



HABITATS OF HAMILTON AND HALTON

www.hamiltonnature.org/habitats

SCIENCE

GRADES 1-8: SCIENCE AND TECHNOLOGY

LIFE SYSTEMS

Grade 1: Characteristics and Needs of Living Things

Overall Expectations:

- Contributes to understanding of needs of animals as illustrated through the concept of habitat (each animal needs resources found in their habitat)
- Contributes to investigation of characteristics and needs of animals and plants
- Raises awareness of the dependence of animals and plants on their environment to meet their basic needs, including the need of humans for natural environments in urban areas

Specific Expectations:

- *Basic Concepts:* classify animal and plant characteristics; identify common characteristics of animals, describe patterns in living things.
- *Relating to outside world:* compare basic needs of humans with other living things; identify a familiar animal or plant from a part of it; identify ways to maintain a healthy environment

Grade 2: Growth and Change in Animals

Overall Expectations:

- Illustrates similarities and differences among animals and environmental adaptations
- Describes physical and behavioural characteristics of selected animals
- Provides insight into the effects of humans on other animals

Specific Expectations:

- *Basic Concepts:* identify and describe physical and behavioural characteristics of animals; classify animals using visible characteristics; compare ways animals utilise their habitat for food, shelter etc.; describe animal adaptations to environment and 'family life'
- *Relating to outside world:* describe environmental features that support animals; identify seasonal effects on animals, understand how humans help or harm other organisms

Grade 3: Growth and Change in Plants

Overall Expectations:

- Illustrates similarities and differences among plants, environmental adaptations and growth changes (*e.g. woody vs. herbaceous plants over the seasons*)
- Discusses environmental requirements of plants and effects of environmental change
- Relates the importance of plants and human dependence upon them

Specific Expectations:

- *Basic Concepts:* describe seasonal effects on plants and how plant parts aid in survival (e.g. dieback, leaf colour change, vascular system, root structure)
- *Relating to outside world:* protection of natural areas for conservation; plants used locally for human crops and where they are grown; interrelationships between plants and animals, plants functions in their environments (e.g. tree shade, grass root structure)

Grade 4: Habitats and Communities

Overall Expectations:

- Assists in understanding of the concepts of habitat and community and discusses factors affecting these natural units (including concepts of habitat islands and corridors in urban settings)
- Demonstrates the dependency of plants and animals on their habitats and the relationships between those organisms
- Illustrates how humans change habitats and the effects of those changes on organisms

Specific Expectations:

- *Basic Concepts:* factors that affect plants and animals in a specific habitat; classify organisms by food chain role, understand food chain and classify animals and omnivore, carnivore and herbivore; describe plants structural adaptations and response to environment, recognise dependence of animals and plants upon their habitat type, classify animals and plants in local habitats according to similarities and differences.
- *Relating to outside world:* humans affecting nature, food chain structure, effects of loss of habitat and extinction.

Grade 5: Human Organ Systems N/A

Grade 6: Diversity of Living Things

Overall Expectations:

- Expresses the diversity of local flora and fauna with information suitable for using in basic classification schemes

Specific Expectations:

- *Basic Concepts:* Includes characteristics and definitions of invertebrates vs. mammals etc., and discussion of prehistoric and primitive invertebrates
- *Relating to outside world:* describes characteristics and adaptations of vertebrates and invertebrates and the importance of habitat maintenance; explains fossil evidence and how they have changed over time and how they help identify geological layers

Grade 7: Interactions within Ecosystems

Overall Expectations:

- Develops better understanding of ecosystem interactions between plants, animals, fungi and micro-organisms
- Discusses factors that affect ecosystem balance (e.g. prairie fires, parasites, nutrient load)
- Addresses the effects of human activities and natural changes on ecosystems

Specific Expectations:

- *Basic Concepts:* Identify biotic and abiotic ecosystem elements; population survival; roles of producers, consumers, decomposers in food chain; importance of micro-decomposer organisms, carbon and water cycling, change and its effects in natural communities
- *Relating to outside world:* impact of technology on the environment; plants as energy sources and habitat ('cover', food); essential requirements of growth in an ecosystem (nutrients, water etc.); effects of habitat loss and reduction in biodiversity; management and preservation factors (e.g. habitat corridors, buffer zones); our connection to nature

