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**Sacramento Model** — (Hydrology) A dynamic *River Flow Model* or *Water Budget Model*, run on a computer at various intervals, which accounts for all water entering, stored in, and leaving a *Drainage Basin*. Though many parameters are used in this water balance accounting process, precipitation has the main impact on runoff.

**Sacramento–San Joaquin Delta [California]** — See *Bay–Delta [California]*.

**Sacrificial Anode** — An easily corroded material deliberately installed in a pipe or intake to give it up to corrosion while the rest of the water supply facility remains relatively corrosion-free.

**Safe Drinking Water Act [SDWA] (Public Law 93–523)** — An amendment to the *Public Health Service Act* which established primary and secondary quality standards for drinking water. The SDWA was passed in 1976 to protect public health by establishing uniform drinking water standards for the nation. In 1986 SDWA Amendments were passed that mandated the *U.S. Environmental Protection Agency (EPA)* to establish standards for 83 drinking water contaminants by 1992 and identify an additional 25 contaminants for regulation every 3 years thereafter. See *Drinking Water Standards, Drinking Water Standards [Nevada], Primary Drinking Water Standards, and Secondary Drinking Water Standards*. [Also see Appendix B–3, Nevada Drinking Water Standards.]

**Safe Water** — Water that does not contain harmful bacteria, toxic materials, or chemicals, and is considered safe for drinking even if it may have taste, odor, color, and certain mineral problems.

**Safe Yield** — (1) The rate at which water can be withdrawn from supply, source, or an aquifer over a period of years without causing eventual depletion or contamination of the supply. (2) A rate of extraction that does not deplete the basin over time. (3) (Groundwater) The amount of water that can be withdrawn from an aquifer without producing an undesired effect. (4) (Surface Water) The amount of water than can be withdrawn or released from a reservoir on an ongoing basis with an acceptably small risk of supply interruption (i.e., reducing the reservoir storage to zero.) More commonly referred to a *Perennial Yield* and *Sustained Yield*. Generally consists of the rate of *Natural Recharge, Artificial (or Induced) Recharge, and Incidental Recharge*.

**Sag Pipe** — A section of a sewer line that is placed deeper in the ground than normal in order to pass under utility piping, waterways, rail lines, highways, or other obstacles. The sewer line is raised again after passing under the obstacle. Also referred to as *Inverted Siphon*.

**Sag Pond** — (1) A small body of water occupying an enclosed depression or sag formed where active or recent fault movement has impounded drainage. (2) (California) One of many ponds and small lakes along the San Andreas Fault.

**Salina** — (1) A salt marsh, spring, pond, or lake. (2) An area of land encrusted with salt.

**Salination** — The process whereby soluble salts accumulate in the soil.

**Saline** — (1) Term used to describe waters containing common salt, or sodium chloride. (2) Of or containing any of the salts of the alkali metals or magnesium.

**Saline/Poor Quality Aquifer** — An aquifer containing water that is high in total dissolved solids, and is unacceptable for use as drinking water.

**Saline Marsh** — A saturated, poorly drained area, intermittently or permanently water covered, having aquatic and grasslike vegetation whose water chemistry contains various dissolved salts.

**Saline Seeps** — Wet areas in non-irrigated soils where soluble salts accumulate from the evaporation of the seeping water and crop or grass production is reduced or eliminated.

**Saline Sodic Land** — Soil that contains soluble salts in amounts that impair plant growth but not an excess of exchangeable sodium.

**Saline Soil** — A nonalkali soil containing soluble salts in such quantities that they interfere with the growth of most plants.

**Saline Water** — Water containing dissolved solids; generally referring to solid contents in excess of 1,000 parts per million (ppm) *Total Dissolved Solids (TDS)*. The *U.S. Geological Survey (USGS)* classifies the degree of salinity of these more mineralized bodies of water as follows:

[1] *Slightly Saline* — 1,000–3,000 ppm;

[2] *Moderately Saline* — 3,000–10,000 ppm;

- [3] *Very Saline* — 10,000–35,000 ppm; and
- [4] *Brine* — More than 35,000 ppm.

**Salinity** — (1) The concentration of dissolved salts in water or soil water. Salinity may be expressed in terms of a concentration or as an electrical conductivity. When describing salinity influenced by seawater, salinity often refers to the concentration of chlorides in the water. (2) The relative concentration of salts, usually sodium chloride, in a given water sample. It is usually expressed in terms of the number of parts per thousand (‰) or parts per million (ppm) of chloride (Cl). Although the measurement takes into account all of the dissolved salts, sodium chloride (NaCl) normally constitutes the primary salt being measured. Salinity can harm many plants, causing leaves to scorch and turn yellow and stunting plant growth. As a reference, the salinity of seawater is approximately 35‰ or 35,000 ppm. See *Salts* for comparative salt concentrations in water. Also see *Total Dissolved Solids*.

**Salinity Control** — The physical control, management, and use of water and related land resources in such a way as to maintain or reduce salt loading and concentrations of salt in water supplies.

**Salinity Intrusion** — The movement of salt water into a body of fresh water. It can occur in either surface water or ground water bodies.

**Salinization** — The accumulation of salts in soil to the extent that plant growth is inhibited. This is a common problem when crops are irrigated in arid regions; much of the water evaporates and salts accumulated in the soil. Also see *Leaching Requirement*.

**Salmonella Typhosa** — A waterborne microorganism which is the causative agent of typhoid fever.

**Salmonellosis** — The bacterial disease caused by the presence of bacteria of the genus *Salmonella*. The disease is a type of food poisoning characterized by a sudden onset of gastroenteritis involving abdominal pain, diarrhea, fever, nausea, and vomiting. A variety of foods, such as sweets, meats, sausages, and eggs, can be the mode of infection. Pet turtles and birds can also transmit the bacteria.

**Salt** — (1) Most generally, all the minerals dissolved in water. (2) A chemical class of ionic compounds formed by the combination of an acid and a base. Most salts are the result of a reaction between a metal and one or more nonmetals. See *Salts*, below.

**Saltation** — Particle movement in water or wind where particles skip or bounce along the stream bed or soil surface.

**Salt Balance** — (1) A condition in which specific or total dissolved solids removed from a specified field, stratigraphic zone, political area, or drainage basin equals the comparable dissolved solids added to that location from all outside sources during a specified period of time. (2) The salt balance of an irrigated area is commonly defined as the difference between the total dissolved solids brought to the land annually by the irrigation water and the total solids carried away by the drainage water. When the input of salts is less than the output, the salt balance is said to be favorable; when the input is greater than the output, the salt balance is unfavorable. In this way, the salt balance is an important indicator of salt accumulation in the root zones and the suitability of soils for agriculture.

**Salt Flat** — A salt-encrusted flat area resulting from evaporation of a former body of water.

**Salt Lake** — A landlocked body of water that has become salty through evaporation.

**Salt Marsh** — (1) Saltwater wetlands that occur along many coasts north and south of the tropics. *Spartina* grasses are the dominant vegetation in many salt marshes. (2) Low areas adjacent to the sea that are covered with salt-tolerant vegetation (*Halophytes*) and regularly flooded by the high tide. As part of the *Wetland* systems, such areas help to stabilize shorelines and prevent erosion from tide and wave actions. Also, similar inland areas near saline springs or lakes, though not regularly flooded.

**Salt Pan** — An undrained natural depression in which water gathers and leaves a deposit of salt on evaporation.

**Salts** — Salts are the minerals that water picks up as it passes through the air, over and under the ground, and through household and industrial uses. A compound composed of the positive ion from a base and the negative ion from an acid; i.e., a metal ion and a nonmetal ion, such as KBr (Potassium Bromide). The proportions or concentrations of salts in water is a determining factor in evaluating its quality. The concentration of salts in fresh water is, on the average, so small that it is expressed in parts per million (ppm). The table below presents examples of average concentrations of dissolved salts in different types of water:

| <u>Sources of Water</u>                  | <u>Salt Concentrations (ppm)</u> |
|--|----------------------------------|
| Distilled . . . . .                      | 0                                |
| Rain . . . . .                           | 10                               |
| Lake Tahoe (California/Nevada) . . . . . | 70                               |
| Truckee River (California) . . . . .     | 100                              |
| Suwannee River . . . . .                 | 150                              |
| Lake Michigan . . . . .                  | 170                              |

|                                    |         |
|------------------------------------|---------|
| Missouri River .....               | 360     |
| Pecos River .....                  | 2,600   |
| Pyramid Lake (Nevada – 1997) ..... | 5,000   |
| Walker Lake (Nevada – 1997) .....  | 12,500  |
| Ocean .....                        | 35,000  |
| Brine Well .....                   | 125,000 |
| Dead Sea .....                     | 250,000 |

**Salt Sink** — A body of water too salty for most freshwater uses.

**Salt Water** — Water which contains a relatively high percentage of sodium chloride.

**Salt-Water Barrier** — A physical facility or method of operation designed to prevent the intrusion of salt water into a body of fresh water. Also see *Hydraulic Barrier*.

**Salt-Water Intrusion** — The invasion of a body of fresh water by a body of salt water, due to its greater density. It can occur either in surface or ground-water bodies. The term is applied to the flooding of freshwater marshes by seawater, the migration of seawater up rivers and navigation channels, and the movement of seawater into freshwater aquifers along coastal regions.

**Salt-Water Marsh** — Low, flat marshlands subject to inundation by salt waters; may be tidal or non-tidal; normally the only vegetation present is salt-tolerant bushes and grasses. Also see *Marsh* and *Tidal Marsh*.

**Salvage** — (1) Saving or conserving water by improving the efficiency of use (e.g., by lining irrigation canals so seepage losses are reduced). (2) Water available for beneficial use because an existing permittee or water right holder does not use their full appropriation due to the implementation of water conservation measures.

**Salvage Harvest** — Removal of dead and dying trees resulting from insect and disease epidemics or wildfire.

**Salvaged Water** — The part of a particular stream or other water supply that is saved from loss, in respect to quantity or quality, and is retained and made available for use.

**Sample** — (Statistics) The sample consists of a number of randomly-selected, representative observations about an economic phenomenon; a part of a population taken to estimate a parameter of the whole population. The underlying assumptions are that we do not have the means to measure the entire population of events and that the sample, if properly selected, will accurately represent the behavior and characteristics of the entire population (of events) within specified limits of probability. Types of samples include:

- [1] **Random** — A sample drawn without bias from a population in which every item has an equal chance of being drawn;
- [2] **Representative** — A sample drawn in such a way that it gives a true value for the population from which it was drawn.

Contrast with *Population* and *Census*.

**Sample Size** — (Statistics) The number of individual observations. The sample size, i.e., number of observations about a particular event or phenomenon, has important implications on how representative the sample is of the *Population*.

**Sand** — Composed predominantly of coarse-grained mineral sediments with diameters larger than 0.074 mm (0.0029 inch) and smaller than 2 mm (0.079 inch) in diameter.

**Sandbar** — A ridge of sand built up by currents, especially in a river or in coastal waters.

**Sand Dune** — Naturally occurring accumulations of sand in ridges or mounds landward of the beach.

**Sand Filter** — (Water Quality) A device used to remove particles from drinking water prior to distribution to customers. The water is allowed to *Percolate* through a chamber containing sand of various grain sizes, with the finest grain size located on the top. The particles in the water are removed at the surface of the sand and later discarded by reverse flushing.

**Sandstone Aquifer** — The type of aquifer supplying groundwater to large parts of the United States upper Middle West, Appalachia, and Texas. The water-bearing formation is often contained by shale strata, and the water has high levels of iron and magnesium.

**Sand Trap** — (Irrigation) A device, often a simple enlargement in a ditch or conduit, for arresting the heavier particles of sand and silt carried by the water.

**Sanitary Landfill** — (Water Quality) A disposal site employing methods of disposing of solid wastes in a manner that minimizes environmental hazards by spreading, compacting to the smallest practical volume and applying cover material over all exposed wastes at the end of each operating day.

**Sanitary Seal (Water Well)** — The neat cement seal at the top of a water well intended to prevent well contamination from surface water or shallow ground water flows containing potential contaminants.

**Sanitary Sewer** — A pipe or network of pipes which transport only municipal, commercial, or industrial wastewater

(sewage) and not rain or storm waters from streets.

**Sanitary Survey** — An on-site review of the water sources, facilities, equipment, operation and maintenance of a public water system to evaluate the adequacy of those elements for producing and distributing safe drinking water.

**Sanitary Water** — Water discharged from sinks, showers, kitchens, or other nonindustrial operations, but not from commodes. Also referred to as *Gray Water*.

**Sandy Soil** — Soils that have comparatively large particles that are rounded rather than flattened. Compared to clay soils, sandy soils contain much more soil and air, drain well, and warm quickly. They also dry out quickly, which necessitates more frequent watering that washes out valuable nutrients. Also referred to as “light” soil.

**Saprobien System** — (Water Quality) A European system of classifying organisms according to their response to organic pollution in slow-moving streams. Classifications include:

- [1] **Alpha-Mesaprobic Zone** — Area of active decomposition, partly *Aerobic*, partly *Anaerobic*, in a stream heavily polluted with organic wastes;
- [2] **Beta-Mesaprobic Zone** — That reach of a stream that is moderately polluted with organic wastes;
- [3] **Oligosaprobic Zone** — That reach of a stream that is slightly polluted with organic wastes and contains the mineralized products of self-purification from organic pollution, but with none of the organic pollution remaining;
- [4] **Polysaprobic Zone** — That area of a grossly polluted stream that contains the complex organic wastes that are decomposing primarily by anaerobic processes.

**Sapropel** — (1) A mud rich in organic matter formed at the bottom of a body of water. (2) A fluid slime found in swamps and bogs as a product of *Putrefaction*.

**Saprophyte** — An organism, especially a fungus or bacterium, that grows on and derives its nourishment from dead or decaying organic matter that help natural decomposition of organic matter in water.

**Sapwood** — Newly formed outer wood that lies just inside the cambium of a tree trunk and is usually lighter in color and more active in water conduction than the heartwood.

**Sastruga** — (Russian) A long wavelike ridge of snow, formed by the wind and found on the polar plains.

**Satellite (Wastewater Treatment) Plant** — Generally refers to a wastewater treatment facility in an outlying area, not connected to the main plant.

**Saturated** — (1) Generally, filled to capacity; having absorbed all that can be taken up; soaked through with moisture. (2) (Hydrologic) A condition often used in reference to soils in which all voids or pore spaces between soil particles are filled with water. (3) (Chemistry) Describes a solution in its most concentrated state in which dissolved material can remain in solution under given conditions of temperature, pressure, etc.

**Saturated Adiabatic Lapse Rate** — The lapse rate in the saturated lower layers of the air. It is equal to about 3.4°F per 1,000 feet in elevation.

**Saturated Air** — Moist air in a state of equilibrium with a plane surface of pure water or ice at the same temperature and pressure; i.e., air whose vapor pressure is the saturation vapor pressure and its relative humidity is 100 percent.

**Saturated Flow** — The liquid flow of water in soils that occurs when the soil pores in the wettest part of the soil are completely filled with water and the direction of flow is from the wettest zone of higher potential to one of lower potential.

**Saturated Soils** — Soils that have absorbed, to the maximum extent possible, water from rainfall or snowmelt. Any further precipitation on saturated soils will result in surface runoff with down-gradient affects on flooding and erosion.

**Saturated Thickness (Aquifer)** — The thickness of the portion of the aquifer in which all pores, or voids, are filled with water. In a *Confined Aquifer*, this is generally the aquifer thickness. In an *Unconfined Aquifer*, this is the distance between the water table and the base of the aquifer.

**Saturated Vapor Pressure** — The pressure exerted by the vapor in a saturated space.

**Saturated Zone** — (1) The part of a water bearing layer of rock or soil in which all spaces, large or small, are filled with water. (2) The zone in the earth’s crust, extending from the water table downward, in which all open pore spaces in the soil or rock are filled with water at greater than atmospheric pressure. A term used synonymously with the *Zone of Saturation*. Also referred to as *Phreatic Zone*.

**Saturation** — The condition of a liquid when it has taken into solution the maximum possible quantity of a given substance at a given temperature and pressure.

**Saturation Deficit** — The difference between the actual vapor pressure and the saturation vapor pressure at the existing temperature. Also referred to as the *Vapor Pressure Deficit*.

**Saturation Mixing Ratio** — The maximum water vapor concentration in the atmosphere for a given air temperature. The higher the air temperature, the higher the saturation mixing ratio.

**Saturation Point** — That point at which a soil or an aquifer will no longer absorb any amount of water without losing an equal amount.

**Saturation Vapor Pressure** — The maximum possible partial pressure of water vapor in the atmosphere at a given temperature.

**Saturation, Zone of** — The zone below the *Water Table* in which all pore spaces are filled with ground water. The water table is the top of the zone of saturation in an unconfined aquifer. Also referred to as the *Phreatic Zone*.

**Sauna** — (1) A Finnish steam bath in which the steam is produced by pouring water over heated rocks; a bathhouse or room for taking such a steam bath. (2) A dry heat bath; a room or an enclosure for taking a dry heat bath.

**Sausage Dam** — A dam composed of loose rock that has been wrapped with wire into cylindrical bundles and laid in a horizontal or vertical position.

**Savanna, also Savannah** — A flat grassland of tropical or subtropical regions dominated by grasses, sedges, and small shrubs with scattered trees, either as individuals or clumps. The savanna often represents a transitional region between true grassland and forest. Also see *Biome* and *Grasslands*.

**Saxitoxin** — The primary toxin produced by dinoflagellate protozoans during blooms known as *Red Tides* in marine waters. The genus or protozoan involved in the generation of the red color in the water is *Gonyaulax*. Also see *Paralytic Shellfish Poisoning*.

**Scabland** — (Geography) An elevated area of barren, rocky land with little or no soil cover, often crossed by dry stream channels.

**Scald** — (1) To burn with or as if with hot liquid or steam. (2) To subject to or treat with boiling water.

**Scale** — (1) An accumulation of solid material on interior surfaces, such as pipelines, tanks, and boilers, as a result of the precipitation of mineral salts from water, most typically salts of calcium. *Hard Water* leaves a deposit (scale) in steam irons, coffee makers, and water heaters. (2) A hard incrustation usually rich in sulfate of calcium that is deposited on the inside of a vessel (as a boiler) in which water is heated.

**Scarify** — In land *Restoration* activities, to stir the surface of the ground with an implement in preparation for replanting.

**Scarp** — (1) A line of cliffs produced by faulting or by erosion. The term is an abbreviated form of *Escarpment*, and the two terms commonly have the same meaning, although “scarp” is more often applied to cliffs formed by faulting. (2) A relatively steep and straight, cliff-like face or slope of considerable linear extent, breaking the general continuity of the land by separating level or gently sloping surfaces lying at different levels, as along the margin of a plateau, mesa, terrace, or bench.

**Scavenging Coefficient** — The exponential constant ( $\bar{E}$ ) in an *Exponential Decay* model for the physical removal of particulate from the air by rainfall. Of the form:

$$X_t = X_0 e^{-\bar{E}t}$$

where:

$X_t$  is the particulate concentration at time  $t$ ;

$X_0$  is the particulate concentration at time 0;

$t$  is the number of time units (periods) since the rainfall began;

$e$  is the base of the natural logarithm; and

$\bar{E}$  is the scavenging coefficient for the specific particulate.

**Scenic Rivers** — A classification under the national *Wild and Scenic Rivers Act* to include those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads. The following represents restrictions applying to such designated rivers:

- (1) **Timber Production** – A wide range of silvicultural practices could be allowed if such practices are carried on so that there is no substantial adverse effect on the river and its immediate environment. The river area should be maintained in its near natural environment. Timber outside the boundary but within the visual scene area should be managed and harvested in a way that provides special emphasis on visual quality.
- (2) **Water Supply** – All water supply dams and major diversions are prohibited.
- (3) **Hydroelectric Power** – No development of hydroelectric power facilities would be allowed.
- (4) **Flood Control** – Flood control dams and levees would be prohibited.
- (5) **Mining** – Subject to regulations (i.e., 36 CFR 228) that the Secretaries of Agricultural and Interior may prescribe to protect the values of rivers included in the national system. New mining claims and mineral leases could be allowed and existing operations allowed to continue. However, mineral activity must be conducted in a way that minimizes surface disturbances, sedimentation and pollution, and visual

impairment.

- (6) **Road Construction** – Roads may occasionally bridge the river area and short stretches of conspicuous or longer stretches on inconspicuous and well screened roads or screened railroads could be allowed. Consideration will be given to the type of use for which roads are constructed and the type of use that will occur in the river area.
- (7) **Agriculture** – A wider range of agricultural uses is permitted to the extent currently practices. Row crops are not considered as an intrusion of the “largely primitive” nature of scenic corridors if there is not a substantial adverse effect on the natural-like appearance of the river area.
- (8) **Recreational Development** – Larger scale public use facilities, such as moderate size campgrounds, public information centers, and administrative headquarters are allowed if such structures are screened from the river. Modest and unobtrusive marinas also can be allowed.
- (9) **Structures** – Any concentrations of habitations are limited to relatively short reaches of the river corridor. New structures that would have a direct and adverse effect on river values would not be allowed.
- (10) **Utilities** – New transmission lines, gas lines, water lines, etc., are discouraged. Where no reasonable alternative exists, additional or new facilities should be restricted to existing right-of-way. Where new rights-of-ways are indicated, the scenic, recreation, and fish and wildlife values must be evaluated in the selection of the site.
- (11) **Motorized Travel** – Motorized travel on land or water may be permitted, prohibited or restricted to protect the river values.

Also see *Wild and Scenic Rivers Act*, *Wild Rivers*, and *Recreational Rivers*.

**Scenic Waterway** — Rivers or river segments chosen for scenic and recreation qualities to be preserved in their natural state.

**Schedule of Compliance** — Description of remedial actions to be accomplished by the permit holder (type of facility to be installed or alternative control measures to be established) and a sequence of actions leading to compliance with applicable standards.

**Scheduled Delivery** — Operation of a water delivery system to meet predetermined needs, generally based on user water orders. Also referred to as *Arranged Delivery*.

**Schist** — A strongly foliated crystalline rock formed by dynamic metamorphism which can be readily split into thin flakes or slabs due to the well-developed parallelism of more than 50 percent of the minerals present.

**Schistosomiasis** — A debilitating tropical disease, common in underdeveloped regions of the world, particularly rural areas of Africa, Asia, and Latin America, caused by a small roundworm named *Schistosoma*. The disease is transmitted to humans through contact with water contaminated by fecal material. Infected humans discharge eggs in feces. These eggs hatch in freshwater, producing a small immature form of the parasite that infects snails common in streams, ponds, and lakes. The life cycle of the worm continues in the snail, and a second immature worm reenters the water where it later infects humans who come in contact with the infected water. Also referred to as *Bilharziasis* and *Snail Fever*.

**“Schmutzdecke” Layer** — In slow sand filters used for water treatment, a biologically active bed of bacterial and algal slime that forms an effective barrier for very small particles, including bacteria and *oocysts*, even *cryptosporidial oocysts*.

**Science Advisory Board (SAB)** — An independent body established by the Administrator of the *U.S. Environmental Protection Agency (EPA)* in 1974 and by Congress in 1977. Its purpose is to review the scientific merits of EPA research and the scientific basis for the agency’s proposed regulations and standards.

**Scientific Method** — A systematic method of inquiry that includes the identification of a specific question or problem, the accumulation of the available data and information relating to that question, the proposal of a tentative answer or solution to the question or problem, the conduct of methodical observations or experiments to test the proposed answer, and the rational interpretation of the results of the observations or experiments.

**Scour** — (1) To clear, dig, or remove by or as if by a powerful current of water. (2) The erosive action of running water in streams, which excavates and carries away material from the bed and banks. Scour may occur in both earth and solid rock material. (3) The powerful and concentrating clearing and digging action of flowing air or water, especially the downward erosion by stream water in sweeping away mud and silt on the outside curve of a bend, or during time of flood. (4) A place in a stream bed swept (scoured) by running water, generally leaving a gravel bottom. (5) The process by which flood waters remove soil around objects that obstruct flow, such as the foundation walls of a house.

