice • Describe, illustrate and model glacial life cycle processes including: o Zone of accumulation o Equilibrium line (snow line) o Zone of ablation • Describe, illustrate and model glacial movement including the concepts and processes of: o Plastic flow o Basal sliding o Internal shearing o Crevasses o Ogivies o Glacial surges • Investigate, record and explain locations/types of major glaciers in Canada to demonstrate: o Classification of glaciers o Morphology of glaciers o Uses of glaciers by Aboriginal groups to acquire food. • Explain the two main processes of glacial erosion: o Abrasion o Plucking / quarrying • Research and model the glacial processes of: o Transportation of material o Deposition of materials (including glacial drift and glacial till) o Stratification and "sorting" of glacial sediments • Explain and investigate through field investigations or lab experiments, periglacial processes such as: o Freezing and thawing o Ice segregation and frost heaves o Up-freezing stones o Frost sorting o Periglacial mass movement and slope deposits • Explain, illustrate and model characteristics of permafrost and frozen ground by investigating: o Formation of permafrost o Characteristics of permafrost o Distribution and thickness of permafrost in northern Canada and their local area. o Ground ice o Taliks o Ice lenses o vii. Ice wedges and ice wedge polygons

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It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
GENERAL OUTCOME: STUDENTS WILL INVESTIGATE GLACIAL AND PERIGLACIAL (ice) PROCESSES AND RELATED LANDFORMS	
Students will gain an understanding of glacial and periglacial landforms	• Research and discuss with Elders or other subject matter experts, the importance of local glacial land forms to Aboriginal culture and survival. • Investigate, describe and model representative depositional landforms composed of stratified glacial drift material including: o Eskers o Kames o Kettles o Terraces o Outwash plains • Investigate, describe and model depositional landforms composed of glacial till material such as: o Moraines (ground, recessional, terminal, lateral, and medial) o Drumlins o Glacial erratics • Describing and modelling or illustrating erosional landforms including: o Arêtes, Cols and Horns o Cirques, tarns o Hanging valleys o Glacial troughs, fjords o Roche moutonnee o Glacial striations o Fluting • Conduct field investigations locally or using representative data available (topographic maps, aerial photos, etc.) to catalogue and map geomorphological features. • Explain, illustrate and model the developmental processes of periglacial landforms, such as: o Pingos o Palsas o Thermokarst topography o iv. Patterned ground
GENERAL OUTCOME: STUDENTS WILL GAIN EXPERIENCE IN BASIC FIELD MAPPING TECHNIQUES AND INVESTIGATE CAREERS AND CAREER PROFILES RELATED TO GEOLOGY AND GEOMORPHOLOGY	
Students will gain an understanding of basic field mapping techniques	• Research and discuss with local Elders or other subject matter experts, traditional methods of navigation used. o Develop and produce (using GIS imagery) a detailed surface map of local surface geological features in: o Plan view o ii. Cross section view
Students will gain an understanding of careers and occupations related to geology and geomorphology	• Research and prepare a career and occupational profile related to the geology and mining industries in the Northwest Territories and throughout Canada.

EXPERIENTIAL SCIENCE 10

Unit 2: Climatology and Meteorology (Emphasis: Science and Technology – 30 hrs.)

Focusing Question: How do the processes for climate and weather affect our lives, locally and globally?

