

Glossary

Adaptation	Process in which an organism changes over many generations to better fit its habitat
Abdomen	End section of crayfish and other arthropods ; area of vertebrates with digestive organs (belly)
Algae	Many species of simple, nonflowering plants that are generally found in aquatic ecosystems; includes single-celled species, seaweeds, and other varieties, none of which have true stems, roots, or leaves
Antenna	One of two long sensory organs at front of crayfish (antennae : two or more)
Antennule	One of two short antennae
Anus	End of digestive tract; in crayfish, located on lower part of telson
Appendage	A part of an animal (or something else) that projects out; on crayfish, these include walking legs , chelipeds , antennae , and maxillae
Aquatic	Living in or frequenting water
Areola	Space between the two carapace plates
ArcGIS	Popular software created by Esri for developing GIS applications and maps
Arthropod	An animal from the vast phylum <i>Arthropoda</i> with jointed limbs, no backbone, and a body covering made of chitin; includes arachnids like spiders, crustaceans like crayfish, insects, and myriapods like centipedes
Autotroph	Organism that creates its own food from photosynthesis (plants) or chemosynthesis (chemical reactions—done by microbes around hydrothermal vents in oceans)
Bacteria	Single-cell organisms that can have positive and negative impacts; harmful bacteria found in freshwater ecosystems include fecal coliform, <i>E. coli</i> , and enterococci
Behaviors	Actions of an organism (things it does)



Algae and other aquatic plants form the base of freshwater food webs. They are referred to as producers, or autotrophs.



Cyanobacteria (blue-green algae) blooms can be harmful. They are caused by too many nutrients entering the water. When the organisms die, levels of dissolved oxygen drop.

Photo: Tom Archer, NASA

Biodiversity (biological diversity)

The variety of life and the interrelationships among various levels of living things

Biology The study of living things

Burrow Digging for shelter, food, etc.; many crayfish species burrow with their **chelipeds** for shelter and to keep their **gills** moist

Camouflage Ways an organism blends in with its **environment**; includes color, patterns, materials, and light

Carapace Upper protective **exoskeleton** (shell) of cephalothorax

Carnivore Meat eater; animal that eats other animals

Cervical Groove Indentation in carapace between head region and thorax region

Cephalothorax Combined head and thorax; contains the heart, gills, stomach, and other organs

Chela One of two big claws used for defense and food handling (**chelae**: two or more)

Cheliped One of two long legs with a **chela**

Chitin Substance most abundant in the **exoskeletons** of **arthropods** like crayfish; also forms the cell walls of fungi

Chlorophyll Green pigments that allow plants and cyanobacteria to use light for **photosynthesis**

Classification In biology, a method to group and categorize organisms

Climate The average weather conditions of a place, such as temperature and rainfall levels, over a long period of time

Common name A name by which a species is known, rather than its scientific name; can vary by region or country, unlike a **scientific name**

Community All the organisms in a habitat that interact in a complex food web

Competition An interaction between organisms or species for a limited supply of one or more resources (such as food, water, and space) that are used by both

Compound eye Two eyes made up of many small eyes; located on **eye stalks** in crayfish

Conservation measures

Actions to preserve, improve, and/or restore habitat for one or more wildlife species and/or future human use

Conservation strategy

An approach for protecting a particular species, habitat, or ecosystem

Consumer In biology, an organism that eats food created by other organisms; **heterotroph** (animal)

Contiguous Connected; meeting or joining at the border

Crayfish **Crustacean** found in freshwater ecosystems; relative of lobsters, found in saltwater; there are about 600 species of crayfish in the world and over 400 species in North America, some of which are at risk of **extinction**