**Scouring Sluice** — An opening in a dam controlled by a gate through which the accumulated silt, sand, and gravel may be ejected.

- Scour Pools** — A pool formed by flow directed either laterally or obliquely against a partial channel obstruction or bank.
- Screening** — The use of screens to remove coarse floating and suspended solids from sewage.
- Scrubber, Spray** — An air pollution control device that removes particulates or gases from an airstream by spraying liquid into the air duct and then collecting the pollutant-containing droplets. Also see *Spray Tower*.
- Scrubber, Venturi** — An air pollution control device that operates by the introduction of a liquid into a narrow throat section (venturi) of an air duct that is carrying a contaminant. The high velocity in the venturi, compared to the low initial liquid velocity, provides efficient contact between the injected scrubbing liquid and the contaminant to be removed.
- Scuba** — A portable apparatus containing compressed air and used for breathing under water. [The name is derived from **S**(elf-)**C**(ontained)**U**(nderwater)**B**(reathing)**A**(pparatus).]
- Scud** — Wind-driven clouds, mist, or rain; a gust of wind; ragged low clouds, moving rapidly beneath another cloud layer.
- Scum** — (Biological) A filmy layer of extraneous or impure matter that forms on or rises to the surface of a liquid or body of water.
- Scupper** — (1) (Nautical) Openings along the side of a ship at deck level to allow water to run off. (2) An opening for draining off water, as from a floor or the roof of a building.
- S-Curve** — The mass curve corresponding to a *Unit Hydrograph* or a distribution graph.
- Scuttlebutt** — (1) A cask on shipboard to contain fresh water for a day's use. (2) A drinking fountain on a ship or at a naval or marine installation. (3) Slang term for rumor.
- Sea** — (1) One of the larger bodies of salt water, less than an ocean, more or less landlocked and generally forming part of, or connecting with, an ocean or a larger sea. (2) An inland body of water, especially if large or if salty or brackish.
- Sea Breeze** — The sea-to-land surface wind that typically occurs in coastal areas during the day. It is caused by the thermal rising of the air above the land, which warms more readily than the water. Also see *Land Breeze*.
- Seacock** — (Nautical) A valve in the hull of a boat or ship that may be opened to let in water so as to flood a ballast tank, for example.
- Seal** — A tight and perfect closure as against the passage of water.
- Sealant** — In retrofitting against the effects of flooding, a waterproofing material or substance used to prevent the infiltration of flood water.
- Sea Level** — (1) The level of the surface of the sea, especially measured at its mean position midway between mean high and low water. (2) Refers to the *National Geodetic Vertical Datum* of 1929 (NGVD of 1929) – a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Seal level Datum of 1929. Also see *Mean Sea Level (MSL)*.
- Sea Mile** — A unit of length used in sea and air navigation, based on the length of one minute of arc of a great circle, especially an international and U.S. unit equal to 1,852 meters (about 6,076 feet). More commonly referred to as *Nautical Mile*.
- (Well) Seal** — (Hydraulics) The watertight seal established in the annular space between the outermost water well casing and the drill hole to prevent the inflow and movement of surface water or shallow ground water, or to prevent the outflow or movement of water under artesian pressures. The term also includes a *Sanitary Seal*.
- Seas (World)** — The following constitute a listing of the principal seas of the world in alphabetical order: Adriatic Sea, Aegean Sea, Amundson Sea, Andaman Sea, Arabian Sea, Arafura Sea, Aral Sea, Baltic Sea, Banda Sea, Barents Sea, Bearing Sea, Beaufort Sea, Bellingshausen Sea, Bismark Sea, Black Sea, Caspian Sea, Caribbean Sea, Celebes Sea, Celtic Sea, Chukchi Sea, Coral Sea, Davis Sea, Dead Sea, D'Urville Sea, East China Sea, East Siberian Sea, Flores Sea, Greenland Sea, Halmahera Sea, Ionic (Ionian) Sea, Irish Sea, Java Sea, Kara Sea, Labrador Sea, Laptev Sea, Ligurian Sea, Mediterranean Sea, Molucca Sea, Norwegian Sea, North Sea, Philippine Sea, Red Sea, Ross Sea, Salton Sea, Savu Sea, Scotia Sea, Sea of Azov, Sea of Cortez, Sea of Crete, Sea of Galilee, Sea of Hebrides, Sea of Japan, Sea of Marmara, Sea of Okhotsk, Sibuyan Sea, South China Sea, Sulu Sea, Tasman Sea, Timor Sea, Tyrrhenian Sea, Weddell Sea, White Sea, Yellow Sea. Also see *Seven Seas*.
- Seashore** — (1) Land by the sea. (2) (Legal) Ground lying between high-water and low-water marks; the *Foreshore*.
- Season** — A period of time characterized by some distinguishable occurrence or feature, such as growing season, harvest season, winter season, dry season, etc. It is not to be used in reference to a 12-month period.
- Seasonal Adjustment** — (Data Analysis) The adjustment of *Time-Series Data*, for example, commercial, residential, and irrigation water use, to eliminate the effects of intra-year normal variations (i.e., fluctuations within a 12-month period), such as those caused by weather patterns, agricultural cycles and irrigation patterns, school

terms, holidays, and business patterns associated with such factors as product demand, tourism, etc. Also see *Seasonal Factors*.

**Seasonal Adjustment Factors** — (Data Analysis) Mathematical indexes used to adjust for the intra-year normal seasonal fluctuations in time-series data. In its simplest form, such indexes may be derived from dividing the value of each observation by a simple moving average centered over each data observation with such an average encompassing the six-month period before and after the observation. More sophisticated seasonal adjustment processes may also account for the placement of weekends and holidays and other factors affecting data behavior. Also see *Seasonal Factors*.

**Seasonal Application Efficiency (SAE)** — The sum of the *Evapotranspiration of Applied Water (ETAW)*, the *Leaching Requirement (LR)*, and cultural practices (CP) (e.g., frost protection, heat protection, weed control), divided by the total applied water (AW), expressed as a percentage, or,

$$SAE = (ETAW + LR + CP)/AW$$

**Seasonal Factors** — (Data Analysis) Factors such as weather conditions, agricultural production and irrigation requirements, business and tourism patterns, school schedules and holidays, etc., which cause normal annual fluctuations in business activity within individual and/or combinations of industries. These factors affect the demand for commercial, residential, and irrigation water use. Also see *Seasonal Adjustment* and *Seasonal Adjustment Factors*.

**Seasonal or Intermittent Streams** — Streams which flow only at certain times of the year when it receives water from springs, rainfall, or from surface sources such as melting snow. Also see *Stream*.

**Seasonality** — (Statistics) Periodic, repetitive, and generally predictable patterns in time series data. Typically, forecast models must explicitly incorporate seasonality in the estimation process either through *Differencing* techniques (transformations), through the introduction of seasonal *Dummy Variables* to explicitly account for these patterns, or by seasonal smoothing (Winters Model).

**Seasonally Adjusted (S.A.)** — (Data Analysis) Data which have been adjusted (modified) by *Seasonal Adjustment Factors* so as to remove the effects of *Seasonality*. Also sometimes referred to as a *De-Seasonalization* of the data. Also see *Seasonal Adjustment*.

**Seasonally Flooded (Estuarine)** — Water regime in estuaries with seasonally-closed mouths and seasonally-flooded habitats.

**Seasonal Wetlands** — Wetland areas flooded or taking on the characteristics of a wetland only during specific periods of the year or seasons. Also see *Wetlands* and *Prairie Potholes*.

**Sea Stack** — A small, steep-sided rocky projection above sea level near a cliffed shore.

**Sea Wall, also Seawall** — An embankment to prevent erosion of a shoreline.

**Seawater** — The salt water in, or coming from the sea or ocean.

**Secchi Depth** — A relatively crude measurement of the turbidity (cloudiness) of surface water. The depth at which a *Secchi Disc (Disk)*, which is about 10–12 inches in diameter and on which is a black and white pattern, can no longer be seen.

**Secchi Disc (Disk)** — A circular plate, generally about 10–12 inches (25.4–30.5 cm) in diameter, used to measure the transparency or clarity of water by noting the greatest depth at which it can be visually detected. Its primary use is in the study of lakes. Also see *Secchi Depth*.

**Second-Feet** — See *Cubic Feet per Second*.

**Secondarily Improved Pastures** — Livestock pasture areas that have not been intensively land leveled or serviced by modern conveyance structures. These areas receive primarily drainage water from improved irrigated areas.

**Secondary (Indirect) Association** — (Statistics) A situation in which there exists an apparent link between two *Variables* that is actually the result of a *Confounding Variable*. When the confounding variable is controlled, then the link is no longer evident.

**Secondary Benefits** — The values over and above the immediate products or services of a water resource development project.

**Secondary Costs** — (FEMA) The cost associated with floodproofing activities, other than providing the basic floodproofing features, that are necessary to prevent a structure from being damaged by flooding.

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

**Secondary Drinking Water Regulations** — Non-enforceable regulations applying to public water systems and specifying the maximum contamination levels that, in the judgement of the *U.S. Environmental Protection Agency (EPA)*, are required to protect the public welfare. These regulations apply to any contaminants that may adversely

affect the odor or appearance of such water and consequently may cause people served by the system to discontinue its use. Term may be used synonymously with *Secondary Drinking Water Standards*.

**Secondary Drinking Water Standards** — Non-enforceable standards related to the aesthetic quality of drinking water such as those relating to taste and odor; generally set by the U.S. *Environmental Protection Agency (EPA)* or state water-quality enforcement agencies based on EPA guidance. Term may be used synonymously with *Secondary Drinking Water Regulations*. Also see *Drinking Water Standards* and *Drinking Water Standards [Nevada]*. [See Appendix B–3, Nevada Drinking Water Standards for a listing of Nevada’s current drinking water primary and secondary quality standards.]

**Secondary Maximum Contaminant Level (SMCL)** — The maximum concentration or level of certain water contaminants in public water supplies set by the U.S. *Environmental Protection Agency (EPA)* to protect the public welfare. The secondary levels are written to address aesthetic considerations such as taste, odor, and color of water, rather than health standards. Also see *Primary Drinking Water Standards*, *Maximum Contaminant Level (MCL)*, and *Maximum Contaminant Level Goal (MCLG)*.

**Secondary Porosity** — The porosity that results from fractures and solution channels.

**Secondary Recovery** — The injection of water into an underground petroleum deposit to force the remaining oil into recovery wells. This technique is used to recover additional oil from old wells following the removal of the oil that can be easily pumped to the surface (*Primary Recovery*). Also referred to as *Enhanced Oil Recovery*. Also see *Injection* and *Recharge*.

**Secondary Settling Tank** — A tank used to hold wastewater that has been subjected to *Secondary Wastewater Treatment*. Floc or particles of organic matter formed during the secondary processes are allowed to settle from the suspension for subsequent removal.

**Secondary Standards** — Allowable amounts of materials in air or water that are set to retain environmental qualities not related to the protection of human health. Secondary water standards are set for, among other things, taste, odor, and color, and some secondary air standards define concentrations that will not be harmful to plant life. Compare to *Primary Standards*.

**Secondary Succession** — The orderly and predictable changes that occur over time in the plant and animal communities of an area that has been subjected to the removal of naturally occurring plant cover. This type of succession occurs when agricultural fields are taken out of use or when forested areas are subjected to severe fires that destroy all vegetation. In both cases the top soil remains for the regrowth of natural plant communities. Compare to *Primary Succession*.

**Secondary Wastewater Treatment** — Treatment (following *Primary Wastewater Treatment*) involving the biological process of reducing suspended, colloidal, and dissolved organic matter in effluent from primary treatment systems and which generally removes 80 to 95 percent of the *Biochemical Oxygen Demand (BOD)* and suspended matter. Secondary wastewater treatment may be accomplished by biological or chemical-physical methods. Activated sludge and trickling filters are two of the most common means of secondary treatment. It is accomplished by bringing together waste, bacteria, and oxygen in trickling filters or in the activated sludge process. This treatment removes floating and settleable solids and about 90 percent of the oxygen-demanding substances and suspended solids. Disinfection is the final stage of secondary treatment. Also see *Primary Treatment* and *Tertiary Wastewater Treatment*.

**Secondary Wetlands [Lahontan Valley, Nevada]** — Wetland habitat in the Environmental Impact Statement (EIS) study area that are not associated with Stillwater National Wildlife Refuge, Stillwater Wildlife Management Area, Carson Lake and Pasture, and the Fallon Indian Reservation. These areas are not part of the primary wetlands mandated to be sustained by *Public Law 101-618*.

**Section** — A unit of land area, generally equal to one square mile or 640 acres (259 hectares). Thirty-six sections also comprise a *Township* (6 miles long by 6 miles wide). The section is part of a description of the location of land using the survey system (*Public Land Survey System — PLSS*) of the United States Government and includes the 40-acre subdivision within a *quarter*, *section*, *township* and *range*. The public land survey system is based on the concept of a township as a square parcel of land six miles on each side. Its location is established as being so many six-mile units east of a north-south line (called the *meridian*) and so many six-mile units north or south of an east-west line (called the *baseline*). The township is described by township and range, e.g., T.4N, R.23E. Each township is further divided into 36 parts called sections one mile square (each section measuring 5,280 feet on each side). A typical section containing 640 acres may be further subdivided into quarters (measuring 2,640 feet on each side). The quarter of a section is equal to 160 acres and described as the NW<sup>1</sup>/<sub>4</sub> or the NE<sup>1</sup>/<sub>4</sub> or the SW<sup>1</sup>/<sub>4</sub> or the SE<sup>1</sup>/<sub>4</sub> of that particular section. The quarter section may be divided into four quarters, each being <sup>1</sup>/<sub>16</sub> of a section, or 40 acres (measuring 1,320 feet on each side). Each sixteenth is described as the NW<sup>1</sup>/<sub>4</sub> or the NE<sup>1</sup>/<sub>4</sub>

or the SW<sup>1</sup>/<sub>4</sub> or the SE<sup>1</sup>/<sub>4</sub> of that particular quarter section. A person must determine which is north on a map (usually at the top) in this case the easterly direction would be to the right, south to the bottom, and west to the left. The written location of a specific 40-acre parcel of land would be NW<sup>1</sup>/<sub>4</sub> of the NW<sup>1</sup>/<sub>4</sub> of Section 13, T.4N., R.23E. Some sections may contain more or less acreage than 640.

**Section 319 (Clean Water Act)** — See *Clean Water Act (CWA)*, Section 319.

**Section 404 (Clean Water Act)** — That section of the *Clean Water Act (CWA)* delineating restrictions on the dredging and filling (only) of *Wetlands* in the United States. While *Section 404 Permits* are issued by the *U.S. Army Corps of Engineers (COE)*, Section 404 regulations are written by the *U.S. Environmental Protection Agency (EPA)*.

**Section 404 Permit** — The *Wetland* dredge and fill permit issued under regulations written to conform to *Section 404* of the *Clean Water Act (CWA)*. The permit is actually granted by the *U.S. Army Corps of Engineers (COE)*.

**Secular Trend** — (Data Analysis) A trend existing to some characteristic or phenomena over a relatively long period of time. Secular trends represent an important underpinning to any form of analysis as once such a trend is determined, deviations or perturbations from this trend may only be temporary and, if caused by man's activities, may not be reasonably sustainable in the long term.

**Secure Landfill** — (Water Quality) A ground location for the deposit of hazardous wastes. The material, either in solid or liquid form, is placed above natural and synthetic liners than prevent or restrict the *Leaching* of dangerous substances (*Leachates*) into the groundwater and deep aquifers. A piping network called a *Leachate Collection System* is placed beneath the facility to allow the pumped removal of any liquid that penetrates the bottom or side liners. Access to the location is restricted and wells are used to monitor the leaching of any dangerous materials into the surrounding area. May constitute a type of treatment, storage, or disposal facility.

**Secure Maximum Contaminant Level** — The maximum permissible level of a contaminant in water delivered to the free flowing outlet of the ultimate user, or of contamination resulting from corrosion of piping and plumbing caused by water quality.

**Sediment** — (1) Soil particles that have been transported from their natural location by wind or water action; particles of sand, soil, and minerals that are washed from the land and settle on the bottoms of wetlands and other aquatic habitats. (2) The soil material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by erosion (by air, water, gravity, or ice) and has come to rest on the earth's surface. (3) Solid material that is transported by, suspended in, or deposited from water. It originates mostly from disintegrated rocks; it also includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation. (4) In the singular, the word is usually applied to material in suspension in water or recently deposited from suspension. In the plural the word is applied to all kinds of deposits from the waters of streams, lakes, or seas, and in a more general sense to deposits of wind and ice. Such deposits that have been consolidated are generally called sedimentary rocks. (5) Fragmental or clastic mineral particles derived from soil, alluvial, and rock materials by processes of erosion, and transported by water, wind, ice, and gravity. A special kind of sediment is generated by precipitation of solids from solution (i.e., calcium carbonate, iron oxides). Excluded from the definition are vegetation, wood, bacterial and algal slimes, extraneous light-weight artificially made substances such as trash, plastics, flue ash, dyes, and semisolids.

**Sediment Control** — The control of movement of sediment on the land, in a stream or into a reservoir by means of manmade structures; such as debris dams, wing dams, or channelization; land management techniques, or natural processes.

**Sediment (Catchment) Dam** — A structure used specifically to trap sediment in water and prevent its transport further downstream.

**Sediment-Delivery Ratio** — The ratio of sediment yield to gross erosion, expressed in percent.

**Sediment Deposition** — The accumulation of soil particles on the channel bed and banks.

**Sediment Discharge** — Mass of sediment passing a stream cross-section at a defined unit of time.

**Sediment Discharge, Total** — The rate at which dry weight of 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. Typically reported in tons per day.

**Sediment Discharge, Unmeasured** — The difference between *Total Sediment Discharge* and measured *Suspended-Sediment Discharge*.

**Sediment Load** — (1) The soil particles transported through a channel by stream flow. (2) The total sediment, including bedload plus suspended sediment load, is the sediment being moved by flowing water in a stream at a specified cross section.

**Sediment Load, Total** — Also referred to as the total load, a term that refers to the total sediment (bed load plus suspended-sediment load) that is in transport. The term needs to be qualified, however, such as “annual suspended-sediment load” or “sand-size suspended-sediment load,” and so on. It is not synonymous with total sediment discharge.

**Sediment Oxygen Demand (SOD)** — The amount of dissolved oxygen removed from the water covering the sediment in a lake or stream because of microbial activity.

**Sediment Pool** — The reservoir space allotted to the accumulation of submerged sediment during the life of the structure.

**Sediment Storage** — The accumulation, in a reservoir, of sediment that would normally be carried downstream without the project.

**Sediment Storage (Reservoir)** — That portion of total reservoir storage dedicated for sediment deposition and encroachment. Normally a part of *Dead Storage*.

**Sediment-Transport Curve** — Usually the relation between water discharge and *Suspended-Sediment Discharge*, but it can be between water discharge and *Bed-Load Discharge*, *Unmeasured Sediment Discharge*, or *Total Sediment Discharge*.

**Sediment Yield** — That amount of sediment transported by a stream system that may be measurable at a particular location. Usually expressed in volume or weight per unit of time.

**Sedimentary Cycle** — The biogeochemical cycle in which materials primarily are moved from land to sea and back again.

**Sedimentary Rock** — (Geology) Rock formed of sediment, especially from mechanical, chemical, or organic processes, and specifically: (1) clastic rock, such as conglomerate, sandstone, and shale, formed of fragments of other rock transported from their sources and deposited in water; and (2) rocks formed by precipitation from solution, as rock salt and gypsum, or from secretions of organisms, such as most limestone. Many sedimentary rocks show distinct layering, which is the result of different types of sediment being deposited in succession. Also see *Igneous Rock* and *Metamorphic Rock*.

**Sedimentation** — (1) Strictly, the act or process of depositing sediment from suspension in water. Broadly, all the processes whereby particles of rock material are accumulated to form sedimentary deposits. Sedimentation, as commonly used, involves not only aqueous but also glacial, aeolian, and organic agents. (2) (Water Quality) Letting solids settle out of wastewater by gravity during treatment.

**Sedimentation Basin (SB)** — A surface water runoff storage facility intended to trap suspended solids, suspended and buoyant debris, and adsorbed or absorbed potential pollutants that are carried by surface water runoff. The sedimentation basin may be part of an overall multipurpose detention and retention facility.

**Sedimentation Tanks** — Wastewater tanks in which floating wastes are skimmed off and settled solids are removed for disposal.

**Sediments** — Soil, sand, and minerals washed from the land into water, usually after rain. They pile up in reservoirs, rivers, and harbors, destroying fish and wildlife habitat, and clouding the water so that sunlight cannot reach aquatic plants. Careless farming, mining, and building activities will expose sediment materials, allowing them to wash off the land after rainfall.

**Seep** — (1) To pass slowly through small openings or pores; ooze. (2) Groundwater emerging on the face of a stream bank. (3) An area which slowly passes water out of the ground to the surface, or where water moves slowly from surface bodies to groundwater bodies, as from canals and ditches into the underlying groundwater table. (4) An area of minor groundwater outflow onto the land surface or into a stream channel or other water body. Flows are usually too small to be a spring.

**Seepage** — (1) The passage of water or other fluid through a porous medium, such as the passage of water through an earth embankment or masonry wall. (2) Groundwater emerging on the face of a stream bank. (3) The slow movement of water through small cracks, pores, *Interstices*, etc., of a material into or out of a body of surface or subsurface water. (4) The *Interstitial* movement of water that may take place through a dam, its foundation, or its *Abutments*. (5) The loss of water by infiltration into the soil from a canal, ditches, laterals, watercourse, reservoir, storage facilities, or other body of water, or from a field. Seepage is generally expressed as flow volume per unit of time. During the process of priming (a field during initial irrigation), the loss is called *Absorption Loss*.

**Seepage Bed** — A trench or bed more than 36 inches (0.91 meter) wide containing at least 12 inches (30.5 centimeters) of clean, coarse aggregate and a system of distribution piping through which treated sewage may seep into the surrounding soil.

