

Biodiversity in the New Science & Technology Curriculum: 1-8
A Continuum

Grade	Units Fundamental Concepts	Big Ideas	Biodiversity Links
1	<p>Needs and Characteristics of Living Things (Life Systems)</p> <p>Systems & Interactions Sustainability & Stewardship</p> <p>Daily and Seasonal Changes (Earth Systems Structure & Function Change & Continuity)</p>	<p>Plants and animals, including people are living things Different kinds of living things behave in different ways All living things are important and should be treated with care and respect Living things have basic needs (air, water, food and shelter) that are met from the environment</p> <ul style="list-style-type: none"> • Describe changes or problems that could result from the loss of some kinds of living things that are part of everyday life • Identify personal action that they can take to help maintain a healthy environment <p>Changes in daily and seasonal cycles affect living things</p> <ul style="list-style-type: none"> • Describe changes in the appearance or behaviour of living things that are adaptations to seasonal changes 	<ul style="list-style-type: none"> • Biodiversity is the variety of life on Earth. • For any kind of animal or plant – each individual is not exactly the same as any other; nor are species. • Biodiversity has intrinsic value. • Because biodiversity represents the interconnectedness of all things, the effects of some causes can be surprising. • All Canadians depend on biodiversity and have a responsibility to contribute to biodiversity and conservation • Connections among species and elements keep the environment functioning and healthy.
2	<p>Growth and Changes in Animals (L)</p> <p>Systems & Interactions Sustainability & Stewardship Change & Continuity</p>	<p>There are similarities and differences among different kinds of animals Humans need to protect animals and the places where they live</p> <ul style="list-style-type: none"> • Assess ways in which animals have an impact on society and the envir. and ways in which humans have an impact 	<ul style="list-style-type: none"> • Biodiversity is the variety of life on Earth • For any kind of animal – each individual is not exactly the same as any other; nor are species • All Canadians depend on biodiversity and have a responsibility to contribute to biodiversity and conservation

Grade	Units Fundamental Concepts	Big Ideas	Biodiversity Links
	Air and Water in the Environment (E) Systems & Interactions Sustainability & Stewardship	<p>upon animals and the places where they live</p> <ul style="list-style-type: none"> Investigate ways in which a variety of animals adapt to their environment and/or to changes <p>Our actions affect the quality of air and water, and its ability to sustain life</p> <ul style="list-style-type: none"> Describe ways in which living things depend on air and water Changes to air and water affect living things 	<ul style="list-style-type: none"> Connections among species and elements keep the environment functioning and healthy. Biodiversity has ecological, social and cultural value. Biologically diverse ecosystems offer a variety of natural products. Biodiversity is declining because of habitat loss, invasive species, pollution and over consumption. Individuals use a variety of means to protect animals.
3	<p>Growth and Changes in Plants (L)</p> <p>Systems & Interactions Sustainability & Stewardship Change & Continuity</p> <p>Soils in the Environment (E)</p> <p>Systems & Interactions Sustainability & Stewardship</p>	<p>There are similarities and differences among various types of plants Humans need to protect plants and their habitats</p> <ul style="list-style-type: none"> Assess ways in which plants have an impact on society and envir. and ways in which human activity has an impact on plants and habitat Describe ways in which humans use plants Investigate ways in which plants adapt and/or react to their environment, including changes Describe ways in which plants and animals depend on each other <p>The composition, characteristics and condition of soil determine its capacity to sustain life Soil is an essential source of life and nutrients</p>	<ul style="list-style-type: none"> Biodiversity is the variety of life on Earth For any kind of plant – each individual is not exactly the same as any other; nor are species All Canadians depend on biodiversity and have a responsibility to contribute to biodiversity conservation Connections among species and elements keep the environment functioning and healthy. Biodiversity has ecological, social and cultural value. Biologically diverse ecosystems offer a variety of natural products. Biodiversity is declining because of habitat loss, invasive species, pollution and over consumption. Individuals use a variety of means to

