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Dabble — To bob forward and under in shallow water so as to feed off the bottom.

Daily Flood Peak — The maximum mean daily discharge occurring in a stream during a given flood event.

Daily Record — A summary of streamflow, sediment, or water-quality values computed from data collected with sufficient frequency to obtain reliable estimates of daily mean values.

Daily Record Station — A site for which daily records of streamflow, sediment, or water-quality values are computed.

Daily Temperature Range — The difference between the highest and lowest temperatures recorded on a particular day.

Dalton — A unit of molecular weight; a unit of mass convenient for the expression of the mass of atoms, being one-sixteenth the mass of an oxygen atom. It equals approximately 1.65×10^{-24} grams. Named after the English chemist and physicist John Dalton (1766-1844). Used frequently for sizing particles trapped by semipermeable membrane filters.

Dam — A structure of earth, rock, or concrete designed to form a basin and hold water back to make a pond, lake, or reservoir. A barrier built, usually across a watercourse, for impounding or diverting the flow of water. General types of dams include:

- [1] **Arch Dam** — Curved masonry or concrete dam, convex in shape upstream, that depends on arch action for its stability; the load or water pressure is transferred by the arch to the *Abutments*.
- [2] **Buttress Dam** — A dam consisting of a watertight upstream face supported at intervals on the downstream side by a series of buttresses.
- [3] **Cofferdam** — A temporary watertight enclosure that is pumped dry to expose the bottom of a body of water so that construction, as of piers, a dam, and bridge footings, may be undertaken. A “diversion cofferdam” prevents all downstream flow by diverting the flow of a river into a pipe, channel, or tunnel.
- [4] **Crib Dam** — A barrier or form of *Gravity Dam* constructed of timber forming bays, boxes, cribs, crossed timbers, gabions or cells that are filled with earth, stone or heavy material.
- [5] **Embankment Dam** — A dam structure constructed of fill material, usually earth or rock, placed with sloping sides and usually with a length greater than its height. Types of embankment dams include:
Earthfill or Earth Dam — A dam in which more than 50 percent of the total volume is formed of compacted fine-grained material obtained from a borrow area (i.e., excavation pit); *Fill Dam* — Any dam constructed of excavated natural materials or of industrial waste materials; *Homogeneous Earthfill Dam* — A dam constructed of similar earth material throughout, except for the possible inclusion of internal drains or drainage blankets; distinguished from a *Zoned Earthfill Dam*; *Hydraulic Fill Dam* — A dam constructed of materials, often dredged, that are conveyed and placed by suspension in flowing water; *Rockfill Dam* — A dam in which more than 50 percent of the total volume is comprised of compacted or dumped pervious natural or crushed rock; *Rolled Fill Dam* — A dam of earth or rock in which the material is placed in layers and compacted by using rollers or rolling equipment; and *Zoned Embankment Dam* — A dam which is composed of zones of selected materials having different degrees of porosity, permeability, and density.
- [6] **Gravity Dam** — A dam constructed of concrete and/or masonry that relies on its weight for stability.
- [7] **Inflatable Dam** — A dam constructed of heavy-duty rubber or similar material and inflated with air or water and used for small-scale impoundment of flood flows or as flashboards for regulating the overflow of larger dams..
- [8] **Masonry Dam** — A dam constructed mainly of stone, brick, or concrete blocks that may or may not be joined with mortar. A dam having only a masonry facing should not be referred to as a masonry dam.
- [9] **Weir** — A dam in a river to stop and raise the water, for the purpose of conducting it to a mill, forming a fishpond, or the like. When uncontrolled, the weir is termed a fixed-crest weir. Other types of weirs include broad-crested, sharp-crested, drowned, and submerged.

Damage-Frequency Curve — A graph showing the flood damages and their probabilities of occurrence. The total area under the curve represents the annual damage.

Damages Prevented — The difference between the amount of damages without a particular water project and the damages with the project in place.

Damp — Slightly wet; somewhat moist or wet.

Dap — (1) To dip lightly or quickly into water, as a bird does. (2) To skip or bounce, especially over the surface of water.

Darcy's Law — An empirically derived equation for the flow of fluids through porous media. It is based on the assumption that flow is laminar and inertia can be neglected, and states that velocity of flow is directly proportional to *Hydraulic Gradient*. For groundwater, this is equivalent to the velocity being equal to the product of the hydraulic gradient and the effective subsoil conductivity or permeability. See *Specific Discharge (Specific Flux)*.

Data — In its strictest sense, data may be defined only as the raw numbers (or descriptions, in the case of qualitative data), either in *Time-Series* format (data covering observations over specific periods of time), *Cross-Sectional* format (data consisting of a number of observations taken at a specific point in time or about a specific event or phenomenon), or a combination of these two. Also see *Information*.

Data Bank — A well-defined collection of data, usually of the same general type, which can be accessed by a computer and may readily be used for further analysis, presentation, and forecasting. Also referred to as a *Data Base*.

Data, Cross-Sectional —(Statistics) Data which describe the activities or behavior of individual persons, firms, or other units at a given point in time.

Data Management — The act, process, or means by which data is managed. This may include the compilation, storage, safe-guarding, listing, organization, extraction, retrieval, manipulation, and dissemination of data. In its strictest sense, data may be defined only as the raw numbers for numeric or quantitative data (or descriptions, in the case of qualitative data), either in time-series format (data covering observations over specific periods of time), cross-sectional format (data consisting of a number of observations taken at a specific point in time or about a specific event or phenomenon without regard to its behavior over time), or a combination of these two. Information, on the other hand, deals more specifically with the manipulation, re-organization, analysis, graphing, charting, and presentation of data for specific management and decision-making purposes. Also see *Information Management*.

Data, Primary — Typically, data acquired by direct interaction, such as direct observation through measurements, tabulation, or surveys. Contrast with *Secondary Data*.

Data, Secondary — Typically, data acquired from published sources as opposed to data acquired from direct observation or measurement such as a survey. Contrast with *Primary Data*.

Data, Time-series — (Statistics) Data which describe the movement of a variable over time, e.g., monthly, quarterly, annually.

Datum — Any numerical or geometric quantity or set of such quantities that may serve as a reference or base for other, comparable quantities. For example, *Mean Sea Level (MSL)* is the datum used on most topographic maps. However, most river gages use an arbitrary elevation above the *National Geodetic Vertical Datum (NGVD)* of 1929 for use as a zero datum (e.g., datum equals 3412.6 feet above NGVD of 1929). Datums are always chosen so there will never be negative stages.

Daylight — In the restoration field, a verb that denotes the excavation and restoration of a stream channel from an underground culvert, covering, or pipe.

DDT (Dichlorodiphenyltrichloroethane) — A colorless odorless water-insoluble crystalline insecticide C₁₄H₉C₁₅ that tends to accumulate in ecosystems and has toxic effects on many vertebrates. DDT was used extensively prior to 1972 at which time the *U.S. Environmental Protection Agency (EPA)* banned its production and distribution. Although banned from usage for a number of years, the inert nature of such toxic chemicals and their low biodegradability (15-year half-life) allow them to exist in soils, river sediment, and plants and animals for many years.

Dead End — The end of a water main which is not connected to other parts of the distribution system.

Deadman — A log, block of concrete, rebar, or other object buried in a stream bank that is used to tie in a revetment with cable or chain.

Dead Storage — (1) The volume of water in a reservoir stored below the lowest outlet or operating level. (2) Storage in a reservoir that cannot be released by the dam.

Dead Time — The time required for the response to a change of input to a system to reach the location of a sensor (i.e., the time for a control initiated surge wave to travel from an upstream control check gate to a downstream sensor in a canal.)

Dead Zone [Gulf of Mexico] — (Ecology) A term referring to an extensive area, recorded to be as large as 7,000 square miles [July 1995], that develops every summer at the bottom of the Gulf of Mexico. The area consists of a lifeless area devoid of oxygen that results from an ecological chain reaction precipitated by fertilizers, sewage, and

runoff that flows from the Mississippi River. While many sources contribute to this phenomenon, the primary nutrient cause consists of fertilizer runoff from agriculture within the Mississippi River Basin.

Debacle — (1) The breaking up of ice in a river. (2) A violent flood.

Debouch — To emerge; issue, as a river into which a large stream debouches.

Debouchure — An opening or mouth, as of a river or stream.

Debris — Accumulated material; any material, including floating or submerged trash, suspended sediment, or bed load, moved by a flowing stream.

Debris Basins — Storage for sediment and floating material provided by a dam with spillway above channel grade, by excavation below grade, or both. Water retention is not an intended function of the structure.

Debris Dam — A barrier built across a stream channel to retain rock, sand, gravel, silt, or other material.

Debris Flow — (1) A moving mass of rock fragments, soil, and mud with more than one-half of the material being larger than sand size. (2) A mass movement involving rapid flowage of debris of various kinds under various conditions; specifically, a high-density *Mudflow* containing abundant coarse-grained materials and resulting almost invariably from an unusually heavy rain. (3) The rapid mass movement of a dense, viscous mixture of rock fragments, fine earth, water and entrapped air that almost always follows a heavy rain. A mudflow is a debris flow that has predominately sand size or smaller particles.

Debris Guard — A screen or grate at the intake of a channel, drainage, or pump structure for the purpose of stopping debris.

Decant — To draw off the upper layer of liquid after the heaviest material (a solid or other liquid) has settled.

Decay — The disintegration of organic materials into simpler forms, or into their original elements, by action of bacteria, fungi, or other microorganisms.

Dechlorinate — To remove *Chlorine* from water.

Dechlorination — The partial or complete reduction of residual chlorine in a liquid by any chemical or physical process. Commonly used dechlorinating agents include activated carbon and sulfur dioxide.

Deciduous (Plant) — (Botanical) (1) Any plant that sheds all of its leaves at one time each year (typically in autumn). (2) Plants characterized by a specific growth and dormancy cycle, with certain parts falling at the end of the growing period, as leaves, fruits, etc., or after anthesis, as the petals of many flowers. (2) Plants having leaves of this type. As contrasted with *Evergreen* which remains verdant throughout the year.

Deciduous Stand — A plant community where *Deciduous* trees or shrubs represent more than 50 percent of the total areal coverage of trees or shrubs.

Deciles (Drought Index) — The deciles drought index system is based on a relative frequency distribution of long-term precipitation divided into tenths of the overall range of distribution. Each tenth division or precipitation category is termed a “decile” and ranges from the lowest (drought) ten percentile of precipitation levels to the highest (wet) ten percentile. By definition, the fifth decile is the median (middle-most) and is the precipitation amount not exceeded by 50 percent of the occurrences over the period of record. One disadvantage of the deciles drought index system is that a long climatological record is required for accurate deciles classifications. As a drought index, the deciles are grouped into five classifications as follows:

deciles 1-2 (lowest 20%) – much below normal

deciles 3-4 (next lowest 20%) – below normal

deciles 5-6 (middle 20%) – near normal

deciles 7-8 (next highest 20%) – above normal

deciles 9-10 (highest 20%) – much above normal

Also see *Drought Indexes (Indices)*.

Declared Underground Water Basin — An area of a state designated in some states by their respective State Engineers to be underlain by a ground water source having reasonably ascertainable boundaries. By such a designation, the State Engineer assumes jurisdiction over the appropriation and use of ground water from the source. May not be applicable in states which already claim regulatory rights over both surface and ground waters.

Decomposer — Any of various organisms (as many bacteria and fungi) that feed on and break down organic substances (such as dead plants and animals).

Decomposition — The breakdown of matter by bacteria and fungi, changing the chemical makeup and physical appearance of materials.

Decorative Water Feature — Any manmade stream, fountain, waterfall, or other such water feature that contains water that flows or is sprayed into the air, constructed for decorative, scenic, or landscape purposes.

Decree — The judgement of a court, an official order, or settlement.

Decree 731 (Interim Walker River Decree) [Nevada] — In response to the suit filed in 1902 (*Miller et Lux v.*

Rickey), subsequently renamed to the *Pacific Livestock Company v. Antelope Valley Land and Cattle Company*, water rights adjudication in the Federal District Court for Nevada resulted in the issuance of Decree 731 on March 24, 1919. [During the Nevada gold mining boom of the early 1900's, Thomas B. Rickey was actively involved in both mining and banking as well as ranching. So much so, in fact, that he suffered failure in the panic of 1907 and his ranching properties were sold to the Antelope Valley Land and Cattle Company. Also, the agricultural holdings of Muller and Lux were taken over by the Pacific Livestock Company.] The Decree addressed the amount of water to which each party was entitled, the source of the water, the area to which it was to be applied, and the priority date for each use. The Decree also encompassed many, but not all, of the other water users on the river, particularly the water rights of the smaller agricultural water users as well as the irrigation rights of the Walker River Indian Reservation. Five separate water rights for the reservation were quantified with priority dates ranging from 1868 to 1886 (the reservation was established on November 29, 1859) and the government was permitted to purchase additional rights from the proposed Topaz Reservoir to supply the reservation. [These five water rights included: (1) 1868 priority date – 4.70 cfs, 385.95 acres irrigated; (2) 1872 priority date – 3.55 cfs, 295.80 acres irrigated; (3) 1875 priority date – 6.15 cfs, 512.80 acres irrigated; (4) 1883 priority date – 7.50 cfs, 625.20 acres irrigated; and (5) 1886 priority date – 1.03 cfs, 85.80 acres irrigated.] In effect, the Decree addressed essentially only direct diversions from the river and its tributaries. Except for some general provisions pertaining to the Antelope Valley Land and Cattle Company's storage rights, particularly those relating to the prospective development of Alkali Lake (Topaz) Reservoir, no other storage rights were quantified. As an interim measure, Decree 731 did assign priorities and amounts of water for irrigating specified lands of the parties and allowed incidental domestic and stock-watering uses to be served under the irrigation rights.