**Seepage Lakes** — Lakes whose ecology is determined primarily by ground water rather than surface water.

- Seepage Losses** — A measure of water losses in a conveyance system due to water being seeped into the surrounding soils. Seepage losses from canals and other conveyance systems depend on: (1) the permeability of the surrounding soil; (2) the wetted surface of the canal; and (3) the difference in level of the water in the canal and the adjacent groundwater table. Broadly, the seepage losses range from 15–45 percent of diverted flow for unlined canals and from 5–15 percent for lined canals.
- Seepage Pit** — A covered pit with lining designed to permit treated sewage to seep into the surrounding soil.
- Seeps** — Groundwater/surface water connections caused by river or stream erosion into a near-surface aquifer.
- Seiche** — An oscillation of the water surface of a lake or other body of water due to variations of atmospheric pressure, wind, or minor earthquakes. The oscillation may be a foot or more in amplitude and may last several hours.
- Selective Ion Probe** — An electrode for which the measured voltage is proportional to the concentration of a specific ion in the solution being tested. The most common example is the pH probe, which responds to the hydrogen ions in solution.
- Selenium** — A naturally-occurring inorganic element found primarily in soils, and to a lesser extent in water and air. Selenium is a necessary nutrient in very small amounts, but can be toxic in high doses.
- Self-Produced Water** — A water supply (usually from wells) developed and used by an individual or entity. Also referred to as *Self-Supplied Water*.
- Self-Purification** — The ability of a body of water to rid itself of pollutants. The removal of organic material, plant nutrients, or other pollutants from a lake or stream by the activity of the resident biological community. Biodegradable material added to a body of water will gradually be utilized by the microorganisms in the water, lowering the pollution levels. If excessive amounts of additional pollutants are not added downstream, the water will undergo self-cleansing. This process does not apply to pollution by non-biodegradable organic compounds or metals.
- Self-Supplied Water** — Water withdrawn from a surface or ground-water source by a user rather than being obtained from a *Public Water Supply System (PWSS)*. Also referred to as *Self-Produced Water*.
- Self-Supplied Water (Industrial)** — Water for industrial use, supplied from sources other than municipal distribution systems.
- Selva** — A dense tropical rain forest usually having a cloud cover, especially one in the Amazon Basin.
- Semi-Bolson** — A specific identification for an externally-drained *Intermontane Basin*.
- Semi-Bolson Floor** — A specific identification for the floor of a *Semi-Bolson* as compared with a *Bolson* floor.
- Semiaquatic** — Adapted for living or growing in or near water; not entirely aquatic.
- Semiarid** — A term applied to regions or climates where moisture is normally greater than under arid conditions but still definitely limits the growth of most crops. Dryland farming methods or irrigation generally are required for crop production. The upper limit of average annual precipitation in the cool semiarid regions is as low as 15 inches (38.1 cm). Whereas in tropical regions it is as high as 45 or 50 inches (114.3 or 127.0 cm).
- Semiconfined (Aquifer)** — An aquifer that has a “leaky” confining unit and displays characteristics of both confined and unconfined aquifers, typically evidencing low permeability through which recharge and discharge can still occur. Also see *Leaky Aquifer*.
- Semipermeable** — (1) Partially permeable. (2) Allowing passage of certain, especially small, molecules or ions but action as a barrier to others. Used of biological and synthetic membranes.
- Semipermeable Membrane** — A barrier, usually thin, that permits passage of particles up to a certain size or of a special nature. Also referred to as a *Differentially Permeable Membrane* or simply *Membrane*.
- Senescence (Senescent)** — Describing plants or specific ecosystems that are nearing the end of their normal life span. Sometimes used to describe lakes or other bodies of water in advanced stages of *Eutrophication*. For example, a lake that is filling with accumulated aquatic vegetation, dead plant material, and sediments can be described as senescent because it is nearing extinction as a productive lake environment. Also see *Secular Trend*.
- Senile** — (Geology) Worn away nearly to the base level, as at the end of an erosion cycle.
- Senior Rights** — A senior rights holder is one who holds rights that are older (more senior) than those of junior rights holders. All water rights are defined in relation to other users, and a water rights holder only acquires the right to use a specific quantity of water under specified conditions. Thus, when limited water is available, senior rights are satisfied first in the order of their *Priority Date*.
- Sensitive Species** — (1) Those plant or animal species susceptible or vulnerable to activity impacts or habitat alterations. Species not yet officially listed but undergoing status review for listing on the *U.S. Fish and Wildlife Service’s (USFWS)* official threatened and endangered list; species whose populations are small and widely dispersed or restricted to a few localities; and species whose numbers are declining so rapidly that official listing may be necessary. Also see *Endangered Species Act (ESA)*, *Endangered Species* and *Threatened Species*. (2)

Those plant and animal species identified by a Regional Forester for which population viability is a concern as evidenced by: (a) significant current or predicted downward trends in population numbers or density; or (b) significant current or predicted downward trend in habitat capability that would reduce a species' existing distribution.

**Septage** — *Septic Tank* sludge that is a combination of raw primary sludge and an anaerobically produced raw sludge.

**Septic System** — An on-site system designed to treat and dispose of domestic sewage. A typical septic system consists of a tank that receives waste from a residence or business and a system of tile lines or a pit for disposal of the liquid effluent (sludge) that remains after decomposition of the solids by bacteria in the tank. The remaining solids must be pumped out periodically.

**Septic Tank** — (1) A sewage disposal tank in which a continuous flow of waste material is decomposed by anaerobic (in the absence of oxygen) bacteria. (2) A tank used to detain domestic wastes to allow the settling of solids prior to distribution to a leach field for soil absorption. Septic tanks and their associated *Leaching Fields* are used when a sewer line is not available to carry them to a treatment plant. A settling tank in which settled sludge is in immediate contact with sewage flowing through the tank, and wherein solids are decomposed by anaerobic bacterial action. Usually part of a rural on-site sewage treatment system. Typically, septic tanks would have a volume of 1–3 times the daily sewage flow. Also see *Septic System*.

**Septic Tank Absorption Field** — A soil absorption system for sewage disposal, consisting of a subsurface tile system laid in such a way that effluent from the septic tank is distributed with reasonable uniformity into the natural soil.

**Septic Tank Soil Absorption System (ST–SAS)** — A conventional wastewater treatment process used in isolated, rural, and other areas where normal sewer systems are not available whereby effluent is treated in a *Septic Tank*, then fed to soil-based disposal fields or trenches by gravity or under pressure. The quality of the ensuing filtration and absorption treatment is directly linked to soil and site characteristics such as permeability, drainage, slope, and depth to limiting conditions such as groundwater or bedrock. Unfortunately, many soils are classified as unsuitable for conventional soil absorption systems. Under such unsuitable soil conditions, alternative pretreatment systems may be employed to include sand filters, mound systems, evapotranspiration systems, low pressure pipe systems and a more complex drip soil absorption system. Also see *Drip (Trickle) Soil Absorption System*.

**Sequencing Batch Reactors (SBR)** — (Water Quality) A wastewater treatment technique consisting of an activated sludge system which operates sequentially in time rather than in space, that is, all steps of the process take place, one after the other, in the same tank instead of moving to a second tank for the continuation of the treatment. The typical SBR operation involves filling a tank with raw wastewater or primary effluent, aerating the wastewater to convert the organics into a microbial mass, providing a period for settling, discharging the treated effluent, and a period identified as “idle” that represents the time after discharging the tank and before refilling. Typically, a multiple tank system is required, allowing incoming flow to be switched to one tank while the other is going through the aeration, clarification, discharge, and idle functions. A key element of the SBR process is that a tank is never completely emptied, but rather a portion of settled solids is left in the tank for the next cycle. The retention of sludge within the tank establishes a population of microorganisms uniquely suited to treating the waste.

**Sequestering Agent** — (Water Quality) A chemical compound such as EDTA or certain polymers that chemically tie up (sequester) other compounds or ions so they cannot be involved in chemical reactions.

**Sérac** — A large pointed mass of ice in a glacier isolated by intersecting crevasses.

**Sere** — A transitional stage in plant succession. Environmental conditions, species, or biotic communities may be described as seral in contrast to *Climax*.

**Serial Distribution** — An arrangement of *Absorption Trenches*, *Seepage Pits*, or *Seepage Beds* so that each is forced to pond, utilizing the total effective absorption area, before liquid flows into the succeeding component.

**Service Area** — The geographical land area served by a distribution system of a water agency.

**Service Connector** — The pipe that carries tap water from a public water main to a building.

**Service Line Sample** — A one-liter sample of water collected according to federal regulations that has been standing for at least 6 hours in a service pipeline.

**Service Pipe** — The pipeline extending from the water main to the building served or to the consumer's system.

**Seston** — All material, both organic and inorganic, suspended in a waterway.

**Setback** — Denotes the positioning of a levee or structure in relationship to a stream bank. A setback levee is placed a substantial distance from a stream to allow it to meander without consequences to the levee and to accommodate a floodplain that can store and convey flood flows. A setback regulation of a certain number of feet can be a requirement for the placement of urban buildings away from a stream-channel bank.

**Settle** — To cause to sink, become compact, or come to rest; to cause a liquid to become clear by forming a *Sediment*.

**Settleable Solids** — Most generally, all solids in a liquid that can be removed by stilling the liquid. In the *Imhoff* cone test, the volume of matter in a one-liter sample that settles to the bottom of the cone in one hour. (Water Quality) Bits of debris, sediment, or other solids that are heavy enough to sink when a liquid waste is allowed to stand in a pond or tank. Also see *Settling Chamber* and *Settling Pond*.

**Settling Basin** — An enlargement in the channel of a stream to permit the settling of materials carried in suspension.

**Settling Chamber** — (Water Quality) An enclosed container into which wastewater contaminated with solid materials is placed and allowed to stand. The solid pollutants suspended in the water sink to the bottom of the container for removal. Also referred to as a *Settling Tank*.

**Settling Pond** — (Water Quality) An open *Lagoon* into which wastewater contaminated with solid pollutants is placed and allowed to stand. The solid pollutants suspended in the water sink to the bottom of the lagoon and the liquid is allowed to overflow out of the enclosure.

**Settling Tank** — A term used synonymously with *Settling Chamber*.

**Settling Velocity** — (Water Quality) The rate of downward movement of particles through water. This gravitational settling removes particles naturally and is used also in pollution control devices, for example the *Settling Tanks* and *Ponds* in a sewage treatment facility. The settling velocity of a particle is often the same as the *Terminal Settling Velocity*.

**Seven-Day 10-Year Low Flow (7Q10)** — The period of lowest stream flow during a seven-day interval that is expected to occur once every 10 years. The 7Q10 has a 10-percent chance of occurring in any given year. During this time of low flow, the amount of *Dissolved Oxygen* in the water would be expected to be the lowest encountered under normal conditions. Since such conditions are considered to be the worst natural case, the dissolved oxygen levels during such episodes are used to establish *Ambient Water Quality Standards* for that stream.

**Seven Seas** — Figuratively, all the waters or oceans of the world. The phrase probably has its origins in Brahmanic mythology: the seven seas dividing and surrounding the seven land masses of the earth. In modern times it has been applied to the seven oceans: Arctic, Antarctic, North and South Atlantic, North and South Pacific, and Indian.

**Severance (Water Rights)** — The act of severing or separating water rights from the land. In most western states, water rights are considered attached to the land on which they are used. When land is sold, water rights automatically are transferred with the land to the new owner, unless such rights are specifically severed from the land by provisions of the deed.

**Sewage** — The liquid waste from domestic, commercial, and industrial establishments.

**Sewage Fungus** — A thick filamentous growth that develops in water contaminated with sewage. The filamentous material is composed predominately of the bacterium *Sphaerotilus natans*.

**Sewage Lagoon** — A shallow pond where natural processes are employed to treat sanitary waste from households or public rest rooms. Solid material settles to the bottom and is degraded by *Anaerobic* microbial communities. The enclosure is open to the atmosphere, which permits *Aerobic* mineralization of organic compounds in the upper layers of the water. The decomposition processes are analogous to those in effect in *Primary* and *Secondary Wastewater Treatment* processes. The effluent from these ponds is usually allowed to flow into nearby streams without further purification.

**Sewage Sludge** — Settled sewage solids combined with varying amounts of water and dissolved materials that are removed from sewage by screening, sedimentation, chemical precipitation, or bacterial digestion. The terms *Biosolids*, *Sludge*, and sewage sludge can be used interchangeably.

**Sewage System** — Pipelines or conduits, pumping stations, force mains, and all other structures, devices, and facilities used for collecting or conducting wastes to a point for treatment or disposal.

**Sewage Treatment** — The processing of wastewater for the removal or reduction of contained solids or other undesirable constituents.

**Sewage Treatment Plant** — A facility designed to receive the wastewater from domestic sources and to remove materials that damage water quality and threaten public health and safety when discharged into receiving streams or bodies of water. The substances removed are classified into four basic areas:

- [1] greases and fats;
- [2] solids from human waste and other sources;
- [3] dissolved pollutants from human waste and decomposition products; and
- [4] dangerous microorganisms.

Most facilities employ a combination of mechanical removal steps and bacterial decomposition to achieve the desired results. Chlorine is often added to discharges from the plants to reduce the danger of spreading disease by the release of pathogenic bacteria.

**Sewage Treatment Return Flow** — Water returned to the hydrologic system by a *Sewage Treatment Plant*.

**Sewer** — The piping system or conduit used to carry runoff water or wastewater. Various types of sewer systems fulfill different functions, for example:

- [1] *Sanitary Sewer* carries wastewater from a household or public facility;
- [2] *Storm Sewer* carries runoff from rainfall from streets and parking lots; and
- [3] *Combined Sewer* transports both rainfall runoff and sanitary waste.

**Sewerage** — The entire system of sewage collection, treatment, and disposal.

**Shadoof, also Shaduf** — (1) A device consisting of a long suspended pole weighted at one end and having a bucket at the other end, used in the Near East and especially Egypt for raising water, as for the irrigation of land. (2) A counterbalanced sweep used since ancient times, especially in Egypt for raising water (as for irrigation).

**Shaft** — A vertical or inclined opening of uniform and limited cross section made for finding or mining ore, raising water, or ventilating underground workings (as in a cave).

**Shallow Well** — A well with a pumping head of 20 feet or less, permitting use of a suction pump.

**Sharp-crested Weir** — A device for measuring water, featuring a notch cut in a relatively thin plate and having a sharp edge on the upstream side of the crest.

**Shear** — A force parallel to a surface as opposed to directly on the surface. An example of shear would be the tractive force that removes particles from a stream bank as flow moves over the surface of the slope; a floating log that directly strikes the bank would not be a shear force.

**Sheet** — (Geology) A broad, relatively thin deposit or layer of *Igneous* or *Sedimentary Rock*.

**Sheet Erosion** — (1) The removal of thin, fairly uniform layer of soil or materials from the land surface by the action of rainfall and runoff water. (2) The removal by surface runoff of a fairly uniform layer of soil from a bank slope from *Sheet Flow* or runoff that flows over the ground surface as a thin, even layer not concentrated in a channel.

**Sheet Flow, also Sheetflow** — An overland flow or downslope movement of water taking the form of a thin, continuous film over relatively smooth soil or rock surfaces and not concentrated into channels larger than rills.

**Sheetflood** — A broad expanse of moving, storm-borne water that spreads as a thin, continuous, relatively uniform film over a large area in an arid region and that is not concentrated into well defined channels; its distance of flow is short and its duration is measured in minutes or hours. Sheetfloods usually occur before runoff is sufficient to promote channel flow, or after a period of sudden and heavy rainfall.

**Sheet Flow** — An overland flow or downslope movement of water taking the form of a thin, continuous film over relatively smooth soil or rock surfaces and not concentrated into channels larger than rills.

**Sheetflow (Sheet Flow) Area** — Designated *Flood Zones* AO and AH on a community's *Flood Insurance Rate Map (FIRM)* with a one percent or greater annual chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow. Also referred to as *Area of Shallow Flooding*.

**Sheet Piling** — Material, typically concrete or steel, placed vertically in the ground to contain erosion or the lateral movement of groundwater.

**Sheldon National Wildlife Refuge (NWR) [Nevada]** — One of the nine National Wildlife Refuges (NWR) located in the State of Nevada, the Sheldon NWR is located in the northwestern corner of Nevada and consists of over 575,000 acres (approximately 900 square miles) of high-desert habitat as a representative area for native plants and wildlife. The Sheldon NWR was formally established in 1978 and represented a consolidation of two refuge and range protection areas: (1) the Charles Sheldon Wildlife Range, created in 1931 by President Herbert Hoover from the purchase of the 30,000-acre Last Chance Ranch by the Boone and Crockett Club and the National Audubon Society; and (2) the Charles Sheldon Antelope Range, an area of over one-half million acres created in 1936 by President Franklin D. Roosevelt for the conservation and development of natural wildlife resources. Today, this area encompasses remote settings, scenic vistas, numerous natural geothermal hot springs, old ranches and homesteads plus sites of archaeological significance. Some 20 million years ago this area was covered with pine forests and lush grasslands, nurtured by a mild climate and more than 50 inches of annual rainfall. Today, this area receives only from 4–8 inches of precipitation, primarily in the form of snowfall, and the prominent geological characteristic of this refuge is the subsequent volcanic activity which spewed rhyolitic magma over much of its area with basalt flows up to 100 feet thick. These have formed the large, broad tables prevalent in this area today. Also see *National Wildlife Refuge (NWR) System* and *National Wildlife Refuges (NWR) [Nevada]*.

**Shelf Ice** — An extension of glacial ice into coastal waters that is in contact with the bottom near the shore but not toward the outer edge of the shelf.

**Shifting Control** — A stream-gaging control which is affected by scour, fill, or backwater.

**Shigella Dysenteriae** — A waterborne microorganism which is the causative agent of bacillary dysentery, a disease

characterized by severe diarrhea with blood and pus in the feces. The disease is transmitted through the consumption of water, food, or beverages contaminated with fecal material.

**Shoal** — (1) A shallow place in a body of water. (2) A sandy elevation of the bottom of a body of water, constituting a hazard to navigation. (3) A sandbank or sandbar that makes the water shallow; specifically an elevation which is not rocky and on which there is a depth of water of six fathoms (11 meters or 36 feet) or less. Also referred to as a *Sandbank* or *Sandbar*.

**Shock Load** — (Water Quality) The arrival at a water treatment plant of raw water containing unusual amounts of algae, colloidal matter, color, suspended solids, turbidity, or other pollutants.

**Shoot** — (1) A rush of water down a steep or rapid. (2) A place where a stream runs or descends swiftly. (3) To cause to move suddenly or swiftly forward as motion down rapids.

**Shorebird** — One of several families of often long-legged wading birds that inhabit the seacoast and shallow fresh-water bodies including sandpipers, stilts, killdeer, avocets, plovers and others.

**Shorefront** — Land situated on the edge of a body of water.

**Shore Life** — The essentially marine organisms that inhabit the region bounded on one side by the height of the extreme high tide and on the other by the height of the extreme low tide. Within these boundaries, organisms face a severe environment imposed by the rise and fall of tides. For up to half of a 24-hour period, the environment is marine; the rest of the time it is exposed, with terrestrial extremes in temperature and the drying effects of wind and sun. Life on rocky shores, best developed on northern coasts, is separated into distinct zones that reflect the length of time each zone is exposed. At the highest position on the rocks is the so-called black zone, marked by encrusted bluegreen algae. This transition area between land and the marine environment is flooded only during the high spring or fortnightly tides. The algae, enclosed in gelatinous sheaths to resist drying, are grazed on by periwinkles, which are protected under tightly sealed, conical shells. Below the black zone lies a so-called white zone, where barnacles are tightly glued to rocks. Living among the barnacles are rock-clinging mollusks called limpets. At low tide, barnacles keep their four movable plates closed to avoid drying; at high tide they open the plates and extend six pairs of wand-like tentacles to sweep the water for microscopic life. Preying on the barnacles are hole-drilling snails called dog whelks. Below the white zone and in some places overlying the barnacles are rockweeds, which have no roots but are attached to rocks by holdfasts. Brown algae (*Phaeophyta*) are rockweeds that grow more than 8 feet (2.5 meters) long; the most common are the bladder wracks, with branching thalli up to 6 inches (15 centimeters) wide. Looking like fronds, the thalli have conspicuous, bubble-like swellings that buoy the plants at high tide. Blue mussels also inhabit this tide zone, especially where sediment accumulates. They attach themselves to the substrate by threadlike byssuses secreted by a gland in the foot. In the lowest zone, uncovered only during the spring tides, is the large brown alga *Laminaria*, one of the kelps. Beneath its frond-like thalli live starfish, sea cucumbers, limpets, mussels, and crabs. Also see *Marine Life*.

**Short-Circuiting** — (Water Quality) A condition that exists when some of the water in water treatment tanks or basins flows faster than the rest; may result in shorter contact, reaction, or settling times than calculated or presumed.

**Shoulder** — The convex slope component at the top of an erosional *Sideslope*.

**Shower** — A brief fall of precipitation, such as rain, hail, sleet, or snow.

**Showerhead** — A fixture for directing the spray of water in a bathroom shower.

**Shrink-Swell Potential** — The susceptibility of soil to volume change due to loss or gain in moisture content.

**Shrub** — A woody plant which at maturity is usually less than 6 m (20 feet) tall and generally exhibits several erect, spreading, or prostrate stems and has a bushy appearance; e.g., speckled alder (*Alnus rugosa*) or buttonbush (*Cephalanthus occidentalis*).

**S-Hydrograph** — The direct surface discharge hydrograph resulting from a continuous succession of *Unit Storms*.

**SIC Code** — See *Standard Industrial Classification (SIC) Code*.

**Sideslope** — The erosional slope around the sides of an erosional fan remnant, hill, ballena, mountain, etc., that is composed of shoulder, backslope, footslope and perhaps toeslope components. Also, the planimetrically-linear portions of the slopes around a digitately-dissected fan remnant or hill, etc., as compared with the planimetrically-convex noseslope and concave headslope portions.

**(The) Sierra Club** — A national environmental organization founded in 1892 based in San Francisco, California. The Sierra Club is dedicated to the exploration, enjoyment, and protection of the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources; to educate and enlist humanity to protect and restore the quality of the natural and human environment; and to use all lawful means to accomplish these objectives. The Sierra Club is active in public education, lobbying of legislative and administrative bodies, and, through its affiliated *Sierra Club Legal Defense Fund*, in the courts.

**Sierra Club Legal Defense Fund** — See *Sierra Club*.

**Sierra Valley Decree [California–Nevada]** — Adjudication (1958) allowing the Sierra Valley Water Company to divert a portion of the Little Truckee River in California into Webber Creek for irrigation purposes in the Sierra Valley in the Feather River Basin. The maximum allowable diversion is 60 cubic feet per second (cfs), averaging approximately 5,700 acre-feet (AF) per year (although as a supplemental water source, diversions typically vary between 1,500 AF and 10,000 AF per year). Waters may be diverted only between March 15th and September 30th of each year. The *Priority Date* of this water right was set at 1870.

**Sierra Wave [Sierra Nevada Mountains]** — The condition along the eastern slope of the Sierra Nevada Mountain range in California and Nevada which manifests itself in the creation of *Lenticular Clouds*. This condition is facilitated by the north-south orientation of the mountains and the prevailing westerly winds, providing ideal conditions for the formation of such clouds. The condition is most prevalent in the winter months when the jet stream reaches further south. The resultant lenticular clouds typically form at between 20,000 and 25,000 feet and appear as flat or elongated clouds which appear “trapped” beneath the rising and falling air stream over the mountains. In fact, the stationary effect is an optical illusion; the lenticular cloud is actually forming on its front edge and vanishing on its trailing edge.

**Sigmoid Growth** — (Data Analysis) A growth rate trend characterized by an elongated S-shaped, or sigmoid curve. Typical of population growth rate trends which begin rapidly at an exponential rate but slow as limiting factors are encountered until a limit is approached asymptotically. Also see *Arithmetic Growth*, and *Exponential Growth*.

**Significant (Statistical)** — A term applied to differences, correlations, cause-and-effect relationships, etc., to indicate that they are probably not due to chance alone. Significant ordinarily indicates a probability of not less than 95 percent, while highly significant indicates a probability of not less than 99 percent.

**Significant Hydrologic Resources (SHR)** — Generally refers to either federally significant resources, e.g., wetlands, which meet federal definitions and guidelines, or regionally designated significant resources which do not meet such federal definitions or guidelines, e.g., stream and riparian environments, playas, spring fed stands of riparian vegetation, and other wetland areas.

**Significant Municipal Facilities** — Those publicly owned sewage treatment plants that discharge a million gallons per day or more and are therefore considered by states to have the potential to substantially effect the quality of receiving waters.

**Silica** — (Geology) Silicon dioxide (SiO<sub>2</sub>). It occurs in crystalline (quartz), amorphous (opal), or impure (silica sand) forms.

**Sill** — (1) A submerged ridge at relatively shallow depth separating the basins of two bodies of water. (2) A horizontal beam forming the bottom of the entrance to a lock. (3) Also, a low, submerged dam-like structure built to control riverbed scour and current speeds.

**Silt** — (1) Sedimentary particles smaller than sand particles, but larger than clay particles. (2) An intermediate soil textural class consisting of particles between 0.05 and 0.002 millimeters in diameter.

**Siltation** — The deposition of finely divided soil and rock particles upon the bottom of stream and river beds and in reservoirs.

**Silver Iodide** — A compound of silver and iodine, the crystalline structure of which closely approximates that of ice crystals; used as ice nuclei in weather modification.

**Silver Iodide Generator** — Any of several devices used to generate a smoke of *Silver Iodide* crystals for *Cloud Seeding*.