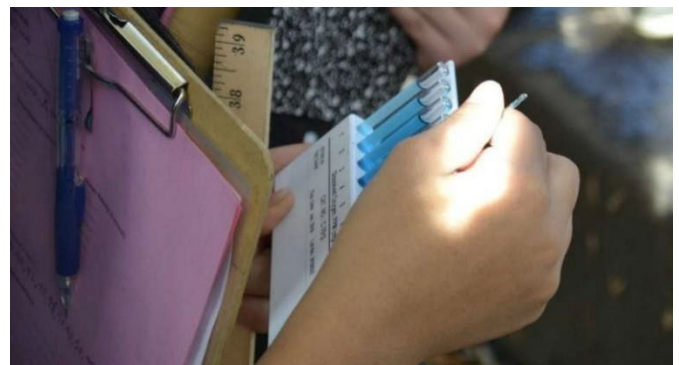
Crustacean	An arthropod in subphylum <i>Crustacea</i> that includes crayfish, crabs, shrimp, and wood lice (pill bugs); most have two pairs of antennae (the smaller called antennules) and other paired appendages near their mouths
Data	Evidence, facts, and statistics collected for analysis or reference
Data analysis	Process of evaluating data using statistics, graphs, etc. to determine trends
Decomposer	Organism that breaks down dead plants and animals, allowing the nutrients to be recycled in the ecosystem
Detritus	Any kind of waste or debris; plant and animal detritus provide important food for crayfish
Digestive tract	Internal organs used by an animal to break down food; starts at mouth and ends at anus
Dissolved oxygen	Oxygen in water that most aquatic animals need to breathe; crayfish do best with dissolved oxygen levels of 2 ppm (parts per million) or higher, although they are more tolerant of low levels of oxygen than some other aquatic organisms, such as salmon
Diversity	A variety of different things; the number of different species, communities, or habitats; can also apply to human communities
Dorsal	Refers to upper side (back) of an organism
Ecosystem	The plants, animals and other living organisms interacting together and with their environment, which includes nonliving things like water, air, and sunlight; often thought of as a functioning unit
Ecosystem services	The life-sustaining functions of healthy, diverse ecosystems, such as flood control, food, and water/air purification
Egg	Round or oval object produced by female animals for reproduction; crayfish females hold eggs in their swimmerets after they have been fertilized by males
Endangered species	An organism that is in danger of extinction throughout all or a significant part of its range
Endangered Species Act of 1973	Federal law designed to protect species at risk of extinction and the ecosystems on which they depend; administered by the U.S. Fish & Wildlife Service and the National Oceanic and Atmospheric Administration
Environment	Surroundings of an organism; includes all the other living and nonliving things
Erosion	The process of moving rock, soil, or minerals by water, wind, or other natural processes; can reduce water clarity and quality in freshwater ecosystems
Evolve	To change gradually over time
Evolution	Process by which organisms change over time through natural selection

Exoskeleton	Outside shell that protects and supports the body of crayfish and other arthropods
Exotic	Not native, introduced
External	Outside of something, such as the exoskeleton of a crayfish
Extinct	A species that no longer exists
Extinction	When a species completely dies out
Eye stalk	One of two columns that attaches to each crayfish compound eye ; allows them to have a larger field of view
Fertilizer	Nutrients , such as nitrogen and phosphorus, added to plants to help them grow; can reduce water quality
Field journal	A place to record observations, illustrations, data, and ideas
Food chain	A series of organisms that depend on each other for food; usually begins with producers (plants), followed by consumers (animals)
Freshwater ecosystem	An area of freshwater, such as rivers, lakes, streams, and ponds; includes all the living and nonliving things that interact
Genital pores	Openings in female crayfish from which eggs exit (and sperm enters)
Gills	Internal feathery organs used to get oxygen from the water
GIS	Geographic information system; way to organize/analyze data rooted in geography
Gonopods	Modified swimmerets of males; used to pass sperm to females
Green gland	One of a pair of organs used to remove waste products and balance salt levels in blood; two openings to them are on the lower side of the head
Groundwater	Underground water in soil or permeable rock, often feeding springs and wells
Habitat	The place or type of site where an organism lives
Herbicide	A chemical designed to control or destroy plants, weeds, or grasses; can reduce water quality in freshwater ecosystems
Herbivore	Animal that eats plants
Heterotroph	Organism that cannot create its own food; eats plant and animal matter
Indicator species	Organism that can provide evidence about the health of an ecosystem by its presence, absence, or change of abundance
Internal	Inside of something, such as the organs inside a crayfish
Instar	Phase between molts for crayfish and other invertebrates
Invasive species	A species, usually nonnative, that spreads and crowds out native species, causing harm to the environment, economy, and/or human health

Invertebrates	Animal species that lack a backbone, such as crustaceans, insects, snails, and worms; includes 97% of all animal species
Larva	Immature stage of certain organisms, such as crustaceans and insects
Macroinvertebrates	Animals without a backbone that can be seen without magnification
Mandible	One of two strong jaws used to crush food
Maxillae	First pair of maxillae helps hold, tear, and pass food to mouth; second pair helps draw water over the gills
Maxillipeds	One of three pairs of feeding appendages; attached to jaws
Metamorphosis	In biology, the process of changing into an adult; crayfish go through incomplete metamorphosis, because they hatch from eggs into miniature crayfish, they grow through about 11 instars (depending on the species) before reaching adulthood
Microscopic	So small as to be invisible without a microscope
Mineral	Any natural, inorganic material that can be extracted from the earth
Mitigation	Steps taken to avoid or minimize negative environmental impacts
Molt (molting)	Process in which a crayfish or other organism sheds its outer layer before growing a new one; shedding their exoskeleton allows crayfish to grow larger
Monoculture	Area consisting almost entirely of a single plant species
Mouth	Opening at start of digestive tract
Mutation	A rare change in the DNA of genes that creates genetic diversity
Native plant	A plant that is naturally found in an area
Natural selection	The process in which organisms better adapted to their environment survive to produce more offspring
Native species	An organism that is naturally found in an area
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Nocturnal	Being most active at night
Nonnative (introduced) species	Species brought into an ecosystem by humans (accidentally or intentionally)
Nutrients	Substances that provide nourishment for growth and life; includes nitrogen and phosphorus applied as fertilizer ; too many nutrients can cause aquatic organisms like algae and bacteria to grow very quickly, and when they die all the dissolved oxygen can be used up
Observation	What one notices or pays attention to using their senses
Omnivore	Animal that consumes food from both plants and animals