NWT Specific Outcomes	Achievement Indicators
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
GENERAL OUTCOME: STUDENTS WILL GAIN AN UNDERSTANDING OF THE COMPOSITION, STRUCTURE AND DYNAMICS OF THE ATMOSPHERE	
Students will gain and understanding of the composition, structure and dynamics of the atmosphere	• Compare and contrast the sciences of meteorology and climatology. • Distinguish between the terms "air" and "atmosphere" and describe the composition of air • Model and represent the vertical structures of the atmosphere including: o Troposphere o Stratosphere o Ozone layer o Mesosphere o Thermosphere o Exosphere • Describe and illustrate basic weather profiles, their interactions, cause and effect of: o Temperature (versus heat) o Dew point o Atmospheric pressure gradients forming / transforming fronts o Temperature inversion o Wind o Relative humidity o Conditions for cloud formation • Identify basic cloud types in photographs and in the field. • Collect and read local and national weather data, daily, use basic weather instrumentation or a local ground station to analyse trends. • Investigate how local Elders or other subject matter experts, "read" the signs to predict short or long term weather patterns and events. • Predict local, short term, weather patterns based on data collected and compare this to the 48-hour projection from Environment Canada and local Elders. • Describe the factors and illustrate the processes that affect global weather patterns, and their affect on northern climates, such as: o Air masses and fronts (Continental polar and Arctic; Maritime polar; Cold fronts; Warm fronts; Stationary fronts) o The Coriolis Effect (Trade winds) o Upper atmospheric currents and near surface winds (Hadley cell; Westerlies. Jet stream; Troughs and ridges)
Students will gain and understanding of the relationships between energy transference and the atmosphere	• Research and investigate local Aboriginal indicators of seasonal change. • Describe, illustrate and model energy transfer mechanisms including: o Energy transfer between the sun and the Earth's surface and the atmosphere: (Radiation, Conduction, Convection o Temperature profiles and the relationship between: (Latitude and altitude, Land and water interactions (freshwater and oceans as heat sinks); Atmospheric circulation patterns. Local considerations and their effect) o Atmospheric moisture cycles and processes for: (Evaporation and condensation; Relative humidity; Dew, frost, fog, rain, freezing rain, hail, snow; Cloud growth and development) o Solar radiant energy profile on the Earth's surface during: (Winter, Spring, Summer, Autumn)

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Unit: Climatology and Meteorology (Emphasis: Science and Technology – 30 hrs.)

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It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
GENERAL OUTCOME: STUDENTS WILL INVESTIGATE THE NATURAL CYCLICAL NATURE OF CLIMATE CHANGE, THE HUMAN FACTORS AND TECHNOLOGIES THAT ALLOW SCIENTISTS TO STUDY AND MAKE PREDICTIONS ABOUT CLIMATE CHANGE	
Students will gain and understanding of climate change and climatology	• Discuss climate change with local Elders or other subject matter experts, to determine how weather patterns have changed over their lifetime and record the impact of climate change on traditional hunting and gathering activities. • Research and explain current theories through which climate change is believed to occur. • Investigate / present evidence of human effects on weather and atmospheric pollutants. • Describe and model methods used to study polar climatology such as: o Read sediment cores in various aquatic and terrestrial systems. o Read vegetative profiles in trees and soil samples. o Collect ice cores to determine chemical properties and temperature profiles of historic climatic events o Global Warming trends of the past 5,000 years including: (Factors affecting climate change; Atmospheric conditions and turbidity as indicators; Solar radiation and absorbing gas concentrations; Variations in solar output) o Ice – Albedo feedback mechanisms and its effects on the atmosphere. o v. Predict outcomes of global warming using electronic forecasting models and simulations in a variety of contexts o vi. Consult with Elders and local community members to document what they feel may be some of the potential future outcomes if climate change continues. • Become "actively aware" of current climate change issues by: o Take the "One Ton" challenge (www.climatechange.gc.ca/onetonne) o Read and discuss the Kyoto Accord • Investigate use of GIS processes and satellite imaging to gain info on monitoring climate change in an area.
GENERAL OUTCOME: STUDENTS WILL INVESTIGATE CAREERS AND CAREER PROFILES RELATED TO CLIMATOLOGY AND METEOROLOGY	
Students will gain and understanding of careers and occupations related to climatology and meteorology	• Investigating (using electronic media) and listing careers and occupations in climatology and meteorology that are available locally and across Canada

EXPERIENTIAL SCIENCE 10

Unit: Ecology of the Land (Emphasis: Science, Technology, Society and the Environment [STSE]) ~ 30 hrs.