**Silver Iodide Seeding** — A method of *Cloud Seeding* in which *Silver Iodide* crystals are introduced into the supercooled portions of clouds to induce the *Nucleation* of ice crystals and, thus, precipitation.

**Silvics** — (1) The science treating of the life of trees in the forest. (2) Habit or behavior of a forest tree.

**Silviculture** — The art of producing and caring for a forest.

**Simple Regression (Model)** — (Statistics) A model structure characterized by only one explanatory (*Exogenous*) variable, of the form:

$$Y_t = \hat{\alpha} + \hat{\beta} X_t + \hat{\epsilon}_t$$

where:

$t$  represents the time periods of observation (where  $t=1, 2, \dots, n$ );

$Y_t$  represents the dependent (*Endogenous*) variable in time period  $t$ ;

$\hat{\alpha}$  (*alpha*) represents the model equation’s constant term (without a time reference);

$\hat{\beta}$  (*beta*, also a constant term without a time reference) represents the coefficient of the independent variable;

$X_t$  represents the independent variable in time period  $t$ ; and

$\hat{\epsilon}$  (*epsilon*), the error term, represents the value of the unexplained disturbance term.

Also see *Multiple Regression (Model)*.

- Simulation Analysis** — (1) (General) A method by which various changes to input factors are tested in their effects on certain outputs within a modeling environment, i.e., the use of an econometric forecasting model, simulation analysis, or some other structured analytical framework. (2) (Statistics) A procedure or process by which an *Econometric Model (Regression Analysis)* is designed to test the effects on outputs of various changes (simulations) of inputs. Simulations of a model might be performed for a variety of reasons, including model testing and evaluation, historical policy analysis, and forecasting. Simulation may be *ex post*, or simulation beyond the estimation period of the model but for periods of time for which actual data is available for validation purposes. Simulation may also be *ex ante* which includes forecasting beyond the last actual data point. Therefore, forecasting represents a form of simulation of an econometric model forward in time beyond the model's estimation period.
- Sink** — (1) Generally, a dry or intermittently dry lakebed in the lowest spot of a closed valley; a depression in the land surface, especially one having a central playa or saline lake with no outlet. Salt contents are generally quite high. The term sink is interchangeable with the term *Playa*. Also see *Natural Sink*. (2) (Environmental) A place in the environment where a compound or material collects.
- Sinkhole** — A depression in the earth's surface caused by dissolving of underlying limestone, salt, or gypsum. Drainage is provided through underground channels which may be enlarged by the collapse of a cavern roof. Also see *Karst*.
- Sinking** — (Environmental) Controlling oil spills by using an agent to trap the oil and sink it to the bottom of the body of water where the *Sinking Agent* and the oil are biodegraded.
- Sinking Agent** — A chemical additive that, when applied to a floating oil discharge, will cause oil to sink below the surface of the water. The application of sinking agents is generally not permitted by regulations of the *U.S. Environmental Protection Agency (EPA)* governing the treatment of oil discharges.
- Sinter** — A chemical sedimentary rock deposited as a hard incrustation on rocks or on the ground by precipitation from hot or cold mineral waters of springs, lakes, or streams.
- Sinuuous (Stream)** — Characterized by many curves or turns; winding. See *Sinuosity*.
- Sinuosity (Average)** — (1) (General) The nature of a meandering and winding stream system. (2) (Measured) The ratio of the *Thalweg* length (i.e., the line connecting the deepest points along a stream) to valley length, for a specific reach of a river or stream system. This is, in essence, a ratio of the stream's actual "running" length to its down-gradient length.
- Siphon, also Syphon** — (1) A pipe or tube fashioned or deployed in an inverted U shape and filled until atmospheric pressure is sufficient to force a liquid from a reservoir in one end of the tube over a barrier higher than the reservoir and out the other end. (2) (Zoology) A tubular organ, especially of aquatic invertebrates such as squids or clams, by which water is taken in or expelled.
- Siphon Tubes** — (Irrigation) Small curved pipes, typically 0.5–4.0 inches (1.3–10.2 centimeters) in diameter, that deliver water over the side of a head ditch or lateral to furrows, corrugations, or borders.
- Site** — (Environmental) An area or place within the jurisdiction of the *U.S. Environmental Protection Agency (EPA)* and/or a state.
- (Local Test-Well) Site Designation [Nevada]** — The local test-well site designation used in Nevada is based on the identification of a site by hydrographic area and by the official rectangular subdivision of the public lands referenced to the Mount Diablo (located east of Walnut Creek, California) base line and meridian and is based on the *Public Land Survey System (PLSS)*. Each site designation consists of four units: The first unit is the hydrographic area number. The second unit is the township, preceded by an N or S to indicate location north or south of the base line. The third unit is the range, preceded by an E to indicate location east of meridian. The fourth unit consists of the section number and letters designating the quarter section, quarter-quarter section, and so on (A, B, C, and D indicate the northeast, northwest, southwest, and southeast quarters, respectively), followed by a number indicating the sequence in which the site was recorded. For example, site 210 S12 E63 29DABC2 is in Coyote Spring Valley (Nevada Hydrographic Area 210). It is the second site recorded in the southwest quarter (C) of the northwest quarter (B) of the northeast quarter (A) of the southeast quarter (D) of Section 29, Township 12 South, Range 63 East, Mount Diablo base line and meridian.
- (Test-Well) Site Identification (U.S. Geological Survey)** — The standard *U.S. Geological Survey (USGS)* site identification is based on the grid system of latitude and longitude. The number consists of 15 digits. The first six digits denote the degrees, minutes, and seconds of latitude; the next seven digits denote degrees, minutes, and seconds of longitude; and the last two digits (assigned sequentially) identify the sites within a 1-second grid. For example, site 365227114554401 is at 36°52'27" latitude and 114°55'44" longitude, and it is the first site recorded

in that 1–second grid. The assigned number is retained as a permanent identifier even if a more precise latitude and longitude are later determined. Also see *Local Site Designation [Nevada]*.

**SI Units** — The *International System of Units (Le Système International d'Unités)* defined by an international gathering convened to establish agreements on the most frequently used units of measurement. The *Conference on Weights and Measures* in 1960 adopted standard measures based on the meter/kilogram/second units and radiation quantities based on the becquerel, gray, and sievert. The units adopted by the conference represent the currently preferred measures of length, mass, time, radiation, and so on.

**Skerry** — (Scandinavian) A rocky isle; a reef.

**Skim** — (1) To remove floating matter from the surface of a liquid. (2) To throw in a gliding path; especially to throw so as to ricochet along the surface of water.

**Skimming** — (1) The diversion of water from a stream or conduit by a shallow overflow in order to avoid diversion of sand, silt, or other debris carried as bottom load. (2) Using a machine to remove oil or scum from the surface of the water.

**Skin Diving** — The sport of swimming under water with a face mask and flippers and especially without a portable breathing device.

**Skin Sample** — Sampled water that is not representative of the cross-sectional flow in a pipe or conduit. A skin sample can result if the tap opens on the inside wall of the pipe and can be avoided by using sampling taps that extend toward the center of the pipe, away from the wall.

**Slack Tide** — See *Slack Water*.

**Slack Water** — (1) The period at high or low tide when there is no visible flow of water. (2) An area in a sea or river unaffected by currents; still water. Also referred to as *Slack Tide*.

**Slackwater Channel** — A navigation channel in a canal or river where the water surface elevation is controlled by a dam or dams with locks.

**Slake** — (1) To satisfy (a craving) as to quench a thirst. (2) To cool or refresh by wetting or moistening. (3) To become mixed with water so that a true chemical combination takes place, as in the slaking of lime.

**Slaked Lime** — Calcium hydroxide which is formed by the addition of water to quicklime; a process termed *Slaking*.

**Slaker** — A mechanical device in which dry lime (calcium oxide) or magnesium oxide is powdered and mixed with water to produce alkali consisting of calcium or magnesium hydroxide. Calcium hydroxide is used as a water softener.

**Slash and Burn** — (Environmental) An agricultural practice involving the rapid destruction of natural forest for limited farming activity. The natural forest is cleared, the residue from the clearing process is burned, and crops are planted for a few years. When the fertility of the soil is depleted, the process is repeated in a new area, and the initial land is abandoned.

**Sleet** — (1) A form of precipitation consisting of frozen raindrops cooled to the ice stage while falling through air at subfreezing temperatures. (2) A mixture of rain and snow or hail. (3) A thin icy coating that forms when rain or sleet freezes, as on trees or streets.

**Slickensides** — (Geology) A smooth striated polished surface produced on rock by movement along a fault.

**Slick Spots** — Barren areas having puddled or crusted, very smooth, nearly impervious surfaces, usually because of high salinity or alkalinity.

**Slimes** — (Water Quality) Substances of viscous organic nature, which are usually formed from micro-biological growth and which attach themselves to other objects forming a coating.

**Slip** — (1) (Nautical) A docking place for a ship or boat between two piers; a *Slipway*. (2) The downslope movement of a soil mass under wet or saturated conditions.

**Slip-Off Slope Bank** — The bank of a meandering stream which is not eroded by stream action, and which may be built up gradually.

**Slipway** — (Nautical) A sloping surface leading down to the water, on which ships are built or repaired and then more readily moved back into the water.

**Slope** — The side of a hill or mountain, the inclined face of a cutting, canal or embankment or an inclination from the horizontal. In the United States, it is measured as the ratio of the number of units of horizontal distance to the number of corresponding units of vertical distance. The term is expressed as a percent when the slope is gentle, in which case the term *Gradient* is also used.

**Slope Component** — A morphological element of an erosional slope and a morphological subdivision of the sideslope landform element.

**Slope-Discharge (Diagram)** — A curve which shows the discharge at a given *Gaging Station*, taking into account the slope of the water surface, as well as the *Gage Height*. This curve may be plotted either by using the difference

between elevations of water surface at two fixed gages on the stream, instead of the slope or by using the three variables of discharge, elevation of water surface at the lower gage, and elevation of the water surface at the upper gage.

**Slope Protection** — The protection of a *Slope* against wave action or erosion.

**Slope Wash** — Soil and rock material that is being or has been moved down a slope predominantly by the action of gravity assisted by running water that is not concentrated into channels. The term applies to the process as well as the materials.

**Sloping Gage** — A staff gage used to register the elevation of the water surface in a stream channel, conduit, reservoir or tank, with a scale graduated to represent vertical elevation. A sloping gage is usually installed on a flat sloping bank where it is desirable to increase the accuracy of reading the gage.

**Slosh** — (1) To spill or splash (a liquid) copiously or clumsily. (2) To agitated in a liquid.

**Slough** — (1) A place of deep mud or mire; a wet or marshy place as a swamp or marshland creek. Also a side channel or inlet as from a river; ordinarily found on or at the edge of the flood plain or a river; a *Bayou*. (2) (Localized) In the Mississippi Valley and in California, a tide flat or bottom-land creek. (3) (Sewage Disposal) Of a filter, to cast off a thin film of scum or a mass of bacterial growth or fungus. (4) Also *Slue*. A stagnant swamp, marsh, bog, or pond, especially as part of a bayou, and inlet, or a backwater.

**Sloughing (or Sloughing Off)** — Movement of a mass of soil down a bank into the channel (also called *Slumping*). Sloughing is similar to a landslide.

**Slow Sand Filter** — Essentially, a concrete basin covered with graded gravel and about 3 feet of sand used to pass raw water through at low velocity, resulting in substantial removal of chemical and biological contaminants. Cleaning is accomplished by removing the surface layers of sand at periodic intervals. These are then washed and stored for reuse. The slow sand filtration process is simple, reliable and relatively inexpensive. The slow sand filter is an appropriate technique for removing suspended organic and inorganic matter and also may remove pathogenic organisms. The filter reduces bacteria, cloudiness, and organic levels, thereby reducing the need for disinfection and, consequently, the presence of disinfection byproducts in the finished water. There are limitations, however. Slow sand filters require a large land area, large quantities of filter media, and manual labor for cleaning. Water with high turbidity levels can quickly clog the fine sand used in these filters. Also, slow sand filters are less effective at removing microorganisms from cold water because as temperatures decrease, the biological activity within the filter bed declines. In operation, a sticky mat of biological matter, called a *Schmutzdecke*, forms on the sand surface, where particles are trapped and organic matter is biologically degraded. Slow sand filters rely on this cake filtration at the surface of the filter for particulate straining. As the surface cake develops during the filtration cycle, the cake assumes the dominant role in filtration rather than the granular media.

**Sludge** — (1) (Water Quality) Semisolid material such as the type precipitated by a *Sewage Treatment Plant*. The terms *Biosolids*, sludge, and *Sewage Sludge* can be used interchangeably. (2) Mud, mire, or ooze covering the ground or forming a deposit, as on a riverbed. (3) Finely broken or half-formed ice on a body of water, especially the sea.

**Sludge Age** — A measure of the time biological solids are retained in a basin calculated by dividing the mass of volatile solids in the basin by the total mass of volatile solids wasted during a given time period. Expressed in units of time.

**Sludge Bulking** — A common problem encountered in the operation of activated sludge plants in which a portion of the sludge does not settle properly and is carried out with the effluent.

**Sludge Deposits** — Accumulations of settled, usually rapidly decomposing organic material in the aquatic system.

**Sludge Digester** — A tank in which complex organic substances like sewage sludges are biologically dredged. During these reactions, energy is released and much of the sewage is converted to methane, carbon dioxide, and water.

**Sludge Digestion** — The biological decomposition of solids collected during the operation of a facility designed to remove organic wastes from domestic or industrial sources. The total volume of solids is reduced by the *Mineralization* activity of bacteria, and the sludge remaining is rendered less reactive because the easily degraded compounds have been removed.

**Sludge Disposal** — The removal and discarding of thick watery suspensions of particulate waste matter. Final disposal may involve the removal of excess water and the subsequent burning of the solids, or placing the dewatered material in a landfill.

**Sludge Volume Index (SVI)** — A laboratory test result used to indicate the rate at which *Sludge* is to be returned from the discharge end of an *Aeration Tank* to the inflow (upstream) end. It is calculated as:

$$SVI = (SV/MLSS) \times 1,000$$

with the result in milligrams/gram and where SV is the sludge volume (solids settled in a 1-liter graduated cylinder after 30 minutes, in milliliters/liter) and MLSS is the level of *Mixed Liquor Suspended Solids (MLSS)*, in milligrams/liter. The SVI has units of milliliters/gram. Used in conjunction with the *Activated Sludge Process*. Also known as the *Mohlman Index*.

**Slue** — See *Slough*.

**Sluice** — (1a) An artificial channel for conducting water, with a valve or gate to regulate the flow; (1b) A valve or gate used in such a channel; a *Floodgate* or *Sluice Gate*. (2) A body of water impounded behind a floodgate. (3) A *Sluiceway*. (4) A long inclined trough, as for carrying logs or separating gold ore.

**Sluice Gate** — A gate which can be raised or lowered by sliding in vertical guides.

**Sluiceway** — (1) An artificial channel, especially one for carrying off excess water. (2) An opening at a low level from a reservoir generally used for emptying or for scouring sediment and sometimes for irrigation releases. In such instances it is also referred to as a *Bottom Outlet* or *Low Level Outlet*.

**Slump (Slumping)** — The sliding or gravitational movement of an overlying layer of soil, typically from becoming saturated, and lying on a rock layer or other relatively impermeable layer.

**Slurry** — (1) A thin, watery muck, or any substance resembling it, such as a lime slurry. The mixture is pourable and can be transported by pipe. (2) A very wet, highly mobile, semiviscous mixture or suspension of finely divided, insoluble matter, especially a muddy lake-bottom deposit having the consistency of a thick soup. (3) The form in which some raw material is added to an industrial process. Compare with *Liquor*.

**Slurry Wall** — (1) Material placed vertically in the ground to prevent the lateral movement of groundwater. (2) Barriers used to contain the flow of contaminated water or a subsurface liquid. Slurry walls are constructed by digging a trench around a contaminated area and filling it with an impermeable material that prevents water from passing through it. The ground water or contaminated liquids can then be exacted or treated within the area confined by the slurry wall.

**Slush** — (1) Partially melted snow or ice. (2) Soft mud; slop; mire.

**Small Stream Flooding** — Nuisance flooding of very small creeks and streams due to excessive rainfall over small drainage areas. Should not be confused with flash flooding. Usually 0.5–1.0 inch (1.3–2.5 cm) of rainfall in an hour is sufficient to cause some small stream flooding.

**Snow** — (1) One of the common solid forms of precipitation (2) Precipitation in the form of branched, hexagonal crystals, often mixed with simple ice crystals, which fall more or less continuously from a solid cloud sheet. These crystals may fall either separately or in cohesive clusters forming *Snowflakes*.

**Snow Ablation** — The removal of snow by the force of the wind.

**Snowcap** — Snow covering a mountain peak, especially such snow existing year-round.

**Snow, Cold Content of** — The amount of heat required to raise the temperature of the snowpack to 0°C (32°F). Usually expressed as the number of inches of liquid water (produced at the surface by either rain or melt) which, on refreezing within the pack, will warm the snowpack to 0°C (32°F).

**Snow Course** — A line laid out and permanently marked on a drainage area along which the snow is sampled at definite distances or stations. Sampling occurs at appropriate times to determine snow depth, water equivalent, and density.

**Snow Crystal** — A configuration of ice crystals, usually in the shape of a hexagonal plane or delicate column, formed around a nucleus by sublimation, condensation and freezing, coalescence, or a combination thereof.

**Snow Density** — The ratio of the volume of meltwater derived from a sample of snow and the initial volume of the sample. This is numerically equal to the specific gravity of the snow.

**Snow Depth** — The vertical distance between the surface of a snow layer and the ground beneath.

**Snowdrift** — A mass or bank of snow piled up by the wind.

**Snowfall** — The amount of snow, hail, sleet, or other precipitation in solid form which reaches the earth's surface. It may be expressed in depth in inches as it falls, or in terms of depth in inches of the equivalent amount of water.

**Snow Fence** — A fence of slat and wire or other material used in winter to intercept drifting snow, thus protecting roads, railways, and other areas from snowdrifts. Also, fences used to impound snow where melting in place will add to the soil moisture content.

**Snow Field** — An area, usually at high elevation or in polar latitudes, where snow accumulates and remains on the ground throughout the entire year.

**Snowhedge** — A planting of shrubs or other plants to intercept drifting snow. Also referred to as *Snowbreak* and *Snow Catch*.

**Snowflake** — Precipitation which is made up of a number of snow crystals fused together.

**Snow Line** — (1) The general altitude to which the continuous snow cover of high mountains retreats in summer, such

as the *Snowcap* of a mountain, chiefly controlled by the depth of the winter snowfall and by the summer temperature. (2) A line, sometimes drawn on a map during the winter, which shows the lower elevation of the snow cover at a particular time. (3) The fluctuating latitudinal boundaries around the polar regions marking the extent of snow cover.

**Snow Line, Temporary** — A line sometimes drawn on a weather map during the winter showing the southern limit of the snow cover.

**Snow, Liquid Water Deficiency of** — The difference between the liquid water-holding capacity and the water content of a snowpack.

**Snow, Liquid Water-Holding Capacity of** — The maximum amount of liquid water that a snowpack can hold against gravity at a given stage of metamorphism and density. When the liquid water-holding capacity is reached, the snowpack is said to be “ripe”.

**Snow Making** — The production of artificial snow in the form of granular ice particles for use on ski slopes.

**Snow Management** — The management of snow in such a way as to increase moisture for crop production. This is generally accomplished through the use of wind barriers, including grass and grass stubble barriers, but may also include trees and shrubs.

**Snowmelt** — (1) The runoff from melting snow. (2) The net decrease in water equivalent of the snowpack after allowing for increases due to precipitation. It does not include water which refreezes or is retained as liquid water within the *Snowpack*. (3) A period or season when such runoff occurs.

**Snowmelt Rate** — The rate of conversion of ice into water within a snowpack.

**Snow Metamorphism** — The transformation of snowflakes within a snowpack into different forms or structures.

**Snowmold** — (1) A disease of grasses appearing as grayish-white or pinkish patches after heavy snow has melted and caused by fungi that thrive at low temperatures. (2) A fungus that causes this disease.

**Snowpack** — A field of naturally packed snow that ordinarily melts slowly during the early summer months.

**Snowpack Telemetry (SNOTEL)** — A remote, automated measurement system operated and maintained by the U.S. Department of Agriculture, *Natural Resources Conservation Service (NRCS)* in the western United States to assess snowpack accumulation and potential streamflows. The concept is based upon the relationship between the water content in the snowpack and spring runoff under certain assumptions. Forecasts of runoff are made through the coordination of hydrologists with the NRCS and the *National Weather Service (NWS)*. A typical SNOTEL site consists of: (1) a precipitation measurement tube which measures the actual level of precipitation in inches of equivalent water; (2) a snow “pillow” which measures the weight of the snowpack and therefore its water content, and (3) the measurement and transmitting equipment which send the data to NRCS collection offices.

**Snow Pellet** — A small white ice particle that falls as precipitation and breaks apart easily when it lands on a surface. Often used in the plural. Also referred to as *Graupel* or *Soft Hail*.

**Snow Quality** — The ratio of the weight of the ice within a snowpack to the total weight of the snowpack, usually expressed as a percentage.

**Snow Sample** — A core taken from the snow mantle on a snow course from which the depth and density of snow may be determined.

**Snow Sampler** — An instrument used in obtaining snow samples, which consists of a set of light, jointed metal tubes for taking samples and a spring scale graduated to read directly the corresponding depth of water contained in the sample.

**Snow Stake** — A graduated fixed pole or staff used to measure snow depth.

**Snow Survey** — The process or operation of determining the depth, water content, and density of snow at various selected points on a drainage basin. This is done in order to determine the amount of water stored there in the form of snow for the purpose of forecasting subsequent runoff.

**SNOTEL** — See *Snowpack Telemetry*.

**Snow, Thermal Quality of** — The ratio of the amount of heat required to produce a specific quantity of water from a snowpack to the amount of heat required to produce the same quantity of water from pure ice at 0°C (32°F).

**Snow, Water Equivalent of** — The amount of water that would be obtained if the snowpack were melted, usually expressed in inches of water.

**Soak** — (1) To make thoroughly wet or saturated by or as if by placing in liquid; to immerse in liquid for a period of time. (2) To absorb a liquid through or as if through pores or interstices.

**Soakage** — (1) The process of soaking; the condition of being soaked. (2) The amount of liquid that soaks into, through, or out of an object.

**Soaker Hose** — A low-flow watering device with small holes throughout the surface of the hose used to soak plant beds and gardens.

**Socioeconomics** — The study of the economic, demographic, and social interactions of humans.

**SOCs** — See *Synthetic Organic Chemicals (SOCs)*.

**Soda Ash** — (Water Quality) Also known as *Sodium Carbonate*, typically of chemical symbol  $\text{Na}_2\text{CO}_3$ , a salt of strong alkaline taste used in making glass, soap, paper, chemical reagents and to remove non-carbonate hardness from water.

**Sodic (Soils)** — Soils having an excess concentration of sodium ions. Excess sodium results in poor aeration, slow infiltration rates, and causes serious nutritional disturbances in plants by affecting the availability of calcium, magnesium, and other ions required by plants.

**Sodicity (of Soils)** — A measure of the excess sodium in a soil which imparts a poor physical condition to the soil. *Sodic Soils* are generally impermeable to water, which makes it difficult to germinate crops.

**Sodium Adsorption Ratio (SAR)** — An expression of relative activity of sodium ions in exchange reactions with soil, indicating the sodium or alkali hazard to soil. It is calculated from the expression:

$$\text{SAR} = (\text{Na})/[(\text{Ca} + \text{Mg})/2]^{1/2}$$

where all quantities are expressed in milliequivalents per liter (meg/L). It is a particularly important measure in waters used for irrigation purposes. Waters range in respect to sodium hazard from those which can be used for irrigation on almost all soils to those which are generally unsatisfactory for irrigation.

