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EC98-787 Glossary of Ecosystem Terms

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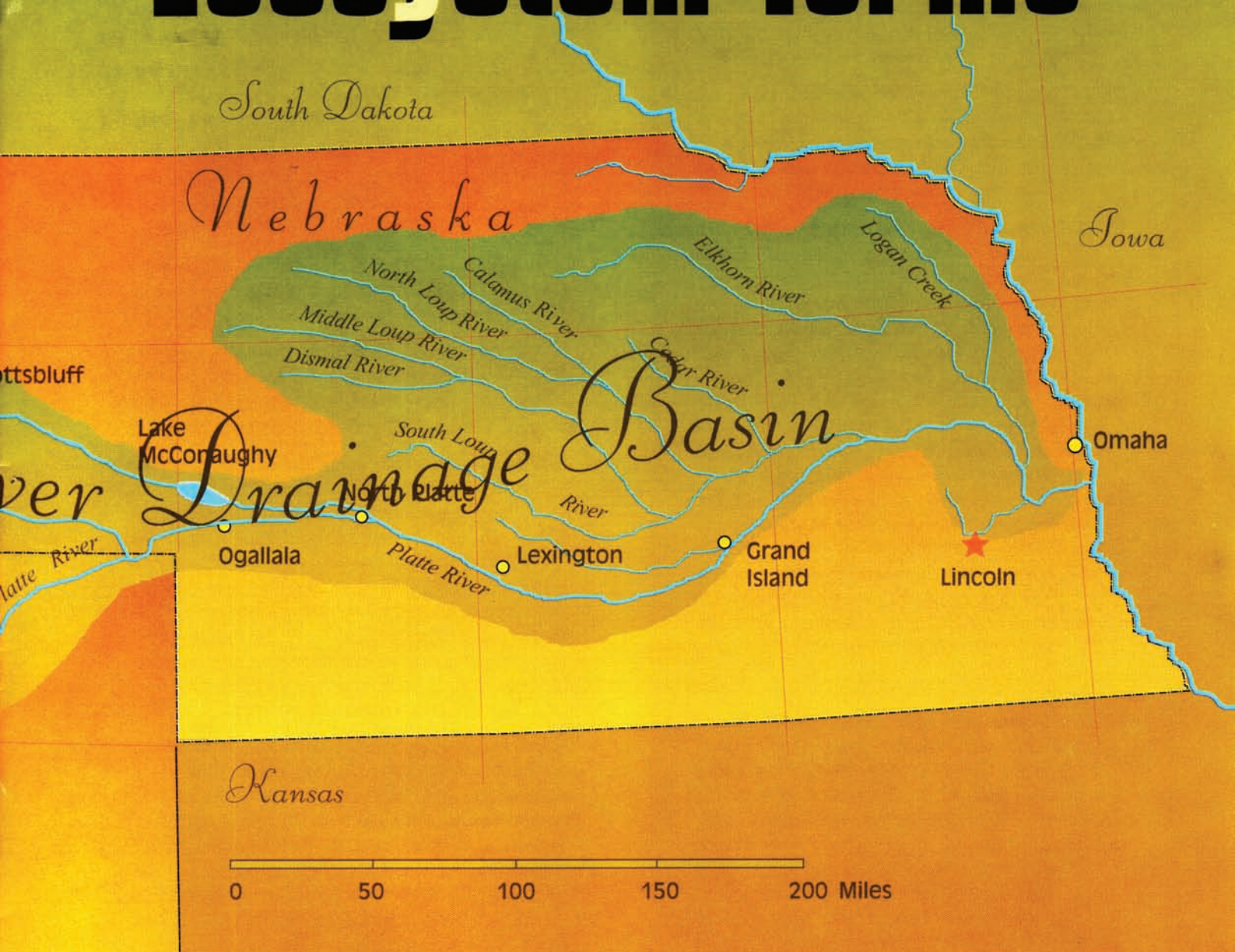

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Glossary of Ecosystem Terms

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Abiotic: Non-biological, non-living components of the **Ecosystem,** including chemical and physical factors such as the availability of nitrogen, temperature and rainfall.

Abstractive Use: A use of water which makes it temporarily unavailable as a resource (e.g., in a cooling tower).

Acre-foot: The amount of water it takes to cover a level acre of land (43,560 square feet) to a depth of one foot; about 43,560 cubic feet of water or 325,851 gallons.

Acre-yield: The amount of water obtained from one acre of an **Aquifer;** also the amount of anything obtainable from one acre of the land that produces it.

Adaptation: An alteration in the behavior and/or physical characteristics of an **Organism** or **Species** which enables it to adjust to permanent changes in its **Environment,** improving its chance of survival.

Adaptive Management: A **Habitat** management approach under which activity impacts are monitored and evaluated according to goals established for a targeted **Species** and associated habitat. The adaptive management approach requires evaluating information gained through **Biological Monitoring** and research activities. Habitat managers and field biologists also periodically examine whether habitat management practices and program goals and objectives should be modified or continue unchanged.

Aggregation: A usually temporary gathering of many individuals of the same **Species** at a single geographic location. An aggregation differs from a herd or flock because it is circumstantial, not structured. Aggregation has little or no social organization and is environmental, rather than social. An example of an aggregation is birds collecting in one spot before and during their seasonal **Migration**.

Agroecosystem: An **Ecosystem** under management by humans to produce food, fiber and/or forest products. An agroecosystem can include cropping systems agroforestry systems, and integrated crop and livestock systems.

Alluvium or **Alluvial Soil:** Silt, sand, gravel or other sediments transported and deposited by the action of flowing water. An example of alluvial deposit is the *alluvial plain*, made by filling in a river valley with sediment. See **Flood Plain**.

Anthropogenic Effects: Both the positive and negative effects of human activities on the natural world. Examples of anthropogenic effects include **Pollution, Habitat** destruction and **Restoration**, preservation of **Threatened Species**.

Aquifer: Any geologic formation of porous materials capable of receiving, storing and transmitting water beneath the surface of the ground. Aquifers are generally composed of buried layers of gravel, sand, limestone, sandstone or **Alluvium**. Water held in aquifers (**Groundwater**) is obtained for human use by digging and pumping from wells or tapping SPRINGS or SEEPS. A *confined aquifer* (also known as an *artesian aquifer*) is bounded above, and perhaps below, by a confining layer of relatively **Impermeable** soil or rock material. The water is confined under pressure, similar to water in a pipeline. An *unconfined aquifer* consists of relatively porous natural material that transmits water readily and does not confine water. The upper surface of an unconfined aquifer (**Water Table**) fluctuates with the addition or subtraction of water. See **Permeability, Porosity**.

Avian: Of, relating to or characteristic of birds.