Decree C-125 (Final Walker River Decree) [Nevada] — In adjudication of the 1924 filing of *United States v. Walker River Irrigation District, et al.*, Decree C-125 for waters of the Walker River was issued on April 14, 1936 by the Federal District Court for Nevada. In addition to recognizing the water rights defined in Decree 731 (March 24, 1919) as to priority date, amount and place of use, and defined other storage and diversion rights, the Walker River Indian Reservation's attempt to acquire a right to divert 150 cfs for the irrigation of reservation lands was rejected. While Decree C-125 adjudicated most of the irrigation rights of the Walker River system, the court did not define domestic rights, irrigation uses on natural forest land, some private riparian lands, and any storage rights for Weber Reservoir, which had recently been constructed on the Walker River Indian Reservation. Also, no rights were included for Walker Lake itself. A federal Watermaster would be responsible for its enforcement. The District Court refused the Tribe's claim (for right to a rate of flow of 150 cfs), stating that even if an implied tribal water right was included with reservation lands, the white pioneers were in "an inexpugnable position" and the "court was not about to take fifty years of beneficial farming use away from these settlers for the sake of supplying the tribe with guaranteed water." In June 1939 Decree C-125 was modified on appeal to the U.S. Circuit Court of Appeals, Ninth Circuit (104 Fed 2d 334 [1939]). The Walker River Indian Reservation was granted a right to divert 26.25 cfs (they had asked for 150 cfs) for 180 days (amounting to 9,450 acre-feet from natural flows) to be measured at the Parker Gage (currently the Wabuska gage) at the north (outlet) end of Mason Valley approximately where the reservation boundary begins. This diversion period is in contrast to upstream users who have an irrigation season of up to 245 days as reaffirmed in the "Rules and Regulations for the Walker River System" under Decree C-125. All defendants agreed to the stipulation which granted the Walker River Indian Reservation a November 29, 1859 priority date for its water rights for the irrigation of 2,100 acres of reservation land. The original priority dates established in Decree 731 in 1919 had assigned priority dates (5) ranging from 1868 to 1886. [These five water rights included: (1) 1868 priority date – 4.70 cfs, 385.95 acres irrigated; (2) 1872 priority date – 3.55 cfs, 295.80 acres irrigated; (3) 1875 priority date – 6.15 cfs, 512.80 acres irrigated; (4) 1883 priority date – 7.50 cfs, 625.20 acres irrigated; and (5) 1886 priority date – 1.03 cfs, 85.80 acres irrigated.]

Decreed Rights (Water) — Water rights determined by court decree.

Dedicated Natural Flow — River flows dedicated to environmental use. Also see *Environmental Flows*.

Dedications (Water) — A controversial water rights policy that involves a trade-off in which a user can begin pumping groundwater in exchange for a guarantee to buy and retire a like amount of surface water in the future. Critics of the policy argue that dedications are often difficult to enforce and can lead to overuse of groundwater when a user fails to fulfill on the guarantee.

Deep Carbonate Aquifer [Nevada] — An aquifer within the *Great Basin* which is comprised of a thick sequence of carbonate rock, generally lying below basin fill deposits.

Deep-Draft Harbor — A harbor designed to accommodate commercial cargo vessels having drafts greater than 15 feet (4.6 meters).

Deep-Lava Theory — (Geophysics and Climatology) A theory first espoused by a geophysicist from the University

of Hawaii whose research found a strong *Correlation* between periodic patterns of undersea volcanoes (and related seismic activity) within what is known as the East Pacific Rise and the onset of *El Niño*, a phenomenon characterized by a warming of surface waters in the eastern Pacific Ocean near the Equator. While the causes surrounding the arrival of the El Niño effect are complex and not fully understood, it is generally recognized that the event is accompanied by a stall in the trade winds that normally blow from west to east across the southern Pacific. The Deep-Lava Theory postulates that heated seawater (from increased undersea lava flow activity) weakens a normally high-pressure area in the eastern Pacific. This, in turn, reduces air pressure and slows the trade winds. Subsequently, warm water in the western Pacific is released, along with warm unstable air above it, by the absence of the trade winds, thereby producing the El Niño effect along the western coast of South America, along with changes to other weather patterns elsewhere. For example, also see *Hurricane Forecasting*.

Deep Percolation (Loss) — (1) Water that percolates below the lower limit of the *Root Zone* of plants into a ground water aquifer and cannot be used by plants. (2) Percolation of (irrigation) water through the ground and beyond the lower limit of the root zone of plants into groundwater.

Deep Seepage (Losses) — That portion of applied irrigation water that, in excess of the leaching requirement, passes through the rooting zone and is subsequently unavailable for crop use.

Deep-Water — Of, relating to, or carried on in waters of a relatively great depth, for example, a deep-water port or a deep-water drilling for oil; Of, relating to, or characterized by water of considerable depth, especially water able to accommodate oceangoing vessels.

Deepwater Habitats — (Ecology) In conjunction with *Wetlands*, *Deepwater Habitats* constitute the spectrum of an ecological classification system to better understand and describe the characteristics and values of all types of land and to wisely and effectively manage such ecosystems. Deepwater habitats are permanently flooded lands lying below the deepwater boundary of wetlands. Deepwater habitats include environments where surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live, whether or not they are attached to the substrate. As in wetlands, the dominant plants are hydrophytes; however, the substrates are considered nonsoil because the water is too deep to support emergent vegetation. While wetlands and deepwater habitats are defined separately, both must be considered in an ecological approach to classification. The deepwater habitat/wetland classification includes five major Systems:

- [1] *Marine*
- [2] *Estuarine*
- [3] *Riverine*
- [4] *Lacustrine*
- [5] *Palustrine*

The first four of these classifications include both wetland and deepwater habitats, but the *Palustrine Wetlands* System includes only wetland habitats. Also see *Wetlands* and *Wetlands, Palustrine*. [See Appendix D-2 for an explanation of the Wetland and Deepwater Habitat Classification System.]

Deep Well — A well whose pumping head is too great to permit use of a suction pump.

Deep-Well Disposal — Transfer of liquid wastewater to underground strata; usually limited to biologically or chemically stable wastes.

Deep-Well Injection — Deposition of raw or treated, filtered hazardous waste by pumping it into deep wells, where it is contained in the pores of permeable subsurface rock.

Deflocculate — To cause the particles of the disperse phase of a colloidal system to become suspended in the dispersion medium.

Deflocculating Agent — A material added to a suspension to prevent settling.

Defluoridation — (Water Quality) A process by which the level of fluoride in a water is reduced to prevent mottling of teeth or fluorosis in consumers. Either activated alumina or bone charcoal is used in the process.

Defog — To remove condensed water vapor from a surface.

Defrost — (1) To remove ice or frost from. (2) To cause to thaw.

Degasification — A water treatment process that removes dissolved gases from the water.

Degradation (River Beds or Stream Channels) — The general lowering of the streambed by erosive processes, such as scouring by flowing water. The removal of channel bed materials and downcutting of natural stream channels. Such erosion may initiate degradation of tributary channels, causing damage similar to that due to gully erosion and valley trenching. Opposite of *Aggradation*.

Degrade — The lowering of a stream-channel bed with time due to the erosion and transport of bed materials or the blockage of sediment sources.

Degree Day — The difference, expressed in degrees, between the mean temperature for a given day and a reference

temperature (usually 0°C).

Degree of Protection — The amount of protection that a flood control measure is designed for, i.e., 100-year, as determined by engineering feasibility, economic criteria, and social, environmental, and other considerations. Also see *Level of Protection*.

Dehumidify — To remove atmospheric moisture from.

Dehydratase — (Biochemistry) An *Enzyme* that catalyzes the removal of oxygen and hydrogen from organic compounds in the form of water.

Dehydrate — (1) To remove bound water or hydrogen and oxygen from (a chemical compound) in the proportion in which they form water. (2) To remove water from (as foods). (3) To remove water from; make *Anhydrous*. (4) To Lose water or moisture; become dry.

Dehydration — (1) The process of removing water from a substance or compound. (2) Excessive loss of water from the body or from an organ or a body part, as from illness or fluid deprivation.

Dehydrator — (1) A substance, such as sulfuric acid, that removes water. (2) A container or an engineered system designed to remove water from substances such as absorbents or food.

Deice — To make or keep free of ice; melt ice from.

Deicer — (1) A device used on an aircraft to keep the wings and propellers free from ice or to remove ice after it has formed. (2) A compound, such as ethylene glycol, used to prevent the formation of ice, as on windshields.

Deionization — The removal of all charged atoms or molecules from some material such as water. For example, the removal of salt from water involves the removal of sodium ions (Na^+) and chloride ions (Cl^-). The process commonly employs one resin that attracts all positive ions and another resin to capture all negative ions. Also see *Capacitive Deionization*.

Deionize — To remove ions from water by *Ion Exchange*. See *Deionization*.

Deionized Water — Water that has been passed through resins that remove all ions. Also see *Deionization*.

Delay Time — Duration of time for contamination or water to move from point of concern to the well; analogous to time-of-travel.

Delegated State — A state (or other governmental entity such as a tribal government) that has received authority from the U.S. Environmental Protection Agency (EPA) to administer an environmental regulatory program in lieu of a federal counterpart. As used in connection with *National Pollutant Discharge Elimination System (NPDES)*, *Underground Injection Control (UIC)*, and *Public Water System (PWS)* programs, the term does not connote any transfer of federal authority to a state. Also see *Primacy*.

Delineation — The process of deciding where something, for example, the boundaries of a *Wetland*, begins and ends.

Deliquesce — (1) To melt away; to disappear as if by melting. (2) (Chemistry) To dissolve and become liquid by absorbing moisture from the air.

Deliquescence — The process whereby substances absorb water from the air, and eventually form solutions.

Delivery (Irrigation) — (1) The release of water from turnouts to water users. (2) The amount of irrigation water delivered to a water-user's headgate during the irrigation season.

Delivery Box — An irrigation structure for diverting water from a canal to a farm unit, often including measuring devices.

Delivery Concept — The mode of making deliveries with respect to time; types are rotation, scheduled, or demand deliver concepts.

Delivery Flexibility — The flexibility that water users have in requesting delivery changes and the ability of the canal system to accommodate the request.

Delivery/Release — The amount of water delivered to the point of use and the amount released after use; the difference between these amounts is usually the same as the *Consumptive Use*.

Delivery System — A system which conveys water from a single source, such as a storage reservoir, to a number of individual points of use. The delivery system is a common classification. It is associated with irrigation, municipal and industrial use, and fish and wildlife canal systems.

Delta — (1) An alluvial deposit made of rock particles (sediment and debris) dropped by a stream as it enters a body of water. (2) A plain underlain by an assemblage of sediments that accumulate where a stream flows into a body of standing water where its velocity and transporting power are suddenly reduced. (3) The low, nearly flat, alluvial tract of land deposited at or near the mouth of a river, commonly forming a triangular or fan-shaped plain of considerable area enclosed and crossed by many distributaries of the main river. Originally so named because many deltas are roughly triangular in plan, like the Greek letter delta (Δ), with the apex pointing upstream.

Deluge — (1) A great flood. (2) A heavy downpour.

Demand (Water) — (1) Maximum water use under a specified condition. (2) The amount of water that a water-right

owner calls for or requests in any one irrigation season.

Demand Delivery — A method of irrigation water delivery whereby the project delivers water to the headgate upon farm irrigator demand; usually is associated with high head (cfs) delivery rates. Unrestricted use of the available water supply with limitations only on maximum flow rate and total allotment.

Demand Management Alternatives — Water management programs that reduce the demand for water, such as water conservation, drought rationing, rate incentive programs, public awareness and education, drought landscaping, etc.

Demersal — (1) Dwelling at or near the bottom of a body of water, such as demersal fish. (2) Sinking to or deposited near the bottom of a body of water, such as demersal fish eggs.

Demineralization, also Demineralize — The act or treatment process that removes dissolved minerals or mineral salts from a liquid, such as water.

Demineralized Water — Water which has been passed through a mixed-bed ion exchanger to remove soluble ionic impurities. Nonelectrolytes and *Colloids* are not removed from water so treated. Also referred to as *Deionized Water*.

De Minimis — Derived from the Latin meaning that the law does not care for or take notice of very small or trifling matters. De minimis water uses are those deemed by law to be too insignificant to notice.

Demographics — Relating to the statistical study of human populations to include such characteristics and factors as population counts, births, deaths, migration, sex, age, and related statistics.

Demography — The statistical science dealing with the distribution, density, vital statistics, and other related characteristics of population. *Demographics* is the adjective describing the various characteristics of a population.

Dendritic — (1) A drainage pattern in which tributaries branch irregularly in all directions from and at almost any angle to a larger stream. (2) A tree-like pattern, typical of most drainage networks. From an aerial view, it resembles the branching pattern of trees.

Dendrochronology — (1) Dating an object by means of tree rings. (2) The technique of dating events, determining climatic conditions, growth patterns, etc. through the use of tree rings.

Denitrification — The removal of nitrate ions (NO_3^-) from soil or water; involves the *Anaerobic* biological reduction of nitrate to nitrogen gas. The process reduces desirable fertility of an agricultural field or the extent of undesirable aquatic weed production in aquatic environments. Also see *Denitrifying Bacteria*.

Denitrifying Bacteria — Bacteria in soil or water that are capable of anaerobic respiration, using the nitrate ion as a substitute for molecular oxygen during their metabolism. The nitrate is reduced to nitrogen gas (N_2), which is lost to the atmosphere during the process.

Denizen — (Ecology) An animal or a plant naturalized in a region.

Density — (1) Matter measured as mass per unit volume expressed in pounds per gallon (lb/gal), pounds per cubic foot (lb/ft³), and kilograms per cubic meter (kg/m³). The mass of quantity of a substance per unit volume. (2) (Biology) The number per unit area of individuals of any given species at any given time. A term used synonymously with *Population Density*.