**Sodium Bicarbonate** — (Wastewater Treatment) A white crystalline salt,  $\text{NaHCO}_2$ , less soluble than *Sodium Carbonate* and having only a slight alkaline taste. Used as a *Coagulant Aid* in the neutralization process of wastewater treatment plants, it promotes more rapid settling, increases the efficiency of the coagulation process and extends the pH range to a level at which *Alum* (aluminum sulfate), a common inorganic coagulant, is effective.

**Sodium Carbonate** — (Water Quality) Any carbonate of sodium, typically  $\text{Na}_2\text{CO}_3$ , a salt of strong alkaline taste, found in nature, as in soda lakes, but more often made artificially and used extensively in making glass, soap, paper, chemical reagents and in the softening of water. Also referred to as *Soda Ash*.

**Sodium Hypochlorite** — (Water Quality) A water solution of sodium hydroxide and chlorine,  $\text{NaOCl}$ , used as a primary disinfectant in water treatment.

**Soft Detergents** — Cleaning agents that break down in nature.

**Soft Hail** — See *Snow Pellet*.

**Soft Water** — Water that contains low concentrations of metal ions such as calcium and magnesium. This type of water does not precipitate soaps and detergents. Compare to *Hard Water*.

**Softening** — The removal of metal ions such as calcium and magnesium from water supplies. The converting of *Hard Water* to *Soft Water*.

**Soil** — The meaning of this term varies depending on the field of consideration: (1) *Pedology* — the earth materials which have been so modified and acted upon by physical, chemical, and biological agents that it will support rooted plants; (2) *Engineering Geology* — the layer of incoherent rock material that nearly everywhere forms the surface of the land and rests on *Bedrock*, also called *Regolith*; (3) *Ecology* — A dynamic natural body on the surface of the earth in which plants grow, composed of mineral and organic materials and living forms.

**Soil Absorption Field** — A sub-surface area containing a trench or bed with clean stones and a system of piping through which treated sewage may seep into the surrounding soil for further treatment and disposal.

**Soil Absorption System, Drip or Trickle** — 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 *Soil Absorption System, Septic Tank*.

**Soil Absorption System, Septic Tank** — A conventional wastewater treatment process used in isolated, rural, and other areas where normal sewer systems are not available whereby effluent is treated in a *Septic Tank*, then fed to soil-based disposal fields or trenches by gravity or under pressure. The quality of the ensuing filtration and absorption treatment is directly linked to soil and site characteristics such as permeability, drainage, slope, and depth to limiting conditions such as groundwater or bedrock. Unfortunately, many soils are classified as unsuitable for

conventional soil absorption systems. Under such unsuitable soil conditions, alternative pretreatment systems may be employed to include sand filters, mound systems, evapotranspiration systems, low pressure pipe systems and a more complex drip soil absorption system. Also see *Soil Absorption System, Drip or Trickle*.

**Soil Aggregates** — Conglomeration of inorganic and organic matter in the *A-Horizon* which, if present, is referred to as the “mull” layer.

**Soil Air** — Below-ground air in the pore spaces between soil particles. Decomposition of organic matter in the soil can cause high concentrations of carbon dioxide in the soil air. The carbon dioxide combines with water to form carbonic acid, thereby increasing the acidity of the groundwater.

**Soil Amendment** — (1) Any material added to soil that enhances plant growth. (2) Organic matter added to soil to improve texture, aeration, drainage, and moisture retention.

**Soil and Sediment Adsorption Isotherm Test** — A test method that measures the *Adsorption* of a chemical substance to soil or sediment and thus indicates the likely distribution pathways in the environment. If a substance is readily adsorbed, it will increase in concentration in a soil or sediment layer; if it is not adsorbed, it will be free to move through the soil into groundwater or run off into surface water.

**Soil and Water Conservation Practices** — Control measures consisting of managerial, vegetative, and structural practices to reduce the loss of soil and water.

**Soil Bioengineering** — A process involving the use of live and dead woody cuttings and poles or posts collected from native plants to revegetate watershed slopes and stream banks. The cuttings, posts, and vegetative systems composed of bundles, layers, and mats of the cuttings and posts provide structure, drains, and vegetative cover to repair eroding and slumping slopes. Also referred to as *Biotechnical Slope Protection*.

**Soil Classification** — — The systematic arrangement of soils into groups or categories on the basis of their characteristics. Broad groupings are made on the basis of general characteristics and subdivisions on the basis of more detailed differences in specific properties. *Soil Taxonomy* is the study of soil classification systems. For a description of soil classifications, see *Land Capability Classes*.

**Soil Conditioner** — An organic material like humus or compost that helps soil absorb water, build a bacterial community, and take up mineral nutrients.

**Soil Conservation** — The use of land, within the limits of economic practicability, according to its capabilities and its needs to keep it permanently productive.

**(United States) Soil Conservation Service (SCS)** — Former name of the *U.S. Natural Resources Conservation Service (NRCS)*, an agency of the U.S. Department of Agriculture (USDA).

**Soil Core** — A sample of soil taken by forcing a cylindrical device into the ground perpendicular to the horizontal. The resulting sample contains a circular section of each layer of sediment.

**Soil Creep** — The slow mass movement of soil materials down slopes primarily under the influence of gravity, but facilitated by saturation with water and/or by alternating freezing and thawing.

**Soil Erodibility** — An indicator of a soil’s susceptibility to raindrop impact, runoff, and other erosive processes.

**Soil Erosion** — The detachment and movement of soil from the land surface by wind or water.

**Soil Flushing** — A treatment technique for cleaning soil contaminated with inorganic or organic hazardous waste. The process involves the flooding of the soil with a flushing solution, which may be acidic, basic, or contain *Surfactants*, and the subsequent removal of the *Leachate* via shallow wells or subsurface drains. The recovered leachate is then purified.

**Soil Management** — The basis of all scientific agriculture, which involves six essential practices: (1) proper tillage; (2) maintenance of a proper supply of organic matter in the soil; (3) maintenance of a proper nutrient supply, including water; (4) control of soil pollution; (5) maintenance of the correct soil acidity; and (6) control of erosion.

**Soil Moisture (Soil Water)** — Water diffused in the upper part of the *Unsaturated Zone (Zone of Aeration)* of the soil, from which water is discharged by the *Transpiration* of plants, by *Evaporation*, or *Interflow*. Also referred to as *Soil Moisture Content* or *Available Water Content (AWC)*.

**Soil-Moisture Depletion** — The process where soil water is removed by crops through *Evapotranspiration*.

**Soil-Moisture Deficiency (or Deficit)** — The difference between the water-holding capacity of the soil and the instantaneous soil moisture.

**Soil Moisture Regime** — The changes in the moisture content of soil during a year.

**Soil-Moisture Retention** — That part of the soil moisture retained by surface tension and molecular forces against the influence of gravity.

**Soil-Moisture Sensor** — A device attached to an automatic irrigation or sprinkler system that monitors the level of drops or water administered to the soil based on the level of *Soil Moisture*.

**Soil Monolith** — A vertical section of a soil profile removed and mounted for display or study.

**Soil Morphology** — The physical constitution, particularly the structural properties, of a soil profile as exhibited by the kinds, thickness, and arrangement of the horizons in the profile and by the texture, structure, consistency, and porosity of each horizon.

**Soil Productivity** — The capacity of a soil, in its normal environment, to produce a specific plant or sequence of plants under a specific system of management.

**Soil Profile** — (1) The arrangement of soil horizons or layers below the ground surface. (2) A vertical section of the soil from the surface through all its horizons. The three basic horizontal layers that may be observed in a soil profile are the A, B, and C horizons. The A horizon, or topsoil, is the main source of plant nutrients. Soluble materials leach from the A horizon down to the subsoil, or B horizon. This is the zone of clay accumulation. The deepest layer, the C horizon, is composed of partially weathered bedrock. Also referred to as *Soil Horizons*. Also see *Soil Core*.

**Soil Sorption Coefficient ( $K_d$ )** — A parameter relating the partitioning of a chemical between soil and water in a soil-water mixture. The coefficient is computed by:

$$K_d = C_s/C_w$$

where  $C_s$  is the amount of a specific chemical bonded to the soil (micrograms chemical per gram of soil) and  $C_w$  is the concentration of the same substance dissolved in the water (micrograms of the chemical per gram of water).

**Soil Structure** — The physical properties of different soils. Sand has little structure because sand particles do not tend to stick together, whereas clay has a firm structure because clay particles tend to pack tightly together to form a solid material.

**Soil Taxonomy** — — The systematic study and arrangement of soils into classifications based on their characteristics. For a description of soil classifications, see *Land Capability Classes*.

**Soil Texture** — (1) A classification of soils based on the size distribution of mineral grains comprising the soil. (2) The relative proportions of silt, sand, clay, and gravel in a soil.

**Soil Thin-Layer Chromatography** — A method used to estimate the potential for leaching a chemical from soil by measuring the mobility of the chemical in soil under controlled conditions.

**Soil Tilth** — Refers to the ease with which a soil can be worked. A soil with good tilth is well aerated and can be easily penetrated by roots. It is easy to break, crumble or crush.

**Soil Toxicity** — A measure of the toxic effects that a soil and its constituents may have on plants and/or animals. A number of elements have varied effects on plant growth as well as aquatic habitat and downstream drinking water supplies. Some of the more common toxic substances include excess levels of boron, arsenic, molybdenum, selenium, nitrate, and mercury. Other elements of growing concern include Nickel, Uranium, Copper, Manganese, Lead, Calcium, Zinc, Silver, Chromium, Beryllium, Lithium, and Cobalt.

**Soil Vapor Survey** — A non-invasive method for the detection of volatile or semivolatile organic contaminants in shallow subsurface soil. The technology is especially useful in the analysis of soils with a high sand content and of shallow groundwater. A probe is driven into the ground, and samples of vapors in the soil are drawn to the surface for analysis.

**Soil Water** — Water present in the soil pores. Also referred to as *Soil Moisture* which includes *Water Vapor*.

**Soil Water Tension** — The work that must be done per unit quantity of pure water to transport it from free water at the same elevation to soil water. Also referred to as *Matric* or *Capillary Potential*.

**Soil Zone** — The *Root Zone*.

**Solar Aquatic Systems (SAS)** — A technology which, under controlled conditions, duplicates the natural water purification processes of streams and wetlands. The solar greenhouse wastewater treatment system includes solar tanks which optimize photosynthetic reactions and biological activity, and artificially-controlled ponds and wetlands which replicate a natural environment. Within such a system, wastewater is circulated through ecologically-engineered aquatic environments where the contaminants and nutrients are metabolized or “bound up.” Typically, tertiary treatment of wastewater requires up to four days.

**Solar Pond** — A pool of salt water heated by the sun and used either as a direct source of heat or to provide power for an electric generator.

**Solder** — A metallic compound used to seal joints between pipes. Until recently, most solder contained 50 percent lead. Use of lead solder containing more than 0.2 percent lead in pipes carrying drinking water is now prohibited.

**Sole Source Aquifer (SSA)** — An aquifer that is the sole or principal source (50 percent or more) of drinking water for a geographical area, as established under Section 1424(e) of the *Safe Drinking Water Act (SDWA)*. This designation bars the use of federal funds for projects in the *Recharge Zone* that may lead to a significant hazard to the public health by degrading groundwater quality in the aquifer. Also see *Critical Aquifer Protection Area*

(CAPA).

**Solid** — A state of matter, neither liquid nor gas. The solid state of water is ice.

**Solid Waste** — (Water Quality) Any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semisolid, or contained gaseous materials resulting from industrial, municipal, commercial, mining, and agricultural operations, and from community and institutional activities.

**Solifluction** — (1) The slow downhill flow or creep of soil and other loose materials that have become saturated. (2) The slow (normally 0.5-5.0 cm/year), viscous, downslope flow of water logged soil and other unsorted and saturated surficial material.

**Solubility** — The relative capacity of a substance to serve as a solute. Sugar has a high solubility in water, whereas gold has a low solubility in water.

**Solubilize** — To make (substances such as fats and lipids) soluble in water by the action of a detergent or similar agent.

**Soluble** — That which can be dissolved; able to pass into solution.

**Soluble Minerals** — Naturally occurring substances capable of being dissolved.

**Soluble Reactive Phosphate (SRP)** — That phosphate which is detected by analysis of a sample which has been filtered through a 0.45  $\mu\text{m}$  ( $10^{-6}$  meter) membrane filter.

**Solum** — The top two soil layers, composed of the topsoil (*A-Horizon*) and the subsoil (*B-Horizon*, or layer of leached material deposition). The solum excludes the parent material layer (*C-Horizon*). Also referred to as the *Zone of Eluviation*. Also see *Soil Profile*.

**Solute** — (1) Any material which is dissolved in another, such as salt dissolved in water. (2) Any substance that is dissolved in water.

**Solute Transport** — The movement of dissolved substances through a *Hydrogeologic Unit*.

**Solute Transport Model** — Mathematical model used to predict the movement of solutes (generally contaminants) in an aquifer through time.

**Solution** — A homogeneous mixture of a solute in a solvent. For example, when sugar (the solute) is dissolved in water (the solvent), the molecules that comprise the sugar crystal are separated from one another and dispersed throughout the liquid medium.

**Solution Channel** — Tubular or planar channel formed by solution in carbonate-rock terrains, usually along joints and bedding planes.

**Solution Mining** — The removal of a mineral deposit that is soluble in water. Water is injected into the geological strata containing the mineral and the dissolved material is recovered by wells. The method is applied to mine salt (sodium chloride) and potash (potassium chloride), among others.

**Solvent** — Any material which acts to dissolve another, such as water dissolving salt. The solvent constitutes the dissolving medium, or liquid portion, of a solution. Water is frequently referred to as the universal solvent. The term also applies to organic materials (e.g., benzene, acetone, or gasoline) used to clean (dissolve) oils or grease from machinery, fabrics, or other surfaces, or to extract hydrocarbons from some source material.

**Solvent Recovery** — A method to minimize hazardous waste by recovering process solvents for reuse. Common techniques are distillation or absorption of the solvent from a solvent-containing mixture.

**Sonar** — A system using transmitted and reflected underwater sound waves to detect and locate submerged objects or measure the distance to the floor of a body of water.

**Sop** — (1) To dip, soak, or drench in a liquid; saturate. (2) To take up by absorption.

**Sorption** — Processes that remove solutes from the fluid phase and concentrate them on the solid phase of a medium; used to encompass absorption and adsorption.

**Sound (Water)** — (1) A long, relatively wide body of water, larger than a strait or a channel, connecting larger bodies of water and between the mainland and one or more islands. (2) A long, wide ocean inlet. (3) To measure the depth of water, especially by means of a weighted line; *Fathom*.

**Sounding** — (1) Measuring the depth of water, as in a well, river, or lake; *Fathom*. (2) A probe of the environment for scientific observation. (3) A place or part of a body of water where a hand sounding line will reach bottom.

**Sounding Line** — (Nautical) A line marked at intervals of fathoms and weighted at one end, used to determine the depth of water. Also referred to as a *Lead Line*.

**Sour** — Of or relating to excessively acid soil that is damaging to crops.

**Source Water Assessment Program (SWAP)** — A requirement established under 1996 amendments to the *Safe Drinking Water Act (SDWA)* which requires every state with primacy for the Public Water Supply Supervision program to develop and implement a program intended to identify ground and surface waters that supply drinking

water for public water systems. Once a source area is identified or delineated, a state must then locate contaminants within the delineated area which could potentially degrade source water.

**Source Water Protection** — The prevention of pollution of the lakes, reservoirs, rivers, streams, and groundwater that serve as sources of drinking water. Wellhead protection would be an example of a source water protection approach that protects groundwater sources, whereas management of land around a lake or reservoir used for drinking water would be an example for surface water supplies. Source water protection programs typically include: delineating source water protection areas; identifying sources of contamination; implementing measures to manage these changes; and planning for the future.

**Source Water Protection Program (SWPP)** — A program encouraged and highly recommended under 1996 amendments to the *Safe Drinking Water Act (SDWA)* intended to develop and implement a program to extend and supplement existing *Wellhead Protection Programs (WPP)* by allowing communities and local governments to obtain financial assistance to protect both surface and ground public drinking water sources from future contamination.

**Souse** — (1) To plunge into a liquid. (2) To make soaking wet; drench.

**Southern Nevada Water Authority (SNWA) [Nevada]** — An agency created in 1991 through a cooperative agreement among the seven regional water and wastewater agencies in southern Nevada. The purpose of the SNWA was to address water resource management and water conservation on a regional basis through *Integrated Resource Planning (IRP)* techniques and, through such efforts, plan, manage, and develop additional supplies of water for southern Nevada. The seven regional agencies comprising the SNWA include:

- [1] Big Bend Water District (Laughlin)
- [2] City of Boulder City
- [3] City of Henderson
- [4] City of Las Vegas
- [5] City of North Las Vegas (serving portions of unincorporated Clark County and the City of Las Vegas)
- [6] Clark County Sanitation District
- [7] Las Vegas Valley Water District (LVVWD, serving the City of Las Vegas and portions of unincorporated Clark County)

Potable water in the Las Vegas region is provided by five different water purveyors: Big Bend Water District, Boulder City, City of Henderson, Las Vegas Valley Water District (LVVWD), and the City of North Las Vegas. Wastewater service is provided by four different agencies: Boulder City, City of Henderson, the City of Las Vegas and Clark County Sanitation District. Also see *Southern Nevada Water System*.

**Southern Nevada Water System (SNWS) [Nevada]** — On October 22, 1965, President Lyndon B. Johnson signed legislation authorizing construction of the Alfred Merritt Smith Water Treatment Facility and the Robert B. Griffith Water Project. These two projects form the Southern Nevada Water System, which supplies municipal and industrial water to the Las Vegas Valley Water District, Nellis Air Force Base and the cities of Boulder City, Henderson, and North Las Vegas. The Southern Nevada Water System refers to the system of treatment and transmission facilities that diverts raw Colorado River water from Lake Mead, and delivers potable water to three major retail water purveyors in the Las Vegas Valley, as well as Nellis Air Force Base and Boulder City. The treatment facility, located on the shores of Lake Mead, is known as the Alfred Merritt Smith Water Treatment Facility (AMSWTF). The transmission facilities, which divert water from Lake Mead to the treatment plant and then deliver treated water to Boulder City through the River Mountains tunnel and throughout the Las Vegas Valley, are referred to as the Robert B. Griffith Water Project. Treatment facilities were constructed in two stages by the State of Nevada acting through its Colorado River Commission. Transmission facilities were also constructed in two stages by the federal government through the *U.S. Bureau of Reclamation (BLM)*. The state and federal facilities work together to form the Southern Nevada Water System which, as of January 1, 1996, is controlled by the *Southern Nevada Water Authority (SNWA)*. SNWA in turn employs the Las Vegas Valley Water District (LVVWD) as its operating agent.

**Treatment Facilities** – Treatment facilities currently have the capacity to treat 600 million gallons per day (MGD). Until completion of the SNWS Phase II Improvements in 1999, delivery capability is 480 MGD. During 1997 the treatment plant produced an average of 314.8 MGD. The maximum day production was 469.5 MGD. The treatment process involves disinfection, aeration, flocculation, filtration and post-treatment. Disinfection is accomplished primarily by the application of chlorine; however, new facilities will employ ozonation for disinfection as well. Aeration is done primarily to improve aesthetic qualities of the water. Flocculation is a chemical process that causes minute particles in the water to coagulate into larger particles that can be filtered out. Filtration is provided by 26 filters, each with 2800 square feet of surface area; the filter

media is composed of anthracite coal, silica sand, and aggregate. Filter performance is monitored and, when it declines below acceptable limits, the filter is backwashed. All backwash water is reclaimed and recycled to the head of the facility; no backwash water is returned to Lake Mead. Sludge captured in the backwash process is dried and disposed of in a landfill. Post-treatment is the addition of a small amount of chemicals to retard corrosion, and additional chlorine if necessary, to prevent bacteriological regrowth in the distribution systems. Water quality is assured by testing samples taken from over 260 different locations throughout the system. Samples are tested for chemical, microbiological, and other contaminants. Lake Mead has proven to be a very high quality water source which, along with effective design and operation of the treatment facilities, allows SNWS to provide water that exceeds all applicable standards to the over one million people in the Las Vegas Valley.

**Transmission Facilities** – Transmission facilities begin with the 13-foot diameter intake tunnel, which diverts Lake Mead water from 150 feet below its surface and conveys it through Saddle Island to Pumping Plant #1. The pumping plant lifts the water up to the raw water aqueduct, which conveys it to the AMSWTF. Treated water is lifted 708 feet to the River Mountains Tunnel, where it flows 4 miles by gravity to the Las Vegas Valley. After emerging from the tunnel, water is diverted to various points throughout the valley, where it is handed off to the facilities of retail purveyors at 17 rate-of-flow control stations. Pumping plants are used to move the water uphill, and rate-of-flow control stations are used to regulate and measure the flow into customers' storage facilities. Water from the AMSWTF is also conveyed to Boulder City by five pumping plants and eight miles of pipelines. Once it enters the system, treated water is never exposed to open air until the consumer uses it. SNWS consumes approximately 10 percent of the power generated by Nevada Power Company, making it the largest single customer.

**Major Components of the Transmission Facilities** – (1) Intake Tunnel: 1400 feet long, 13 feet in diameter; (2) 6 miles of raw and treated water aqueducts, 10 feet in diameter, and associated surge tanks; (3) River Mountains Tunnel: 4 miles long, 12 feet in diameter; (4) 14 major pumping plants and associated electrical equipment; (5) 18 major lateral systems totaling over 80 miles of pipeline as large as 12 feet in diameter; (6) 17 rate-of-flow control stations and associated regulating tanks.

**Spa** — (1) A resort providing therapeutic baths. (2) A resort area having mineral springs. (3) A tub for relaxation or invigoration, usually including a device for raising whirlpools in the water.

**Sparkling Water** — Water charged with carbon dioxide (CO<sub>2</sub>).

**Spate** — (1) A sudden flood, rush, or outpouring. (2) (Chiefly British) A *Flash Flood*; a *Freshet* resulting from a downpour of rain or melting snow; a sudden heavy fall of rain.

**Spatter** — (1) To scatter in drops or small blobs. (2) A mark or wet spot caused by spattering.

**Spawning** — The depositing and fertilizing of eggs (or roe) by fish and other aquatic life.

**Special Assessment District** — A legally established area for the express purpose of levying a special fee for public improvements that are of a special rather than a general benefit.

**Special District** — A political subdivision of a state established to provide a single public service (as water supply or sanitation) within a specific geographical area. Also see *General Improvement District (GID)*.

**Special Flood Hazard Area (SFHA)** — (1) Areas in a community that have been identified as susceptible to a one-percent or greater chance of flooding in any given year. A one-percent-probability flood is also known as the 100-year flood or the base flood. (2) An area having special flood, mudslide, or flood-related erosion hazards, and shown on a *Flood Boundary Floodway Map (FBFM)*, *Floodway Hazard Boundary Map (FHBM)*, or a *Flood Insurance Rate Map (FIRM)*. SFHA's are further subdivided into *Flood Hazard Zones* A, AO, AH, A1-A30, AE, A99, AR, AR/A, AR/AE, AR/A1-A30, AR/AH, AR/AO, V, V1-V30, and VE.

**Species** — (Biology and Botany) A group of individuals having a common origin and a continuous breeding system. A basic category of biological classification intended to designate a single kind of animal or plant.

**Species Diversity** — The number of different *Species* occurring in some location or under some condition.

**Species of Special Concern [California]** — Species which are not federal or state-listed as endangered, threatened, or rare, but are declining or are so few in number in California that extirpation is a possibility

**Specific Capacity (of a Well)** — In ground water hydrology, the ratio of the discharge or yield of a well, usually measured in gallons per minute per foot, to drawdown after a period of sustained pumping.