Backwater: Chutes, lakes, bays and **Sloughs** which are connected to a river only at their outlets. During periods of high flow, these entire areas may be submerged. Also, any body or accumulation of water resulting from the backing up of water in its course by an obstruction or an opposing current, especially when the water overflows into lowlands or forms a body fed by a side channel from the main channel. Backwater areas are good for hunting, fishing and wildlife habitat. See **Flood**.

Base Flow: The part of a stream's discharge not attributable to overland **Runoff** from precipitation or melting snow. Usually sustained by **Groundwater Discharge**, base flow remains steady from day to day; though it varies seasonally. Base flows are

most evident during low flow in late fall and winter.

Baseline: A known quantity used as a control for further research. Compare to **Benchmark**.

Baseline Monitoring: A designed surveillance system whereby continuous or periodic measurements and recording of existing and changing conditions can be compared with future observations.

Benchmark: Any carefully established data that may be used as a comparison to new data. **Biological bench-marking** is the use of plant or animal **Species** to measure **Pollution** based on assessments of population level and fitness, against which changes can be evaluated. See **Biological Indicator, Biological Monitoring.** Compare to **Baseline.**

Beneficial Use: In general, a use of the **Environment,** or some part of it, that benefits a human population. More specifically, a use of water that confers monetary or other definable advantages on the user (see **Water Rights**). Beneficial use is traditionally defined in broad statutory or constitutional terms as "the basis, the measure and the limit" of an appropriative water right. Two principal criteria for beneficial use: the water must be diverted from its natural source and the amount of water used must be consistent with the amount customarily used in the same region for the same purpose. All states recognize domestic, municipal, industrial and agricultural use as beneficial. Uses that may or may not be classified as beneficial are stock watering, power generation, mining, recreation, fish and wildlife, groundwater recharge, **Pollution** control, navigation and aesthetics.

Benthic: Relating to the bottom underlying a body of water; for example, bottom-dwelling mollusks are benthic organisms.

Berm: A narrow, usually man-made, bank of earth surrounding ponds or waste-disposal sites. Berms may also run along hillsides or form the outside edges of canals or **Irrigation** ditches.

Biodiversity or **Biological Diveristy:** The variety and variability of living organisms — all **Species** of plants, animals and microorganisms and their **Ecosystems**. Biodiversity is generally described three ways: diversity of species, the different types of living organisms; diversity of ecosystems, as well as the variety of ecological processes and interrelationships within each type of system; and diversity within species, as well as the variety of genetic information held in the genes of individuals of a species.

Biological Indicator: *See* ***Indicator Species***.

Biological Monitoring: The direct measurement of changes a habitat's biological status. The measurement is based on evaluation of the number and distribution of individuals or **Species** before and after a change. See **Indicator Species**.

Biomass: The total mass of all living things in a given **Environment** or sample. Also used to indicate the total mass of all living members of a single **Species** in a given environment or sample the term is sometimes extended to include recently living matter that has not yet decayed.

Biotic: The biological component of the ecosystem, consisting of populations of living things — plants, animals and microorganisms — and the relationship between organisms and the environment. Compare to **Abiotic**.

Braided River: A river channel in which loose, unconsolidated sediment — usually deposited by the stream itself — has created a series of bars and islands which divide, reconnect and interweave channels which appear from above, like the strands of a braid. Braided channels are characteristic *of areas of recently deposited* ***Alluvium*** *with a* broad **Flood Plain** and shallow water.

Buffer Strip: An area of restricted management along an environmentally sensitive linear landscape feature such as a stream, trail or river. The purpose of the buffer strip is to protect the environmentally sensitive area from management activity impacts.

Carriage Water: The amount of water over and above a specified **Duty of Water** which must be diverted into a canal or ditch to make certain a specified amount reaches its destination. Because water is necessarily lost to **Evaporation** and **Seepage** between the diversion and the point of use, diverting a larger amount of water than needed assures the desired amount will arrive at the point of use. The extra water "carries" the desired amount to its destination. In most states, carriage water is made part of a diverter's **Water Right** by measuring the amount of water to be appropriated at the point of diversion rather than at the point of use.

Carrying capacity: The optimum population size (maximum number) of a given **Species** which a given **Ecosystem** can support. Carrying capacity also describes the level of use at a given level of management a natural or man-made resource can sustain with an acceptable degree of deterioration of the resource (e.g., the maximum level of recreation use, in terms of numbers of people and types of activity, that can be accommodated before the ecological value of the area declines.)

CFS: See **Cubic Feed Per Second**.

Channel: *An open conduit which periodically or* continuously contains moving water. In a narrow

valley, the channel may include the entire valley floor, but ordinarily it occupies only a small fraction of the valley.

Climax Community: The final stage of community **Succession**, when stability has been achieved and the **Ecosystem** is no longer changing. The climax state is characterized by complexity and interdependence. Compare to **Sere**.

Coevolution: The process by which two or more independent **Species** develop complimentary characteristics, often to the point where they are no longer fully independent.

Commons: Any resource used in common by many people, such as air, water and land.

Community: The naturally occurring group of organisms occupying a common **Environment** at a particular stage of a **Succession**. The term is a general one covering groups of various sizes and implies not only the numbers of species present, but the often complex patterns of dependency and other relationships among them. In a closed community, colonization by new species is precluded because all the **Niches** are occupied. Compare to **Ecosystem**. See **Climate Community; Sere**.

Compatible Use: Simultaneous activities on one same piece of land, meeting the land-use objectives for both. See **Conflicting Use, Complimentary Use**.

Complex: The meeting of several communities in which each **Community** is characterized by its own mix of species. This mix may or may not differ from one community to another (e.g., several different stages in a SERE may be found). The communities are related to one another by certain shared species.

Complimentary Use: A primary use for a piece of land which improves the land's ability to serve a second, simultaneous use. Compare **Compatible Use, Conflicting Use, Incompatible Use**.

Conflicting Use: A use for a piece of land that diminishes its ability for other uses. Although the two uses exist simultaneously, neither will be able to expand to its full potential. Compare to **Incompatible Use**. See **Compatible Use**.

Conjunctive Use: See **Integrated Water Management**.

Conservation: Any strategy to reduce the depletion of resources, especially through increased efficiency, reuse, recycling, replacement and decreased demand. Resource use is planned and managed to secure the continuity of the resource supply while maintaining, and possibly enhancing, its quality, value and diversity. The resources may be natural or man-made (e.g., historic buildings, landscapes produced by farming). Conservation strategies involve managing resources to assure that it will continue to provide maximum benefit to humans. One example: the ability to store a resource for later use, such as water in reservoirs. In wildlife management, conservation is all methods and procedures designed to increase and maintain the number of individuals within species and populations of wildlife up to the habitat's optimum **Carrying Capacity**. *Nature conservation* is the application of this concept to **Flora, Fauna** and physiographical features.

