**Ecosystems, Organisms, & Trophic Levels**

**I. Introduction**

 In this lab, you will explore a number of different biomes and ecosystems, searching out the organisms that live in each environment. Some organisms will be easy to find. Others will be more difficult.

 Once you find an organism, you will use a set of existing field observations to answer questions about that organism, as well as its relationship with (and effect on) the ecosystem it inhabits. When you click on an organism, you may be asked to :

 - Identify how that organism obtains the nutrients it needs to survive.

 - Classify the organism’s trophic level.

 - Demonstrate your understanding of the relationship between the organism and the

 biome it inhabits.

 - Name which animals, insects, or foods the organism consumes (and is consumed by)

 within its food web.

 All organisms and the environment they live in are interconnected. Sometimes the connection is obvious. Other times the connection is subtle, even invisible. As you study the different organisms and answer the questions, notice how many of the concepts you explore are directly related to others, and how one concept often illuminates another.

**II. Procedure**

 1. Start the activity by going to the following website :

<http://glencoe.mheducation.com/sites/dl/free/0078802849/383916/BL_03.html> .

 2. To begin, click on the icons of different regions on the screen to explore the different

 ecosystems.

 3. You can go wherever you like, and explore any of the different biomes in whatever order you

 wish. When you notice an organism that looks interesting, click on it. You’ll see a close-up

 of that organism, and you’ll be asked a question about that organism. If you already know the

 answer to the question, go ahead and answer it. If you don’t, search through the field

 observations to discover the answer. The field observations automatically appear in this

 window whenever you click on an organism.

 4. You’ll receive 2 eco-points if you correctly answer a question on your first attempt. You’ll

 receive 1 eco-point if you correctly answer a question on your second attempt. If you can’t

 answer a question after 2 attempts, don’t worry – just keep exploring, and click on other

 organisms. When you finish using the lab, note your total score. Over time, as you gain a

 greater understanding of ecosystems and try the lab again, your score should increase.

 5. You can click on an organism more than once – each time you do, you’ll be asked a new

 question. Sometimes, you’ll need to know the answers to questions about one organism

 before you’re able to answer questions about another, related organism. Eventually you’ll

 answer all the questions about a given organism. That means it’s time to find another animal.

 6. As you answer the questions and consider the concepts being addressed, remember that all

 organisms in a biome are related in one way or another, and each depends on the others to

 survive.

**III. Data**

 1. Record your score for each biome that you investigate.

 **Desert** : SCORE \_\_\_\_\_\_\_ points

 Saguaro Cactus

 Scientific Name: *Carnegiea gigantean*

 Habitat: desert slopes and flats

 Range: Sonoran Desert

 Observations: The shape and appearance of the Saguaro Cactus is easily recognizable in

 countless movies set in the desert. The cactus is a producer, using photosynthesis to

 create its energy needs. Since it doesn't have leaves, its photosynthesis takes place in the

 top layer of its green stem. The cactus uses a number of adaptations to survive in the dry

 desert conditions. They include a large root system that collects water after rain, and an

 expandable stem that stores the collected water.

 Velvet Ant

 Scientific Name: *Dasymutilla occidentalis*

 Habitat: deserts, semi-arid environments

 Range: throughout US and Canada

 Observations: The Velvet Ant is actually a wasp. "Velvet Ant" is the common name for

 any of a family of wasps whose appearance is similar to that of large furry ants. The

 wasps live primarily in deserts and hot, semiarid environments. There are thousands of

 species of Velvet Ants throughout the world, including nearly 500 species in North

 America alone. All Velvet Ants in North America are parasites. They invade the nest of

 bees and other wasps, then lay their eggs in the host's cocoon. As adults, the ants feed on

 green shrubs, cacti, and other available plants.

 Cactus Wren

 Scientific Name: *Campylorhynchus brunneicapillus*

 Habitat: desert, arid scrubland

 Range: Southwestern U.S.A. to central Mexico

 Observations: The cactus wren lives in cacti, trees, and thorny shrubs. It is the largest

 wren in North America, and has an easily recognizable white stripe over each eye, as well

 as a long tail. The wren feeds on beetles, wasps, ants, fruit, berries, lizards, and small

 frogs. It can run swiftly for short distances.