Density Current — (1) A flow of water maintained by gravity through a large body of water, such as a reservoir or lake, which retains its identity because of a difference in density. (2) Submerged gravity-driven flows which occur when inflows to a water body are denser than the ambient water. The inflow subsequently plunges and continues as a distinct flow which can be envisioned as a submerged stream. Density currents, also called *Underflows*, are known to form intermittently on coastal continental shelves, in reservoirs and at effluent discharge sites.

Density Stratification — The arrangement of water masses into separate, distinct horizontal layers as a result of differences in density. Such differences may be caused by differences in temperature or dissolved and suspended solids. Also see *Thermal Stratification*.

Deoxygenate — To remove dissolved oxygen from a liquid, such as water.

Department of Conservation And Natural Resources [Nevada] — The mission of the Department is to conserve, protect, manage, and enhance the Nevada's natural resources in order to provide the highest quality of life for Nevada's citizens and visitors. The Department consists of nine divisions and/or agencies which include:

- [1] **Division of Conservation Districts** – Regulates the activities of the state's locally elected conservation districts which work for the conservation and proper development of the state's renewable natural resources by providing services to individual landowners and coordination with other public and private agencies.
- [2] **Division of Environmental Protection (DEP)** – Responsible for the administration and enforcement of all environmental statutes and regulations; issues permits, monitors for air and water pollution and inspects solid and hazardous waste management. The Division consists of the *Bureau of Air Quality*,

the Bureau of Water Pollution Control, Bureau of Mining Regulation and Reclamation, Bureau of Water Quality Planning, Bureau of Corrective Actions, Bureau of Waste Management, and the Bureau of Federal Facilities. The State Environmental Commission is also part of the Division and is responsible for adopting necessary environmental rules, regulations and plans authorized by statute. [See Appendix E-4 for a more complete description of DEP's functional responsibilities.]

- [3] **Division of Forestry** – Manages and coordinates all forestry, nursery, endangered plant species and watershed resource activities on certain public and private lands; responsible for protecting structural and natural resources through fire protection, prevention and suppression. The Division also conducts the Forestry Conservation Camps Program which coordinates and supervises the outside work performed by inmates residing in Department of Prison conservation camps.
- [4] **Division of State Lands** – Acquires, holds, and disposes of all state lands and interests in lands; provides technical land-use planning assistance, training, and information to local units of government or other agencies; develops policies and plans for the use of lands under federal management and represents the state in its dealings with the federal land management agencies.
- [5] **Division of State Parks** – Plans, develops, and maintains a system of parks and recreational areas for the use and enjoyment of residents and visitors. The Division also preserves areas of scenic, historic, and scientific significance in Nevada.
- [6] **Division of Water Planning** – Provides technical, financial and economic assistance to government agencies and individual citizens concerning regional and local water supplies; develops and implements a statewide water resource management plan and policy initiatives on a watershed basis; conducts hydrologic, climatologic, and socioeconomic data collection, research, modeling, forecasting and data analysis; develops and implements water resource public information and education programs; provides technical and financial assistance and outreach programs to assist local governments, watershed planning groups, and other agencies with respect to water resource matters; and develops and implements a statewide water conservation program.
- [7] **Division of Water Resources** – Responsible for protecting the health and safety of Nevada citizens through the appropriation of public waters. Other responsibilities include the adjudication of claims of vested water rights; distribution of water in accordance with court decrees; review of water availability for new major construction and housing projects; review of the construction and operation of dams; appropriation of geothermal resources; licensing of well drillers and water right surveyors; review of flood control projects; maintenance of water resource data and records; and providing technical assistance to government boards, offices, and agencies.
- [8] **Division of Wildlife** – Preserves, protects, manages and restores wildlife and its habitat within the state for aesthetic, scientific, recreational and economic benefits; tasked with promoting safety for persons and property in the operation of equipment and boating vessels
- [9] **Natural Heritage Program** – Serves as a centralized repository containing detailed information on sensitive (threatened and endangered) species of animals, plants, and communities; provides information on biology, habitats, locations, population and conservation status, and management needs.

(United States) Department of the Interior (USDI) — Originally established by Congress in 1849 as the executive department of the United States government, the USDI's function has changed from that of performing housekeeping duties for the federal government to its present role as custodian of the nation's natural resources. As the nation's principal conservation agency, the USDI has the responsibility of protecting and conserving the country's land, water, minerals, fish, and wildlife; of promoting the wise use of all these natural resources; of maintaining national parks and recreation areas; and of preserving historic places. It also provides for the welfare of American Indian reservation communities and of inhabitants of island territories under U.S. administration. As of 1988 the USDI managed more than 220 million hectares (550 million acres, or 850,000 square miles) of federal resource lands; about 340 units of the national park system; 70 fish hatcheries, and 442 *National Wildlife Refuges (NWF)*; and numerous reclamation dams that provide water, electricity, and recreation. The USDI also constructs irrigation works, enforces mine safety laws, makes geological surveys and prepares maps, conducts mineral research, and administers wild and scenic rivers as well as national and regional trails. The USDI is currently in charge of the *Bureau of Indian Affairs (BIA)*, the *U.S. Fish and Wildlife Service (USFWS)*, the *National Park Service (NPS)*, and the *U.S. Geological Survey (USGS)*. It also oversees the Bureau of Mines, which is responsible for ensuring that the nation has adequate mineral supplies and for overseeing and evaluating all aspects of minerals research; the *U.S. Bureau of Land Management (BLM)*, which manages public lands and their resources; the *U.S. Bureau of Reclamation (USBR)*, which assists local governments in reclaiming arid lands in western states and

provides programs for hydro-electric power generation, flood control, and river regulation; the Minerals Management Service, which deals with leasable minerals on the Outer Continental Shelf and ensures efficient recovery of mineral resources; and the Office of Surface Mining Reclamation and Enforcement, which helps to protect the environment from adverse effects of mining operations. Other agencies under the USDI's jurisdiction include the Office of Small and Disadvantaged Business Utilization and the Office of Territorial and International Affairs.

Department of Water Resources (DWR) [California] — The California state agency within *The Resources Agency* that is responsible for long-term water planning, operation of the *State Water Project*, and state water conservation programs. The basic goal of the DWR is to ensure that California's needs for water supplies, water-related recreation, fish and wildlife, hydroelectric power, prevention of damage and loss of life from floods and dam failure, and water-related environmental enhancements are met; and to ensure that the manner in which these needs are fulfilled is consistent with public desires and attitudes concerning environmental and social considerations. The *California Water Commission*, also within The Resources Agency, serves as a policy advisory body to the Director of the DWR on matters within the department's jurisdiction and coordinates state and local views on federal appropriations for water projects in California. The commission also conducts public hearings and investigations statewide for the department and provides an open forum for interested citizens to voice on water development issues. The *California State Water Resources Control Board (SWRCB)*, located within the California Environmental Protection Agency, is assigned the responsibility to protect water quality and allocate water rights.

Depauperate — (Biology) An area poor in species quantities and/or diversity; an aquatic sample showing few life forms. Impoverished habitat.

Dependable Supply — (1) That water which can be expected to be available at a time and place with the quality demanded; sometimes the amount of water available is at a stated percentage of time. (2) The average annual quantity of water that can be delivered during a drought period.

Dependable Yield — The maximum annual supply of a given water development that is expected to be available on demand, with the understanding that lower yields will occur in accordance with a predetermined schedule or probability. More frequently referred to as *Firm Yield*.

Depletion — (1) The water consumed within a service area or no longer available as a source of supply; that part of a withdrawal that has been evaporated, transpired, incorporated into crops or products, consumed by man or livestock, or otherwise removed. (2) Net rate of water use from a stream or groundwater aquifer for beneficial and nonbeneficial uses. For irrigation or municipal uses, the depletion is the headgate or wellhead diversion minus return flow to the same stream or groundwater aquifer. For agriculture and wetlands, it is the *Evapotranspiration of Applied Water (ETAW)* (and *Evapotranspiration (ET)* of flooded wetlands) plus irrecoverable losses. For urban water use, it is the ETAW (water applied to landscaping or home gardens), sewage effluent that flows to a salt sink, and incidental ET losses. For instream use, it is the amount of dedicated flow that proceeds to a salt sink and is not available for reuse.

Depletion (Ground Water) — The withdrawal of water from a ground water source at a rate greater than its rate of recharge, usually over an extended period of several years.

Depletion (Streamflow) — The amount of water that flows into a valley, or onto a particular land area, minus the water that flows out of the valley or off from the particular land area.

Depletion (Water) — That portion of the water supply that is consumptively used.

Depletion Curve — (Hydraulics) A graphical representation of water depletion from storage-stream channels, surface soil, and groundwater. A depletion curve can be drawn for base flow, direct runoff, or total flow.

Deposit — Something dropped or left behind by moving water, as sand or mud.

Depositing Substrates — Bottom areas where solids are being actively deposited; often occurring in the vicinity of effluent discharges.

Deposition — The accumulation of material dropped because of a slackening movement of the transporting medium, e.g., water or wind. Also, the transition of a substance from the vapor phase directly to the solid phase, without passing through an intermediate liquid phase, also referred to as *Sublimation*.

Depression Storage — (1) Water contained in natural depressions in the land surface, such as puddles. (2) Water that is temporarily detained on the surface of the earth in puddles and cavities that have little or no surface outlet.

Depth, often Depths — A deep art of place, as the ocean depths.

Depth-Area-Duration Analysis — Determination of the maximum amounts of precipitation within various durations over areas of various sizes; used to predict flood events.

Depth Finder — An instrument used to measure the depth of water, especially by radar or ultrasound.

Depth of Runoff — The total runoff from a drainage basin divided by its area. For convenience in comparing runoff

with precipitation, depth of runoff is usually expressed in inches during a given period of time over the drainage area expressed in inches per square mile.

Depth Sounder — An ultrasonic instrument used to measure the depth of water under a ship.

Depuration — A process during which an organism, such as an oyster or clam, eliminates dangerous chemicals or microorganisms when placed in uncontaminated water.

Derelict — (Legal) Land left dry by a permanent recession of the water line.

Derection — (Legal) (1) A gaining of land by the permanent recession of the water line. (2) The land so gained. Also see *Reliction* and *Doctrine of Reliction*.

Desalination, or Desalinization — (1) To remove salts and other chemicals, as from sea water or soil, for example. Usually used with respect to the salt contained in water. (2) Specific treatment processes to demineralize sea water or brackish (saline) water for reuse. Also referred to as *Desalting*.

Desalinize — See *Desalination* or *Desalinization*.

Desalting — A term used to refer to any process by which the dissolved solids content of saline water or seawater is reduced. Also known as *Desalination*, *Desalinization*, or *Saline Water Conversion*.

De-Seasonalization — (Statistics) A process which removes the seasonal effects from time series data. One way to determine if a de-seasonalization transformation of the data is necessary is to examine the autocorrelations. If, for monthly data, the twelfth autocorrelation is abnormally high, or for quarterly data, the fourth autocorrelation abnormally high, then the data is seasonal in nature and requires de-seasonalization before attempting to fit a model to its behavior. More frequently referred to as *Seasonal Adjustment (S.A.)*. Also see *Seasonal Adjustment*, *Seasonal Adjustment Factors*, *Seasonal Factors*, and *Seasonality*.

Desert — A barren or desolate area, especially one characterized by dry, often sandy conditions of little rainfall, typically less than 10 inches of rain per year, extreme temperatures, and sparse vegetation. Also see *Biome*.

Desert Pavement — Surfaces of tightly packed gravel that armor, as well as rest on, a thin layer of silt, presumably formed by weathering of the gravel. They have not experienced fluvial sedimentation for a long time, as shown by the thick varnish coating the pebbles, the pronounced weathering beneath the silt layer, and the striking smoothness of the surface, caused by obliteration of the original relief by downwashing into depressions.

Desert Stream Valley — The valley of a perennial stream that is fed from mountain sources and is erosionally-cut through several desertic *Semi-Bolsons*.

Desert Varnish — A dark coating (from 2 to 500 microns thick) that forms on rocks at and near the Earth's surface as a result of mineral precipitation and *Eolian* influx. The chemical composition of rock varnish typically is dominated by clay minerals and iron and/or manganese oxides and hydroxides, forming red and black varnishes, respectively. With time the thickness or the coating increases if abrasion and burial of the rock surface do not occur. As a result, *Clastic* sediments on alluvial fan surfaces that have been abandoned for long periods of time have much darker and thicker coatings of varnish than do younger deposits.

Desertification — The transformation of arable or habitable land to desert, as by a change in climate or destructive land use. The term is generally applied to the production of artificial deserts where people have intensified the problems caused by droughts through overgrazing marginal land, repeated burning of natural vegetation, intensive farming of arid land, aggressive removal of trees, and prolonged irrigation of arid land for agricultural use.

Desert Research Institute (DRI) [Nevada] — The Desert Research Institute was created in 1959 by an act of the Nevada Legislature as a unit of the University of Nevada. When the University of Nevada System was formed in 1968, DRI became an autonomous, nonprofit division of this system. Since that time DRI has grown to be one of the world's largest multi-disciplinary environmental research organizations focusing on arid lands. The DRI operates from statewide facilities in Las Vegas, Reno, Stead, Laughlin, and Boulder City. The DRI's activities are directed from five research centers representing the *Geosphere* (Quaternary Sciences Center), *Hydrosphere* (Water Resources Center), *Biosphere* (Biological Sciences Center), and *Atmosphere* (Atmospheric Sciences Center and Energy and Environmental Engineering Center). Multi-disciplinary teams drawn from these centers are assembled to address basic and applied research problems on a project-by-project basis. Listed below are the DRI's five research centers and their primary mission statement:

- [1] **Atmospheric Sciences Center (ASC)** — The ASC is a nationally recognized leader in the field of atmospheric sciences. The ASC's mission is to improve the fundamental understanding of the earth's atmosphere, particularly as it relates to the weather and to the climate of arid regions. The ASC is the home of the strongest atmospheric modification research program in the United States.
- [2] **Biological Sciences Center (BSC)** — The BSC focuses on plant and soil biology from an ecological perspective. The BSC's mission is to improve the fundamental understanding of the earth's biosphere, thereby providing the knowledge needed to effectively manage biological resources important to the

- future use and habitation of the earth.
- [3] ***Energy and Environmental Engineering Center (EEEC)*** – The EEEC largely conducts air resources research. The EEEC's mission is to conduct high-quality research to understand current and future human impacts on the environment, especially air quality, and the technology that can be applied to mitigate these impacts.
 - [4] ***Quaternary Sciences Center (QSC)*** – The QSC is one of approximately 15 Quaternary research programs worldwide. The QSC's mission is to improve the fundamental understanding of past climates and associated environmental responses and human adaptations to climate change during the Quaternary Period (covering the last 1.8 million years).
 - [5] ***Water Resources Center (WRC)*** – The WRC is the largest water research group focused on arid lands in the United States. The WRC's mission to improve the fundamental understanding and knowledge of hydrologic systems, with special emphasis on arid lands, for more effective management of hydrologic resources.