Conservation Biology: A discipline devoted to the threats of decreasing **Biological Diversity**. Conservation biology investigates the **Anthropogenic Effects** on biological diversity in order to develop practical approaches to maintain it. Approaches generally involve compromising human needs with conservation strategies.

Conservation Easements: Legal, binding, restrictions on a property. Some, not all, of the owner's rights, such as the right to develop, are surrendered to a conservation organization or governmental organization for the purposes of long-term land protection. Tax benefits and/or monetary payments are often involved.

Controlled Burn: An intentionally set fire lit when specific conditions of wind speed, temperatures, and soil and vegetation moisture are met so the burn will proceed slowly and kept under control. The normal time for controlled burning is during calm, cool weather, just after the rainy season. See **Prescribed Burn**.

Cost-benefit Analysis: A method of estimating the economic, social and environmental benefits and cost of a proposed action, such as the construction of a dam or **Habitat Restoration**. Since 1936, federal law has required benefits to exceed costs for water projects such as dams, levees and canals. This seemingly straight-forward process is complicated by two factors: the need to include the cost of money (e.g. interest rates) and the difficulty in determining cost and benefit dollar values. With cost-benefit analysis it is sometimes difficult to measure environmental benefits and costs.

Critical Habitat: The **Habitat** essential to the survival of a **Species** of plant, animal or other **Organism**. Critical habitat includes all air, land and water space that the species in question requires to carry out its normal living patterns, as well as other living things utilized by the species for food, shelter or other necessary activities. The **Endangered Species Act** provides for the designation and protection of critical habitat for all **Endangered** or **Threatened Species**.

Critical Population Size or **Minimum Viable Population:** Population level below which a **Species**

cannot successfully reproduce and sustain a viable gene pool. This is the smallest number of individuals necessary to prevent the population from going extinct. See **Extinction**.

Critical Thermal Maximum: The temperature at which locomotor activity becomes disorganized and an **Organism** loses its ability to escape life-threatening conditions. For fish, critical thermal maximum is typically characterized by the inability to right itself and the onset of muscular spasms.

Cubic Feet per Second (CFS): A measurement describing flowing water or discharge representing the amount of water that would flow in a stream one foot wide by one foot deep and moving at a rate of one foot per second.

Decreaser Plant Species (Decreaser): Range plants that decrease in population with overgrazing. They are palatable to livestock.

Deep Soil Sampling: A technique used to identify the amount of nitrogen in the **Soil Profile** available for deep-rooted plant use. Higher levels of available nitrogen in the deeper soil profile permits lower application of commercial fertilizer and therefore reduces the nitrogen that may **Leach** into the **Groundwater**. The use of deep soil sampling has increased in Nebraska since 1989 and may be one of the factors that has led to changes in nitrogen application rates over time. See **Nitrogen Management**.

Demography: The study of a population's age, sex structure, geographical distribution, rate of change of size and other characteristics.

Denitrification: The microbial conversion of nitrate Nitrogen (N) to gaseous nitrogen in anaerobic (oxygen poor) conditions.

Discharge: The volume of water flowing past a given point in a stream **Channel** in a specific amount of time.

Discharge Area: An area where **Groundwater** moves toward or is delivered to the soil surface. Groundwater can flow as **Springs** or **Seeps** contribute **Base Flow** to streams or provide supplemental water for plant use.

Disclimax Community: A **Subclimax Community** that endures for a long time and is prevented from becoming a full **Climax Community** by human or other animal interference.

Duty of Water: The maximum amount of water usable by the holder of a **Water Right** under the doctrine of prior appropriation. Duty of water limitations are set to prevent water overuse by irrigators (see **Irrigation**). These limitations are usually set at what is felt to be the maximum amount of water that crops can use and delivered at the maximum rate at which it can be assimilated, considering the climate of the region, the soil of the growing site and other factors. See **Beneficial Use**.

Dynamic Equilibrium: A state of adjustment between or among opposing or divergent elements, characterized by continuous change, movement, advance or expansion. The term is used to describe the ability of **Ecosystems** to return to their previous state (resilience) and to resist change (inertia).

Ecological Risk Assessment: The process of defining and assigning magnitudes and probabilities and determining the acceptability of, adverse effects of human activities or natural catastrophes on nonhuman **Biota**. This process involves identifying hazards and using measurement, testing and mathematical or statistical models to quantify the relationship between the event and its effects.

Ecology: The study of the relationships of living things to **Biotic** and **Abiotic** factors. This term is used to refer to the complex, interconnected web of relationships among **Organisms** within an **Environment** or **Ecosystem.**

Ecosystem (Short for ecological system)**:** The total physical and biological **Environment** in a given area, with an emphasis on the relationships and connections. Changes in any one component of the system results in changes in others as the system adjusts to the new conditions (see **Dynamic equilibrium**). Ecologists tend to think of ecosystems as sets of **Niches**, rather than as sets of specific plants and animals. A *mature ecosystem* is an ecosystem near the climax stage of **Succession**, typically characterized by high species diversity and high stability (see **Climax Community**). An *immature ecosystem* is an early successional community, typically characterized by low species diversity and low stability. Compare to **Community**.

Ectothermic: Having a body temperature determined primarily by environmental temperature; cold-blooded. Compare to **Endothermic**.

Endangered Species: As defined in the **Endangered Species Act**, a **Species** of plant or animal in imminent danger of **Extinction** over all or a significant portion of its **Range**. A species may be listed as endangered for any of the following reasons: the present or threatened destruction, modification or curtailment of its habitat or range; overutilization for commercial, recreational, scientific or educational purposes; disease or predation; the inadequacy of existing regulatory mechanisms; or other natural or manmade factors. Compare to **Threatened Species**.

Endangered Species Act (87 Stat. 884): A law, signed December 28, 1973, which requires the **U.S. Fish and Wildlife Service** to list **Endangered** and **Threatened Species**, creates federal protection of the **Habitat** of listed species, provides money to purchase this habitat, and enables the United States to help other nations protect their endangered and threatened species.

Endangered Species Recovery: The process by which the decline of an **Endangered** or **Threatened Species** is arrested or reversed. The ultimate purpose of the U.S. Endangered Species Program is to recover the listed species to levels where protection under the **Endangered Species Act** is no longer necessary.

Endemic Species: A plant or animal **Species** which lives naturally in a particular, and limited, geographic area. Compare to **Indigenous Species, Exotic Species**.

Endothermic: Having a body temperature maintained by internal chemical processes; warm-blooded. Compare to **Ectothermic**.

Environment: The total setting in which a given object rests or a given action takes place, including all physical, chemical, biological, physiological and psychological factors. Used without a modifier, the term "environment" generally means the *natural environment*, or all things in an area or region that are not human-made. Compare to **Ecosystem**.

Environmental Corridor: A narrow strip of relatively undeveloped land running through a developed region, such as a **Buffer Strip** along a stream or trail.