Grade	Units Fundamental Concepts	Big Ideas	Biodiversity Links
		<p>for many living things Living things, including humans, interact with soils and can cause positive or negative changes</p> <ul style="list-style-type: none"> • Demonstrate an understanding of the composition of soils, the types of soils, and the relationship between soils and other living things • Describe ways in which the components of various soils enables the soil to provide shelter and/or nutrients for different kinds of living things 	<p>protect plants.</p> <ul style="list-style-type: none"> • Biodiversity provides ecosystem services, including fertile soil. • Connections among species and elements keep the environment functioning and healthy. • Human impact on the environment directly or indirectly affect the function of other species and systems
4	<p>Habitats and Communities (L)</p> <p>Systems & Interactions Sustainability & Stewardship Change & Continuity</p>	<p>Plants and animals are interdependent and are adapted to meet their needs from the resources available in their particular habitats; changes to habitats affect this Society relies on plants and animals</p> <ul style="list-style-type: none"> • Identify reasons for the depletion or extinction of a species, evaluate the impacts on the community and propose possible actions.... • Demonstrate an understanding of a community as a group of interacting species sharing a common habitat • Explain why changes in the environment have a greater impact on specialized species than on generalized species • Demonstrate an understanding of why all habitats have limits to the number of plants and animals they can support 	<ul style="list-style-type: none"> • All life forms that make up biodiversity, including humans, are ultimately connected to all other life forms, and to their physical environment. • Each species is not exactly the same as any other. • Connections among species and elements keep the environment functioning and healthy • No one element of any ecosystem can survive independent of the others. • Human impact on the environment directly or indirectly affects the functions of others and, by extension, ourselves. • The scientific community has linked human activity to the accelerated rate of recent and current extinctions. • Biodiversity is declining because of habitat loss, invasive species, pollution and over consumption.

Grade	Units Fundamental Concepts	Big Ideas	Biodiversity Links
			<ul style="list-style-type: none"> • Individuals use a variety of means to protect plants and animals. • physical environments, even healthy ones, can support just so many of any species, including people, <i>indefinitely</i>.
5	Conservation of Energy and Resources (E) Sustainability & Stewardship	Choices about using energy and resources have both immediate and long-term impacts Conservation is one way of reducing the impacts of using energy and resources	<ul style="list-style-type: none"> • The scientific community has linked human activity to the accelerated rate of recent and current extinctions. • Biodiversity is declining because of habitat loss, pollution, over-consumption and climate change. • Climate change resulting from, among other things, unsustainable use of fossil fuels results in loss of biodiversity. • Individual and community contributions to biodiversity conservation and steps towards sustainable living <i>do</i> make a difference: i.e. informed consumer choices.
6	BIODIVERSITY (L) Systems & Interactions Sustainability & Stewardship Change & Continuity	Opening: because all living things are connected, maintaining biodiversity is critical to the health of the planet.... Biodiversity includes diversity of individuals, species and ecosystems Humans make choices that can have an impact on biodiversity <ul style="list-style-type: none"> • Assess human impacts on biodiversity, 	<ul style="list-style-type: none"> • All life forms that make up biodiversity, including humans, are ultimately connected to all other life forms, and to their physical environment. • Biologically diverse ecosystems maintain a stable environment capable of providing a high quality of life. • Biodiversity is generally described at three levels: genetic, species and ecosystem. • Biodiversity is declining because of habitat loss, invasive species, pollution, population growth, over-consumption and

Grade	Units Fundamental Concepts	Big Ideas	Biodiversity Links
		<p>and identify ways of preserving biodiversity</p> <ul style="list-style-type: none"> • Demonstrate an understanding of biodiversity, its contributions to the stability of natural systems and its benefits to humans • Describe ways in which biodiversity within species is important for maintaining resilience of those species • Describe ways in which biodiversity within and among communities is important for maintaining the resilience of those communities 	<p>climate change.</p> <ul style="list-style-type: none"> • Human impacts on biodiversity have been accelerating as population growth and consumption rates have increased. • Individuals use a variety of means to protect plants and animals. • Individual and community contributions to biodiversity conservation and steps towards sustainable living <i>do</i> make a difference: i.e. informed consumer choices. • Biological diversity is key to long-term ecosystem sustainability. • Healthy, stable, diverse environments are able to respond to change more efficiently than degraded or simple systems. • Biodiversity has evolutionary, ecological, economic, social, cultural and intrinsic values. • Biodiversity provides ecosystem services... • Sustaining biodiversity has economic benefits... • For any kind of animal or plant – each individual is not exactly the same as any other. • Biodiversity is nature’s insurance policy – the more variety there is now, the more there can be in the future, and the greater the chances of adapting to major changes in environmental conditions.