Grade 8: Cells, Tissues, Organs and Systems

Overall Expectations:

- Discussion of plant structures (xylem, phloem, vascular vs. non-vascular plants), leaf function, root function

Specific Expectations:

- *Basic Concepts:* unicellular organisms (e.g. algae) and their mode of living; plant cell functions; root, stem and leaf structure and function; compare plant structures and conditions
- *Relating to outside world:* compares plant and human vascular function

MATTERS AND MATERIALS

Grade 8 – Fluids

Overall Expectations:

- Develops better understanding of the properties of water in a natural context
- Enables description of how knowledge of the properties of water can help in the understanding and influence of organisms in the natural world

Specific Expectations:

- *Basic Concepts:* relationship between temperature and density of water in lakes
- *Relating to outside world:* describe situations in which the density of a substance changes naturally (e.g. water seasonally changes T and density causing lake turnover)

EARTH AND SPACE SYSTEMS

Grade 1 – Daily and Seasonal Cycles

Overall Expectations:

- Contributes to understanding of seasonal cycles and how they affect characteristics, behaviour and location of living things
- Describes adaptations to seasonal changes

Specific Expectations:

- *Basic Concepts*: relates concepts about sun's light and heat; describes seasonal characteristics (e.g. snow vs. rain)
- *Relating to outside world*: describes changes in plant and animal behaviour/characteristics/location in response to daily/seasonal changes

Grade 2: Air and Water in the Environment

Overall Expectations:

- Assists in understanding of awareness of forms of water and air in the environment and how living things are affected by them
- Describes how clean air and water are necessary for human and wildlife health

Specific Expectations:

- *Basic Concepts*: identifies ways that changes in temperature affect living things (e.g. migration); specifies changing states in water (water as ice, snow, rain)
- *Relating to outside world*: relates how local weather conditions affect living things (e.g. local lake effects, urban heat islands); discusses some water uses for humans and wildlife

Grade 3: Soils in the Environment

Overall Expectations:

- Provides understanding of similarities and differences between soil types and their components (e.g. organic vs. mineral) and the effects of moving water on them (e.g. valley/channel creation)

Specific Expectations:

- *Basic Concepts*: describes differences in soil composition; discusses ability of different soils to hold water; compares how different soils have plants with different root forms
- *Relating to outside world*: describes changes in plant and animal behaviour/characteristics/location in response to daily/seasonal changes

Grade 4: Rocks, Minerals and Erosion

Overall Expectations:

- Assists in understanding of physical properties of local rock materials (e.g. sedimentary escarpment rock) and the effects of erosion (e.g. glaciation, water/air erosion)
- Discusses alteration of natural landscape through human intervention (reservoir creation, infilling of streams/shoreline, urban development)

Specific Expectations:

- *Basic Concepts*: Rock classification (e.g. sedimentary); effects of wind, water and ice on landscape; rocks that contain records of earth's history (e.g. fossils) and their formation
- *Relating to outside world*: distinguish between natural features and human features (E.G. escarpment vs. urban and rural landscapes)

Grade 5: Weather

Overall Expectations:

- Contributes to understanding of climatic factors in local area (e.g. lake effect, moderation of temperature, urban heat island effect)

Specific Expectations:

- *Basic Concepts*: provides information about local weather patterns and local precipitation
- *Relating to outside world*: discusses the importance of local weather related features to people involved in local occupations (e.g. farmers)

Grade 6: Space N/A

Grade 7: The Earth's Crust

Overall Expectations:

- Contributes to understanding of the formation of local features of the earth's crust (e.g. the Niagara Escarpment/Cuesta and the Michigan Basin)
- Identifies factors to consider in land use planning (e.g. environmental impact, uniqueness of local natural features, historical changes and significance to wildlife)

Specific Expectations:

- *Basic Concepts*: classify rocks according to their formation; identify geological processes involved in rock formation (e.g. ancient lakes and sedimentary rock formation); soil formation (organic and inorganic, e.g. plant decomposition vs. mineral weathering)
- *Relating to outside world*: identifies factors to consider in planning land use (environmental impact, value of nature to humanity); landscape alteration by humanity; soils characteristics and their utility for human use