[See Appendix E–3 for a more complete listing of the DRI's major laboratories operated and the principal skills and activities supported.]

Desert National Wildlife Refuge (NWR) [Nevada] — One of the nine National Wildlife Refuges (NWR) located in the State of Nevada, the Desert NWR was established in 1936 and covers 1,588,459 acres (2,482 square miles) of the diverse Mohave Desert in southern Nevada and is the largest National Wildlife Refuge in the 48 contiguous United States. The Desert NWR's most important objective is the perpetuation of the desert bighorn sheep and its habitat. The refuge contains six major mountain ranges, the highest rising from a 2,500 foot elevation valley floor to nearly 10,000 feet. The dry climate and varying elevations provide varied plant life with creosote bush and white bursage dominant in the lower elevations, Mojave yucca and cactus dominant in the mid-elevations, blackbrush and Joshua trees prevalent near 6,000 feet, and single-leaf pinyon and Utah juniper become prominent at 6,000 feet. From 7,000–9,000 feet Ponderosa pine and white fir become dominant and near 10,000 feet the only remaining tree is the bristlecone pine. Throughout this area the big sagebrush is the most common shrub. Within this refuge, and in stark contrast to the typical habitat and wildlife prevalent throughout the refuge, are the numerous and diverse plant and animal communities at Corn Creek. Here springs turn the desert into an oasis attracting over 200 species of birds alone. Also see *National Wildlife Refuge (NWR) System* and *National Wildlife Refuges (NWR) [Nevada]*.

Desiccant — A substance, such as calcium oxide or silica gel, that has a high affinity for water and is used as a drying agent.

Desiccate — (1) To dry out thoroughly. (2) To preserve (foods) by removing moisture.

Desiccation — (1) Loss of water from pore spaces of sediments through compaction or through evaporation caused by exposure to air. (2) (Geology) Used to refer to a long period of time between *Pluvial* (wet) episodes.

Desiccation Cracks — Surface fractures that can result from the drying of soil or porous sedimentary rock.

Design Capacity — (1) Volume of water that a channel, pipe, or other drainage line is designated to convey. (2) The average daily flow that a water or wastewater treatment plant or other facility is designed to accommodate.

Design Flood — (1) Commonly used to mean the magnitude of flood used for design and operation of flood control structures or other protective measures. It is sometimes used to denote the magnitude of flood used in floodplain regulations. (2) The flood magnitude selected for use as a criterion in designing flood control works. The largest flood that a given project is designed to pass safely. In dam design and construction, the reservoir inflow-outflow hydrograph used to estimate the spillway discharge capacity requirements and corresponding maximum surcharge elevation in the reservoir.

Design Flow — The average flow of wastewater that a treatment facility is built to process efficiently, commonly expressed in millions of gallons per day (MGD).

Design Runoff Rate — In irrigation, the maximum runoff rate expected over a given period of time.

Designated Floodway — The channel of a stream and the portion of the adjoining floodplain designated by a regulatory agency to be kept free of further development to provide for unobstructed passage of flood flows.

Designated Groundwater Basin — A basin where permitted ground water rights approach or exceed the estimated average annual recharge and the water resources are being depleted or require additional administration. Under such conditions, a state's water officials will so designate a groundwater basin and, in the interest of public welfare, declare *Preferred Uses* (e.g., municipal and industrial, domestic, agriculture, etc.). Also referred to as *Administered Groundwater Basin*.

Designated Groundwater Basin [Nevada] — In the interest of public welfare, the Nevada State Engineer, *Division of Water Resources, Department of Conservation and Natural Resources*, is authorized by statute (Nevada Revised Statute 534.120) and directed to designate a ground water basin and declare *Preferred Uses* within such designated

basin. The State Engineer has additional authority in the administration of the water resources within a designated ground water basin. [A listing of Nevada's Hydrographic Regions, and designated Areas and Sub-Areas is presented in Appendix A-1 (hydrographic regions, areas and sub-areas), Appendix A-2 (listed sequentially by area number) Appendix A-3 (listed alphabetically by area name), and Appendix A-4 (listed alphabetically by principal Nevada county(ies) in which located).]

Designated Uses — Those water uses identified in state water quality standards that must be achieved and maintained as required under the *Clean Water Act (CWA)*. Such uses may include cold water fisheries, public water supply, irrigation, recreation, minimum stream flows, etc.

Designated Watersheds — Watershed areas that have been set aside as sources of municipal water or other similar purposes would be included in this category. Other uses are either modified or excluded.

Designer Bugs — A popular term for *Microbes* developed through *Biotechnology* that can degrade specific toxic chemicals at their source in toxic waste dumps, in ground water, or on the land surface. May also be useful in cleaning (decomposing) oil spills.

Desilting Area — An area of grass, shrubs, or other vegetation used for inducing the deposition of silt and other debris from flowing water. Typically located above a stock tank, pond, field, or other area needing protection from sediment accumulation.

Desorption — The removal of a substance adsorbed to the surface of an adsorbent. Also see *Sorption*, which is the reverse process.

Destratification — Vertical mixing within a lake or reservoir to totally or partially eliminate separate layers of temperature, plant, or animal life.

Detachment — The removal of transportable fragments of soil material from a soil mass by an eroding agent, usually falling raindrops, running water, or wind. Through this process, soil particles or aggregates are made ready for transport, the first stage in soil erosion.

Detectable Leak Rate — The smallest leak (from a storage tank), expressed in terms of gallons or liters per hour, that a test can reliably discern with a certain probability of detection or false alarm.

Detection Criterion — A predetermined rule to ascertain whether a tank is leaking or not. Most volumetric tests use a threshold value as the detection criterion. Also see *Volumetric Tank Tests*.

Detection Monitoring Program — Groundwater monitoring at the boundary of a treatment, storage, or disposal facility (the point of compliance) to detect any contamination caused by leaks from the hazardous waste at the facility. The materials for which the samples must be analyzed (the indicator parameters/constituents) are specified in the facility permit.

Detention Dam — A dam constructed for the purpose of temporary storage of streamflow or surface runoff and for releasing the stored water at controlled rates.

Detention Basin — A relatively small storage lagoon for slowing stormwater runoff, generally filled with water for only a short period of time after a heavy rainfall. Also see *Retention Basin*.

Detention Facility — A surface water runoff storage facility that is normally dry but is designed to hold (detain) surface water temporarily during and immediately after a runoff event. Examples of detenational facilities are: natural swales provided with crosswise earthen berms to serve as control structures, constructed or natural surface depressions, subsurface tanks or reservoirs, rooftop storage, and infiltration or filtration basins. Also see *Retention Facility*.

Detention Storage — (1) The volume of water, other than *Depression Storage*, existing on the land surface as flowing water which has not yet reached the channel. (2) Water temporarily detained in the non-capillary pores of the soil, free to move by gravity, which it generally does within about 24 hours of the event that filled the pores.

Detention Structure (Dam) — A structure constructed for the temporary storage of floodflows where the opening for release is of a fixed capacity and not manually operated.

Detention Time — (1) The theoretical calculated time required for a small amount of water to pass through a tank at a given rate of flow. (2) The actual time that a small amount of water is in a settling basin, flocculating basin, or rapid-mix chamber. (3) In storage reservoirs, the length of time water will be held before being used.

Detergent — Synthetic washing agent that helps to remove dirt and oil. Some contain compounds which kill useful bacteria and encourage algae growth when they are in wastewater that reaches receiving waters.

Deterministic Process — (Statistics) An analytical and forecasting technique which assumes that the future can be predicted exactly from its past. Consequently, it is assumed that the data series to be forecasted contains all the information necessary to predict its future behavior. A deterministic process or relationship is assumed to be "exact", and therefore assumes no presence of a *Disturbance (or Error) Term*. The simplest form of this process is commonly termed an *AutoRegressive Moving Average (ARMA) Process*, or *Box-Jenkins*, which involves

regressing a series on itself and using solely the historical patterns contained in the data to formulate forecasts. As a naive method, such a process does not include the capability to incorporate external “shocks” or other influences which may have an effect on the future behavior of a series. Such a technique is typically used only for well-behaved data showing typically predictable repetitive cycles and patterns. Contrast with *Stochastic Process*.

Detrital — (Geology) Clastic; rock and minerals occurring in sedimentary rocks that were derived from pre-existing igneous, sedimentary, or metamorphic rocks.

Detritus — (1) The heavier mineral debris moved by natural water courses, usually in the form of *Bed Load*. (2) The sand, grit, and other coarse material removed by differential sedimentation in a relatively short period of detention. (3) Bits of vegetation, animal remains, and other organic material that form the base of food chains in wetlands and many other kinds of habitats.

Deuterium Oxide — An isotopic form of water with composition D₂O, isolated for use as a moderator in certain nuclear reactors. Also referred to as *Heavy Water*. Also see *Heavy Water Moderated Reactor* and *Light Water Reactor (LWR)*.

Developed Water — Water that is controlled and managed (dammed, pumped, diverted, stored in reservoirs or channeled in aqueducts) from rivers or otherwise developed for a variety of uses.

Deviation, Standard — (Statistics) A measure of the average variation of a series of observations or items of a population about their mean. In a normally distributed set of observations the interval of the mean plus or minus one standard deviation includes about two-thirds of the observations.

Dew — The droplets of water condensed from air, usually at night, onto cool surfaces.

Dew Point — (1) The temperature at which a gas or vapor condenses to form a liquid; the point at which dew begins to form. (2) The temperature to which the air must be cooled in order to reach 100 percent relative humidity, or saturation.

Dewater, and Dewatering — (1) To remove water from a waste produce or streambed, for example. (2) The extraction of a portion of the water present in sludge or slurry, producing a dewatered product which is easier to handle. (3) (Mining) The removal of ground water in conjunction with mining operations, particularly open-pit mining when the excavation has penetrated below the ground-water table. Such operations may include extensive ground-water removal and, if extensive enough and if not re-injected into the groundwater, these discharges may alter surface water (stream) flows and lead to the creation of lakes and wetland areas. As such water removals only last so long as the mine is in operation, eventually surface water impacts, if present, will be eliminated, consequently jeopardizing surface water uses, such as irrigation, livestock, wildlife, or riparian habitat that may have become dependent upon the continuation of these temporary flows. Also, when the mine dewatering operations cease, the remaining open pit will eventually begin to fill up with ground water, resulting in significantly increased evaporation from ground water reservoirs.

Diadromous — Relating to a fish that migrates between salt and fresh waters.

Diameter at Breast Height (DBH) — A measure of tree diameter determined at the standard height of 4.5 feet (1.4 meters) from the ground.

Diastrophic — (Geology) Pertaining to processes by which the earth’s crust is deformed, producing continents, oceans, basins, mountains, and other *Geophysical* features. Also see *Orogenic* and *Tectonic*.

Diatom — Any of the microscopic unicellular or colonial algae constituting the class *Bacillarieae*. They have a silicified cell wall, which persists as a skeleton after death and forms kieselguhr (loose or porous diatomite). Diatoms occur abundantly in fresh and salt waters, in soil, and as fossils. They form a large part of the *Plankton*.

Diatoma — A small genus of fresh-water diatoms typifying the family *Diatomaceae*. They sometimes cause aromatic or disagreeable odors in water.

Diatomaceous Earth — A yellow, white or light-gray material composed of the siliceous shells of *Diatoms* (fossilized diatoms) and used in water filtration to filter out solid waste in wastewater treatment plants; also used as an active ingredient in some powdered pesticides. Also referred to as *Diatomite*.

Diatomite — See *Diatomaceous Earth*.

Diel — Of or pertaining to a 24-hour period of time; a regular daily cycle.

Diffluence — A lateral branching or flowing apart of a glacier in its *Ablation* area. This separation may result from the glacier’s spilling over a preglacial divide or through a gap made by basal sapping of a *Cirque* wall, or from down-valley blocking at the junction of a tributary glacier. Can be used to describe similar processes in water flow.

Diffused Air — (Water Quality) A type of aeration that forces oxygen into sewage by pumping air through perforated pipes inside a holding tank.

Diffusion — The movement of a substance from an area of high concentration to an area of low concentration. Turbulent diffusion results from atmospheric motions diffusing water, vapor, heat, and other gaseous components

by exchanging parcels called eddies between regions in space in apparent random fashion.

Diffusion Coefficient — (1) The rate at which solutes are transported at the microscopic level due to variations in the solute concentrations within the fluid phases. (2) The rate of dispersion of a chemical caused by the kinetic activity of the ionic or molecular constituents. Also referred to as the *Coefficient of Molecular Diffusion*. See *Molecular Diffusion*.

Diffusivity, Soil Water — The hydraulic conductivity divided by the differential water capacity, or the flux of water per unit gradient of moisture content in the absence of other force fields.

Digester — (Water Quality) In a *Wastewater Treatment Plant*, a closed tank that decreases the volume of solids and stabilizes raw sludge by bacterial action.

Digester Gas — The gas produced as a result of the microbial decomposition of particulate organic matter under *Anaerobic* conditions. Methane and hydrogen are major components.