 Diamondback Rattlesnake

 Scientific Name: *Crotelus Atrox*

 Habitat: desert, rocky hillsides

 Range: Southwestern U.S.A.: Southern California, Nevada and Utah, south to Mexico

 Observations: The distinctive rattle that the Rattlesnake makes to warn-off threats makes

 the snake easy to identify. The bite of the rattlesnake is poisonous; it injects hemotoxic

 venom through its fangs, which rapidly attacks the blood system of its prey, though the

 bite is usually not fatal to humans. A predator, the rattlesnake feeds on small mice, rats,

 and lizards. It uses its tongue as an olfactory organ, and is able to see in total darkness

 due to heat sensitive organs located in its head. An adult Diamondback is commonly five

 feet in length, with gray, tan, or black scales, often with a distinctive yellow, red, or green

 tone. Rattlesnakes are largely defensive and tend to stand their ground if provoked.

 Coyote

 Scientific Name: *Canis latrans*

 Habitat: desert, rocky hillsides and valleys

 Range: North America, from eastern Alaska to New England and south through Mexico

 to Panama.

 Observations: The Coyote is a member of the dog family, similar in size and shape to a

 medium-sized dog; its tail is round and bushy and is carried straight out, below the level

 of its back. Desert Coyotes are found in low deserts and valleys. They weigh about 20

 pounds, less than half of mountain coyotes. Desert Coyotes are light gray or tan with a

 black-tipped tail. The Coyote is one of the most adaptable animals in the world, and can

 change its breeding habits, diet and social dynamics to survive in a wide variety of

 habitats. They maintain their territories by marking them with urine, either alone or in

 packs. They use their distinctive calls to defend their territory, as well as to strengthen

 social bonds and communicate.

 **Tropical Rain Forest** : SCORE \_\_\_\_\_\_\_ points

 Whirligig Beetle

 Family: *Gyrinus sp.*

 Habitat: Tropical environments, freshwater lakes, ponds

 Range: North American and African continents

 Observations: Whirligig beetles received their name from their tendency to move rapidly

 in small circles on the surface of the water. This apparent dance - or gig - is just one of

 the distinctive characteristics that the beetles display. Others include its compound eyes,

 that allow it to see both under the water and above the water simultaneously, and its

 antennae, which allow it to sense wavelets on the surface of the water, thereby providing

 information regarding potential food sources and obstacles. The Whirligig can remain

 under the water for a long period of time. It is able to do this by trapping a bubble of air

 under its body before it submerges.

 Chimpanzee

 Scientific Name: *Pan troglodytes*

 Habitat: rainforest, savanna with woodland

 Range: Africa: Guinea to Zaire, Uganda and Tanzania

 Observations: Intelligent and social, the chimpanzee is the closest relative to humans in

 the animal world. Its hands and feet are long, its arms are longer than its legs, and it

 possesses surprising strength. Like humans, the chimpanzee has opposable thumbs,

 which allow it to grasp objects other animals cannot, and it uses twigs and sticks as

 primitive tools. Chimpanzees, known colloquially as Chimps, express a myriad of

 emotions through their gestures and vocal expressions. They live in troops, and defend

 their living territory when neighboring troops attempt to infringe on it, though this

 defense usually takes the form of non-violent noise and communication. Chimpanzees

 feed primarily on fruit, nuts, insects, and leaves.

 African Elephant

 Scientific Name: *Loxodonta africana*

 Habitat: Tropical environments, freshwater lakes, ponds

 Range: North American and African continents

 Observations: The elephant is a large, hairless animal with long, thick legs and large feet.

 Its color is brownish gray. It has large flat ears, a trunk and tusks varying in length. Its

 long trunk is both it nose and an appendage used to break branches, transfer food to its

 mouth, and siphon water for showering itself or for squirting into the mouth. Elephants

 are diurnal and nocturnal, forming herds of from 6-200 animals, with a cow as herd

 leader. Old males form small bachelor herds. Elephants are normally peaceful but can be

 extremely dangerous, especially when they have calves or are wounded. They have a

 strong sense of smell, however their hearing and vision are relatively poor.

 Leopard

 Family: *Panthera pardus*

 Habitat: Rainforest and arid desert habitats

 Range: Sub-Saharan Africa

 Observations: The rain forest leopard is a dark, deep gold in color. Its coat color varies

 from yellow to gold, and is patterned with black spots. Specific coat color and patterning

 are associated with habitat type. Despite its relatively small body size, the leopard is an

 effective hunter. Its one of the fastest animals, and its skull is large, with strong jaw

 muscles. To protect its eyes and assist in its movement through vegetation in darkness,

 the leopard has evolved long whiskers, as well as long hairs in the eyebrows. The

 leopard, a predator, feeds on numerous animals, including rodents, birds, antelopes,

 hares, and arthropods.