Environmental Impact Assessment (EIA) or **Environmental Assessment (EA):** The identification and evaluation of the environmental consequences of a proposed action, as well as those actions intended to minimize adverse effects.

Environmental Impact Statement (EIS): A written document prepared by a federal agency or private firm under contract to a federal agency detailing what effects the proposal will have on the **Environment**. Under the terms of the **National Environmental Policy Act**, all "major Federal actions significantly affecting the quality of the human environment" require the preparation of an EIS. An EIS must include: the environmental impacts of the proposed action; any adverse environmental effects which cannot be avoided should the proposal be implemented; alternatives to the proposed action; the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and any irreversible and irretrievable commitments of resources which would be involved in the proposed action. Because a preferred alternative must be identified, the EIS encourages federal agencies to make well-informed, environmentally-sound decisions.

(U.S.) Environmental Protection Agency (USEPA): The agency charged with administering federal laws dealing with pollution control and cleanup, particularly those regarding air pollution, hazardous waste, microcontaminants and the protection of surface waters and **Groundwater**.

Erosion: The wearing away of land surface by various natural processes, such as moving water in the form of seas, rivers, rain, glacial ice and melting snow. Accelerated erosion is the unusually high rate of soil erosion by water and wind as a result of man's activities.

Eutrophication: The over-enrichment of a water body with nutrients, resulting in the excessive growth of **Organisms** and the depletion of oxygen. Under natural conditions, eutrophication is an extremely slow process, normally requiring a decrease in the depth of the lake through the settling of sediment, erosion of the outlet or both. Man-caused eutrophication (*cultural eutrophication*), however, can be quite rapid. Some of the major causes of cultural eutrophication include: dumping sewage and other nutrient-rich substances into the water; **Sedimentation** from agricultural activities; the use of chemical fertilizers on fields or lawns from which nutrient-rich **Runoff** enters the water body; the concentrated grazing of livestock; and the increase of water temperatures through power-plant cooling, reservoir construction, deforestation or other activities whereby the water is heated directly or by more exposure to the sun.

Evaporation: The physical process by which a liquid or solid is transformed to the gaseous state. See **Evapotranspiration**.

Evapotranspiration (ET): The combined processes by which water is transferred from the earth's surface to the atmosphere — the sum of **Evaporation** of water from soil and open water and **Transpiration** of water from plants. The rate of evapotranspiration for a given area at a given time, called *ET rate*, varies greatly with temperature, wind speed, type of vegetation and relative humidity.

Exotic Species: A non-native **Species** of plant or animal, Exotic species are often brought into a region by human activity, either accidentally or purposefully but may also be carried in by natural forces, such as storms or floods. Compare to **Endemic Species, Indigenous Species**.

Extinction: Complete eradication of a specific group of animals or plants. When the word is used without

a qualifier, total extinction of a **Species** is what is meant. The ultimate cause of all extinctions: a change or series of changes in the group's **Environment** to which it cannot adapt. The most common cause of extinction, either natural or man-caused, is the destruction or alteration of **Habitat.** A contributing factor is often an animal's susceptibility to extinction, especially when requirements for a strictly limited set of environmental conditions have developed. *Accelerated extinction* is the elimination of species caused by human activities. See **Endangered Species, Threatened Species, Endangered Species Act**.

Extinct Species: A **Species** of animal or plant with no living members. See **Extinction**. Compare to **Threatened Species, Endangered Species, Keystone Species**.

Extirpated Species: A species of animal or plant that has no living member in a given area (e.g., county, state or watershed), but has not become extinct over its entire range. See **Extinction**. Compare to **Extinct Species.**

Fauna: Animals, specifically animals within a particular set of boundaries. The boundaries may be geographical, temporal or biological. For example, fauna of Nebraska or avifauna (see **Avian**). See **Flora.**

Federal Energy Regulatory Commission (FERC): A quasi-independent federal regulatory agency housed within the U.S. Department of Energy and charged with overseeing siting and rate-setting activities for all energy production and distribution facilities falling within federal jurisdiction. FERC is governed by a five-member board whose chairman reports directly to the Secretary of Energy. It is considered a judicial body, and hearings before it on permit applications follow strict legal procedures.

(U.S.) Fish and Wildlife Service (USFWS): An agency within the U.S. Department of Interior charged with conserving and managing the nation's wildlife resources, including birds, game and nongame animals, fish and some marine mammals. The agency's principal role is managing the National Wildlife Refuge System (see **Wildlife Refuge**); however, it also enforces federal wildlife laws (including the **Endangered Species Act**), administers wildlife research programs and provides both technical expertise and field assistance to wildlife managers.

Fledge: To grow the plumage necessary for flight; also to take care of a young bird until it is ready to fly. The *fledge ratio* is the number of fledged chicks per nest. For example, if a total of 10 piping plover nests result in the production of eight juveniles, the fledge ratio is 0.8 fledglings per nest.

Flood: An unusual accumulation of water above the ground caused by heavy rain, melting snow or rapid **Runoff**. Flooding is a temporary condition of partial or complete inundation of normally dry land areas. Although floods may be caused by immediate runoff from urban areas, they also occur naturally. A *100-year flood* is the instantaneous magnitude of river discharge that, on the average, can be expected once in 100 years at a specified location on a stream. A 100-year flood has a probability of 0.01 (1 percent) in any given year, but a 100-year flood can occur more than once in any given 100-year period. A 100-year flood can occur two years in a row.

Flood Plain: Low-lying, nearly level region along a river or stream that is periodically subject to being flooded by water from any source. Flood plains are mapped by using past rainfall and **Runoff** data, with extrapolations based on changes in the character of the stream's **Watershed** (such as increased concrete cover from urbanization). Several different flood plains are usually designated in a given area, differentiated on the basis of the expected frequency of flooding (e.g. 100-year flood plain). Flood plains are common sites for human habitation and farming. See **Flood, Floodway, Riparian Zone.**

Floodway or Regulatory Floodway: The portion of a **Flood Plain** kept open to actively convey the large discharges of flood water. This area remains dry when the river is not flooding. Natural floodways can pose a problem if unrecognized because structures built in them will be damaged or destroyed during floods.

Flora: Plants, specifically plants within a particular set of boundaries. The boundaries may be geographical, temporal or biological. For example, flora of the Great Plains. See **Fauna**.

Fluvial: Of, or pertaining to, flowing water; growing or living in flowing waters; produced by flowing waters.

Flyway: A pathway taken by migrating birds (e.g., waterfowl) from their nesting grounds in northern North America to their overwintering ground in southern parts of the United States. Flyways are broad, well-defined clumpings of **Migration Corridors**. Their heavy use by waterfowl means it is especially important to preserve **Wetlands** along them (see **Wildlife Refuge**). Four major flyways have been mapped across the United States, one of which, the Central Flyway, passes through Nebraska.