Grade 8: Water Systems

Overall Expectations:

- Contributes to understanding of how local water bodies were formed, their similarities and differences and how they influence local climate and weather
- Defines and describes water features (lakes, creeks/streams, glaciers, precipitation) and their effects on local ecosystems

Specific Expectations:

- *Basic Concepts*: discusses different water states; describes water circulation; describes units of water allocation (catchments/watersheds); describes effects of temperature change on water bodies (lake turnover and stratification); discusses how large water bodies affect local climate and weather (moderation of temperature, precipitation)
- *Relating to outside world*: discusses human water use and impacts (e.g. stream infilling, reservoir creation); looks at factors effecting productivity of aquatic animals (e.g. eutrophication); discusses water control by humans (dams, reservoirs, channelization, use of wetlands to control flooding); explains water table concept

GRADES 9-10: SCIENCE

BIOLOGY

Grade 9: Reproduction/Reproduction – Processes and Applications

N/A

Grade 10: The Sustainability of Ecosystems/Ecosystems and Human Activity

Overall Expectations:

- Contributes to understanding of the nature of ecosystems, ecological balance and the sustainability of life
- Relates factors that affect ecological systems and the consequences of change in these factors – focuses upon natural and human threats to local ecosystems and proposes some ways to restore ecological balance
- Provides examples of issues relating to environmental sustainability and the impact of technology on ecosystems – local focus on Ontario and ‘Head of the Lake’ area

Specific Expectations:

- *Understanding Concepts*: addresses photosynthesis; factors affecting population equilibrium; abiotic factors effecting biotic communities; compares natural and disturbed communities; discusses soil composition and fertility and their relationship to ecosystems
- *Developing Inquiry/Research and Communication Skills*: provides vocabulary; provides relevant information (secondary source); identifies current local concerns
- *Relating Science to Technology, Society and the Environment*: Assists in the assessment of the impact of technological/natural change on ecosystems (e.g. addition of fertilizer and pesticides to soils and waterways, fires, invasive species); identifies local ecosystem issues as a starting point for further research

EARTH AND SPACE SCIENCE

Grade 10: Weather Dynamics/Weather Systems

Overall Expectations:

- Contributes to understanding of local weather conditions

Specific Expectations:

- *Developing Inquiry/Research and Communication Skills*: relates factors affecting local weather systems (e.g. lake effect) and their impact on local economy (e.g. agriculture)

GRADES 11-12: SCIENCE

BIOLOGY - UNIVERSITY

Grade 11: Diversity of Living Things

Overall Expectations:

- Contributes to understanding of the diversity of living organisms

Specific Expectations:

- *Understanding Concepts:* taxonomic names are used throughout; discusses different characteristics of organisms from different kingdoms, orders, etc.
- *Relating Science to Technology, Society and the Environment:* connects concepts of biodiversity and species survival and having sufficient genetic variety/movement in a population

Grade 11: Plant Anatomy, Growth and Functions

Overall Expectations:

- Describes processes by which plants grow and survive
- Describes ways in which plants adapt to their environment and factors that affect growth

Specific Expectations:

- *Understanding Concepts:* describes differences between vascular and non-vascular plants and their modes of nutrient/water transport
- *Developing Inquiry/Research and Communication Skills:* mentions plant nutrients

Grade 12: Population Dynamics

Overall Expectations:

- Describes some processes by which populations grow and change and interrelate

Specific Expectations:

- *Understanding Concepts:* explains some concepts of interaction (e.g. predation, symbiosis, competition) among organisms

BIOLOGY - COLLEGE

Grade 11: Microbiology

This website does address fungi and micro-organisms in an ecological context (e.g. mutualism vs. parasitism, visible vs. invisible fungal anatomy, roles in food chain as decomposers).