**Specific Conductance** — A measure of the ability of water to conduct an electrical current as measured using a 1-cm cell and expressed in units of electrical conductance, i.e., siemens or microsiemens (μS or μmho) at 25 °C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the total dissolved solids (TDS) content of water by testing its capacity to carry an electrical current. Commonly, the concentration of dissolved solids (in milligrams per liter, mg/L) is from 55 to 75 percent of the specific

conductances (in microsiemens,  $\mu\text{S}$ ). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water. For comparison, the specific conductance of sea water is approximately 50,000  $\mu\text{S}$ , which is equivalent to a TDS concentration of about 35,000 milligrams per liter (mg/l). (Water Quality) Specific conductance is used in groundwater monitoring as an indication of the presence of ions of chemical substances that may have been released by a leaking landfill or other waste storage or disposal facility. A higher specific conductance in water drawn from *Downgradient Wells* when compared to *Upgradient Wells* indicates possible contamination from the facility.

**Specific Discharge (Specific Flux)** — For ground water, the rate of discharge per unit area, measured at right angles to the direction of flow.

**Specific Drawdown** — The drawdown in a well per unit discharge.

**Specific Energy** — The sum of the piezometric head and the velocity head; total energy, with respect to the bottom of a conduit or channel as a datum.

**Specific Gravity (SG or SP GR)** — (1) The ratio of the density of a substance to the density of some substance (as pure water) taken as a standard when both densities are obtained by weighing in air. (2) The ratio of the mass of a solid or liquid to the mass of an equal volume of distilled water at 4 °C (39 °F) or of a gas to an equal volume of air or hydrogen under prescribed conditions of temperature and pressure. Relative to water, the specific gravity (SG) is given by:

$$SG = \tilde{n}/\tilde{n}_w$$

where  $\tilde{n}$  is the density (weight per unit volume) of the unknown substance and  $\tilde{n}_w$  is the density of water. The parameter has no units and is frequently used to determine the concentration of a *Solution*.

**Specific Heat (SP HT)** — (1) The ratio of the amount of heat required to raise the temperature of a unit mass of a substance by one unit of temperature to the amount of heat required to raise the temperature of a similar mass of a reference material, usually water, by the same amount. (2) The amount of heat, measured in calories, required to raise the temperature of one gram of a substance by one Celsius degree (1 °C); the specific heat of water is 1 calorie.

**Specific Humidity** — The mass of water vapor per unit mass of moist air.

**Specific Retention (of a Water-Table Aquifer)** — Generally, a measure of the water-retaining capacity of a porous medium. The amount of water held in saturated rock or soil after the excess gravitational water has drained away as compared to the total volume of the rock or soil. Specific retention is dependent on both pore characteristics as well as factors affecting the surface tension, such as temperature, viscosity, mineral composition of the water, etc. Also referred to as *Field Capacity* or *Water-Holding Capacity*. Also see *Porosity* and *Effective Porosity*.

**Specific Storage** — The volume of water removed or added within the unit volume of an aquifer per unit change in head.

**Specific Yield (of an Aquifer)** — The volume of water available per unit volume of aquifer, if drawn by gravity. Specific yield is expressed as a percent. For example, if 0.2 cubic meter of water will drain from 1 cubic meter of aquifer sand, the specific yield is 20 percent.

**Specific Yield (Ground Water)** — The ratio of the volume of water that a rock will yield by gravity, after being saturated, to its own volume, expressed as a percentage.

**Specification** — The process in the construction of *Econometric Models* during the selection of the *Independent or Exogenous Variables* by which we attempt to provide the best and most complete explanation of the *Dependent or Endogenous Variable*. Correct model specification results in a representation of the “true” physical, economic, or behavioral relationships described by the model’s structure. Mis-specified models generally result from the inclusion of irrelevant variables in the model’s structure or relevant variables omitted from the model. Another model mis-specification can occur when the model is represented by a linear relationship when in fact the true relationship is nonlinear, or vice versa.

**Spectroscopic Hygrometer** — An instrument used to measure the selective absorption by water vapor of light in certain bands of the spectrum.

**Spiles** — (Irrigation) Small pipes, generally straight, from 1–4 inches (2.5–10 centimeters) in diameter, used to distribute water from a ditch into furrows, borders, or corrugations.

**Spill** — (1) To cause or allow to run or fall from a container unintentionally so as to be lost or wasted. (2) With respect to a dam and reservoir system, the water passed over a spillway without going through turbines to produce electricity. Spill can be forced, when there is no storage capability and flows exceed turbine capacity, or planned, for example, when water is spilled to enhance fish passage or to support other downstream uses (e.g., agriculture, wetland maintenance, etc.). (3) With reference to reservoir operations, water that is released, either inadvertently

or through precautionary releases, in excess of that required to compensate for deliver system losses and to meet irrigation demand.

**Spill Prevention Control and Countermeasures Plan (SPCCP)** — A plan covering the release of hazardous substances as defined in the *Clean Water Act (CWA)*.

**Spillway** — The channel or passageway around or over a dam through which excess water is diverted. If the flow is controlled by gates, it is a controlled spillway; if the elevation of the spillway crest is the only control, it is an uncontrolled spillway. The following lists some typical spillways:

- [1] **Auxiliary Spillway (Emergency Spillway)** — A secondary spillway designed to operate only during exceptionally large floods;
- [2] **Fuse Plug Spillway** — An auxiliary or emergency spillway comprising a low embankment or a natural saddle designed to be overtopped and eroded away during normal inflow and flood flows;
- [3] **Primary Spillway (Principal Spillway)** — The principal or first-used spillway during normal inflow and flood flows;
- [4] **Shaft Spillway (Morning Glory Spillway)** — A vertical or inclined shaft into which flood water spills and then is conducted through, under, or around a dam by means of a conduit or tunnel; if the upper part of the shaft is splayed out and terminates in a circular horizontal weir, it is termed a “bellmouth” or “morning glory” spillway;
- [5] **Side Channel Spillway** — A spillway whose crest is roughly parallel to the channel immediately downstream of the spillway;
- [6] **Siphon Spillway** — A spillway with one or more siphons built at crest level; this type of spillway is sometimes used for providing automatic surface-level regulation within narrow limits or when considerable discharge capacity is necessary within a short period of time.

**Spit** — (1) A narrow point of land extending into a body of water. (2) A brief, scattered fall of rain or snow.

**Splash** — (1) To cause (a liquid substance) to scatter and fall in drops or blobs. (2) To dash or scatter a liquid substance, mud, etc. on, so as to wet or soil.

**Splashboard** — (Nautical) A screen on a boat to keep water from splashing onto the deck. (2) A board for closing a *Spillway* or *Sluice*.

**Splashdown** — A spacecraft’s soft landing on the water, thereby permitting recovery of personnel and critical components.

**Splat** — A splattering or wet, slapping sound.

**Splatter** — To *Splatter* or *Splash*.

**Spoil** — Soil or rock material excavated from a canal, ditch, basin, or similar construction.

**Spongy** — (1) Porous; absorbent. (2) Soft and thoroughly soaked with moisture.

**Sponson** — A light air-filled structure or a winglike part protruding from the hull of a seaplane to steady it on water.

**Spout** — To gush forth in a rapid stream or in spurts.

**Spray** — (1) A cloud or mist of fine liquid particles, as of water from breaking waves. (2) A jet of fine liquid particles, or mist, as from an atomizer or spray gun.

**Spray Chamber** — A device that removes certain organic compounds from an airstream by condensation. A cooling material, usually water, is sprayed into a chamber, and the condensed organics exit with the water. In addition to the removal of the condensable contaminants, the condensation greatly reduces the volume of the waste exhaust. Also referred to as a *Contact Condenser*.

**Spray Field** — Refers to the release of reclaimed water or treated effluent on the surface of the ground through a variety of sprinkler heads or nozzles (including overhead systems, center pivot systems, periodic moving systems, and portable or traveling gun systems). Also see *Land Application*.

**Spray Irrigation** — Any irrigation by means of nozzles along a pipe or from perforated overhead pipes.

**Spray Tower** — (Air Quality) An air pollution control device in which contaminated air is passed through a tower containing substances (packing) possessing large surface area. Water is passed over the packing material in a countercurrent fashion, i.e., in a direction opposite to the passage of the air, and the air contaminants are then absorbed into the liquid. Also referred to as *Absorption Tower*, *Packed Tower*, or *Tray Tower*.

**Spray Tower Scrubber** — A device that sprays alkaline water into a chamber where acid gases are present to aid in the neutralizing of the gas.

**Spread/Spreading** — A method of recharging a *Ground Water Basin* by diverting water to a highly-pervious area for *Percolation* into the basin. Also see *Recharge*, *Artificial*.

**Spreading Basin** — A surface facility, often a large pond, used to increase the percolation of surface water into a *Ground Water Basin*. Also referred to as *Recharge Basin*.

**Spreading Grounds** — The same as a *Spreading Basin*.

**Spring (Water)** — (1) A concentrated discharge of ground water coming out at the surface as flowing water; a place where the water table crops out at the surface of the ground and where water flows out more or less continuously. (2) A place where ground water flows naturally from a rock or the soil into the land surface or into a body of surface water. Its occurrence depends on the nature and relationship of rocks, especially permeable and impermeable strata, on the position of the water table, and on the topography.

**Spring, Cold** — A spring whose water has a temperature appreciably below the mean annual atmospheric temperature in the area.

**Spring, Hot** — A thermal spring whose temperature is above that of the human body.

**Spring Melt/Thaw** — The process whereby warm temperatures melt winter snow and ice. Because various forms of acid deposition may have been stored in the frozen water, the melt can result in abnormally large amounts of acidity entering streams and rivers, sometimes causing fish kills.

**Spring Overturn** — A physical phenomenon that may take place in a lake or similar body of water during the early spring, most frequently in lakes located in temperate zones where the winter temperatures are low enough to result in freezing of the lake surface. The sequence of events leading to spring overturn include: (1) the melting of ice cover; (2) the warming of surface waters; (3) density changes in surface waters producing convection currents from top to bottom; (4) circulation of the total water volume by wind action; and (5) vertical temperature equality. The overturn results in a uniformity of the physical and chemical properties of the entire water mass. Also see *Fall Overturn*. Also referred to as *Spring Turnover*.

**Spring Runoff** — Snow melting in the spring causes water bodies to rise. This in streams and rivers is called “spring runoff”.

**Spring Tide** — The highest high and the lowest low tides during the lunar month. The exceptionally high and low tides that occur at the time of the new moon or the full moon when the sun, moon, and earth are approximately aligned. Contrast with *Neap Tide*.

**Sprinkle** — A light rainfall.

**Sprinkler Irrigation** — A pressurized irrigation system where water is distributed through pipes to the field and applied through a variety of sprinkler heads or nozzles. Pressure is used to spread water droplets above the crop canopy to simulate rainfall. These systems include portable and traveling guns, solid or permanent fixtures (overhead or pop ups), center pivots, and periodic moving systems. The efficiencies of these sprinkler systems range from 15 to 85 percent; however, the average of 70 percent is commonly used. Also referred to as *Overhead Irrigation*.

**Spritz** — To squirt or spray (something like water) quickly.

**Spume** — (1) Foam or froth on a liquid, as on the sea. (2) To froth or foam.

**Squall** — A brief, sudden, violent windstorm, often accompanied by rain or snow.

**SSA** — See *Sole Source Aquifer (SSA)*.

**Stability** — (Ecological) (1) The tendency of systems, especially ecosystems, to persist, relatively unchanged, through time. (2) A condition whereby system variables return to equilibrium after being disturbed. Stability within ecosystems results from various population feedback mechanisms and integration of disturbances at larger spatial scales.

**Stability Hazard** — A potential or rating for a slope assessing its susceptibility to slope failure.

**Stabilization** — (Environmental) A broad expression used to denote a process that is intended to lessen the damage that a pollutant or discharge causes in the environment; the process of changing an active substance into inert, harmless material, or physical activities at a site that act to limit the further spread of contamination without actual reduction of toxicity. For example, the stabilization of sewage involves allowing microorganisms to degrade those components that can be decomposed.

**Stable Canal System** — A canal system in which flow disturbances are attenuated.

**Stable Isotope Ratio** — A unit expressing the ratio of the abundance of two *Radioactive Isotopes*. Isotope ratios are used in hydrologic studies to determine the age or source of specific waters, to evaluate mixing of different waters, as an aid in determining reaction rates, and other chemical or hydrologic processes.

**Staff Gage** — A graduated scale used to indicate the height of the water surface in a stream channel, reservoir, lake, or other water body.

**Stage** — The height of a water surface above some established reference point or *Datum* (not the bottom) at a given location. Also referred to as *Gage Height*.

**Stage-Capacity Curve** — A graph showing the relation of the surface elevation of the water in a reservoir, usually plotted as the ordinate, to the volume below that elevation, plotted as the abscissa.

**Stage-Discharge Curve (Rating Curve)** — A graph showing the relation between the gage height, usually plotted as the ordinate, and the amount of water flowing in a channel, expressed as volume per unit of time and plotted as the abscissa.

**Stage-Discharge Relationship** — The relationship between the amount of water flowing in a river or stream and *Stage* at any particular point, usually represented by means of a *Rating Curve* or *Rating Table*.

**Stagnation** — A lack of motion in a mass of water that tends to hold pollutants in place.

**Stagnation Point** — A place in a ground-water flow field at which the ground water is not moving. The magnitude of vectors of *Hydraulic Head* at the point are equal but opposite in direction.

**Stakeholders** — (Planning) Individuals and organizations with an interest in a particular area, issue or project. Stakeholders may include public agencies at all levels (i.e., federal, state and local), non-profit organizations, private landowners, industry, and others.

**Stalactite** — An icicle-shaped mineral deposit, usually calcite or aragonite, hanging from the roof of a cavern, formed from the dripping of mineral-rich water. Contrast with *Stalagmite*.

**Stalagmite** — A conical mineral deposit, usually calcite or aragonite, built up on the floor of a cavern, formed from the dripping of mineral-rich water. Contrast with *Stalactite*.

**Stand** — A biotic community, particularly of trees, possessing sufficient uniformity of composition, age, and spatial arrangement to be distinguishable from adjacent communities. Stand structure refers to the composition, age, and arrangement of the trees in a delimited biotic community.

**Stand Density Index (SDI)** — A relative measure of competition in a forest stand based on number of trees per unit area and average tree size.

**Standard** — A pre-mixed solution with a known amount of material to be tested; can be used for calibration of equipment, but also to check monitoring accuracy of tests and procedures.

**Standard Deviation (σ)** — (Statistics) A measure of the variability of a series of data about its mean value. The standard deviation is equal to the square root of the *Variance*, from which it is derived, and measures the sum of the differences between a series' values and its mean. The standard deviation for a large data set (the population standard deviation) is calculated as:

$$\sigma = [\sum(x_i - \bar{x})^2/n]^{-2}$$

where:

- $x_i$  is an individual observation;
- $\bar{x}$  is the mean of all observations; and
- $n$  is the number of observations.

For smaller data sets (typically less than 50) the sample standard deviation ( $s$ ) is calculated by replacing  $n$  with  $n - 1$  in this equation.

**Standard Industrial Classification (SIC) Codes** — Industry codes developed by the U.S. Office of Management and Budget and published in the *SIC Manual* (1987 edition) defining industries according to the composition and structure of the entire economy. Each firm, based on its principal product or service, is assigned a 4-digit SIC code. The first two digits (range 01–99) indicate the major industrial category, and the last two digits classify the company further. For example, major category codes 20–39 identify manufacturing facilities; code 28 within this range is the major category code for chemical and allied products manufacturing, and the 4-digit SIC code 2869 is the classification for industrial organic chemicals, not elsewhere classified (N.E.C.). Environmental regulations are often applied to facilities within certain SIC codes based on pollution potential. Also, such industry coding is also applicable in assessing commercial water use by industry sector based upon either employment levels or output. This form of analysis is used in deriving industry water use based on GED (gallons per employee per day) water use coefficients. The following listing presents the 4-digit code ranges of the SIC coding by major industry classifications and industries covered.

| SIC Code        |  |
|-----------------|--|
| <u>Range</u>    | <u>Industries Covered</u>                            |
| [1] (0100–09XX) | Agriculture, Forestry, and Fishing                   |
| [2] (1000–1499) | Mining   |
| [3] (1500–1799) | Construction   |
| [4] (2000–3999) | Manufacturing  |
| [5] (4100–4959) | Transportation, Communications, and Public Utilities |
| [6] (5000–5999) | Wholesale and Retail Trade                           |
| [7] (6000–6799) | Finance, Insurance, and Real Estate                  |

- [8] (7000–8999) Service Industries  
 [9] (9100–93XX) Government  
 [10] (9400–97XX) Administration of Education, Health, and Social Programs

Also see *Gallons per Employee per Day (GED)*.

**Standard Methods** — A short form for *Standard Methods for the Examination of Water and Wastewater* which is prepared and published every five years jointly by the *American Public Health Association*, *American Water Works Association*, and the *Water Pollution Control Federation*. The book serves as the primary reference for analytical methods employed in investigations and monitoring of water purification, sewage treatment and disposal, water pollution, sanitary quality, and other functions.

**Standard Permeability** — The permeability corresponding to a temperature of 60°F.

**Standard Project Flood** — (1) The flood that may be expected from the most severe combination of meteorological and hydrological conditions considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. (2) (U.S. Army Corps of Engineers) A term used to designate a flood that may be expected from the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. The peak flow for a standard project flood is generally 40 to 60 percent of the probable maximum flood for the same location.

**Standard Sample** — The part of finished drinking water that is examined for the presence of coliform bacteria.

**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

Also see *Drought Indexes (Indices)*.

**Standards** — Norms that impose limits on the amount of pollutants or emissions produced by an activity. The *U.S. Environmental Protection Agency (EPA)* establishes minimum standards, but individual states are allowed to be more strict.

**Standing (Water)** — Water that is not flowing, as stagnant.

**Standing Crop** — The quantity of plant *Biomass* in a given area. For example, the amount of plant material per acre of forest or swamp, or per cubic meter of water. Usually expressed as mass (dry) per unit area, or energy content per unit area.

**Standpipe** — (1) A large vertical pipe into which water is pumped in order to produce a desired pressure; a high vertical pipe or reservoir that is used to secure a uniform pressure in a water-supply system. (2) A pipe or tank connected to a closed conduit and extending to or above the hydraulic grade line of the conduit to afford relief from surges of pressure in pipelines. (3) A tank used for storage of water in distribution systems.

**Stank** — (1) (British) Pond, pool. (2) A ditch containing water. (3) (British) A small dam or weir.

**State Coordinating Agency** — (FEMA) The agency of the state government designated by the Governor of the state at the request of the Administrator to coordinate the flood insurance program in that state.

**State Engineer** — The official most often charged with the administration of the water appropriation system within a state. In some states this function is assigned to a board or department.

**State Water Project (SWP) [California]** — State-owned and operated water project consisting of twenty-two dams and reservoirs which deliver 2.4 million acre-feet of water each year from the Sacramento Valley to the San Francisco Bay Area, Central Valley and Los Angeles. For additional information, see *Central Valley Project (CVP) [California]*.

**State Water Resources Control Board (SWRCB) [California]** — The water rights and water permitting agency of the State of California. The SWRCB consists of five members (to include a Chairman and Vice Chairman) whose responsibility it is to “protect water quality and allocate water rights” within the State of California. To assist in these functions, the SWRCB is served by a staff to include an Executive Director, a Chief Deputy and nine (9) Regional Board Executive Officers serving the regions of:

- [1] North Coast Region;
- [2] San Francisco Bay Region;
- [3] Central Coast Region;
- [4] Los Angeles Region;
- [5] Central Valley Region;
- [6] Lahontan Region;
- [7] Colorado River Basin Region;
- [8] Santa Ana Region; and
- [9] San Diego Region.

**State Wellhead Protection Program** — A program established to protect wellhead protection areas within a State’s jurisdiction from contaminants that may have any adverse effects on the health of persons (*Safe Drinking Water Act (SDWA)*, subsection 1428[a]). See *Wellhead Protection (Program)*.

**Static (Fixed Water)** — Pertaining to water stored in a tank but not under pressure.

**Static Head** — The difference in elevation in feet between the water surface of the body of water being pumped and the centerline of the discharge pipe at the point of release. It is the lift measured in feet.

**Static Level (Ground Water)** — The level of water in a nonpumping or nonflowing well. For the purpose of computing the drawdown, it generally is the water level immediately before pumping begins.

**Static Lift** — The vertical distance between source and discharge water levels in a pump installation.

**Static Pressure** — The pressure exerted by a still liquid or gas, especially water or air.

**Static Water Depth** — (Hydraulics) For a water well, the vertical distance from the centerline of the pump discharge down to the surface level of the free pool while no water is being drawn from the pool or water table.

**Static Water Level** — (1) The elevation or level of the water table in a well when the pump is not operating. (2) The level or elevation to which water would rise in a tube connected to an *Artesian Aquifer* or basin in a conduit under pressure.

**Statistical Inference** — (Statistics) The area of statistics that describes the procedures by which we use the observed data (the sample) to draw conclusions about the population from which the data came or about the process by which the data were generated. Our assumption is that there is an unknown process that generates the data and that this process can be described by a probability distribution, i.e., a likelihood of occurring. Statistical inference can be classified as *Classical Inference* and *Bayesian Inference*.

**Statistical Tests of Significance** — (Statistics) Mathematical methods of stating the probability that two data sets are not from the same *Population*; specifically, that there is an actual difference in some characteristic between the two groups. These tests are commonly used in instances in which one sample has been affected by some disturbance (cause and effect) and the other has not. Statistical tests are designed to determine if measured differences between the two sample groups are due to random sample variability or to cause-and-effect relationships.

**Statistically Significant** — (Statistics) Describes the difference between two groups or two samples from the same population, one of which serves as the unaffected control group and the other having been subject to manipulation (cause and effect) by some external factor. *Statistical Tests of Significance* can be applied to determine if the observed resultant differences are due to the cause-and-effect hypothesis or to random sampling variability.

**Statistics** — The mathematics of the collection, organization, and interpretation of numerical data by inference from sampling.

**Statutory Law** — A body of law based on statutes enacted by a legislature.

**Steady Flow** — Flow in which the rate remains constant with respect to time at a given cross-section.

**Steady State** — (1) State of balance in a *Hydrologic System* where little or no change in hydraulic head occurs through time. (2) In a system with a flow-through of material (e.g., water) or energy, the equilibrium condition in which the flow in equals the flow out.

**Steady-State Conditions** — Synonymous with *Equilibrium* conditions.

**Steady-State or Apparent Plateau** — (Biology) In testing chemical substances for their *Bioconcentration Potential* in fish, the situation in which the amount of chemical substance taken into the test fish from the water is equal to the amount being eliminated from the test fish. If the substance bioconcentrates in the fish, the steady-state condition will follow an uptake phase in which the absorbance rate exceeds the elimination rate.

**Steam** — The vapor that forms when water is heated to the boiling point. Steam under pressure is capable of driving a piston in a piston engine or turning the blade of a turbine.

**Stream Depletion** — See *Depletion*.

**Steam, Dry** — A steam that is so hot that no water droplets are present in it.

**Steam Injection Well** — A method of recovering deposits of oil and other minerals which involves injecting steam directly into the deposit to decrease viscosity and facilitate extraction. Also used in deep-buried oil-sand deposits in an “in situ” process to separate the bitumen from the sand so it may be pumped to the surface along with water and a trace of natural gas.

**Steam Stripping** — The removal of volatile compounds from wastewater by forcing steam through the liquid. The higher the wastewater temperature increases, the higher the evaporation rate of the volatile contaminants.

**Stemflow** — The rainfall or snowmelt led to the ground down the trunks or stems of plants.

**Stenobathic** — Limited to or able to live only within a narrow range of water depths. Used of aquatic organisms.

**Stenohaline** — Pertaining to an aquatic organism unable to withstand wide variation in salinity of the surrounding water.

**Step Aeration** — (Water Quality) A modification of the activated sludge process wherein the waste enters the aeration tank at a number of different points, while recycled sludge enters at the head of the tank.