Focusing Question: How do the organisms interact and react with each other, their ecological community and humans?

NWT Specific Outcomes	Achievement Indicators
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
GENERAL OUTCOME: STUDENTS WILL INVESTIGATE THE BASIC CONCEPTS AND PRINCIPLES OF ECOLOGY AS THEY RELATE TO ABIOTIC AND BIOTIC LIMITING FACTORS.	
Students will gain an understanding of ecology	• Discuss with local Elders, hunters or naturalists on a field expedition, their perspectives on ecology, such as their beliefs, values and understanding of the circle of life. • Investigate the basic concepts and components of ecology, including: o Habitats o Populations o Communities o Ecosystems • Investigate the basic principles and field study approaches used for ecological studies. • Illustrate the connectedness of the following terms for the process of studying ecology. o Fact o Theory o Hypothesis o Law o Extrapolation/Interpolation o Experiment • Apply the Scientific Method through the design and application of basic, local ecological field investigations.
Students will gain an understanding of abiotic and biotic limiting factors	• Investigate and explain the methods of dispersal and distribution of representative plants and animals in the Arctic. • Explain behavioural mechanisms and evolution of habitat preferences as it relates to the Theory of Habitat Selection. • Investigate sub-Arctic and Arctic species interrelationships and interactions between: o Predator – prey relationships o Disease and parasitism o Intra and interspecies competition for resources. • Research and discuss with local Elders and hunters or other subject matter experts. o Predator – prey relationships o Disease and parasitism o iii. Intra and interspecies competition for resources.

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Focusing Question: How do the organisms interact and react with each other, their ecological community and humans?

NWT Specific Outcomes	Achievement Indicators
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Students will gain an understanding of abiotic and biotic limiting factors - CONTINUED	• Investigate the upper and lower limits of representative species as it relates to limiting factors of representative/indicator species of plants and animals, including the parameters of: o Temperature o Water o Physical / Chemical Factors o Climate Change (including discussions with Elders or other subject matter experts, on the changes they have seen over their lifetimes). • Explaining and illustrating the critical role of nutrient cycling in an ecosystem, including: o Carbon cycle o Nitrogen cycle o Oxygen cycle o Phosphorous cycle • Explain/illustrate using mapping techniques, the geographical ranges and abundance of representative sub-Arctic and Arctic plants and animal species in relation to their limiting factors. • Research/discuss, with local Elders or subject matter experts, changes in local populations and distribution of plants and animals and the link to changes in limiting factors.
GENERAL OUTCOME: STUDENTS WILL INVESTIGATE AND USE SIMPLE MODELS TO GAIN USEFUL INFORMATION ON A POPULATION	
Students will gain an understanding of populations	• Define and illustrate the parameters that determine a population. • Study populations and population densities of plants and animals by: o Estimate experimentally using simple models. o Conduct field investigations in an established study plot. • Analyze vital statistical data, from a variety of sources including local Elders or other subject matter experts, of a representative sub-Arctic and Arctic mammal population to determine its: o Age o Gender o iii. Density
Students will gain an understanding of population growth	• Explain and investigate the factors that determine the growth and regulation of a population in northern Canada. • Investigate time lag models for population growth and applying this information to make predictions of possible future events or outcomes. • Investigate traditional legends that explain or interpret predator-prey models. • Describe representative northern species interactions with regard to: o Competition o Predation o Mutualism o Disease and parasitism: (Effects on an individual and or a population(s); Mortality rates and changes in population)