Grade 11: Plant Structure and Physiology

Overall Expectations:

- Contributes to understanding of the diversity of plants, their internal transport systems, growth and adaptations
- Describes the roles that plants play in the urban community and natural ecosystems

Specific Expectations:

- *Understanding Concepts:* describes differences between vascular and non-vascular plants and their modes of nutrient/water transport; discusses aspects of plant tissues related to adaptations to local conditions (e.g. grasses to heavy soils, trees to shade)

Grade 11: Environmental Science

Overall Expectations:

- Analyses how various factors influence the relationship between organisms and the natural environment
- Explains the importance of being aware of the impact of human activities on the natural environment

Specific Expectations:

- *Understanding Concepts*: assess agricultural impact on the natural environment; explain ecological roles of organisms from different kingdoms (e.g. decomposers); describes symbiosis (*properly*, with mutualism, parasitism etc.); compares local habitats/ecosystems in terms of ecosystem units (animal, plants, climate, soil, land use)

EARTH AND SPACE SCIENCE – UNIVERSITY

The earth science content of this website relates mainly to the Niagara Escarpment and local river valleys, and their formation and structure (erosion, glacial processes and sedimentary rock formation).

Grade 12: Introduction to Earth Sciences

Overall Expectations:

- Describes the impact of some natural forces and systems on the earth's physical and human environments locally and the impacts of human activities on natural systems

Specific Expectations:

- *Understanding Concepts*: describes evidence of changes in the earth's crust over time (e.g. glaciation and the formation of post-glacial features)
- *Relating Science to Technology, Society and the Environment*: describe and explain the effects of natural systems on the Earth's physical and human environments and the increasing alteration of natural systems through human activity

Grade 12: Earth Materials

Overall Expectations:

- Describes the formation and characteristics of sedimentary rock

Specific Expectations:

- *Understanding Concepts*: Describes the formation of sediments and the corresponding rock types in a local context

Grade 12: Internal and Surficial Earth Processes

Overall Expectations:

- Identifies processes at work on the Earth's surface (e.g. running water, weathering, erosion, glaciation) and their roles in shaping the Earth's surface

Specific Expectations:

- *Understanding Concepts*: describes and differentiates between types of erosion and their effects; identifies sediment transport and sedimentary structures

Grade 12: Earth History

Overall Expectations:

- Assists in analysis and assessment of geological evidence that suggests that the Earth's crust has changed over time
- Explains importance of geological and fossil records for our understanding of the Earth's history and their use in economic activities (escarpment and agriculture)

Specific Expectations:

- *Understanding Concepts:* Describes processes by which fossils (e.g. foraminifers) are produced and preserved (e.g. biologic sedimentation in glacial lakes and subsequent mineralization)
- *Developing Skills of Inquiry and Communication:* describe the geological history of Ontario using maps and diagrams.; investigate geological evidence of changes in Earth history (escarpment)

SCIENCE – UNIVERSITY / COLLEGE

Grade 12: Organic Products in Everyday Life

Overall Expectations:

- Contributes to understanding of the impact on society of using organic products

Specific Expectations:

- *Understanding Concepts:* describe the use of fertilizers and pesticides in agriculture
- *Relating Science to Technology, Society and the Environment:* helps to evaluate the costs and benefits of using organic products (e.g. pesticides, fertilizers) and their impact on the environment

SCIENCE – WORKPLACE

Grade 11: Human Impact on the Environment

Overall Expectations:

- Contributes to understanding of human impact on the environment and suggests ways to protect it
- Assists in evaluation of costs and benefits to society of protecting or not protecting a specific environment
- Suggests some factors affecting the sustainability of the human population on Earth

Specific Expectations:

- *Understanding Concepts:* analyse interactions between the environment and human activities; explain the importance of biodiversity with respect to the sustainability of life within the biosphere
- *Developing Skills of Inquiry and Communication:* helps formulate scientific questions/produce reports/conduct studies about the effects of contaminants (e.g. nutrients) on aquatic life

Grade 12: Gardening, Horticulture, Landscaping and Forestry

Overall Expectations:

- Provides better understanding of the importance of wild (native) plants to society and the environment

Specific Expectations:

- *Understanding Concepts*: describe different methods of gardening (e.g. organic gardening and gardening for wildlife and the environment with native plant material)
- *Relating Science to Technology, Society and the Environment* helps to illustrate the role of forests as essential habitats for other plants and animals including endangered and threatened species; helps in analysis of environmental factors that affect approach and methods of gardening, horticulture and landscaping (e.g. problems of monoculture and the environmental need for biodiversity in horticulture)