Digestion — (General) The biochemical decomposition of organic matter, resulting in partial gasification, liquefaction, and mineralization of pollutants. (Water Quality) In wastewater treatment, the biological decomposition of organic matter in sludge.

Dike — (1) (Engineering) An embankment to confine or control water, especially one built along the banks of a river to prevent overflow of lowlands; a levee. (2) A low wall that can act as a barrier to prevent a spill from spreading. (3) (groin, spur, jetty, deflector, boom) A structure designed to: (a) reduced water velocity as stream flow passes through the dike so that sediment deposition occurs instead of erosion (permeable dike), or (b) deflect erosive currents away from the stream bank (impermeable dike). (4) (Geology) A tabular body of igneous (formed by volcanic action) rock that cuts across the structure of adjacent rocks or cuts massive rocks.

Diligence — A persistent effort in the completion of a specific task, such as the construction of a water diversion project and putting water to beneficial use.

Diluent — A substance used to dilute a solution or suspension.

Dilute — To make thinner or less concentrated by adding a liquid such as water.

Dilution — The reduction of the concentration of a substance in air or water.

Dilution Factor — The extent to which the concentration of some solution or suspension has been lowered through the addition of a *Diluent*.

Dilution Ratio — (Water Quality) The ratio of the volume of water in a stream to the volume of incoming waste. The capacity of a stream to assimilate waste is reflected in the dilution ratio.

Diluvial, also Diluvian — Of, relating to, or produced by a flood.

Dimictic Lake (or Reservoir) — A stratified lake or reservoir that experiences two periods of full mixing or (*Fall and Spring*) *Overturbs* annually. The water in lakes layer in response to differences in the temperatures of surface and deep waters. The surface water will be warmer because of radiant heating by the sun, and the bottom water will be cooler and therefore denser. The waters in these two layers (termed the *Epilimnion* on the surface and *Hypolimnion* on the bottom) are separated by a boundary referred to as the *Thermocline*. This layering is disrupted in response to variation in air temperature associated with changes in the seasons of the year. As the epilimnion cools, it sinks, mixing the water within the lake. Contrast with *Meromictic Lake*.

Dioxin — Any of several carcinogenic or teratogenic heterocyclic hydrocarbons that occur as impurities in petroleum-derived herbicides and through over-use or runoff may threaten both surface and groundwater supplies. Dioxin has been linked to cancer, damage to the immune system, and other serious health conditions. It is also produced in paper mills when chlorine is mixed with wood pulp to brighten paper. Dioxin ends up in the mills' wastewater, which is then discharged into rivers.

Dip — To plunge briefly into a liquid, as in order to wet, coat, or saturate. Synonymous with *Dunk*.

Dipper — One that dips, especially a container for taking up water.

Diquat — A strong, non-persistent, yellow, crystalline herbicide, $C_{12}H_{12}Br_2N_2$, used to control water weeds.

Direct Discharger — A municipal or industrial facility which introduces pollution through a defined conveyance or system such as outlet pipes; a point source.

Direct Filtration — (Water Quality) A method of treating water which consists of the addition of coagulant chemicals, flash mixing, coagulation, minimal flocculation, and filtration. Sedimentation is not used in this process.

Direct Precipitation — Water that falls directly into a lake or stream without passing through any land phase of the runoff cycle.

Direct Runoff — The runoff entering stream channels most immediately after rainfall or snowmelt. It consists of surface runoff plus interflow and forms the bulk of the *Hydrograph* of a flood. Direct runoff plus *Base Runoff* compose the entire flood hydrograph.

Direct Water Uses — Uses of water that are apparent, for example, washing, bathing, cooking, etc.

Disaster Area — An area that officially qualifies for emergency governmental aid as a result of a catastrophe, such as an earthquake or a flood.

Discharge — (1) The volume of water (or more broadly, the volume of fluid including solid- and dissolved-phase material), that passes a given point in a given period of time. (2) The flow of surface water in a stream or the flow of groundwater from a spring, ditch, or flowing artesian well. (3) (Hydraulics) The rate of flow, especially fluid flow; the volume of fluid passing a point per unit time, commonly expressed as cubic feet per second, million gallons per day, gallons per minute, or cubic meters per second.

Discharge (Hydrologic) — (1) The volume of water passing through a channel during a given time, usually measured in cubic feet per second (cfs). (2) In its simplest concept, discharge means outflow and is used as a measure of the rate at which a volume of water passes a given point. Therefore, the use of this term is not restricted as to course or location, and it can be used to describe the flow of water from a pipe or a drainage basin. With reference to groundwater, the process by which groundwater leaves the *Zone of Saturation* via *Evaporation*, *Evapotranspiration*, or by flow to the surface through springs and seeps. The data in the reports of the *U.S. Geological Survey (USGS)* on surface water represent the total fluids measured. Thus, the terms discharge, streamflow, and runoff represent water with the solids dissolved in it and the sediment mixed with it. Of these terms, discharge is the most comprehensive. The discharge of drainage basins is distinguished as follows:

- [1] **Yield** — The total water runout or “water crop” and includes runoff plus underflow;
- [2] **Runoff** — That part of water yield that appears in streams; and
- [3] **Streamflow** — The actual flow in streams, whether or not subject to regulation or underflow.

Each of these terms can be reported in total volumes (e.g., acre-feet) or time-related rates of flow (e.g., cubic feet per second or acre-feet per year).

Discharge Area — (1) An area in which ground water is discharged to the land surface, surface water, or atmosphere. (2) An area in which there are upward components of hydraulic head in the aquifer. Ground water is flowing toward the surface in a discharge area and may escape as a spring, seep, or base flow, or by evaporation and transpiration.

Discharge, Average — The arithmetic average of the annual discharges for all complete water years of record whether or not they are consecutive. The term *average* is generally reserved for average of record and *mean* is used for averages of shorter periods; namely, daily mean discharge.

Discharge Coefficient — (Hydraulics) The ratio of actual rate of flow to the theoretical rate of flow through orifices, weirs, or other hydraulic structures.

Discharge Curve — A curve that expresses the relation between the discharge of a stream or open conduit at a given location and the stage or elevation of the liquid surface at or near that location. Also called *Rating Curve* and *Discharge Rating Curve*.

Discharge Formula — (Hydraulics) A formula used to calculate the rate of flow of fluid in a conduit or through an opening. For a steady flow discharge,

$$Q = A V$$

where Q is the rate of flow, A is the cross-sectional area, and V is the mean velocity. Common units are cubic feet per second.

Discharge Measurement — Total discharge is equal to the cross-sectional area of the water in a channel or pipe times its average velocity.

Discharge Period — The period of time during which effluent is discharged.

Discharge Permit — A permit issued by the state to discharge effluent into waters of the state.

Discharge Point — A location at which effluent is released into a receiving stream or body of water.

Discharge Probability Relationship — A graph of annual instantaneous peak discharge (or other hydrologic quantity) on the vertical axis, versus probability and/or recurrence interval on the horizontal axis. The graph provides a means of estimating the flow that will be reached or exceeded in a given year at a specified probability, or a means of estimating the probability that a specified discharge will be reached or exceeded in a given year.

Discharge, Sediment — The rate at which sediment passes a section of a stream or the quantity of sediment, as measured by dry weight or by volume, that is discharged in a given time.

Discharge Velocity — An apparent velocity, calculated by *Darcy's Law*, which represents the flow rate at which water would move through an aquifer if the aquifer were an open conduit. Also referred to as *Specific Discharge*.

Discount Rate — (1) The interest rate used in evaluating water (and other) projects to calculate the present value of future benefits and future costs or to convert benefits and costs to a common time basis (e.g., current dollars). (2) An interest rate that takes into account the future value of dollars currently being expended. In the case of water

project discount rates, the interest is figured on an annual basis for a reasonable life of the project. The discount rate recognizes the value of the potential opportunities lost into the future by tying funds up into a water project that could go to other uses. Both the interest rate selected and the length of time it is applied can greatly affect the calculated costs for a project.

Disembogue — To discharge or pour fourth; to flow out or empty, as water from a channel.

Disinfectant — A chemical or physical process that kills pathogenic organisms in water. Chlorine is often used to disinfect sewage treatment effluent, water supplies, wells, and swimming pools.

Disinfectant and Disinfection By-Product Rule (D/DBP) — The rule promulgated by the *U.S. Environmental Protection Agency (EPA)* that would require water suppliers to reduce the levels of *Disinfection By-Products* found in treated drinking water. Stage 1 of the rule has been delayed until at least the year 2000 with Stage 2 following in 2003.

Disinfectant By-Product — A compound formed by the reaction of a *Disinfectant* such as *Chlorine* with organic material in the water supply. See *Disinfection By-Products*.

Disinfectant Time — The time it takes water to move from the point of *Disinfectant* application (or the previous point of residual disinfectant measurement) to a point before or at the point where the residual disinfectant is measured.

Disinfection — (Water Quality) The process of killing a large portion of microorganisms in or on a substance, but not bacterial spores. The primary of disinfection in water and wastewater treatment is to kill or render harmless microbiological organisms that cause disease. At the present time *Chlorination* is the most important disinfection option for drinking water treatment for the foreseeable future; however, other viable disinfection processes include *Ozonation* and *Ultraviolet Radiation (UV)*.

Disinfection By-Products — (1) Chemicals which are formed when a disinfectant such as *Chlorine* is added to water that contains organic matter, usually from decaying plant or animal material. (2) Compounds that form when chlorine combines with naturally occurring or pollution-derived organic, carbon-based materials, such as the acids from soils or decaying vegetation and bromide (salt). Such by-products are suspected to be human *Carcinogens*. One typical such disinfection by-product for which the *U.S. Environmental Protection Agency (EPA)* has established *Maximum Contaminant Levels (MCLs)* as part of its enforcement of the *Safe Drinking Water Act (SDWA)* are total *Trihalomethanes (TTHMs)*.

Dispersant — A chemical agent used to break up concentrations of organic material such as spilled oil on a water surface.

Dispersion — The spreading and mixing of chemical constituents in both surface and ground waters caused by diffusion and mixing due to microscopic variations in densities and velocities.

Dispersion Coefficient — A measure of the spreading of a flowing substance due to the nature of the porous medium (and specific substance or fluid properties), with interconnected channels distributed at random in all directions. Also equals the sum of the *Coefficient of Mechanical Dispersion* and the *Coefficient of Molecular Diffusion* in a porous medium.

Dispersivity — A property of a porous medium (and the specific substance or fluid) that determines the dispersion characteristics of the contaminant in that medium by relating the components of pore velocity to the *Dispersion Coefficient*.

Displacement — (Geology) The distance by which portions of the same geological layer are offset from each other by a fault.

Displacement Ton — (Nautical) A unit for measuring the displacement of a ship afloat, equivalent to one long ton or about one cubic meter of salt water.

Disposal — The transference of unwanted material, such as wastes, to a new entity, a new place, or a new form.

Disposal Field — Area used for spreading liquid effluent for separation of wastes from water, degradation of impurities, and improvement of drainage waters. Also referred to as *Infiltration Field* or *Septic Tank Absorption Field*.

Disposal Pond — A small, usually diked, enclosure that is open to the atmosphere and into which a liquid waste is discharged. Also see *Lagoon*.

Disposal System — A system for the disposing of wastes, either by surface or underground methods; includes sewer systems, treatment works, disposal wells, and other systems.

Disposal Well — A deep well used for the disposal of liquid wastes.

Dissection — The partial erosional destruction of a land surface or landform by gully, arroyo, canyon or valley cutting leaving flattish remnants, or ridges, or hills or mountains separated by drainageways.

Dissoluble — That can be dissolved, e.g., dissoluble airborne pollutants brought back to the earth as rain.

Dissolve — A condition where solid particles mix, molecule by molecule, with a liquid and appear to become part of

the liquid.

Dissolved — That material in a representative water sample that passes through a 0.45-micrometer membrane filter. This is a convenient operational definition used by federal agencies that collect water data. Determination of “dissolved” constituents are made on subsamples of the filtrate.

Dissolved Inorganic Nitrogen — Nitrogen primarily in the form of nitrite, nitrate, or ammonia.

Dissolved Load — All the material transported by a stream or river in solution, as contrasted with *Bed Load* and *Suspended Load*.

Dissolved Organic Carbon (DOC) — A measure of the organic compounds that are dissolved in water. In the analytical test for DOC, a water sample is first filtered to remove particulate material, and the organic compounds that pass through the filter are chemically converted to carbon dioxide, which is then measured to compute the amount of organic material dissolved in the water.

Dissolved Organic Compounds — Carbon-based substances dissolved in water.

Dissolved Oxygen (DO) — (1) Concentration of oxygen dissolved in water and readily available to fish and other aquatic organisms. (2) The amount of free (not chemically combined) oxygen dissolved in water, wastewater, or other liquid, usually expressed in milligrams per liter, parts per million, or percent of saturation. The content of water in equilibrium with air is a function of atmospheric pressure, temperature, and dissolved-solids concentration of the water. The ability of water to retain oxygen decreases with increasing temperature or dissolved solids, with small temperature changes having the more significant offset. Photosynthesis and respiration may cause diurnal variations in dissolved-oxygen concentration in water from some streams. Adequate concentrations of dissolved oxygen are necessary for the life of fish and other aquatic organisms and the prevention of offensive odors. Dissolved oxygen levels are considered the most important and commonly employed measurement of water quality and indicator of a water body's ability to support desirable aquatic life. The ideal dissolved oxygen level for fish is between 7 and 9 milligrams per liter (mg/l); most fish cannot survive at levels below 3 mg/l of dissolved oxygen. Secondary and advanced wastewater treatment techniques are generally designed to ensure adequate dissolved oxygen in waste-receiving waters.

Dissolved Solids — (1) Minerals and organic matter dissolved in water. (2) The dissolved mineral constituents or chemical compounds in water or solution; they form the residue that remains after evaporation and drying. Excessive amounts of dissolved solids make water unfit to drink or use in industrial processes.