 **Freshwater Lake** : SCORE \_\_\_\_\_\_\_ points

 Bell Frog

 Scientific Name: *Litoria cyclorhynchus*

 Habitat: Large ponds

 Range: Western Australia

 Observations: The green and gold bell frog is a predator. It feeds on a number of small

 animals, and occasionally on its own tadpoles. It emits a distinctive croaking sound,

 particularly during mating season, when the male croaks to attract mates. The frog lives

 primarily in water, but may leave the water during heavy rainfall.

 Largemouth Bass

 Scientific Name: *Micropterus salmoides*

 Habitat: ponds, rivers, shallow lakes

 Range: USA, parts of Canada; Europe and Africa

 Observations: The Largemouth bass is a predator. It feeds on frogs, other fish, and

 invertebrates. It is part of the sunfish family, and is green and silver in appearance, with

 a notched dorsal fin, and a dark stripe on each side of its body. The male digs a nest in

 the sand in shallow water. Once a female lays her eggs in the nest, the male fertilizes and

 guards the eggs until they hatch, which is typically 7 - 10 days after they are laid.

 Mute Swan

 Scientific Name: *Cygnus olor*

 Habitat: coastal bays and lakes with rich vegetation

 Range: Britain to Siberia and from Southern Finland to Central Asia; Northern USA,

 Canada

 Observations: Swans are the largest of the waterfowl, and many regard them as the most

 beautiful. The Mute Swan is one of 7 species of swan. Adult males weigh approximately

 11kg; females around 9kg. A male is known as a cob, a female is a pen, and the young

 are called cygnets. The long-necked birds will breed at 3 years of age, having a clutch of

 3 to 8 eggs, although larger clutches have been recorded. During the incubation period

 the male becomes very territorial and will aggressively protect his mate. He will normally

 use his strong wings as a weapon instead of biting. Mute Swans have been known to live

 for over 25 years, but most only survive to 5 or 6 years old. The Mute Swan feeds on

 aquatic plants.

 Green Darner Dragonfly

 Scientific Name: *Aeshnidae darners*

 Habitat: ponds, rivers, shallow lakes

 Range: USA, parts of Canada; Europe and Africa

 Observations: This species of Dragonfly, known as Green Darners or Mosaic Darners, is

 large, robust, and fast. Usually found in groups, or swarms, they congregate in relatively

 humid environments, often near fresh water sources. The males are blue, green, or

 brown; the females are green, brown, or purple. They eat small insects, which they catch

 in fields and ponds. Dragonflies are typically 57-110 mm in size, with wingspans up

 to 150mm.

 **Tundra** : SCORE \_\_\_\_\_\_\_ points

 Caribou

 Scientific Name: *Rangifer tarandus*

 Habitat: tundra

 Range: N. Europe and Asia: Scandinavia to Siberia; Alaska, Canada, Greenland

 Observations: A graceful animal, at home in frigid, below-zero environments, the caribou

 is the same species as the reindeer. Some caribou populations migrate up to a thousand

 miles every year as they travel between winter feeding grounds and summer breeding

 grounds in the tundra. Caribou vary widely in appearance; some are nearly black, others

 gray, or brown, or white. Caribou feed primarily on lichen, but also eat grass and other

 tundra plants.

 Arctic Wolf

 Scientific Name: *Canis lupus arctos*

 Habitat: tundra

 Range: Northern Canada

 Observations: While the Arctic Wolf is smaller than wolves found further south, it is a

 tenacious, effective hunter. Hunting singly or in small packs, wolves hunt co-operatively

 to prey on the far-faster caribou, their major prey species. The Arctic wolf can bring

 down an adult caribou with a single bite to the neck. Coloring ranges from black, to gray,

 to white. Survival of wolf pups depends on food supply and their mortality rate is often

 high.

 Arctic Fox

 Scientific Name: *Alopex lagopus*

 Habitat: tundra

 Range: Northern Alaska, Canada

 Observations: The arctic fox has a gray, or gray-blue coat in the summer; during the

 winter the coat changes to white. With densely furred foot pads, the fox is comfortable

 both on snow and ice. The arctic fox feeds on lemmings, voles, squirrels, birds, bird eggs,

 berries, fish and carrion. It often burrows into the ground or snow for protection from the

 arctic cold. The female fox has a litter of 6-12; the young are born in the spring. The

 male fox supplies food for the mother and the young, and protects them from threats.