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It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
GENERAL OUTCOME: STUDENTS WILL INVESTIGATE AND USE SIMPLE MODELS TO GAIN USEFUL INFORMATION ON A POPULATION - CONTINUED	
Students will gain an understanding of distribution and abundance of a population at the community level	• Define, explain and model what a community is by investigating: o Dynamic relationships between representative populations in northern Canada (plants, birds, mammals, insects) o Community change and succession (including fire) o Community biodiversity o Community equilibrium o Disturbance of a community • Conduct field investigations to determine the biodiversity of a local ecological community. • Explain and illustrate representative examples of the Arctic ecosystem metabolism processes of: o Primary production o ii. Secondary production
Students will gain an understanding of technology is used to investigate and monitor plant and animal populations and communities	• Conduct field studies using: o GIS processes and satellite imagery o A variety of mapping techniques o A variety of sampling techniques o iv. Monitoring and tagging processes (simulations)
Students will gain an understanding of careers and occupations in the field of ecology	• Investigate career and occupations related to ecology that are available to them in their jurisdiction and throughout Canada.
Unit: Resource Management and Population Dynamics (Emphasis: STSE) ~ 25 hrs. **Focusing Question:** How are science management techniques and governance used to better understand and manage natural resources for s sustainable future?	
GENERAL OUTCOME: STUDENTS WILL INVESTIGATE TUNDRA, TAIGA AND NORTHERN BOREAL FOREST ECOLOGY AND THE PROCESS OF SUCCESSION	
Students will gain an understanding of the ecology of the tundra, taiga and northern boreal forest	• Investigate, describe, and map representative plant distribution of Arctic and sub Arctic indicator species used to monitor climate change. • Establish a study plot(s) to monitor indicator species of plants for climate change and to conduct ecological field studies. • Conduct field investigations to identify, catalogue, and determine the relative distribution of vegetation in a study area. • Discuss with Elders or other subject matter experts, the historical practices and locations of various food sources, their relative abundance and cycles of availability. • Collect, press, and classify representative plants from the local area (including those used by local cultures for ceremonial, food and medicinal purposes). • Investigate and describe the animal distribution of Arctic and sub-Arctic indicator species in a study area.

EXPERIENTIAL SCIENCE 10

Unit: Resource Management and Population Dynamics (Emphasis: STSE) ~ 25 hrs.
Focusing Question: How are science management techniques and governance used to better understand and manage natural resources for s sustainable future?

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It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
GENERAL OUTCOME: STUDENTS WILL INVESTIGATE TUNDRA, TAIGA AND NORTHERN BOREAL FOREST ECOLOGY AND THE PROCESS OF SUCCESSION	
Students will gain an understanding of the principles of plant succession	• Describe and explain the general processes of plant succession, including: o Pioneer community o Climax community o Primary succession o Secondary succession • Conduct a field survey of a local vegetated area to monitor plant succession. • Summarize how plant species diversity, population and niche availability change through succession and with major disturbances. • Compare and contrast the species diversity of old and new growth forests.
GENERAL OUTCOME: STUDENTS WILL GAIN AN UNDERSTANDING OF RESOURCE MANAGEMENT ISSUES AND PRACTICES INCLUDING THE USE OF TECHNOLOGY AND THE VALUE OF CONSERVATION TO SOCIETY	
Students will gain an understanding of basic wildlife management and practices	• Investigate the wildlife management practices of representative species (birds and mammals) using traditional Aboriginal and contemporary methods, including the parameters of: o Home range o Territory o Range o Emigration, immigration and migration • Investigate through research and describe the traditional and contemporary harvesting practices of representative northern populations of land mammals (caribou, moose, deer, wood buffalo, musk ox, elk) and birds (geese, ducks, grouse, ptarmigan) with regard to: o Regulating populations o Concept of optimal yield o iii. Pest control
Students will gain an understanding of how technology is used to investigate and monitor populations and communities	• Conduct field studies using available technology to: o Gather and interpret data from GIS / satellite sources. o Identify and monitor populations or communities. o Sample representative plants and animals o iv. Tag and monitor for long and short-term study
Students will gain an understanding of conversation BIOLOGY	• Use case studies or research information on a sensitive habitat or endangered species to build a case for conservation. • Investigate, research and discuss with Elders or other subject matter experts, the historical Aboriginal practices of natural resource (plant and animal) conservation, husbandry and harvesting techniques to ensure the sustainability of a population. Investigating, researching or discussing with scientists, the practices of natural resource (plant and animal) conservation, husbandry and harvesting techniques to ensure the sustainability of a population.