Dissolved-Solids Concentration — For water this concentration is determined either analytically by the “residue-on-evaporation” method, or mathematically by totaling the concentrations of individual constituents reported in a comprehensive chemical analysis. During that analytical determination of dissolved solids, the bicarbonate (generally a major dissolved component of water) is converted to carbonate. Therefore, in the mathematical calculation of dissolved-solids concentration, the bicarbonate value, in milligrams per liter, is multiplied by 0.4926 to reflect the change. Alternatively, alkalinity concentration (as in mg/L of CaCO₃) can be converted to carbonate concentration by multiplying by 0.60.

Distillate — A liquid condensed from vapor in *Distillation*.

Distillation — The separation of different substances in a solution by boiling off those of a lower boiling point first. For example, water can be distilled and the steam condensed back into a liquid that is almost pure water. The impurities (minerals) remain in the concentrated residue. In waste treatment, distillation consists of heating the effluent and then removing the vapor or steam. When the steam is returned to a liquid, it is almost pure (distilled) water. The pollutants remain in the concentrated residue.

Distilled Water (DW) — Water that has been purified by the *Distillation* process. Water that contains various chemicals or ions in solution is heated to boiling and the water vapor is condensed. The process leaves behind various inorganic ions and results in a water that is free of dissolved salts.

Distributary — A diverging stream which does not return to the main stream, but discharges into another stream or the ocean. Also refers to conduits that take water from a main canal for delivery to a farm. See *Distributary Channel or Stream*.

Distributary Channel (or Stream) — A river branch that flows away from a main stream and does not rejoin it. Characteristic of *Deltas* and *Alluvial Fans*.

Distribution (of Water) — The management of water which allows water users to receive the amount of water to which they are entitled by law and as supply permits.

Distribution Coefficient — The quantity of a solute absorbed per unit weight of a solid divided by the quantity dissolved in water per unit volume of water.

Distribution Graph (Distribution Hydrograph) — A *Unit Hydrograph* of direct runoff modified to show the portion of the volume of runoff that occurs during successive equal units of time.

Distribution System — (1) Any combination of pipes, tanks, pumps, and so forth that delivers water from water sources or treatment facilities to the consumer. (2) (Irrigation) A system of ditches and their appurtenances which convey irrigation water from the main canal to the farm units; diverse water from the main canal-side turnout to individual water users or to other smaller distribution systems. (3) Any system that distributes water within a farm.

Distribution Uniformity (DU) — (1) Generally, a term used to describe how evenly water is applied on a field and therefore a practical method for measuring the performance of an irrigation system. The concept of distribution uniformity constitutes one of the limiting factors on a system's *Irrigation Efficiency (I.E.)*. (2) Also, a ratio used to measure the infiltration of irrigation water through a given soil profile. More specifically, the ratio of the average low-quarter depth of irrigation to the average depth of irrigation, for the entire farm field, expressed as a percent. Typically, a DU of between 80 and 90 percent is considered very good.

District (USBR) — An entity that has a contract with the *U.S. Bureau of Reclamation (USBR)* for the delivery of irrigation water. Such entities include, but are not limited to: canal companies, conservancy districts, ditch companies, irrigation and drainage districts, irrigation companies, irrigation districts, reclamation districts, service districts, storage districts, water districts, and water users associations.

Disturbance — A discrete event or process which kills or removes vegetation. From an ecological and hierarchical perspective, disturbance is a change in the minimal structure of an ecosystem caused by a factor external to the reference structure, for example, fire, activities by man, etc.

Disturbed Area — (Geology) Area where vegetation, topsoil, or overburden has been removed, or where topsoil, spoil, and processed waste has been placed.

Ditch — A long narrow trench or furrow dug in the ground, as for irrigation, drainage, or a boundary line.

Ditch Rider — An individual responsible for operating structures and distributing water internally within an irrigation project. Canal system operations personnel. The person or persons responsible for controlling the canal system based on the flow schedule established by the *Watermaster*.

Dive — To plunge, especially headfirst, into water.

Divergence — A meteorological condition characterized by the uniform expansion in volume of a mass of air over a region, usually accompanied by fair dry weather.

Divergent Plate Boundary — In the theory of *Plate Tectonics*, a boundary between two plates that make up the crust of the earth. The boundary is characterized by a chasm between the two plates, filled with molten rock from within the earth.

Diversion — (1) A structure in a river or canal that divers water from the river or canal to another watercourse. (2) The transfer of water from a stream, lake, aquifer, or other source of water by a canal, pipe, well, or other conduit to another watercourse or to the land, as in the case of an irrigation system. Also, a turning aside or alteration of the natural course of a flow of water, normally considered physically to leave the natural channel. In some states, this can be a consumptive use direct from a stream, such as by livestock watering. In other states, a diversion must consist of such actions as taking water through a canal or conduit.

Diversion Channel — (1) An artificial channel constructed around a town or other point of high potential flood damages to divert floodwater from the main channel to minimize flood damages. (2) A channel carrying water from a diversion dam.

Diversion Dam (and Dike) — A barrier built to divert part or all of the water from a stream into a different course. The diversion dam is commonly constructed on a natural river channel and is designed to check or elevate the water level for diversion into a main canal system. Also referred to as *Diversion Cofferdam*.

Diversion Entitlements — The maximum amount of water which may be diverted or withdrawn from a water source for a particular purpose over a given period of time. Historical appropriation of diversionary water entitlements is based on priority or seniority, i.e., those who made use of the water first have historical priority to use it first. The water appropriation system is primarily concerned with making sure that water entitlements are received in the order of seniority. Making sure that senior water rights holder do not exceed their diversion entitlements serves to protect junior entitlements as well as downstream users.

Diversion Rate — A rate of water flow (cfs) diverted into a canal or through a farm headgate.

Diversity Index — A numerical expression of the evenness of distribution of aquatic organisms. Several different formulae are in current use for its calculation. One such formula for the diversity index is expressed as

$$d = - \sum n_i/n \log_2 n_i/n \text{ where the summation ranges from } i=1 \text{ to } s$$

where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Diversity index values range from zero, when all the organisms in the sample

are the same, to some positive number, when some or all of the organisms in the sample are different.

Divertible Water Supply — Includes that amount of water consumptively used and that water which returns to the river system. Since return flow becomes available for subsequent diversion and reuse, the total divertible supply is greater than the available supply.

Divide — An imaginary line indicating the limits of a sub-basin, sub-watershed, or watershed; the boundary line along a topographic ridge or high point which separates two adjacent drainage basins. Also referred to as *Ridge Lines*.

Diving Reflex — A reflexive response to diving in many aquatic mammals and birds, characterized by physiological changes that decrease oxygen consumption, such as slowed heart rate and decreased blood flow to the abdominal organs and muscles, until breathing resumes. Though less pronounced, the reflex also occurs in certain non-aquatic animals, including human beings, upon submersion in water.

Divining Rod — A forked branch or stick that is believed to indicate subterranean water or minerals by bending downward when held over a source. Also see *Douse* (*also Dowse*).

Division Box — (Irrigation) A structure used to divide and direct the flow of water between two or more irrigation ditches.

(State) Division of Health [Nevada] — An agency within the Department of Human Resources, State of Nevada, whose primary water-related mandate (Nevada Revised Statutes 445.361) is “to provide water which is safe for drinking and other domestic purposes and thereby promote the public health and welfare.” The Division serves as the primacy agency for the *Public Water System Supervision Program (PWSSP)* as authorized under the federal *Safe Drinking Water Act (SDWA)* [*Public Law 93–523*] and its amendments. The Division implements State Board of Health regulations which address drinking water monitoring and quality, public water system construction, and public water system operator certification. To accomplish its tasks, the Division consists of a number of Boards and Bureaus, to include:

- [1] ***State Board of Health*** — Advises the Health Division Administrator on matters relating to public health and welfare.
- [2] ***State Health Officer*** — Primary state adviser on matters pertaining to medical health; oversees the activities of the Bureau of Laboratory Services, Bureau of Community Health Services, Bureau of Family Health Services, Bureau of Disease Control and Intervention Services, and the Bureau of Health Planning.
- [3] ***Bureau of Health Protection Services*** — Provides for safe drinking water, health engineering, sanitation (food, dairy, drugs and cosmetics), and radiological health matters.
- [4] ***Bureau of Laboratory Services*** — Microbiology lab, chemistry lab, research and testing on community water systems.
- [5] ***Bureau of Community Health Services*** — Family planning, community health nursing, and clinic services.
- [6] ***Bureau of Family Health Services*** — Genetics, special children’s clinic, children’s dental services, newborn screening, and health promotion and education.
- [7] ***Bureau of Health Planning*** — State health plan, primary care development center, state center for health statistics, tobacco control initiative.
- [8] ***Bureau of Disease Control and Intervention Services*** — Programs dealing with surveillance, immunization, TB control.
- [9] ***Bureau of Licensure and Certification*** — Programs dealing with health facilities, laboratory personnel certification, emergency medical services and trauma.
- [10] ***Bureau of Administrative Services*** — Fiscal management, personnel, affirmative action, legal services, vital records, and cancer registry.

DO — See *Dissolved Oxygen (DO)*.

DOC — See *Dissolved Organic Carbon (DOC)*.

Dock — (1) The area of water between two piers or alongside a pier that receives a ship for loading, unloading, or repairs. (2) A pier; a wharf. (3) Often docks: A group of piers on a commercial waterfront that serve as a general landing area for ships or boats.

“Docking” (of Water Rights) — The temporary transfer of control of water rights so that water permitting authorities will not revoke the rights because the water has not been put to beneficial use within a certain time limit as required. To dock the water rights, the holder would typically file a “Change of Point of Diversion and Change in Point of Use” application to be approved by the State Engineer or other water permitting authority. When the water is needed by the water right holder, another application would be filed to return the water rights to their original point of diversion.

Dockyard — An area, often bordering a body of water, with facilities for building, repairing, or dry-docking ships.

Doctrine — A particular principle or tenet that is presented for acceptance or belief, such as the *Public Trust Doctrine*.

Doctrine of Relation [Nevada] — A water rights concept which means that a water priority is claimed as of the date of appropriation for the amount appropriated, even though a part of it may not have been put to beneficial use until a later date. More specifically, to secure the benefit of the doctrine of relation, there must be posted a notice of appropriation (which must be recorded), there must be a bona fide intention to use the water for a beneficial purpose, there must be diligence in the construction work, and the work must be completed (i.e., the waters conducted to the place of intended use). Actual application of the water is not a prerequisite to the vesting of the right. The right is complete when possession has been taken. When these requisites have been completed the right to the water relates back to the date of posting notice, in order to determine priority between conflicting claims.

Doctrine of Reliction [Nevada] — In a Nevada Supreme Court ruling (*State Engineer v. Cowles Bros.*, 86 Nev. 872, 1964) it was held that the lands so exposed by *Reliction*, i.e., those lands exposed by the recession of a body of water, should belong to the adjoining land owners. This held true even for those lands exposed by the recession of a navigable body of water, whose bed is owned by the State of Nevada (e.g., Winnemucca Lake). Also see *Dereliction*.

Doldrums — (1) A region of the ocean near the equator, characterized by calm, light winds, or squalls. (2) The weather conditions characteristic of these regions of the ocean.

Dollop — A small quantity or splash of a liquid.

Dolos — A concrete protective unit used to dissipate wave energy thus preventing damages to breakwaters and jetties. Units may vary in size and weight depending on design wave parameters.

Domestic Consumption — Water used for household purposes such as washing, food preparation, toilets and showers. It is the quantity, or quantity per capita (person), of water consumed in a municipality or district for domestic uses or purposes during a given period. It sometimes encompasses all uses, including the quantity wasted, lost, or otherwise unaccounted for.

Domestic Sewage — Wastewater and solid waste that is characteristic of the flow from toilets, sinks, showers, and tubs in a household. Also referred to as *Domestic Waste*.

Domestic Wastewater Facility — Refers to those facilities that receive or dispose of wastewater derived principally from residential dwellings, business or commercial buildings, institutions, and the like. May also include some wastewater derived from industrial facilities. Also referred to as *Municipal Wastewater Facility*.

Domestic Water — Water supplied to individual dwellings and other land uses which is suitable for drinking.

Domestic Water Use (Withdrawals) — Water used normally for residential purposes, including household use, personal hygiene, drinking, washing clothes and dishes, flushing toilets, watering of domestic animals, and outside uses such as car washing, swimming pools, and for lawns, gardens, trees and shrubs. The water may be obtained from a public supply or may be self supplied. The terms “water use” and “water withdrawals” are equivalent, but not the same as *Consumptive Use* as they do not account for return flows. Also referred to as *Residential Water Use*. Also see *Public Water Supply System* and *Self-Supplied Water*.

Domestic Well — A water well used solely for domestic, i.e., residential or household purposes to include both indoor and outdoor water uses. Such wells are generally not required to be permitted; however, they may have restrictions in terms of daily pumping amounts, for example, 1,800 gallons per day.

Dominant Discharge — The channel-forming discharge, which is equivalent to the bankfull discharge, responsible for the active channel that erodes and deposits, creates pools, riffles, and meanders. The discharge, in terms of flood frequency, usually has a return period or recurrence interval of 1.5 to 2 years in natural channels. This represents a flow condition where the stream flow completely fills the stream channel up to the top of the bank before overflowing onto the floodplain.

Dormancy — Annual period when a plant’s growth processes greatly slow down. This occurs in many plants by the coming of winter as days grow shorter (sunlight hours) and temperatures grow colder.

Dormant — Unexercised, not active but capable of becoming exercised, as a dormant riparian right to use water.

Double Cropping — The practice of producing two or more crops consecutively on the same parcel of land during a 12-month period. Also referred to as *Multi-Cropping*.

Douche — A stream of water, often containing medicinal or cleansing agents, that is applied to a body part or cavity for hygienic or therapeutic purposes.