Food Chain: A set of predator-prey relationships (see **Predator, Prey, Habitat**) through which the food energy of an **Ecosystem** flows. A food chain always begins with some type of plant and ends with a top predator. Because energy is lost at each link of the chain, no food chain is very long. Part of a bigger network called the **Food Web**.

Food Web: Complex intermeshing of individual food chains in an ecosystem, representing the total pattern of pathways along which food energy may flow through an **Ecosystem.** The food web recognizes **Predators** may have several different types of **Prey**, and that prey and predators may also prey on each other. By tracing food webs, it is possible to get a sense of the stability of an ecosystem (the more complex the food web, the more stable the system) and to identify points where the system is most vulnerable to change or destruction. It is also possible to see where energy is being lost from the system and to determine from that the **Carrying Capacity** of the system for each species active in it.

Forage: To search for food. Also the food obtained by animals through browsing or grazing. Forage is generally vegetable matter — grasses, **Forbs** and berries — but the term is occasionally extended to include grubs and other **Invertebrate** animals which are found rather than hunted.

Forb: Any broad-leaved, flowering herbaceous plant, other than grasses or grass-like plants.

(U.S.) Geological Survey (USGS): An agency within the U.S. Department of the Interior created by Congress in 1879 and charged with inventorying and mapping the nation's soil, water, land, biological, and mineral resources.

Geographic Information System (GIS): Computer programs linking common map features (such as roads, town boundaries or water bodies) with related information, such as type of road surface, population, type of agriculture, type of vegetation or water quality information. These properties may be represented as several different informational layers. Each feature is then linked to a position on the graphical image of a map. Layers of data are organized to be studied and to perform statistical analysis. The computer system facilitates the storage of, checks, integrates, manipulates, analyses and displays this data.

Groundwater: Underground water found in the pores, voids, fractures and other spaces between soil particles and in rock strata. The term is generally reserved for water lying at or below the **Water Table,** the level below which the ground is saturated. Groundwater is held in porous rock or soil bodies called **Aquifers**; is the source of the water which flows from **Springs** and **Seeps**; and provides **Baseflow** for permanent streams. It is free to move by gravity, either downwards toward the **Impermeable** layer or by following a water pressure gradient.

Growth Factors: Abiotic and **Biotic** conditions which must be present if an **Organism** is to grow to potential.

Habitat: The area where an animal or plant resides and finds favorable environmental conditions, including particular types of food, water, cover, space and other factors. More than simply a place or vegetation, habitat is the sum of the resources needed by an **Organism.** This includes migratory stopovers, breeding areas and wintering grounds. Organisms are said to "prefer" their proper habitat.

Habitat Preservation: To keep and reserve **Habitat.**

Herbaceous: Plant growth relatively free of woody tissue.

Hydric Soil: A soil that is saturated, flooded or ponded long enough during the growing season to develop conditions that do not require oxygen and favor the growth and regeneration of **Hydrophytic Vegetation**. Hydric soils suggest the presence of **Wetlands**.

Hydrograph: A graph relating stage, flow, velocity or other characteristics of water **Discharge** and depth within a given time span.

Hydrologic Cycle: The constant movement of water above, on and below the Earth's surface, responsible for all freshwater features of the earth, including lakes, streams, rivers, **Springs** and **Seeps.** Processes such as precipitation, **Evaporation,** condensation, **Infiltration** and **Runoff** comprise the cycle. Within the cycle, water changes forms to respond to the Earth's climatic conditions. The hydrologic cycle depends on water's ability to exist in both gaseous and liquid forms at earth-normal temperatures and pressures.

Hydroperiod: The seasonal pattern of a wetland's water level, recognized as a hydrologic signature. A wetland's hydroperiod defines the rise and fall of its surface and subsurface water. See **Wetland.**

Hydrophytic Vegetation: The sum total of macrophytic plant life growing in water or on a **Substrate** and periodically deficient in oxygen as a result of excessive water content. See **Macrophyte.**

Hyporheic Zone: The underground aquatic habitat beneath rivers and **Flood Plains** where the movement of water between the alluvium provides conditions suitable for animals, such as some

invertebrates, to complete some or all of their life cycle.

Impermeable: Generally describes a material restricting the vertical flow of water in soil. Clay or other dense soil layers are often impermeable. See **Permeability.**

Incompatible Uses: Two or more activities that cannot take place on the same piece of land at the same time. Compare to **Conflicting Use, Compatible Use, Complimentary Use.**

Increasor Plant Species (Increaser): Plant species of the original vegetation that increase in relative amount, at least for a time, under overgrazing. Generally they are less palatable to livestock.

Indicator Species: A **Species** or **Organism** surveyed or sampled for analysis because it is believed to represent the **Biotic Community,** some functional or taxonomic group (see **Taxonomy**) or some population that cannot be readily sampled or surveyed. An indicator species is monitored (see **Biological Monitoring**) to evaluate environmental quality or change. The health of an indicator species reflects upon the health of an entire community, serving as an early warning that a community or an **Ecosystem** is recovering or being degraded.

Indigenous Species: A plant or animal **Species** that inhabited a particular geographic area prior to human disturbance. Compare to **Endemic Species, Exotic Species.**

Instream Flow: Water in a stream or river. Instream flow may be maintained for **Beneficial use.**

Instream Flow Right: A **Water Right,** held by a government body under the doctrine of **Prior Appropriation,** to maintain water in a stream for fish and wildlife, recreation, and other **Instream Uses.** In Nebraska, only the Nebraska Game and Parks Commission or a Natural Resources District may hold an instream flow right.

Instream Use: A **Beneficial Use** of stream water requiring it to be left in the streambed as natural flow rather than diverted. Instream uses in Nebraska include wildlife and fisheries preservation, recreation and municipal drinking water well recharge.

Integrated Water Management: recognizing and understanding the interrelationships between hydrologically connected surface water and groundwater and managing both resources consistent with that understanding.

Integrated Wildlife or Species Management: Control of populations through the reintroduction of natural **Predators, Habitat** improvement, reduction in habitat destruction, establishment of preserves, reduced pollution, managed hunting and captive breeding.

Invader Plant Species (Invader): Plant species absent in undisturbed portions of the original vegetation which invade under disturbance or continued overgrazing; also referred to as a **Weed Species.**

Invertebrate: Any animal without a backbone. The invertebrates include insects, arachnids, mollusks, crustaceans, starfish, sea anemones, and virtually all other animals except for fish, amphibians, reptiles, birds and mammals. Opposite of vertebrate.

Irrigation: The application of water to soil to assist in plant growth. Irrigation application systems are generally classified into four categories, based on how water is applied: *surface irrigation systems* which distribute water on the surface of the soil by gravity; *sprinkler irrigation systems* discharge water through the air from sprinkler heads or spray nozzles mounted on pressurized distribution pipes; *microirrigation systems* distribute water in closely spaced, pressurized conduits; and *subirrigation systems,* which require raising the **Water Table** so that capillary action will move water upward into the soil root zone.