 Snowy Owl

 Scientific Name: *Nyctea scandica*

 Habitat: tundra

 Range: N. Europe and Asia: Scandinavia to Siberia; Alaska, Canada

 Observations: Found only in the Arctic, Snowy Owls are similar in size to the Great

 Horned Owl. In summer, Snowy Owls are brownish with dark spots and stripes. In the

 winter, their feathers change to a pure white color. Snowy Owls hunt both during the day

 and night. They feed on small mice and other birds, and the eggs of waterfowl, including

 geese and swans.

 **Taiga** : SCORE \_\_\_\_\_\_\_ points

 Douglas Fir

 Scientific Name: *Psuedotsuga pinaceae*

 Habitat: cold, semi-arrid, alpine environment

 Range: all northern hemisphere continents; from the Artic circle to 50 degrees latitude

 north

 Observations: Douglas Firs are one of many different kinds of Conifer trees. Conifers are

 evergreen; they produce cones annually or bi-annually in the fall or late winter. The

 seeds of the Douglas Fir are located in their cones, but they are only present if the cone is

 fertilized. Upon fertilization, the cone dries up and the ripened seeds fall out. Small

 mammals, including rabbits and squirrels, often feed on the seeds.

 Snowshoe Rabbit

 Scientific Name: *Lepus americanus*

 Habitat: swamps, thickets, forests

 Range: Northern U.S.A., Alaska, Canada,

 Observations: The snowshoe rabbit possesses a coat that changes color during the year to

 aid in the animal's camouflage. It is white in the winter and brown in the summer.

 Because of this, the rabbit is known and the varying hare. The rabbit is primarily

 nocturnal, and feeds on twigs and buds in the winter and grass and plants in the summer.

 The population of the Snowshoe rabbit displays marked changes, depending on the

 number of local predators and food availability.

 Golden Eagle

 Scientific Name: *Aquila chrysaetos*

 Habitat: mountainous areas, prairie coulees

 Range: U.S.A., Canada, Northern Europe

 Observations: The golden eagle is a solitary bird, usually found in remote areas. The

 Golden Eagle does not congregate in large numbers. It is an efficient hunter, with keen

 eyesight, and feeds on groundhogs, marmots, foxes, skunks, cats, rabbits, grouse, ground

 squirrels, crows, pheasants, meadowlarks, tortoises, and snakes. It seldom eats carrion.

 Its hunting territory extends up to 162 square miles. The Golden Eagles lives in

 mountainous areas, prairie coulees, and other places where rugged terrain creates

 abundant updrafts. Golden eagles mate at approximately four years of age, and often stay

 paired with the same mate for life. They prefer to nest on cliff faces, although they will

 sometimes build a nest in a tree. The eagle has a length of about 3 feet, weighs up to 15

 pounds, with a wing span of up to 7 feet.

 White-tailed Deer

 Scientific Name: *Odocoileus virginianus*

 Habitat: open brushland, forest, swamps,

 Range: USA, Southern Canada, Central and South America to Peru

 Observations: An adaptable animal, the white-tailed deer is found from near-arctic

 regions to the tropics. It grazes on many kinds of grasses, weeds, shrubs, twigs, fungi,

 nuts and lichens. The white-tailed deer has a long tail, white on its underside, a white

 band across its nose and a white patch on the throat. White-tailed deer do not usually

 congregate in large herds, they are shy, solitary creatures. During the breeding season,

 males engage in savage battles over mates.

 Human Being

 Scientific Name: *Homo sapien*

 Habitat: due to its unique ability to modify its environment, build protective structures

 and don clothing, this organism's habitat includes almost every point on the planet

 Range: Every continent, all ocean surfaces and low-earth orbit.

 Observations: *Homo sapien* is a highly unusual organism, and excels at both positive and

 negative influences on its ecosystem. While it spends much time and expense protecting

 other organisms, and their natural environments, it has also hunted many species to

 extinction. *Homo sapien* has damaged, polluted, and literally destroyed much of the

 planet's eco-system, including rain forests, much of the atmosphere, even the planet's

 delicate ozone protection system. The species has incredibly varied eating habits,

 ranging from every imaginable plant, fruit, and vegetable, to almost every type of animal,

 including cows, chickens, goats, sheep, fish, rabbits, monkeys, horses, dogs, cats, and –

 occasionally - each other. Whether the organism's effects on the planet's climate has

 changed it permanently for the worse remains to be seen - but the survival of every

 organism on the planet, including *Homo sapien's* entire species, hangs in the balance.