Douse, also Dowse — (1) To plunge into liquid; to immerse and wet thoroughly. (2) To use a *Divining Rod* to search for underground water or minerals, as in *Dowsing*.

Downfall — A fall of rain or snow, especially a heavy or unexpected one.

Downgradient — The direction that groundwater flows; similar to “downstream” for surface water flows.

Downgradient Well — One or more monitoring wells placed to sample groundwater that has passed beneath a facility with the potential to release chemical contaminants into the ground. Results of testing downgradient well water are compared with data from an *Upgradient Well* to determine whether the facility may be contaminating the groundwater.

Downpour — A heavy fall of rain.

Downstream — In the direction of the current of a stream.

Downstream Control — (Irrigation) Control structure adjustments which are based on information from downstream; the required information is measured by a sensor located downstream or based on the downstream water schedule established by the *Watermaster*.

Downstream Slope (of a Dam) — The slope or face of the dam away from the reservoir water, which, for *Embankment Dams*, requires some form of protection such as grass to protect it from the erosive effects of rain and surface flows.

Downstream Toe of Dam — The junction of the downstream face of a dam with the ground surface. For an *Embankment Dam* the junction of the upstream face with the ground surface is the upstream toe.

Dowser — (1) A person who uses a *Divining Rod* to search for underground water or minerals. (2) A divining rod.

Draft — (1) The act of drawing or removing water from a tank or reservoir. (2) The water which is drawn or removed. (3) (Nautical) The depth of a vessel's keel below the water line, especially when loaded.

Drag — To search or sweep the bottom of a body of water, as with a grappling hook or dragnet.

Drain — (1) To draw off (a liquid) by a gradual process. (2) A buried pipe or other conduit (closed drain) for the conveyance of surplus groundwater. (3) A ditch or canal (open drain) for carrying off surplus surface water or groundwater. (4) A system to control water tables near the ground surface to maintain levels at or below specified depths.

Drainage — (1) The removal of excess surface water or groundwater from land by means of surface or subsurface drains. (2) Improving the productivity of agricultural land by removing excess water from the soil by such means as ditches or subsurface drainage tiles (pipes). (3) The downward movement of water through the soil. When this occurs rapidly, the soil is referred to as "well drained"; otherwise poorly drained. Most plant roots need oxygen as well as water, and soil that remains saturated (poorly drained) deprives roots of necessary oxygen. (4) Soil characteristics that affect natural drainage.

Drainage Area (of a Stream at a Specified Location) — That area, measured in a horizontal plane, enclosed by a topographic (drainage) divide from which direct surface runoff from precipitation or snowpack runoff normally drains by gravity into the stream above the specified point.

Drainage Basin — (1) The land area drained by a river. (2) Part of the Earth's surface that is occupied by a drainage system with a common outlet for its surface runoff. (3) Part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water. The term is used synonymously with *Watershed*, *River Basin*, or *Catchment*.

Drainage Class, Soils — The relative terms used to describe natural drainage and corresponding types of soils are as follows:

- [1] **Excessive** — Excessively drained soils are commonly very porous and rapidly permeable, and have low water-holding capacity;
- [2] **Somewhat Excessive** — Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile;
- [3] **Good** — Well drained soils that are nearly free of mottling and are commonly of intermediate texture;
- [4] **Moderately Good** — Moderately well drained soils that commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the surface layers and upper subsoil, and mottling in the lower subsoils and substrata;
- [5] **Somewhat Poor** — Somewhat poorly drained soils are wet for significant periods, but not all the time. They commonly have a slowly permeable layer in their profile, a high water table, additions through seepage, or a combination of these conditions;
- [6] **Poor** — Poorly drained soils are wet for long periods of time. They are light gray and generally are mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Drainage Coefficient — Design rate at which water is to be removed from a drainage area.

Drainage Density — (1) The relative density of natural drainage channels in a given area, obtained by dividing the total length of the stream channels by the area. (2) The length of all channels above those of a specified *Stream Order* per unit of *Drainage Area*.

Drainage District — A special purpose district created under state law to finance, construct, operate, and maintain

a drainage system involving a group of land holdings.

Drainage Divide — The line of highest elevations which separates adjoining drainage basins.

Drainage Field Ditch — A shallow graded ditch for collecting excess water within a field, usually constructed with flat side slopes for ease of crossing.

Drainage Flooding — Ponding of water at or near the point where it fell due to improper or limited drainage.

Drainage Lateral — A side ditch or conduit which contributes water to a drainage main.

Drainage Layer (or Blanket) — (Dam) A layer of permeable material in a dam to relieve pore pressure or to facilitate drainage of fill material.

Drainage Main — A natural or artificial ditch or conduit for moving water off the land.

Drainage Water — The water which has been collected by a drainage system. It may come from surface water or from water passing through the soil. It may be of a quality suitable for reuse or it may be of no further economic use.

Drainage Well — (Irrigation) A vertical opening to a permeable substation into which surface and subsurface water is channeled. A well drilled to carry excess water off agricultural fields. Because they act as a funnel from the surface to the groundwater below, drainage wells can contribute to groundwater pollution.

Drain Field — A network of buried piping or tubing where the fluid is discharged to the ground through seepage. Most common use is with septic tanks, but can also be used for domestic or industrial wastewater disposal after other treatment methods.

Drainpipe — A pipe for carrying off water or sewage.

Drains (of a Dam) — A vertical well or borehole, usually downstream of impervious cores, grout curtains, or cutoffs, designed to collect and direct seepage through or under a dam to reduce uplift pressure under or within the dam. A line of such wells forms a drainage curtain. Also referred to as *Relief Wells*.

Drainwater — Any water which flows from an irrigation project for which there is no claim to satisfy an agricultural water right.

Draw — To cause to flow forth as a pump drawing water.

Drawdown — (1) The act, process, or result of depleting, as a liquid or body of water as in the lowering of the water surface level due to release of water from a reservoir. (2) The magnitude of lowering of the surface of a body of water or of its piezometric surface as a result of withdrawal of the release of water therefrom. (3) The decline of water below the static level during pumping. (4) (Water Table) The lowering of the elevation of the *Groundwater Table*, usually from pumping wells, but can occur naturally during periods of prolonged drought. At the well, it is the vertical distance between the static and the pumping level.

Dredge — To clean, deepen, or widen with a mechanical scoop. See *Dredging*.

Dredging — (1) A method for deepening streams, swamps, or other waters by scraping and removing solid materials from the bottom. Such actions can disturb the *Ecosystem* and cause silting that kills aquatic life. Dredging of contaminated muds can expose *Biota* to heavy metals and other toxic substances. (2) The process of digging up and removing material from wetlands or from the bottoms of waterways to clear them or make them deeper or wider. For example, tidal creeks in salt marshes are often dredged to make them wide enough for boat passage. Dredging and activities associated with it can damage wetlands. Dredging activities may be subject to regulation under *Section 404* of the *Clean Water Act (CWA)*.

Dreg — The sediment in a liquid; lees. Often used in the plural.

Drench — To wet through and through; soak.

DRI [Nevada] — See *Desert Research Institute (DRI) [Nevada]*.

Dribble — To flow or fall in drops or an unsteady stream; trickle.

Driblet — A tiny falling drop of liquid.

Drift — To be carried along by currents of air or water.

Driftage — (1) (Nautical) Deviation from a set course caused by drifting. (2) Matter that has been carried along or deposited by air or water currents.

Drift Organisms — Benthic organisms temporarily suspended in the water and carried downstream by the current.

Driller's Well Log — A log kept at the time of drilling showing the depth, thickness, character of the different strata penetrated, location of water-bearing strata, depth, size, and character of casing installed.

Drilling Mud — A mixture of clay, water, and other materials, often bentonite clay and barite, commonly used in drilling with a rotary drill rig. The mud is pumped down the drill pipe and through a drill bit and back up to the surface between the drill pipe and the walls of the hole. The mud helps lubricate and cool the drill bit as well as carry the cuttings to the surface. The mud also stabilizes the hole. Also referred to as *Drilling Fluid*.

Drink — (1) To take into the mouth and swallow a liquid such as water. (2) To take in or soak up; absorb.

Drinkable — Suitable or fit for drinking; *Potable*.

Drinking Water — A term used synonymously with *Potable Water*, and refers to water that meets federal drinking water standards of the *Safe Drinking Water Act [SDWA] (Public Law 93–523)* as well as state and local water quality standards and is considered safe for human consumption. Freshwater that exceeds established standards for chloride content and dissolved solids limits is often referred to as slightly saline, brackish, or nonpotable water and is either diluted with fresher water or treated through a desalination process to meet drinking-water standards for public supply.

Drinking Water Equivalent Level — Protective level of exposure related to potentially non-carcinogenic effects of chemicals that are also known to cause cancer.

Drinking Water Standards — Drinking water standards established by state agencies, the U.S. Public Health Service, and the *U.S. Environmental Protection Agency (EPA)* for drinking water throughout the United States. [See Appendix B–1 for regulated contaminants and Appendix B–2 for proposed contaminants to be regulated by the *Safe Drinking Water Act [SDWA] (Public Law 93–523)*]

Drinking Water Standards [Nevada] — The primary objective of Nevada's drinking water standards is to assure safe water for human consumption. To this end, the *Nevada Department of Human Resources, Health Division — Consumer Health Protection* has established statewide primary and secondary drinking water standards at least as rigorous as those required by the *U.S. Environmental Protection Agency (EPA)*. *Primary Drinking Water Standards* limit contaminants (constituents) which may affect consumer health. *Secondary Drinking Water Standards* were developed to deal with the aesthetic qualities of drinking water. [Appendix B–3, Nevada Drinking Water Standards, presents a listing of Nevada's current primary and secondary drinking water quality standards.]

Drinking Water Supply — Water provided for use in households. The most common sources are from surface supplies (rivers, lakes, and reservoirs) or subsurface supplies (aquifers). The distribution of water to households is regulated under the *Safe Drinking Water Act (SDWA)* of 1974, as amended.

Drip — To fall in drops; to shed drops; to ooze or become saturated with or as if with liquid.

Drip Irrigation — (1) A system for watering at points on or just below the soil surface so that a plant's *Root Zone* is thoroughly moistened without water being wasted. The irrigation is accomplished with very low pressure over a long period of time to achieve necessary soil penetration of water. (2) A planned irrigation system in which water is applied directly to the root zone of plants by means of applicators (orifices, emitters, porous tubing, perforated pipe, etc.) operated under low pressure. The applicators may be placed on or below the surface of the ground. Also see *Irrigation Systems*.

Drip (Trickle) Soil Absorption System — A shallow slow rate pressure-dosed system used for land application of treated wastewater, particularly under soil conditions unsuitable for normal septic tanks and gravity-fed soil absorption systems. In agriculture, drip soil irrigation systems irrigate crops by means of a network of shallow underground pipes fed by a pump. Such a system conserves water used in crop irrigation by applying it at a controlled rate in the root zone, minimizing evaporation and percolation losses. In the drip soil absorption system, the filtered effluent is delivered via supply lines to a subsurface drip field consisting of parallel rows of polyethylene tubing, known as dripper lines. Emitters are installed along these tubes to uniformly distribute and control the flow of effluent. The key to the effective operation of drip soil absorption systems is the slow and controlled rate at which it applies effluent over a large surface area, allowing relatively shallow placement of the dripper lines and long-term use without risk of saturating soils. This allows such systems to be effectively used for subsurface irrigation of trees, shrubs, and gardens in arid regions. Also see *Septic Tank Soil Absorption System (ST-SAS)*.

Drizzle — Rather uniform precipitation consisting exclusively of minute and very numerous drops of water less than 0.02 inches (0.51 mm) in diameter, which seem to float in and follow even the slightest motion of the air. Poor visibility during drizzle, which frequently occurs simultaneously with fog, distinguishes it from light rain.

Drop — The quantity of fluid which falls in one spherical mass; a liquid globule; often, a teardrop, raindrop, dewdrop, etc. The size of a drop varies with the specific gravity and viscosity of the liquid and also with the conditions under which it is formed.

Drop-Inlet Spillway — Overfall structure in which the water drops through a vertical riser connected to a discharge conduit.

Drop Spillway — An overfall structure in which water drops over a vertical wall onto a protected apron at a lower elevation.

Droplet — A small airborne liquid particle that is larger than liquid aerosol and therefore settles out of the atmosphere relatively quickly.

Dropper — A small tube with a suction bulb at one end for drawing in a liquid and releasing it in drops.

Drops — Structures to reduce or control water velocity within an irrigation ditch or canal by lowering the water

abruptly from one level to a lower level.

Drop Spillway — An overfall structure in which water drops over a vertical wall onto a protected apron at a lower elevation.

Drop Structure — A structure for dropping water to a lower level and dissipating its surplus energy. A drop may be vertical or inclined.

Drought — There is no universally accepted quantitative definition of drought. Generally, the term is applied to periods of less than average or normal precipitation over a certain period of time sufficiently prolonged to cause a serious hydrological imbalance resulting in biological losses (impact flora and fauna ecosystems) and/or economic losses (affecting man). In a less precise sense, it can also signify nature's failure to fulfill the water wants and needs of man. The following are three broad categories of drought:

- [1] **Meteorological Drought** – Such a drought is considered to occur when annual rainfall (or precipitation) is less than the long-term average annual rainfall;
- [2] **Hydrological Drought** – The onset of such a drought is signified by the occurrence and/or persistence of meteorological drought causing shortage of surface water in streams, lakes, reservoirs and/or groundwater supplies;
- [3] **Agricultural Drought** – This type of drought occurs when soil moisture availability to agricultural crops is reduced to a level causing adverse effects on grain yield and consequently, the agricultural production of a region.

Drought Condition — Hydrologic conditions during a defined *Drought* period during which rainfall and runoff are much less than average.