Keystone species: A **Species** that, when removes from its **Ecosystem,** leads to a series of **Extinctions** in that system. A keystone species is said to control the structure of its ecosystem.

Lacustine: Pertaining to wetland habitats greater than *20 acres in size and 2 meters in depth at low water,* such as lakes and impoundments. See **Palustrine**

Land Use Planning: The process by which governments regulate and offer recommendations for managing the private use of land. It serves as a guide for residential, industrial and commercial development and can be used to preserve farmland, recreational areas, wetlands, scenic views, watersheds, aquifer recharge zones and wildlife habitat. Land use planning may also serve as a method of establishing priorities among claims and potential uses of land.

Leaching: Natural processes by which salts and other soluble materials are removed from soil by water.

Lentic Ecosystem: A still-water **Ecosystem** such as a lake, pond, or marsh. See **Lotic Ecosystem.**

Limiting Factor: A chemical or physical factor that limits the growth, abundance or distribution of the population of a **Species** in an **Ecosystem** and determines whether or not an organism can survive. In many ecosystems, precipitation is a limiting factor.

Losing Stream: A stream or portion of a stream experiencing **Instream Flow** decrease. Loss may be caused by **Seepage** through the streambed, by **Evaporation** from water surface or by uptake by vegetation in contact with the stream **(Transpiration).**

Lotic Ecosystem: Flowing water **Ecosystems** influenced by water movement in one direction, such as in a river. Compare to **Lentic Ecosystem.**

Macroinvertebrate: Any non-vertebrate **Organism** large enough to be seen without the aid of a microscope which lives on, in or on the bottom of a body of water. A **Benthic** *macroinvertebrate* lives close to the bottom of a body of water.

Macrophyte: Large aquatic plants, such as water lilies (see **Plankton**).

Migration: Movements animals carry out regularly, often between breeding places and winter feeding grounds.

Migration Corridor: A localized, specific route used by migrating birds or other animals.

Monoculture: Cultivation of one plant species, such as corn, to the exclusion of all other crop types. Because they are highly simplified **Ecosystems,** monocultures lack most of the built-in feedback loops common in natural systems, and must have the functions normally served by these loops provided instead by the crop grower. Methods, such as cultivation and the use of herbicides and pesticides, are used to control competitors. Monocultures are vulnerable, allowing any diseases that catch hold in the stand to spread rapidly. Disadvantages of monoculture must be balanced against the advantages of harvest simplification and management concentration, among others.

National Environmental Policy Act (NEPA): Federal U.S. law passed in 1969, establishing a framework for policy decisions regarding action that will significantly effect the environment. The act's most important provision, is section 102(2)(c), requires federal agencies to file an **Environmental Impact Statement** on all "proposals for legislation and other major Federal actions significantly affecting the quality of the human environment".

National Wildlife Refuge: See **Wildlife Refuge**.

Nebraska Nongame and Endangered Species Conservation Act (Nebraska Statute 37-430 to 37-438)**:** Passed by the Nebraska Legislature in 1975, the act requires the Nebraska Game and Parks Commission to conduct investigations and enforce regulations to protect the nongame and **Endangered Species** designated by the commission. See **Threatened Species.**

Niche: An **Organism's** function or role in its **Ecosystem**; its place in the **Community,** including both the space it occupies (see **Habitat**) and the role it plays in maintaining the community's balance (what it consumes; what consumes it; and how it interacts with all **Biotic** and **Abiotic** factors). The *exclusion principle* states no two **Species** can permanently occupy the exact same *niche* at the same time. When a community is looked at as a group of niches, rather than a group of species, two facts rapidly emerge — similar habitats produce similar sets of niches; and in a stable community, no niche is left unfilled. A *generalist* is an organism that has a broad *niche*, usually feeding on a variety of foods and sometimes adapted to many habitats. A *specialist* is an organism that has a narrow niche, feeding on one or a few food materials and adapted to a particular habitat.

Nitrogen Fertilizer: The nutrient most often required for growing corn, lawns and gardens. Nearly all corn grown in Nebraska needs some nitrogen fertilizer applied, unless there is substantial nitrogen in the soil from fertilizer carryover, legumes or other nitrogen sources.

Nitrogen Management: Managing a crop's **Nitrogen Fertilizer** applications to reduce the probability of nitrate-nitrogen **Leaching** to **Groundwater.**

Nonpoint Source Pollution: Diffuse source of pollution such as eroding slopes and **Runoff** from agricultural and nonagricultural lands, such as urban and suburban lawns and pavement. Compare to **Point Source Pollution.**

Non-renewable Resource: A natural resource which, in terms of human time measurements, is contained within the Earth in a fixed quantity. Nonrenewable resources include the fossil fuels, and extends to mineral resources and sometimes **Groundwater,** although water and many minerals are renewed eventually (see **Hydrologic Cycle**). The distinction is drawn according to time scales. Compare to **Renewable Resource.**

Organism: Any living entity, including plants, animals and fungus.

Palustrine: Pertaining to wet, marshy **Habitats** less than 20 acres in size and 2 meters in depth at low water. See **Lacustrine.**

Periphyton: Organisms (including both plants and animals) that grow on submerged surfaces such as stones, wood, aquatic plants or other objects, forming more or less continuous slimy or woolly coatings on these objects.

Permaculture: A method of agriculture in which ecological principles are used to produce a **Sus-**

tained Yield of renewable goods without affecting the **Environment**. Permaculture involves planning a farm operation as an integrated system of humans, domestic animals and plants and wild animals and plants, emphasizing *diversity* (a wide variety of different **Species**) and *complexity* (as many functional relationships between species as possible). In permaculture, the crops and livestock help each other, rather than depend upon human intervention. See **Renewable Resources.**

Permeability: The ability of water (or other fluid) to flow through a soil (or other porous material) by traveling through the void spaces. High permeability indicates flow occurs relatively rapidly. Permeability depends upon the size and number of the connections between the openings in the material, rather than on the size and number of the openings themselves.

Perturbations: A disturbance or any departure of a biological system from a steady state.

Phreatophyte: A plant that obtains its water from the saturated zone of the soil (see **Water Table**), rather than from soil moisture. These plants commonly grow along water courses, where the saturated root zone is close to the surface. See **Riparian Zone, Transpiration.**

Physiology: The study of the vital processes and functions of living organisms.

Plankton: Small, often microscopic animals and plants, which are unable to maintain their position or distribution independent of the movement of water.

Point Source Pollution: Easily discernible pollution sources such as a factory, outlet or other singular point. Compare to **Nonpoint Source Pollution.**

Pollution: Any physical, chemical or biological alteration of the chemical, physical, biological or radiological integrity of air, water or land creating a hazard or potential hazard to the health, safety or welfare of any living **Species.** Although pollution may occur naturally, the term is more commonly applied to the changes wrought by the pollution sources. See **Nonpoint Source Pollution, Point Source Pollution.**

Pond: A small body of standing fresh water, either natural or artificial, usually with negligible current and having more or less continuous vegetation from the marginal land areas into the water.