Organism	Individual living thing that can react to stimuli, reproduce, and grow
Pesticide	A chemical designed to control or destroy insects or other organisms; can reduce water quality in freshwater ecosystems
pH	Measure of the number of hydrogen ions (which are acidic) in the water compared to the number of hydroxide ions (which are basic); neutral pH is 7, and crayfish prefer a range of 7.5–8.5. Most aquatic organisms prefer a range of 6.5 (slightly acidic) to 9 (a little basic). Macroinvertebrates are generally quite sensitive to changes in pH.
Photosynthesis	The process of using energy in sunlight to convert water and carbon dioxide into carbohydrates and oxygen
Policy	A statement of guiding principles or procedures
Pollution	Substance with harmful effects on the environment
Predation	When one species (the predator) feeds on another (the prey)
Predator	Animal that hunts and eats other animals
Prey	Animal hunted by other animals
Producers	In biology, organisms that produce food in an ecosystem ; plants
Protocol	System of rules that explains procedures that must be followed
Red swamp crayfish (<i>Procambarus clarkii</i>)	The most common invasive crayfish species in the world with red to black coloration and elongated chelipeds with tubercles ; may be expanding its range in the Great Lakes region
Rehabilitate	To make habitable or useful again; to return to original condition
Reintroduction	To return members of a species to their historical range
Restoration	The process of returning a degraded or former habitat to a healthy condition
Riparian area	The important strip of habitat along rivers and streams where water is more abundant
Rostrum	Beak-like structure above eyes; also called the supraorbital spine
Rubric	A document that explains expectations for an assignment and the components that will be included in the evaluation of the assignment
Saline	Containing salt; some crayfish can live in moderately saline water
Scavenger	Animal that feeds on dead animal or plant matter
Scientific name	The two-part Latin name assigned to a species; system established by botanist Carl Linnaeus in the 1700s
Sediment	Loose sand, clay, silt and other soil particles that settle on the bottom of a body of water
Species	A group of organisms that share a unique set of characteristics and that (usually) can reproduce among themselves

Species diversity	The number and variety of species present in a community, as well as the relative abundance of each species
Sternum	Lower protective plates of crayfish abdomen
Stewardship	Caring for our natural resources in a way that preserves them for future generations
Structure	In biology, the shape or arrangement of parts of an organism
Swimmerets	Five pairs of short appendages on bottom of crayfish abdomen used for swimming; also used by females to hold eggs and young crayfish
Tail fan	The telson and four uropods of crayfish; used for swimming backwards—fast!
Telson	Center section of tail fan
Tergum	Upper protective plates of abdomen of crayfish
Threatened species	A species likely to become endangered in the future throughout all or a significant part of its range
Topography	The earth surface features of a region, such as mountains, plains, or hills
Toxic substances	Pollution such as ammonia, metals, and oil-based products
Temperature	Amount of heat energy contained in a substance (such as water or air); more oxygen can dissolve in cooler water and be available for animals to breathe
Turbidity	Measure of amounts of solids in water; provides good measure of water quality
Tubercles	Bumps found on some crayfish species
Uropods	Two pairs of appendages on tail fan that surround the telson
Ventral	Refers to underside of an organism
Vertebrate	Animal with a backbone; includes mammals, reptiles, birds, fish, and amphibians
Walking legs	Four pairs of jointed legs; the gills are attached to them
Water clarity	Measure of how far down light can travel in water
Water quality	Measure of water's ability to support life; includes its physical, biological, and chemical characteristics
Watershed	The land area that drains into a river, stream, or other body of water
Weed	Any plant out of its native habitat that is unwanted and has an ability to spread



A student tests for levels of dissolved oxygen, a key component of water quality. Crayfish and other aquatic life depend on dissolved oxygen for survival.

Photo: IdaH2O