**Sterile (Water)** — A condition in which a quantity of water does not contain viable organisms such as viruses and bacteria. The term, however, is not synonymous with clean.

**Sterilization (of Water)** — The process of killing, inactivating, or removing microorganisms (bacteria, viruses, etc.) from a quantity of water. The normal methods of sterilization involve agents such as heat, chemicals, or radiation.

**Stewardship** — (Ecology) (1) Caring for land and associated resources and maintaining healthy ecosystems for future generations. (2) Administrative and/or custodial actions taken to preserve and protect the *Natural Resources*, particularly the plant (*Flora*) and animal (*Fauna*) life, of an area or *Ecosystem*.

**Stilling Basin** — An open structure or excavation at the foot of an overfall, chute, drop, or *Spillway* to reduce the energy of the descending stream. A basin constructed to dissipate the energy of fast-flowing water, e.g., from a spillway or *Bottom Outlet*, and to protect the stream bed below a dam from erosion.

**Stilling Well** — A device used to allow monitoring of water levels in turbulent flow.

**Still Water** — A flat or level section of a stream where no flow or motion of the current is discernible and the water is still.

**Stillwater National Wildlife Refuge (NWR) [Nevada]** — One of the nine National Wildlife Refuges (NWR) located in the State of Nevada, the Stillwater NWR is part of the *Stillwater Wildlife Management Area [Nevada]* and contained within the *Lahontan Valley Wetland System [Nevada]*, a key, resting, migration, and wintering area for up to 1 million waterfowl, shorebirds, and raptors. The Stillwater NWR is located approximately 15 miles east of Fallon, Nevada within Churchill County on the edge of the Carson Sink and was formally established in 1991 when 77,500 acres (121 square miles) of the Stillwater Wildlife Management Area were set aside to preserve critical nesting and habitat for migratory waterfowl and other birds using the Pacific Flyway in western Nevada. Each spring and fall, it hosts a significant percentage of the Pacific Flyway’s migratory birds. The Lahontan Valley wetland system was named to the *Western Hemisphere Shorebird Reserve Network* in 1988, and it has been nominated for inclusion under the *Convention of Wetlands of International Importance*, attesting to the continental significance of this invaluable resource. By one estimate, in the early 1900s the Lahontan Valley wetland system alone contained about 85,000 acres of wetlands visited by millions of waterfowl and shorebirds using the eastern edge of the Pacific Flyway during migration. With the advent of the *Newlands (Irrigation) Project [Nevada]*, fresh water that traditionally charged the wetlands was replaced by a greatly diminished supply of agricultural drain water. The wetlands initially benefitted from the Newlands Project diversions of large quantities of Truckee River water, including winter hydro releases at Lahontan Dam on the Carson River, that provided the wetlands with considerable infusions of fresh water. As the federal government sought to protect Pyramid Lake’s fisheries and the endangered cui-ui (*Chasmistes cujus*) and threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) by reducing Truckee River diversions (at Derby Dam on the lower Truckee) and other actions to improve Newlands Project efficiency, the wetlands became increasingly dependent on agricultural drainwater as flows into the project were reduced. This drainwater has, at times, contributed to water quality problems and has generally not provided an adequate inflow into the wetlands. Overall, since the Newlands Project has been in operation, wetland acreage in the Lahontan Valley has declined by 85 percent. Because it is one of only three large interior basin wetland systems along the west coast, deterioration of Lahontan Valley wetlands has already markedly reduced the carrying capacity of the Pacific Flyway. On November 16, 1990, Congress passed *Public Law 101-618* (also referred to as the *Negotiated Settlement*) authorizing the purchase and transfer of enough water rights to maintain a total of

25,000 acres of primary wetlands in the Lahontan Valley (to include Stillwater National Wildlife Refuge: 14,000 acres; Carson Lake and Pasture: 10,200 acres; and Fallon Reservation and Indian Lakes: 800 acres). The Department of the Interior, *U.S. Fish and Wildlife Service (USFWS)* estimates this may require up to 125,000 acre-feet of water annually. Also see *National Wildlife Refuge (NWR) System* and *National Wildlife Refuges (NWR) [Nevada]*.

**Stillwater Wildlife Management Area [Nevada]** — An extensive and diverse wetland area located at the termination of the Carson River and on the edge of the Carson Sink situated approximately ten miles northeast of Fallon, Nevada in Churchill County. In the 1860s, Pony Express riders using this route reported great flights of birds darkening the skies. However, in the early 1900s, with the completion of the *Newlands Irrigation Project* and the diversion of much of the flows of the Carson River, this wetland area was reduced from deep-water ponds favored by waterfowl to dense jungles of tules and cattails. As the favored habitat all but disappeared, the bird populations dwindled to a remnant. The Stillwater Wildlife Management Area was established to preserve these critical nesting and habitat areas for migratory waterfowl and other birds using the Pacific Flyway in western Nevada. In 1948, in order to preserve a shrinking wetland system, the *U.S. Fish and Wildlife Service (USFWS)* and the Nevada Fish and Game Commission entered into an agreement with the *Truckee–Carson Irrigation District (TCID)* to develop and manage 224,000 acres (350 square miles) of *U.S. Bureau of Reclamation (USBR)–Newlands (Irrigation) Project* lands, which were then designated as the Stillwater Wildlife Management Area. In 1991, 77,500 acres (121 square miles) of the eastern portion of this area were set aside as the *Stillwater National Wildlife Refuge (NWR)*. The management area also borders on the north with the *Fallon National Wildlife Refuge*. Today, the Stillwater Wildlife Management Area, along with its two adjoining National Wildlife Refuges, includes a variety of habitats, from freshwater sloughs and marshes to brackish-water marshes and alkali flats. Each habitat hosts a unique assemblage of plants and invertebrates, which in turn attracts more than 160 bird species and many other animals. Also see *National Wildlife Refuges [Nevada]*.

**Stochastic Hydrology** — That branch of *Hydrology* involving the manipulation of statistical characteristics of hydrologic variables with the aim of solving hydrologic problems, using the stochastic properties of the events.

**Stochastic Process** — (Statistics) A process in which the dependent variable is random (so that the prediction of its values depends on a set of underlying probabilities) and the outcomes at any instant is not known with certainty. A process is said to be stochastic when its future cannot be predicted exactly from its past; describing an event or process that involves random chance or probability. A stochastic relationship is assumed to be inexact and therefore involves a *Disturbance (or Error) Term* which is used to account for the unexplainable portion of the relationship. Consequently, a simple (stochastic) functional relationship shows that for any time period, *t* (where *t*=1, 2, ..., *n*), the relationship between the dependent (*Endogenous*) variable, *Y*, and the independent (*Exogenous*) variable, *X*, may be written as:

$$Y_t = \alpha + \hat{\alpha} X_t + \hat{\epsilon}_t$$

where:

*Y* represents the dependent variable of variable to be explained;

*t* represents time periods of observation (i.e., *t*=1,2,...,*n*);

$\alpha$  (*alpha*) represents the constant term (without a time reference);

$\hat{\alpha}$  (*beta*, also a constant term without a time reference) represents the coefficient of the independent variable, *X*;

*X* represents the independent, or explanatory variable; and

$\hat{\epsilon}$  (*epsilon*), the error term, represents the value of the unexplained disturbance term.

Contrast with *Deterministic Process*.

**Stockpond** — An impoundment, the principal purpose of which is to supply water to livestock. May include reservoirs, pits, and tanks.

**Stock Resources Versus Flow Resources** — Stock resources are resources that can be permanently expended, and are therefore non-renewable, and whose quantity is usually expressed in absolute amounts rather than in rates. Examples are coal and petroleum deposits. Flow resources are not permanently expendable, i.e., they are renewable, under usual circumstances; they are resources that are replaced. They are commonly expressed in annual rates at which they are regenerated. Examples are fresh-water runoff and timber.

**Stoma** — (Botany) One of the minute pores in the epidermis of a leaf or stem of plants through which gases and water vapor pass. Also referred to as *Stomate*.

**Stomates** — The minute openings in the underside (generally) of leaves that permits passage of gases, including oxygen, carbon dioxide, and water vapor.

- Stone** — Rock fragments larger than 25.4 cm (10 inches) but less than 60.4 cm (24 inches).
- Stopcock** — A valve that regulates the flow of fluid through a pipe; a faucet.
- Stoplogs** — Large logs or timber or steel beams placed on top of each other with their ends held in guides on each side of a channel or conduit providing a temporary closure versus a permanent bulkhead gate.
- Storage** — (1) Water artificially impounded in surface or underground reservoirs for future use. (2) Water naturally detained in a drainage basin, such as ground water, channel storage, and depression storage. The term *Drainage Basin Storage*, or simply *Basin Storage*, is sometimes used to refer collectively to the amount of water in natural storage in a drainage basin. (3) (Water Quality) The temporary holding of waste pending treatment or disposal, as in containers, tanks, waste piles, and surface impoundments.
- Storage Capacity, Active (Usable)** — The volume of water normally available for release from a reservoir below the stage of the maximum controllable level; equal to total capacity less inactive and dead capacity.
- Storage Capacity, Conservation** — Storage capacity available for all useful purposes such as municipal water supply, power, irrigation, recreation, fish and wildlife, etc., excluding joint and exclusive flood control capacity.
- Storage Capacity, Dead** — The volume of a reservoir below the sill or invert of the lowest outlet.
- Storage Capacity, Exclusive Flood Control** — The space in reservoirs reserved for the sole purpose of regulating flood inflows to abate flood damage.
- Storage Capacity, Inactive** — The portion of capacity below which the reservoir is not normally drawn, and which is provided for sedimentation, recreation, fish and wildlife, aesthetic reasons, or for creation of a minimum controlled operational or power head in compliance with operating agreements or restrictions.
- Storage Capacity, Joint Use** — The volume of a reservoir available to store water jointly for flood control and conservation purposes.
- Storage Capacity, Live** — The volume of a reservoir exclusive of dead and surcharge capacity.
- Storage Capacity, Sediment** — The volume of a reservoir planned for the deposition of sediment.
- Storage Capacity, Surcharge** — The volume of a reservoir between the maximum water surface elevation for which the dam is designed and the crest of an uncontrolled spillway, or the normal full-pool elevation with the crest gates in the normal closed position.
- Storage Capacity, Total** — The total volume of a reservoir exclusive of surcharge.
- Storage Coefficient** — (1) For surface water, the relation of storage capacity in a reservoir to the mean annual flow of a stream above the dam forming the reservoir. (2) For ground water, primarily in a *Confined Aquifer*, it is a measure of the volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. This definition is similar to that of the *Specific Yield* for a water-table aquifer. However, confined aquifers remain saturated at all times and therefore water release is not met by drainage of the void spaces as is the case of an *Unconfined Aquifer*, but due to the change in pore pressure. Also referred to as the *Storativity*.
- Storage Ratio** — The net available storage divided by the mean flow for one year.
- Storage-Required Frequency Curve** — A graph showing the frequency with which storage equal to or greater than selected amounts will be required to maintain selected rates of regulated flow.
- Storage Reservoir** — A reservoir that has space for retaining water from springtime snowmelt or other hydrologic events. Retained water is released as necessary for multiple uses — power production, fish passage, irrigation, navigation, municipal and industrial, etc. Compare to a *Run-of-River Dam*.
- Storage Right** — The authority granted by a responsible state entity to impound water in a reservoir.
- Storage, Specific (Ground Water)** — The amount of water released from or taken into storage per unit volume of a porous medium per unit change in head.
- Storage, Usable** — The volume of water normally available for release from a reservoir below the stage of the maximum controllable level.
- Storativity** — The volume of water that a permeable unit, i.e., aquifer, will absorb or expel from storage per unit surface area per unit change in head. In an unconfined aquifer, the storativity value is equal to the *Specific Yield*. The specific yield of the aquifer can be used to estimate the time between when pumping begins and equilibrium groundwater conditions are reached.
- Storm** — (1) An atmospheric disturbance manifested in strong winds accompanied by rain, snow, hail, or other precipitation and often by thunder and lightning. (2) (Meteorology) A wind with a speed from 64 to 73 miles (from 103 to 117 kilometers) per hour, according to *Beaufort's Scale*. Also referred to as *Violent Storm*.
- Storm, Design** — The rainfall or precipitation amount and distribution adopted over a given drainage area, used in determining the *Design Flood*.
- Storm Loss** — Infiltration plus depression storage; may also include interception loss.
- Storm Seepage** — That part of precipitation which infiltrates the surface soil, and moves toward the streams as

ephemeral, shallow, perched ground water above the main ground-water level. Storm seepage is usually part of the direct runoff. Also referred to as *Interflow*.

**Storm Sewer** — A sewer that carries only surface runoff, street wash, and snow melt from the land. In a separate sewer system, storm sewers are completely separate from those that carry domestic and commercial wastewater (sanitary sewers). Contrast with *Combined Sewer*.

**Storm Surge** — The rise in the level of the ocean that results from the decrease in atmospheric pressure associated with hurricanes and other storms.

**Stormwater Drainage System** — Man-made and natural features which function as a system to collect, convey, channel, hold, inhibit, retain, detain, infiltrate, or divert stormwater runoff.

**Stormwater Runoff** — The water and associated material draining into streams, lakes, or sewers as the result of a storm.

**Stoss** — Facing the direction from which a glacier moves. Used of a rock or slope in its path.

**Strait, also Straits** — A narrow channel joining two larger bodies of water.

**Strand** — The land bordering a body of water; a *Beach*.

**Strand Line, also Strandline** — A shoreline, especially one marking an earlier and higher water level, as caused by a decline in the surface waters of a lake.

**Strata** — (Geology) Distinct horizontal layers in geological deposits. Each layer may differ from adjacent layers in terms of texture, grain size, chemical composition, or other geological criteria. The term is also applied to layering of other material such as the atmosphere.

**Stratification** — The arrangement of a body of water, such as a lake, into two or more horizontal layers of differing characteristics, such as temperature, density, etc. Also applies to other substances such as soil and snow, etc.

**Stratification** — (Statistics) The subdivision of a *Population* into groups or strata, each of which is more homogeneous in respect to the variable being measured than the population as a whole. Also see *Stratified Random Sample*.

**Stratified Random Sample** — (Statistics) A randomized sample composed of two or more sets of random samples, each drawn from a single homogeneous unit (stratum) of a heterogeneous population. Also see *Stratification*.

**Stratigraphy** — (1) The branch of geology which treats the formation, composition, sequence and correlation of the layered rocks as parts of the earth's crust. (2) The branch of geology that deals with the definition and description of major and minor natural divisions of rocks (mainly sedimentary, but not excluding igneous and metamorphic) available for study in outcrop or from subsurface, and with the interpretation of their significance in geologic history. It involves interpretation of features of rock strata in terms of their origin, occurrence, environment, thickness, lithology, composition, fossil content, age, history, paleogeographic conditions, relation to organic evolution, and relation to other geologic concepts. (3) The arrangement of strata, especially as to geographic position and chronological order of sequence.

**Stratocumulus** — A low-lying cloud formation occurring in extensive horizontal layers with rounded summits. Also see *Cloud*.

**Stratopause** — The boundary in the *Atmosphere* between the *Stratosphere* and the next highest layer, the *Mesosphere*.

**Stratosphere** — The region of atmosphere above the troposphere and below the mesosphere; the portion of the atmosphere approximately 10 to 25 miles above the earth's surface.

**Stratum** — A horizontal layer or section.

**Stratus** — A low altitude cloud typically resembling a horizontal layer of fog. Also see *Cloud*.

**Stream** — A general term for a body of flowing water; natural water course containing water at least part of the year.

In *Hydrology*, the term is generally applied to the water flowing in a natural channel as distinct from a canal. More generally, as in the term *Stream Gaging*, it is applied to the water flowing in any channel, natural or artificial. Some classifications of streams include, *in relation to time*:

[1] **Ephemeral Streams** — Streams which flow only in direct response to precipitation and whose channel is at all times above the water table.

[2] **Intermittent or Seasonal Streams** — Streams which flow only at certain times of the year when it receives water from springs, rainfall, or from surface sources such as melting snow.

[3] **Perennial Streams** — Streams which flow continuously.

And, *in relation to ground water*:

[4] **Gaining Streams** — Streams or a reach of a stream that receive water from the zone of saturation. Also referred to as an *Effluent Stream*.

[5] **Insulated Streams** — Streams or a reach of a stream that neither contribute water to the zone of saturation nor receive water from it. Such streams are separated from the zones of saturation by an impermeable bed.

[6] **Losing Streams** — Streams or a reach of a stream that contribute water to the zone of saturation. Also referred to as an *Influent Stream*.

[7] **Perched Streams** — Perched streams are either losing streams or insulated streams that are separated from the underlying ground water by a zone of aeration.

**Streambank Erosion** — (1) The wearing away of streambanks by flowing water. (2) The removal of soil particles from a bank slope primarily due to water action. Climatic conditions, ice and debris, chemical reactions, and changes in land and stream use may also lead to bank erosion.

**Streambank Erosion Control** — Vegetative or mechanical control of erodible stream banks, including measures to prevent stream banks from caving or sloughing, such as jetties, revetments, riprap and plantings necessary for permanent protection.

**Streambank Erosion Damage** — Value of land areas destroyed, reduced value of land due to threat of future erosion, and the destruction or damage of wildlife habitat, buildings, bridges, utilities, or other structures.

**Streambank Protection Works** — Structure placed on or near a distressed stream bank to control bank erosion or prevent failure.

**Streambanks** — The usual boundaries, not the flood boundaries, of a stream channel. Right and left banks are named facing downstream (in the direction of flow).

**Streambank Stabilization** — Natural geological tendency for a stream to mold its banks to conform with the channel of least resistance to flow. Also the lining of streambanks with riprap, matting, etc., to control erosion.

**Streambed** — The channel through which a natural stream of water runs or used to run, as a dry streambed.

**Streambed Erosion** — The movement of material, causing a lowering or widening of a stream at a given point or along a given reach.

**Stream Capture** — The process whereby a stream rapidly eroding headward cuts into the divide separating it from another drainage basin, and provides an outlet for a section of a stream in the adjoining valley. The lower portion of the partially diverted stream is called a *Beheaded Stream*. Also referred to as *Stream Piracy*.

**Stream Channel** — The bed where a natural stream of water runs or may run; the long narrow depression shaped by the concentrated flow of a stream and covered continuously or periodically by water.

**Stream Clearance** — The removal of natural or man-caused debris from stream channel areas by mechanical means.

**Stream, Coldwater** — A stream that supports a coldwater fishery, usually including trout, typically with optimum temperatures of 50°–60°F (10°–15.5°C).

**Stream, Coolwater** — A stream that supports a coolwater fishery, usually including smallmouth bass and/or rock bass, typically with optimum temperatures of 60°–70°F (15.5°–21°C).

**Stream, Effluent** — A stream or reach of a stream fed by ground water. It is also referred to as a *Gaining Stream*. See *Stream*.

**Stream, Ephemeral** — A stream that flows only in response to precipitation. See *Stream*.

**Streamflow** — The discharge that occurs in a natural channel. Although the term “discharge” can be applied to the flow of a canal, the word streamflow uniquely describes the discharge in a surface stream course. Streamflow is a more general term than “runoff” as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

**Streamflow Depletion** — The amount of water that annually flows into a valley or onto a particular land area minus the amount that flows out of the valley or away from the particular land area. It is also the amount of water taken from a stream.

**Streamflow Regulation** — The artificial manipulation of the flow of a stream.

**Streamflow Routing** — A technique used to compute the effect of channel storage on the shape and movement of a flood wave.

**Stream Gaging** — The quantitative determination of stream flow using *Gages*, *Current Meters*, *Weirs*, or other measuring instruments at selected locations.

**Stream-Gaging Station** — A gaging station where a continuous record of the discharge of a stream is obtained.

**Stream Gradient** — A general slope or rate of change in vertical elevation per unit of horizontal distance of the water surface of a flowing stream.

**Stream, Influent** — A stream that contributes water to the *Zone of Saturation*. Also referred to as a *Losing Stream*. See *Stream*.

**Stream, Intermittent** — A stream that flows only part of the time or through only part of its reach. See *Stream*.

**Streamlet** — A small stream.

**Streamline (Flowline)** — (1) A line that is parallel to the direction of flow of a fluid at a given instant. (2) The path followed by a particle of water as it moves through a saturated soil mass.

- Stream Load** — All the material transported by a stream or river either as visible sediment (*Bed Load* and *Suspended Load*) or in solution (*Dissolved Load*).
- Stream Order** — (1) Designation of stream segments within a drainage basin; a system of numbering streams according to sequence of tributary size. The smallest perennial tributary is designated as order 1, the junction of two first-order streams produces a stream segment of order 2, etc. (2) A method of numbering streams as part of a drainage basin network as adopted by the *U.S. Geological Survey (USGS)*. The smallest unbranched mapped tributary is a first-order stream, the stream receiving the tributary is a second-order stream, and so on, with the main stream always of the highest order. It is usually necessary to specify the scale of the map used, as a first-order stream on a 1:62,500 map may be a third-order stream on a 1:12,000 map. Tributaries which have no branches are designated as of the first order, streams which receive only first-order tributaries are of the second order, larger branches which receive only first-order and second-order tributaries are designated third order, and so on, the main stream being always of the highest order.
- Stream, Perennial** — A stream that flows continuously. See *Stream*.
- Stream Piracy** — The process whereby a stream rapidly eroding headward cuts into the divide separating it from another drainage basin, and provides an outlet for a section of a stream in the adjoining valley. The lower portion of the partially diverted stream is called a *Beheaded Stream*. Also referred to as *Stream Capture*.
- Stream Power** — Measure of energy available to move sediment, or any other particle in a stream channel. It is affected by discharge and slope.
- Stream Reach** — The continuous portion of a stream channel and adjoining floodplain from one selected point to another, usually measured along the *Thalweg* of the channel.
- Stream Segment** — (Water Planning) Surface waters of an approved planning area exhibiting common biological, chemical, hydrological, natural, and physical characteristics and processes. Segments will normally exhibit common reactions to external stresses, for example, discharge or pollutants.
- Streamside Management Zone (SMZ)** — A designated zone that consists of the stream and an adjacent area of varying width where management practices that might affect water quality, fish, or other aquatic resources are modified. It is a zone which acts as an effective filter and adsorptive zone for sediment; maintains shade; protects aquatic and terrestrial riparian habitats; protects channel and streambanks; and promotes floodplain stability. The zone may be wider than just the riparian area.
- Stream Terrace** — (1) A surface representing remnants of a stream's channel or flood plain when the stream was flowing at a higher level. Subsequent downward cutting by the stream leaves remnants of the old channel or flood plain standing as a terrace above the present level of the stream. (2) A transversely level erosional remnant of a former axial stream or major desert stream floodplain that slopes in the same direction as the adjacent, incised stream, and is underlain by well sorted and stratified sand and gravel or by loamy or clayey sediments.
- Stream, Underground** — A subsurface stream which has all the characteristics of a water-course on the surface — a definite channel with bed and banks, a definite stream of water, and a definite source(s) of supply.
- Stream, Warmwater** — A stream that supports a warmwater fishery, usually including largemouth bass and sunfish, typically with spawning temperatures in excess of 70°F (21°C).
- Streeter-Phelps Equation** — (Water Quality) A means of predicting the effects upon dissolved oxygen levels of organic loading to a stream based on the deaeration and reaeration rates, and resulting in an *Oxygen Sag Curve*.
- Stress** — Growing conditions that endanger a plant's health. Examples include lack of water, too much heat, wind or moisture, or low temperatures. The stressful condition varies according to the particular plant and its needs.
- Stressed Waters** — A portion of an aquatic environment with poor species diversity due to human actions. If a facility applying for a water permit will discharge into an aquatic system that is stressed by the actions of others, then it will not be held responsible for the existing poor conditions but must demonstrate to the environmental agency issuing the permit that further degradation will not occur as a result of its effluent.
- Striation** — One of a number of parallel lines or scratches on the surface of a rock that were inscribed by rock fragments embedded in the base of a glacier as it moved across the rock.
- Stringer** — A long, narrow line of vegetation, usually following a stream channel or bottom of a draw.
- Strip Cropping** — Growing crops in a systematic arrangement of strips or bands that serve as barriers to wind and water erosion.
- Strip Mining** — The process of removing mineral deposits that are found close enough to the surface so that the construction of tunnels (underground mining) is not necessary. The soil and strata that cover the deposit are removed to gain access to the mineral deposit. The primary environmental concerns related to this technique are the disposition of spoils removed to gain access to the deposit and the scoring of the landscape that remains following the complete removal of the mineral deposit. Water pollution is also a concern because runoff from the

mining area is frequently rich in sediments and minerals. Furthermore, such operations sometimes necessitate the removal of groundwater that infiltrates the mining pit, consequently altering the groundwater flow with potential implications on the water table and aquifer characteristics. Also referred to as *Open-Pit Mining* or *Surface Mining*. Also see *Dewatering*.