Pool: A small body of still water or a deep or still place in a stream.

Porosity: A term indicating the percentage of open space (pores or voids) existing within the total volume occupied by a soil or rock mass. For example, a gravel deposit may have 20 percent porosity. Porosity determines the amount of water that can be stored in a saturated formation. A saturated formation 100 feet thick with a porosity of 20 percent could store an equivalent water depth of approximately 20 feet. Porosity is most recognized as the measurement used to determine the amount of water an **Aquifer** can hold when filled to capacity. Compare **Permeability**.

Prairie: An extensive area of flat or rolling, predominantly treeless, grassland. See **Savannah.**

Predator: A living **Organism** that captures and kills other living organisms in order to eat them (*predation*). Predators are secondary consumers in a **Food Chain.** A predator preys externally on many other animals, whereas a parasite often lives on or in a single host without killing it.

Prescribed Burn: A fire set under precisely controlled ("prescribed") conditions. A prescribed burn differs from a **Controlled Burn** in that it is part of an overall management plan, rather than an act to reduce a fuel hazard. Prescribed burning may be used to prepare seed beds for planting, to remove competing vegetation, to improve **Forage** for wildlife and livestock or to allow for the reproduction of fire-dependant species. Prescribed burns are always done under carefully managed conditions in which both fire intensity and acreage burned can be controlled.

Prey: Any living **Organism** that is captured and killed by another living organism in order to serve as a food source. The word "captured" implies mobility. Prey must be capable of taking evasive action to avoid capture, eliminating plants from the definition.

Range: The area where a species is normally found. The term may also be used with qualifiers as a more narrow definition, such as *home range, winter range, summer range, breeding range* and *hunting range*. Compare with **Habitat.**

Range of Tolerance: A parameter of physical and chemical factors within which an organism can survive. When the upper or lower limits of this range are exceeded, growth, reproduction and survival are threatened. The *zones of physiological stress* are the upper and lower limits of the range of tolerance where organisms have difficulty surviving. The *zone of intolerance* is the range of conditions in which an organism cannot survive.

Rangeland: Land on which the dominant vegetation consists of grasses and **Forbs.** Natural rangeland is a **Climax Community** with boundaries are determined largely by rainfall and soil conditions. In other areas, rangeland may be artificially maintained through forest clearing, **Prescribed Burns** and **Irrigation.**

Reach: A stretch of river with similar characteristics. The term is also used more technically, but less often, to refer to any stretch between two bends within which the river does not substantially change course.

Reclamation: Historically, the conversion of land formally unfit for growing crops into agricultural land. The term encompasses both the draining of lakes and **Wetlands** in order to grow crops on their beds, and the process of supplying water by means of **Irrigation** to lands where rainfall is too sparse to grow crops. More recently, the term refers to the process of returning a drastically disturbed site to a condition approximately equal to or greater than its natural state. See **Restoration, Rehabilitation.**

Reduction Factors: Abiotic and **Biotic** factors that tend to decrease population growth and help balance populations and **Ecosystems,** offsetting **Growth Factors.**

Refugia: An area that has escaped major climatic changes and acts as a refuge for **Species** previously more widely distributed; an isolated **Habitat** retaining the environmental conditions once widespread.

Rehabilitation: The process of returning a disturbed site to a predetermined condition. This rehabilitated condition may or may not be the same as the land's condition prior to the disturbance. See **Reclamation, Restoration.**

Renewable resource: A resource that can be utilized without depletion because it is constantly replenished by natural ecological cycles or natural chemical or physical processes. The term includes water; organic materials from living sources that may be grown and harvested, such as wood, wool and cotton; and inorganic forces, such as the energy of solar radiation, wind, waves, tides and hydroelectric power. The term does not include minerals or fossil fuels. Because "renewable" does not mean "inexhaustible", some economists prefer the term *flow resource,* instead of renewable resource, to indicate the availability of the resource depends on its replacement rate ("rate of flow") rather than its total volume. Compare to **Non-Renewable Resource.**

Restoration: The process of returning degraded or disturbed sites to its previous condition by removing factors responsible for the degradation or disturbance. See **Reclamation, Rehabilitation.**

Restoration Ecology: The study of how **Ecosystem** recovery occurs and how it can be facilitated. The principles of science are used in restoration ecology to repair land and waters damaged by misuse or following a drastic disturbance.

Riffle: An area of shallow broken water in a river or stream.

Riparian Zone: Lands adjacent to creeks, streams and rivers where vegetation is strongly influenced by the presence of water. See **Phreatophyte.**

Runoff or **Overland Flow:** Precipitation or **Irrigation** water that does not infiltrate the soil but flows over it toward a surface drain, swale, creek, river, etc. Precipitation that does not runoff may infiltrate into the ground and percolate to the **Water Table;** is returned to the air by **Evaporation** and **Transpiration** (see **Evapotranspiration**); or returns to the surface by **Seepage** or from **Springs.** Runoff is faster and greater: during heavy rain than drizzle; on clay soils than on sandy soils; on frozen soils than on frostless soils; and in treeless areas than in forests. The ratio between runoff and rainfall varies with climatic conditions.

Savannah: A grassland characterized by scattered trees. See **Prairie.**

Scouring: The removal of earth or rock by the action of running water or of a glacier.

Sedimentation: The deposit of waterborne particles, resulting from a decrease in water's transport capacity.

Seep: A small **Spring** from which water oozes, rather than flows. Generally cannot be utilized by humans as water sources.

Seepage: The movement of water into or through a porous material. Seepage occurs from canals, ditches and other water storage facilities.

Sere: The series of slowly changing plant **Communities** occupying a site during the time between the establishment of the pioneer species and the stabilization of the **Climax Community.** Seral stages are almost never pure, but generally contain both remnant plants of the previous stage and youthful plants that will be adults of the next stage. See **Succession.**

Slough: A wet or marshy area.

Snags: A dead tree that remains standing in place, especially one that has lost most or all of its leaves and/or branches. Snags are extremely important wildlife **Habitat.** Approximately 80 **Species** of North American birds, and 40 **Species** of mammals utilize snags for shelter and food sources.

Soil Profile: A vertical section (side view) of soil.