Grade	Units Fundamental Concepts	Big Ideas	Biodiversity Links
		<ul style="list-style-type: none"> • Describe interrelationships within species, between species, and between species and their environment • Describe how invasive species reduce biodiversity 	<ul style="list-style-type: none"> • No one element of any ecosystem can survive independent of the others. • Connections among species and elements keep the environment functioning and healthy
7	<p>INTERACTIONS IN THE ENVIRONMENT (L)</p> <p>Systems & Interactions Sustainability & Stewardship Change & Continuity</p>	<p>Ecosystems are made of biotic and abiotic elements, which interact with, and depend on, each other to survive</p> <p>Ecosystems are in a constant state of change. The changes may be caused by nature or by human intervention</p> <p>Investigate interactions within the environment, and identify factors that affect the balance between different components of an ecosystem.</p> <ul style="list-style-type: none"> • Analyse the costs and benefits of strategies for protecting the environment • Explain why an ecosystem is limited in the number of living things it can support 	<ul style="list-style-type: none"> • All life forms that make up biodiversity, including humans, are ultimately connected to all other life forms, and to their physical environment. • Connections among species and elements keep the environment functioning and healthy. • Biologically diverse ecosystems maintain a stable environment capable of providing a high quality of life. • Healthy, stable, diverse environments are able to respond to change more efficiently than degraded or simple systems. • physical environments, even healthy ones, can support just so many of any species, including people, <i>indefinitely</i>. • This maximum number is termed the <i>carrying capacity</i> for that environment. • The carrying capacity for any species changes as the numbers and actions of other life forms, and environmental conditions, change. • Species can cause changes in environmental conditions, and <i>vice versa</i>, leading to changes in carrying capacity

Grade	Units Fundamental Concepts	Big Ideas	Biodiversity Links
			for themselves and for other species.
8	Water Systems (E) Systems & Interactions Sustainability & Stewardship Change & Continuity	Develop an understanding of the important role that water systems play in global ecosystems. (overview) Water is crucial to life on earth. Water is an important resource that needs to be managed sustainably. <ul style="list-style-type: none"> • assess the impact of human activities and technologies on the sustainability of water resources 	<ul style="list-style-type: none"> • physical environments, even healthy ones, can support just so many of any species, including people, <i>indefinitely</i>. • This maximum number is termed the <i>carrying capacity</i> for that environment. • The carrying capacity for any species changes as the numbers and actions of other life forms, and environmental conditions, change. • Species can cause changes in environmental conditions, and <i>vice versa</i>, leading to changes in carrying capacity for themselves and for other species.

CONTEXT:

This table was developed by Roberta Oswald, Toronto Catholic District School Board, and Alan Crook, Ontario Ministry of Natural Resources, acting for the **Biodiversity Education and Awareness Network** (BEAN). BEAN is a collaborative network whose mission is to support and enhance the development and delivery of biodiversity education and awareness efforts. Members represent a broad range of sectors, including formal education, government, industry, and NGO's engaged in both formal and non-formal education, including:

Canadian Museum of Nature
Canadian Wildlife Service
Citizens Environment Watch
Colleges Ontario
Conservation Ontario
Landscape Ontario
Ministry of Education

Ministry of Natural Resources
Ontario Agri-Food Education
Ontario Association of Deans of Education
Ontario Federation of Anglers and Hunters
Ontario Forestry Association
Ontario Federation of Agriculture
Ontario Nature

Ontario Power Generation
Ontario Stewardship
Royal Botanical Gardens
Science North
Toronto Catholic District School Board
Toronto Zoo

The table represents our first effort at showing where concepts related to biodiversity (Big Ideas) will be taught using the new science curriculum. While the term *biodiversity* may never be mentioned at your grade level, these Ideas contribute building blocks to the overall biodiversity story, and are essential understandings that students need to have in place as they deal directly with biodiversity in Grades 6 and 7. The last column

(Biodiversity Links) shows the direct relationships between the Ideas and biodiversity, as shown by biodiversity concepts from BEAN's Conceptual Framework.