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GENERAL OUTCOME: STUDENTS WILL GAIN AN UNDERSTANDING OF RESOURCE MANAGEMENT ISSUES AND PRACTICES INCLUDING THE USE OF TECHNOLOGY AND THE VALUE OF CONSERVATION TO SOCIETY	
Students will gain an understanding of human impact on an ecosystem	• Research and discuss with Elders or other subject matter experts, how the traditional practices and uses of materials limit the impact of humans on an ecosystem. • Define and explain the concept of loss of habitat and its impact on an ecosystem. • Compare and contrast current ecological footprints with a traditional "living off the land" ecological footprint. • Conduct and present an ecological footprint assessment of one's self and ways in which individuals can reduce their ecological footprint in their community. • Conduct an environmental review of one's home or community (including any recycling projects available).
GENERAL OUTCOME: STUDENTS WILL GAIN AN UNDERSTANDING OF THE BASIC PROCESSES TO ENSURE SUSTAINABLE RESOURCES	
Students will gain an understanding of the foundations of a sustainable future, economics and ethics	• Describe how environmental stressors and disturbances can affect indicator species and ecosystems. • Discuss, describe and illustrate the accumulation effect of environmental stressors on migratory and non-migratory species (e.g. caribou, geese, moose) as a result of contact with humans and industry. • Investigate the uses of renewable resources in the sub-Arctic and Arctic to reduce the ecological footprint with regard to: o Plants o Animals o Renewable sources of energy o Cost effectiveness • Describe current conservation strategies and the need for environmental reviews and public consultations. • Research and develop a media promotion campaign that would encourage people to gain an appreciation of the "Beauty of the Land" and the need to preserve it for future generations.
Students will gain an understanding of how technology is used to investigate, manage and use resources in a sustainable manner	• Conduct field studies of local resources using: o GIS processes and satellite imagery o A variety of mapping techniques o A variety of sampling techniques o iv. Monitoring and tagging processes
Students will gain an understanding of the governance of land-based resources in northern Canada	• Investigate and describe the role of governments (at various levels) in the local environmental, social and economic decisions relating to land-based resource development: o Municipal (including local Hunter and Trapper Associations) o Territorial o Federal • Investigate land claims issues of governance and the use of resources of a region. • Compare and contrast traditional and current laws for land based resource management.

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It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
GENERAL OUTCOME: STUDENTS WILL GAIN AN UNDERSTANDING OF THE BASIC PROCESSES TO ENSURE SUSTAINABLE RESOURCES	
Students will gain an understanding of balancing cultural values and a sustainable future	• Investigate, document, and explain the historical values, traditions and practices of harvesting from the land including changes in values and traditions over time, and how new technology and present day pressures impact wildlife management strategies and harvesting practices. • Provide examples of how governments and local peoples identify and enforce the protection of natural resources through the development of parks, heritage sites, and enforcement legislation. • Evaluate, compare and contrast the pros and cons of Eco-tourism. • Discuss, using a "Town Hall" forum, the environmental impact of a human activity as a function of both population and lifestyle for a given scenario. • Investigate industrial impact by building a case for or against the development of an industrial complex or project, proposed for a given area (oil/gas, mine, road, pipeline development, etc.). • Research, investigate and build a case study on the processes and procedures for mine and or toxic waste reclamation at an industrial or military site in northern Canada.
Students will gain an understanding of careers and occupations in the field of resource management, law, mediation and environmental reclamation	• Research and investigate careers and occupations related to resource management, law, mediation and environmental reclamation that are available locally and in northern Canada.