Species: A group of **Organisms** that are, or were, physically capable of interbreeding with each other to produce fertile offspring, and which are reproductively isolated from any other organisms. Individuals isolated solely by distance that would

reproduce if brought together are considered to be members of the same species; however, individuals physically capable of interbreeding with each other but do not because of differences in **Habitat,** breeding cycles, etc., are considered to belong to different species. See **Taxonomy.**

Species Richness: The absolute number of **Species** in a **Community.**

Spring: The point of natural **Groundwater Discharge** to a soil surface, river or lake. Springs result at the intersection of the lower portion of an **Aquifer** with the ground surface, allowing the water within the aquifer to flow out by gravity. The amount of flow depends both on the **Permeability** of the aquifer and on the slope of the **Water Table.**

Staging: To stop at a particular place in the course of a migration.

Stewardship: An approach to land use emphasizing mans caretaker role. The goal of stewardship is to maintain a particular portion of the earth so its quality is not diminished. Stewardship implies not only the management of natural resources for short- or medium-term gain, but also a desire to serve the long-term well-being of the overall **Ecosystem**. Such an approach requires landowners to be sensitive to the needs of ecosystems by understanding their **Carrying Capacity.** Stewardship is sometime linked to the religious ethic that humans are the stewards of the Earth God made.

Subclimax Community: The **Succession** stage that precedes **Climax Community** and is prevented from attaining full development by one or more **Biotic** factors.

Substrate: The base or material to which a plant is attached and from which it gets its nutrients.

Succession: The natural replacement of one **Biotic Community** by another. Succession is a slow, but continuous process, beginning with the invasion of a patch of open ground or a newly created body of water by *pioneer species.* Succession continues through a series of recognizable stages knows as **Seres,** ending with the formation of a **Climax Community** in which the mix of **Species** forming the community no longer changes with successive generations. *Primary succession* is the sequential development of biotic communities (plants, animals and microorganisms) where none previously existed. *Secondary succession* is the sequential development of biotic communities occurring after a community's complete or partial destruction by natural or anthropogenic forces. See **Anthropogenic Effects.**

Sustainable Development: Meeting current needs without compromising the ability of future generations to meet their needs. Sustainable development relies on appropriate technology and/or the renewability of natural resources and using diverse organisms without interfering with functioning ecological processes and life-support systems. *Sustainable economic development* describes economic growth and activity which neither depletes nor degrades natural resources.

Sustained Yield: The harvest of a **Renewable Resource** at a maintainable rate. The rate may be figured on either an annual or an episodic basis; that is, the resource may be used only at the rate at which it renews itself. Although it is usually thought of as a timber management term, sustained yield applies equally to other renewable resources, such as wildlife and water. All federal agencies are required to practice sustained yield of all renewable resources under their jurisdiction.

Taxonomy: The systematic classification and naming of **Organisms.** Taxonomy involves giving every **Species** of organism a scientific name, thereby clarifying and improving communication about the species. Taxonomy also demonstrates the patterns of relationships exists among different groups of organisms, and helps clarify evolutionary trends and mechanisms.

Threatened Species: According to the **Endangered Species Act,** any **Species** likely to become an **Endangered Species** within the foreseeable future. The category includes *rare species,* (e.g. those whose natural numbers are low); *depleted species* (those whose populations have been reduced by human activities or natural disasters); and species **Endemic** to small areas threatened with development. Lists of threatened species are prepared by the Secretary of the Interior and published in the Federal Register. Species on the list receive essentially the same protection as those on lists of endangered species, although the management goal is to keep them from becoming endangered rather than to keep them from becoming extinct. See **Extinction.**

Transpiration: The process by which water absorbed by a plant's root system moves up through the plant, then exits the plant through pores in the leaves or other parts and evaporates into the atmosphere as water vapor. See **Evapotranspiration.**

Unique Species: A **Species** of plant or animal that is not endangered (see **Endangered Species**) but is of special interest because of its beauty, unusual properties, historical value or local rarity. Unique plant species are protected by the establishment of botanical areas or research natural areas wherever possible. Unique animal species are generally

accorded the same protection as **Threatened Species.**

Water Right: In law, a legal right held by an individual, corporation or public body for the use of water from a stream, lake or **Aquifer.** Water rights vary according to state law. Most states govern the right to surface water supplies by one of two basic systems: *prior appropriation*, where users demonstrating an earlier use of the water from a particular source have rights (*senior water rights*) over all later users of water from the same source (*junior water rights*); and *riparian doctrine*, where the owner of land along a watercourse (see **Riparian Zone**) should have the right to use the water flowing past their property. Although the water may only be used on lands that border the stream it may generally be used anywhere on those lands (some states require it to remain in the **Watershed** of the watercourse it is drawn from).

Watershed: A natural or disturbed area of land upon which water from direct precipitation, snowmelt or other storage collects in a (usually surface) **Channel** and drains to a single stream or water body. A watershed ranges in size from a few acres to large areas of the country. The edges of a watershed (*watershed divides*) are easy to define in mountainous country, where they correspond to ridges. (Rain falling on a ridge separating two streams will flow into the stream on the side on which it has fallen.) Divides are a little more difficult to find in flat country, where they are often low, nearly undetectable rises, possibly intermingling with each other in nearly random patterns.

Water Table: The upper edge of the saturated zone in the soil or in an **Aquifer.** Below it, all pore space in the soil and/or underlying rock is filled with water; above it some spaces are empty, allowing water to trickle down through them from space to space. The water table is closely related to the surface elevation of **Wetlands,** lakes and permanent streams (which are, in most cases, simply places where the water table is higher than the land surface). To a large extent, the water table determines the sensitivity of lands to **Groundwater** pollution. Lands with water tables near to the ground surface are more susceptible to pollution than those where it is well below the ground surface.

Wet Meadow: A complex of grassland and wetland areas within close proximity to a river channel and with a hydrologic connection to river flows or groundwater. Wet meadows are confined to the river **Flood Plain,** and most are located within one to two miles of the channel. They generally have pooled or ponded standing water during a portion of the year (primarily spring and early summer) and may be hydrologically interconnected with the river through a common **Water Table** and, on occasion, by surface water overflow.

Wetland: Any area of land for which the **Water Table** is at or near the surface of the ground for a significant portion of the year. Wetlands display **Hydric Soils** and support the growth of **Hydrophytic** vegetation, such as reeds, cattails, mosses, etc. A wetland may contain substantial amounts of standing water, including **Ponds** and slow-moving watercourses. Among the most productive of all **Ecosystems,** wetlands provide **Habitat** for numerous **Species.** They also generally improve the water quality of streams by filtering out suspended sediments and pollutants.

Wildlife Refuge: An area set aside and managed to provide **Habitat** for wildlife. Hunting, trapping and fishing (for sport or predator control) are generally allowed on refuges. If these activities are curtailed or forbidden, the area is often designated not as a refuge, but as a *wildlife sanctuary*. Grazing and similar activities may take place on a refuge if they can be shown to be congruent with habitat maintenance.

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Montana
Wyoming
Idaho
Casper
North Platte River
Platte Ri
North Platte River
Lodgepole Creek
Cheyenne
Rocky Mountains
Greeley
South
Denver
South Platte River
Colorado