Drought Indexes (Indices) — An indicator of drought, or below-normal precipitation conditions. Drought indexes, based on raw data inputs, are most typically represented as numeric values and are useful for planning and decision-making. The drought index may be useful not only in comparing precipitation over different time periods, but in some cases the indexes can also provide comparative analysis between different geographic and climatologic areas. The drought index is intended to provide an indication of a period's precipitation conditions relative to an average or standard value, frequently referred to as "normal" or "near normal" conditions. A number of drought indexes have been developed over time for specific conditions. While no one drought index is inherently superior to the rest under all conditions and circumstances, some are better suited than others for particular uses. For example, some drought indexes may be better when working with relatively uniform topography, while others may specifically take snowpack conditions into account and therefore be better suited for mountainous regions with complex regional microclimates. Some of the most widely used drought indexes include:

Percent of Normal – One of the simplest measurements of rainfall for a location, a percent of "normal" figure is calculated by dividing the actual period precipitation by the normal precipitation, which is typically based on a historical average of a 30-year mean or average value. This figure is then multiplied by 100 percent to provide the drought index value. Normal precipitation for a specific location is always considered to be 100 percent; therefore, drought index numbers below 100 percent indicated various degrees of drought conditions. The percent of normal index, while easily understood and effective for assessing a single region or season, can be misunderstood as the concept of normal is a mathematical construct and does not necessarily correspond with what one should expect precipitation to be in any given year (i.e., the normal value may be merely an average of extreme conditions).

Standardized Precipitation Index (SPI) – A precipitation index based on the probability of precipitation for any time duration. The SPI was specifically designed to quantify the precipitation deficit for multiple periods of time reflecting the impact of drought on the availability of different water resources. Soil moisture conditions respond to precipitation anomalies on a relatively short scale, while groundwater, stream flow and reservoir storage levels reflect the longer-term precipitation anomalies. For this reason, the SPI is calculated on both a short-term and long-term (up to four years) basis. Positive SPI values indicate greater than median (middle-most) precipitation, while negative values indicate less than median precipitation. Because the index is normalized, wetter and drier climates can be determined in the same way. A drought event occurs any time the SPI is continuously negative and reaches an intensity where the SPI is -1.0 or less. SPI indexes range as follows:

- 2.0 or greater – extremely wet
- 1.5 to 1.99 – very wet
- 1.0 to 1.49 – moderately wet
- 0.99 to 0.99 – near normal
- 1.0 to -1.49 – moderately dry

- 1.5 to -1.99 – severely dry
- 2.0 or less – extremely dry

Palmer Drought Severity Index (PDSI) – The PDSI was the first comprehensive drought index developed in the United States. It is a meteorological drought index based on a balance between moisture supply and demand and responds to weather conditions that have been abnormally dry or abnormally wet. The index is calculated based on precipitation and temperature data, as well as the local *Available Water Content (AWC)* of the soil, i.e., soil moisture. From the index's inputs, all the basic terms of the water balance equation can be determined, including evapotranspiration, soil recharge, runoff, and moisture loss from the surface layer. The index, however, is less well suited for mountainous regions or areas of frequent climatic extremes. Human impacts on the water balance, such as irrigation or drainage, are not considered. The index roughly ranges from extremes of -6 to +6, with negative values denoting dry spells and positive values indicating wet periods. There are also a few values in the magnitude of -7 or +7. Ideally, the PDSI is designed so that a -4.0 in South Carolina has the same meaning in terms of the moisture departure from a climatological normal as a -4.0 in Idaho. The following shows the more typical PDSI classifications:

- 4.00 or more – Extremely wet
- 3.00 to 3.99 – Very wet
- 2.00 to 2.99 – Moderately wet
- 1.00 to 1.99 – Slightly wet
- 0.50 to 0.99 – Incipient wet spell
- 0.49 to -0.49 – Near normal
- 0.50 to -0.99 – Incipient dry spell
- 1.00 to -1.99 – Mild drought
- 2.00 to -2.99 – Moderate drought
- 3.00 to -3.99 – Severe drought
- 4.00 or less – Extreme drought

Crop Moisture Index (CMI) – The CMI, as a derivative of the *Palmer Drought Severity Index (PDSI)*, uses a meteorological method to monitor week-to-week crop conditions. Differing from the PDSI, the CMI was designed to evaluate short-term moisture conditions across major crop-producing regions. It is based on the mean temperature and total precipitation for each week within a “climate division”, as well as the CMI value from the previous week. The CMI is specifically designed to monitor short-term moisture conditions affecting a developing crop and is not a good long-term drought monitoring tool. The CMI was designed for areas in which mountain snowpack is a key element of water supply conditions. The index is based on snowpack, streamflow, precipitation and reservoir storage and is calculated uniquely for each water basin, which tends to limit interbasin and inter-regional index comparisons.

Surface Water Supply Index (SWSI) – Originally developed to complement the *Palmer Drought Severity Index (PDSI)*, the SWSI, unlike the PDSI which is basically a soil moisture index, was designed to be an indicator of surface water conditions in which mountain snowpack is a major component. The intent of the SWSI is to incorporate both hydrological and climatological features into a single index value resembling the PDSI. Four inputs are required for the SWSI: snowpack, streamflow, precipitation and reservoir storage. Because the SWSI calculations are unique to each watershed or defined region, it is difficult to compare SWSI values among these geographic areas.

Reclamation Drought Index (RDI) – The RDI was developed as a tool for defining drought severity and duration, and for predicting the onset and end of periods of drought. The impetus for the development of the RDI came from the *Reclamation States Drought Assistance Act of 1988*, which allowed states to seek federal drought relief assistance. The RDI is calculated at a river basin level and incorporates the supply components of precipitation, snowpack, streamflow and reservoir storage levels. The RDI differs from the *Surface Water Supply Index (SWSI)* in the incorporation of a temperature component. The RDI is adaptable to a particular region and readily accounts for both climate and water supply factors. RDI classifications include:

- 4.0 or more – extremely wet
- 1.5 to 4.0 – moderately wet
- 0 to 1.5 – normal to mild wetness
- 0 to -1.5 – normal to mild drought
- 1.5 to -4.0 – moderate drought
- 4.0 or less – extreme drought

Deciles – The deciles drought index system is based on a relative frequency distribution of long-term

precipitation divided into tenths of the overall range of distribution. Each tenth division or precipitation category is termed a “decile” and ranges from the lowest (drought) ten percentile of precipitation levels to the highest (wet) ten percentile. By definition, the fifth decile is the median (middle-most) and is the precipitation amount not exceeded by 50 percent of the occurrences over the period of record. One disadvantage of the deciles drought index system is that a long climatological record is required for accurate deciles classifications. As a drought index, the deciles are grouped into five classifications as follows:

- deciles 1-2 (lowest 20%) – much below normal
- deciles 3-4 (next lowest 20%) – below normal
- deciles 5-6 (middle 20%) – near normal
- deciles 7-8 (next highest 20%) – above normal
- deciles 9-10 (highest 20%) – much above normal

Drought Period — The period of time over which *Drought Conditions* exist.

Drought Reserve Water — Generally, water reserved in upstream reservoirs for release for downstream purposes, e.g., municipal and industrial, agriculture, recreational, etc. Often provisions will be made such that drought reserve water will convert to *Fish Credit Water* if snowpack water content or runoff is deemed sufficient by a stipulated date.

Drought Year Supply — The average annual supply of a water development system during a defined *Drought Period*.

For dedicated natural flow, it is the average flows or levels for specific drought water years for specific streams or bodies of water, or it is the *Environmental Flows* as required under specific agreements, water rights, court decisions, and congressional directives.

Drown — (1) To kill by submerging and suffocating in water or another liquid. (2) To drench thoroughly or cover with or as if with a liquid.

Drumlin — An elongated hill or ridge of *Glacial Drift*.

Dry — (1) Free from liquid or moisture. (2) Having or characterized by little or no rain, as a dry climate. (3) Marked by the absence of natural or normal moisture, as a dry month. (4) Not under water, as dry land. (5) Having all the water or liquid drained away, evaporated, or exhausted, as a dry river.

Dry Adiabatic Lapse Rate — The *Adiabatic Lapse Rate* for air not saturated with water vapor, or 0.98°C per 100 meters rise (5.4°F per 1,000 feet), expressed as:

$$\tilde{a}_d = -dT/dz$$

where:

dT is the change in air temperature;

dz is the change in altitude; and

\tilde{a}_d is the dry adiabatic lapse rate.

Compare to *Wet Adiabatic Lapse Rate*.

Dry Dam — A dam that has an outlet positioned so that essentially all stored water will be drained from the reservoir by gravity. The reservoir will normally be dry. Permanent storage is not involved, and the detention reservoir can be used for other purposes (farming, grazing, recreation) between flood periods.

Dry Deposition — The introduction of acidic material to the ground or to surface waters by the settling of particles containing sulfate or nitrate salts. Compare to *Wet Deposition*.

Dry Dock — (Nautical) A large dock in the form of a basin from which the water can be emptied or pumped, used for building or repairing a ship below its water line.

Dry Farming — A type of farming practiced in arid areas without irrigation by planting drought-resistant crops and maintaining a fine surface tilth or mulch that protects the natural moisture of the soil from evaporation. Also referred to as *Dryland Farming*.

Dry Floodproofing — Protecting a building by sealing its exterior walls to prevent the entry of flood waters.

Dry Hydrants — A siphon buried beneath the water line that enables fire crews to draw, or “draft” water from ponds or other bodies of water located nearby. Such devices are used in more remote locations and are typically used only for interim purposes until a more consistent supply may be obtained to fight a fire.

Dry Ice — Solid carbon dioxide that sublimates at -78.5°C (-110°F) and is used primarily as a coolant.

Dry Mass — The mass of residue present after drying in an oven at 105 degrees centigrade for zooplankton and periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash, and sediment in the sample. Dry mass is expressed in the same units as Ash Mass.

Dry Proofing — A flood-proofing method used to design and construct buildings so as to prevent the entrance of floodwaters.

Dry Wash — A defined drainage channel in arid regions that is dry except following a major storm or heavy spring snowmelt.

Dry Weight — The weight of animal or plant tissue after it has been dried in an oven at 65 degrees centigrade until a constant weight is achieved. Dry weight represents total organic and inorganic matter in the tissue, i.e., tissue with the weight of water removed.

Dry Well — A large infiltration trench for capturing relatively clean runoff. Not for infiltration of waste materials or other pollutants.

Drying Off — The process of reducing moisture to induce dormancy or a rest period in plants.

Dryland Farming — (1) Non-irrigated cropland. (2) The practice of crop production without irrigation in semiarid regions usually by using moisture-conserving farming techniques. Also referred to as *Dry Farming*.

Dual-Distribution Piping — A water distribution system that uses one set of pipes for the distribution of potable water and a separate set for the distribution of *Reclaimed Water*.

Dual Media Filtration — A system using two layers of dissimilar media, such as anthracite and sand.

Ducking Stool — A seat attached to a plank and formerly used to plunge culprits tied to it into water.

Duckweed — Any of various small, free-floating, stemless aquatic flowering plants of the genus *Lemna*. Particularly useful in filtering *Constituents* and *Contaminants* out of water.

Duct — An often enclosed passage or channel for conveying a substance, especially a liquid or gas.

Duff — A general, non-specific term referring to the more or less firm organic layer on top of mineral soil, consisting of fallen vegetative matter in the process of decomposition, including everything from litter on the surface to pure humus.

Dune — A mound or ridge of sand piled up by wind.

Dune Pond ("Lake") — A lake occupying a basin formed as a result of the blocking of the mouth of a stream by sand dunes migrating along the shore.

Dune Swale — A low place among sand dunes, typically moister and often having distinctive vegetation differing from the surrounding sand environment.

Dunk — To plunge into liquid; immerse as in to submerge oneself briefly in water. Synonymous with *Dip*.

Duplicates — (Water Quality) Two separate samples with separate containers taken at the same time at the same location.

Duralumin — An alloy of aluminum that contains copper, manganese, magnesium, iron, and silicon and is resistant to corrosion by acids and sea water. The term was originally a trademark.

Duration Curve — A graph representing the percentage of time during which the value of a given parameter (e.g., water level, discharge, etc.) is equaled or exceeded.

Duripan — A subsurface (soil) horizon that is cemented by silica.

Duty (of Water) — (1) The total volume of water per year that may be diverted under a vested water right. (2) The total volume of irrigation water required for irrigation in order to mature a particular type of crop. In stating the duty, the crop, and usually the location of the land in question, as well as the type of soil, should be specified. It also includes consumptive use, evaporation and seepage from on-farm ditches and canals, and the water that is eventually returned to streams by percolation and surface runoff. Also see *Alpine Decree [Nevada]*, *Orr Ditch Decree [Nevada]*, *Bench Lands [Nevada]*, and *Bottom Lands [Nevada]* for additional information and examples of specific water duties.

Dusting — A light sprinkling as of snow.

Dynamic Equilibrium — (1) (General) An open system in a steady state in which there is continuous inflow of materials, but within which the form or character of the system remains unchanged. (2) (Surface Water) Within dynamic equilibrium the channel exhibits patterns of erosion and deposition but there is no net change in the input and output of materials. The state is stable but features may change over time. (3) (Groundwater) A condition of which the amount of recharge to an aquifer equals the amount of natural discharge.

Dynamic Head — (Irrigation) The total of the following factors: (1) the total static head, including suction lift; (2) friction head in the discharge pipeline; (3) head losses in fittings, elbows, and valves; and (4) pressure required to operate lateral lines.

Dysentery — A disorder of the gastrointestinal tract characterized by severe diarrhea with blood and pus in the feces. The disease frequently results from an infection by bacteria belonging to the genus *Shigella*.

Dystrophic — (Ecology) Characterized by having brownish acidic waters, a high concentration of humic matter, and a small plant population. Typically used to describe a lake or pond.

Dystrophic Lake — A lake characterized by a lack of nutrients, and often having a low pH (acidic) and a high humus content. Plant and animal life are typically sparse, and the water has a high oxygen demand. This stage follows

the *Eutrophic Phase* in the life cycle of a lake.