**Stripping** — Methods for the removal of unwanted dissolved gases from water. Stripping techniques involve increasing the surface area of the water to be stripped and maintaining the atmospheric partial pressure of the gas(es) to be removed at a low level relative to the partial pressure of the gas dissolved in the water. Oxygen, ammonia, hydrogen sulfide, volatile organic compounds, and carbon dioxide are commonly stripped from water. Also referred to as *Air Stripping*.

**Structural Deformation** — The distortion in walls of a tank after liquid has been added or removed.

**Structural Floodplain Management Measures** — Those physical or engineering measures employed to modify the way floods behave, e.g., dams, dikes, levees, channel enlargements and diversions.

**Structural Measures** — Measures that delay, reduce, or control flood flows. These measures include reservoirs, channel improvements, levees, and diversion channels.

**Stubble Mulching** — The management of plant residues by harvesting, tilling, planting, and cultivating in such a way so as to keep protective amounts of vegetation on the soil surface.

**Subaqueous** — Existing, formed, or taking place in or under water.

**Sub-Basin** — (1) A portion of a subregion or basin drained by a single stream or group of minor streams. (2) The smallest unit into which the land surface is subdivided for hydrologic study purposes.

**Subclimax** — (Ecology) A stage in the ecological succession of a plant or animal community immediately preceding a *Climax*, and often persisting because of the effects of fire, flood, or other conditions.

**Subduction Zone** — According to the theory of *Plate Tectonics*, a region at the boundary of two of the plates that form the crust of the earth where one of the plates is forced downward into the mantle. The deep ocean trenches off the Pacific coasts of Mexico and South America are examples of these regions. These zones are also referred to as *Convergent Plate Boundaries*.

**Subglacial** — Formed or deposited beneath a glacier.

**Subhumid Climate** — Regions where moisture is normally less than under humid conditions but still sufficient for the production of many agricultural crops without irrigation or dryland farming. Natural vegetation is mostly tall grasses. Annual rainfall varies from 20 inches (50.8 centimeters) in cool regions to as much as 60 inches (152.5 centimeters) in hot areas.

**Subirrigation (Subirrigate)** — (1) Irrigation below the surface (as by a periodic rise of the water table or by a system of underground porous pipes). (2) Irrigation of crops from water table(s) that are in turn supplied by seepage from above-lying canals, laterals, reservoirs, or irrigated fields.

**Subirrigated Land** — Land with a high water table condition, either natural or artificially controlled, that normally supplies a crop irrigation requirement.

**Sublimation** — (1) The transformation of a solid to the gaseous phase without passing through the normally intermediate liquid phase. (2) The change of a solid to a vapor (or the reverse) without the appearance of a liquid state, as in the changing of snow directly into water vapor without melting.

**Sublittoral** — (1) Situated, occurring, or formed on the aquatic side of a shoreline or *Littoral Zone*. (2) The deeper part of the *Littoral* portion of a body of water. (3) The region in a lake between the deepest-growing rooted vegetation and the part of the lake below the *Thermocline*. (4) The region in an ocean between the lowest point exposed by a low tide and the margin of the *Continental Shelf*.

**Sublittoral Zone** — The part of the shore from the lowest water level to the lower boundary of plant growth; the transition zone from the *Littoral* to *Profundal* bottom.

**Submarine** — (1) Beneath the surface of the water; undersea. (2) A ship capable of operating submerged.

**Submeander** — A small meander contained within the banks of a main channel, associated with relatively low discharges.

**Submerge** — To place under or cover with water or the like; plunge into water, inundate

**Submerged Aquatic Vegetation** — Vegetation such as sea grasses that cannot withstand excessive drying and therefore live with their leaves at or below the water surface. Such vegetation constitutes an important habitat for young fish and other aquatic organisms. Also referred to as *Submerged Plants*.

**Submerged Plants** — Aquatic vegetation that has roots, stems, and leaves. The plants are rooted in the bottom of a water course but the leaves remain submerged below the surface of the waters. Also referred to as *Submerged Aquatic Vegetation*.

**Submergence** — Condition of a *Weir* when the elevation of the water surface on the downstream side is equal to or

higher than that of the weir crest.

**Submergent Plant** — A vascular or nonvascular *Hydrophyte*, either rooted or nonrooted, which lies entirely beneath the water surface, except for flowering parts in some species; e.g., wild celery (*Vallisneria americana*) or the stoneworts (*Chara* spp.).

**Submergible** — That which can be immersed in or can remain under water.

**Submersed** — (1) Under water, submerged; growing under water. (2) (Botany) Growing or remaining under water.

**Submersible** — (Nautical) A vessel capable of operating or remaining under water, especially a submarine..

**Subsequent Stream** — A tributary stream flowing along beds of less erosional resistance, parallel to beds of greater resistance. Its course is determined subsequent to the uplift that brought the more resistant beds within its sphere of erosion.

**Subsidence** — (1) The sinking of the land surface due to a number of factors, of which groundwater extraction is one. (2) A sinking of a large area of the earth's crust. Typically this may result from the over-pumping of a basin's water table and the inability of the soils to re-absorb water from natural or artificial injection. Also frequently results from overdrafts of the aquifer and its inability to fully recharge, a process termed *Aquifer Compaction*. Also see *Land Subsidence*.

**Subsoil** — Soil material underlying the surface soil.

**Substrate** — (1) The substances used for food by microorganisms in liquid suspension, as in wastewater treatment. (2) The physical surface upon which an organism lives; the surface, natural or artificial, upon which an organism grows or to which it is attached. (3) The layer of material beneath the surface soil.

**Substrate, Artificial** — (1) A device placed in the water for a specified period of time that provides living spaces for a multiplicity of organisms; for example, glass slides, concrete blocks, multi-plate samplers, or rock baskets; used primarily to collect organisms in areas where the physical habitat is limiting or cannot be adequately sampled using conventional methods. (2) A device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multiplate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

**Substrate, Natural** — Any naturally occurring immersed or submersed solid surface, such as a rock or tree, upon which an organism lives.

**Subsurface** — Of, relating to, or situated in an area beneath a surface, especially the surface of the earth or of a body of water.

**Subsurface Drainage** — (1) The process of directing excess water away from the root zones of plants by natural or artificial means, such as by using a system of pipes and drains placed below ground surface level. (2) The water drained away from irrigated farmland. Also referred to as *Agricultural Drainage*.

**Subsurface Drainage System** — A system of underground pipes to remove excess water accumulating below the soil surface that will not naturally percolate out of the root zone.

**Subsurface Drains** — Subsurface drains are buried, perforated pipelines designed to collect and convey subsurface water from an irrigated area.

**Subsurface Flow** — Water which infiltrates the soil surface and moves laterally through the upper soil layers until it enters a channel.

**Subsurface Flow (SF) Constructed Wetland** — A type of constructed wetland, a man-made marsh-like area used to treat wastewater. In the wetland, the effluent flows through a bed of rock or gravel, with the water level remaining below the surface of the gravel bed. Among the advantages of this type of system are its lack of odors, low potential for insect breeding, and minimal risk of public exposure and contact with the water in the system. Contrast with *Free Water Surface (FWS) Constructed Wetland* in which the water is exposed to the air. Also see *Wetlands, Benefits*.

**Subsurface Irrigation System** — Irrigation by means of underground porous tile or its equivalent.

**Subsurface Runoff** — Water that moves through the aerated portion of the soil to the stream and behaves more like overland flow than base flow.

**Subsurface Seepage** — Subsurface seepage is movement of water through soils from above-lying bodies of water.

**Subsurface Water** — (1) All water which occurs below the ground surface. (2) Water below the surface of the ground, including soil moisture, intermediate zone water, capillary fringe water, and ground water. Also referred to as *Underground Water* and *Subterranean Water*.

**Subterranean Water** — Water below the surface of the ground. Also referred to as *Underground Water* and *Subsurface Water*.

**Subterranean Water (Legal)** — Those subsurface waters whose courses are well defined and reasonably ascertainable and whose existence is not temporary.

**Subwatershed** — Drainage area composed of two or more *Subbasins*.

**Succession** — (Biology) (1) The ecological process of sequential replacement by plant communities on a given site as a result of differential reproduction and competition. (2) Directional, orderly process of change in a living community in which the community modifies the physical environment to eventually establish an ecosystem which is as stable as possible at the site in question.

**Succulent** — (Botany) (1) Having thick, fleshy, water-storing leaves or stems. (2) A tropical or desert plant with thick and fleshy stem or leaves designed to retain water and minimize evaporation. Succulent plants are usually found in regions of little rainfall and generally have long roots to absorb a maximum amount of water. Some of the commonest succulents are the cactus, which are leafless or have short, prickly leaves, storing a lot of sap in the stem; and the agave and aloe, which collect water in the stem.

**Suction Lift** — (Irrigation) The difference in elevation between the water source and the pump.

**Suction Lysimeter** — A sampling device for the collection of groundwater from the unsaturated zone. A sample is drawn by applying a negative pressure to a porous ceramic cup embedded in the soil layer.

**Suction Pump** — A pump for drawing up a liquid by means of suction produced by a piston drawn through a cylinder.

**Suitability** — (Environmental) The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences.

**Sulfur Dioxide (SO<sub>2</sub>)** — A colorless, irritating gas that is a primary cause of *Acid Rain*. It is a by-product of coal combustion.

**Sullage** — (1) Silt deposited by a current of water. (2) Waste materials or sewage; refuse.

**Summer Kill** — The complete or partial kill of a fish population in ponds, lakes, or reservoirs during the warm months caused by a combination of factors to include excessively warm water, a depletion of dissolved oxygen, and the release of toxic substances from a decaying algal bloom. Also see *Winter Kill*.

**Summit** — The flattish top of an erosional fan remnant, hill, mountain, etc. The term is used for both a landform element and a slope component.

**Sump** — (1a) A low-lying place, such as a pit, that receives drainage; (1b) A cesspool. (2) A hole at the lowest point of a mine shaft into which water is drained in order to be pumped out.

**Sump Pump** — (1) A pump designed and so placed in a *Sump* to remove the water or other liquids collected there. (2) Device used to remove water from seepage or rainfall that collects in areas protected by a levee, floodwall, or dry floodproofing. In addition, a sump pump is often part of a standard house drainage system that removes water that collects below a basement slab floor.

**Sunbow** — A rainbow-like display of colors resulting from refraction of sunlight through a spray of water. Also see *Rainbow*.

**Sunspot Activity** — (Climate) A theory which posits that weather patterns may be caused by the level and timing of sunspot activity. Sunspots represent increased solar (irradiance) activity on the sun's surface that occurs with periodic frequency of, on the average, once every 11.13 years. They last often a month, sometimes for several months, and their appearance is frequently accompanied by magnetic storms on earth. In research by the *National Center for Atmospheric Research* in Boulder, Colorado and the *U.S. Geological Survey (USGS)* in Lawrence, Kansas, researchers have shown a very high probability that the interior of the United States will be dominated by a low pressure system when there is little solar flare (sunspot) activity and the winds high above the equator are blowing from the west. This system results in cold weather in much of the country but warm weather in the Northeast. These researchers have also shown a much higher probability of wet weather in the West four years after a peak of solar irradiance, a peak that occurs, more or less, in conjunction with a peak in sunspot activity. The last recorded period of high sunspot activity was unusual as it was marked by a double peak, one in 1989 and one in 1991.

**Superchlorination** — *Chlorination* with doses that are deliberately selected to produce water free of combined residuals so large as to require dechlorination.

**Supercool** — To cool a liquid below a transition temperature without the transition occurring, especially to cool below the freezing point of water without solidification into ice.

**Supercooled Water** — Water cooled below its freezing point without causing solidification.

**Supercritical Water** — A type of thermal treatment using moderate temperatures and high pressures to enhance the ability of water to break down large organic molecules into smaller, less toxic ones. Oxygen injected during this process combines with simple organic compounds to form carbon dioxide and water.

**(Hazardous Substances) Superfund** — A federal trust fund for use in the cleanup of spills or sites containing

hazardous waste that pose a significant threat to the public health or the environment. The fund, originally called the *Hazardous Substances Response Trust Fund*, was established by the *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)* in 1980 to carry out U.S. Environmental Protection Agency (EPA) solid waste emergency and long-term removal and remedial activities. Beginning in 1980, \$1.5 billion was to be collected over five years, mainly from taxes on crude oil, petroleum products, petrochemicals, and certain inorganic chemicals. The 1986 re-authorization of the law, which changed the fund's name to the *Hazardous Substances Superfund* (or just "Superfund"), increased the fund to \$8.5 billion and broadened the tax base to include a general corporate Superfund tax. Another one-half billion dollars was included to clean up leaks from underground storage tanks. Also see *U.S. Environmental Protection Agency (EPA)* and the appendix related to EPA activities.

- Superfund Law (Comprehensive Environmental Response, Compensation, and Liability Act — CERCLA)** — This statute, originally enacted in 1980 and substantially modified in 1986, establishes the U.S. Environmental Protection Agency's (EPA) authority for emergency response and cleanup of hazardous substances that have been spilled, improperly disposed of, or released into the environment. The primary responsibility for response and cleanup is on the generators or disposers of the hazardous substances, with a backup federal response using a trust fund provision.
- Superfund List** — A list of the hazardous waste disposal sites most in need of cleanup. The list is updated annually by the U.S. Environmental Protection Agency (EPA) based primarily on how a site scores using the *Hazard Ranking System*. Also referred to as the *National Priorities List (NPL)*.
- Superfund Site** — A hazardous waste landfill on the *National Priorities List (NPL)* (also referred to as the *Superfund List*) being cleaned up by the responsible parties or using proceeds from the *Hazardous Substances Superfund*.
- Superheated Water** — Liquid water heated above 100°C (212°F) under pressures greater than atmospheric.
- Superimposed Stream** — A stream whose present course was established on young rocks burying an old surface. With uplift, this course was maintained as the stream cut down through the young rocks to and into the old surface.
- Supernatant** — (1) Floating on the surface. (2) (Water Quality) The clear fluid that is removed from the top of tanks or ponds used to allow solids to settle from suspension. Also referred to as *Overflow*.
- Supersaturate** — (1) To cause (a chemical solution) to be more highly concentrated than is normally possible under given conditions of temperature and pressure. (2) To cause (a vapor) to exceed the normal saturation vapor pressure at a given temperature.
- Supplemental Irrigation** — When irrigation water supplies are obtained from more than one source, the source furnishing the initial supply is commonly designated the primary source, and the source(s) furnishing the additional supplies, the *Supplemental Sources*.
- Supplemental Sources** — When irrigation water supplies are obtained from more than one source, the source furnishing the principal supply is commonly designated the primary source, and the sources furnishing the additional supplies, the supplemental sources.
- Supplier of Water** — Any person who owns or operates a *Public Water Supply System (PWSS)*.
- Supply Augmentation Alternatives** — Water management programs that increase supply, for example, *Conjunctive Use*, *Water Banking*, or water project facility expansion such as reservoir construction or groundwater extraction.
- Supralittoral Zone** — That portion of the seashore adjacent to the tidal or spray zone. Also referred to as the *Supratidal Zone*.
- Surface Area (Lake or Impoundment)** — That area encompassed by the boundary of the lake or impoundment as shown on U.S. Geological Survey topographic maps, or on other available maps or photographs. The computed surface areas reflect the water levels of the lakes or impoundments at the times when the information for the maps or photographs was obtained.
- Surface Casing** — The well pipe inserted as a lining nearest to the surface of the ground to protect the well from near-surface sources of contamination.
- Surface Collecting Agents** — Chemical additives spread on oil spills in an aquatic environment to control the thickness of the oil layer.
- Surface Compaction** — Increasing soil density by applying force at the surface. The process is frequently used in the installation of clay liners to prevent or reduce surface water movement to underground sources.
- Surface Detention** — That part of the rain which remains on the ground surface during rain and either runs off or infiltrates after the rain ends; surface detention does not include *Depression Storage*.
- Surface Impoundment** — (Water Quality) The treatment, storage, or disposal of liquid hazardous wastes, such as in tanks, ponds, pits, or lagoons. An indented area in the land's surface for such storage and treatment.
- Surface Irrigation** — A water application whereby water is applied to the soil either by controlled flooding or through some kind of furrow.

**Surface Mining** — The process of removing mineral deposits that are found close enough to the surface so that the construction of tunnels (underground mining) is not necessary. The soil and strata that cover the deposit are removed to gain access to the mineral deposit. The primary environmental concerns related to this technique are the disposition of spoils removed to gain access to the deposit and the scoring of the landscape that remains following the complete removal of the mineral deposit. Water pollution is also a concern because runoff from the mining area is frequently rich in sediments and minerals. Furthermore, such operations sometimes necessitate the removal of groundwater that infiltrates the mining pit, consequently altering the groundwater flow with potential implications on the water table and aquifer characteristics. Also referred to as *Open-Pit Mining* or *Strip Mining*. Also see *Dewatering*.

**Surface Mining Control and Reclamation Act** — An act passed in 1977 requiring that mine operators take measures to avoid acid or other toxic mine drainage. To correct existing acid drainage problems, the section of the law dealing with abandoned mine land states that land and water affected by mining that took place before 1977 can be cleaned up with fees paid by coal operators into the *Abandoned Mine Reclamation Fund*. About 90 percent of existing stream damage in the United States is from underground coal mining that took place before 1977. The federal enforcement agency is the U.S. Department of the Interior, Bureau of Mines, Office of Surface Mining Reclamation and Enforcement (OSM).

**Surface Runoff** — That part of the runoff which travels over the soil surface to the nearest stream channel. It is also defined as that part of the runoff of a drainage basin that has not passed beneath the surface since precipitation. Also applies to snowmelt or irrigation water in excess of what can infiltrate the soil surface and be stored in small surface depressions. In terms of surface water quality, surface runoff may constitute a major transporter of *Non-Point Source (NPS) Pollution*. The term is misused when applied in the sense of *Direct Runoff*. Also see *Runoff*, *Direct Runoff*, *Overland Flow*, *Ground-Water Runoff*, and *Surface Water*.

**Surface Supply (of Water)** — Water supply from streams, lakes, and reservoirs.

**Surface Tension** — A phenomenon caused by a strong attraction towards the interior of the liquid action on liquid molecules in or near the surface in such a way to reduce the surface area. The tension that results is usually expressed in dynes per centimeter (cm) or ergs per square centimeter (cm<sup>2</sup>).

**Surface Water** — (1) An open body of water such as a stream, lake, or reservoir. (2) Water that remains on the earth's surface; all waters whose surface is naturally exposed to the atmosphere, for example, rivers, lakes, reservoirs, ponds, streams, impoundments, seas, estuaries, etc., and all springs, wells, or other collectors directly influenced by surface water. (3) A source of drinking water that originates in rivers, lakes and run-off from melting snow. It is either drawn directly from a river or captured behind dams and stored in reservoirs. Also see *Ground Water Under the Direct Influence (UDI) of Surface Water*.

**Surface Water Disposal** — Refers to the release of reclaimed water or treated effluent directly into a surface body of water (including marshes and wetlands). This does not include water discharged into ponds for holding or *Percolation* purposes. Also see *Percolation Ponds*.

**Surface Water Supply Index (SWSI) (Drought Index)** — 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. Also see *Drought Indexes (Indices)*.

**Surface Water Treatment Rule (SWTR)** — Water quality treatment standards as prescribed under the *Safe Drinking Water Act (SDWA)* and amendments thereto. The rule is a set of treatment technique requirements which apply to all water systems using surface water and those using ground water which is under the influence of surface water. Surface water systems are those using water exposed to the atmosphere, such as rivers, lakes, reservoirs, or streams. Ground water systems that are under the influence of surface water may include shallow wells, infiltration galleries, and springs which may contain the same disease-causing microorganisms of concern in surface water. The rule requires that these systems properly filter the water, unless they can meet certain strict criteria. The rule also requires that these systems disinfect the water. There are no exceptions from the disinfection requirement.

**Surface Water Withdrawals** — Includes all waters taken from streams, rivers, ponds, lakes, reservoirs, springs and all effluent and other waste water.

**Surfactant** — An agent that is used to decrease the surface tension of water, useful for removing or dispersing oils or oily residues. Most detergents are surfactants. The term is derived from *surface active agent*.

**Surficial Bed Material** — The top 0.1 to 0.2 feet of the bed material that is sampled using U.S. Series Bed-Material

Samplers.

**Surge** — (1) To move in a billowing or swelling manner in or as if in waves. (2) To roll or be tossed about on waves, as a boat. (3) To move like advancing waves.

**Surge Wave** — A *Translatory Wave* in an open channel resulting from a sudden change in flow of water, such as that caused by opening or closing a gate.

**Surplus Water** — Developed water supplies in excess of contract entitlement or apportioned water.

**Suspended** — Refers to the amount (concentration) of undissolved material in a water-sediment mixture. It is associated with the material retained on a 0.45-micrometer filter.

**Suspended Load** — (1) Portion of sediment that moves in suspension. (2) All the material transported by a stream or river, neither in contact with the river bottom (*Bed Load*) nor in solution (*Dissolved Load*).

**Suspended Particulate Matter** — A sample drawn from natural water or from a wastewater stream consists of a mixture of both dissolved and suspended matter. Those solid materials that are retained on a filter prescribed by the specific technique being followed are referred to as particulate matter. The suspended particulate matter can be subdivided into two fractions: volatile and fixed. The volatile particulates are those that are lost when the filter is heated to about 550°C (1,022°F), and the fixed particulates are those that are not lost upon being so heated. The volatile substances are generally considered to be of biological origin, and the fixed solids are considered to be minerals.

**Suspended, Recoverable** — The amount of a given constituent that is in solution after the part of a representative suspended-sediment sample that is retained on a 0.45-micrometer membrane filter has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all the particulate matter is not achieved by the digestion treatment and thus the determination represents something less than the “total” amount (that is, less than 95 percent) of the constituent present in the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results. Determinations of “suspended, recoverable” constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by the difference, based on determinations of (1) dissolved and (2) total recoverable concentrations of the constituent.

**Suspended Sediment** — Very fine soil particles which remain in suspension in water for a considerable period of time without contact with the bottom. Such material remains in suspension due to the upward components of turbulence and currents and/or by *Colloidal Suspension*.

**Suspended-Sediment Concentration** — (1) The ratio of the mass of dry sediment in a water-sediment mixture to the mass of the water-sediment mixture. Typically measured at a given distance between the surface of the water and the bed, expressed in milligrams of dry sediment per liter of water-sediment mixture. (2) The velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 feet above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L). The entire sample is used for the analysis. Also see *Mean Concentration of Suspended Sediment*.

**Suspended-Sediment Discharge** — (1) The quantity of suspended sediment passing a transect in a unit of time. When expressed in tons per day, it is computed by multiplying water discharge (in cubic feet per second) by the suspended-sediment concentration (in milligrams per liter) and by the factor 0.0027. (2) The quantity of sediment moving in suspension, reported as dry weight, that passes a cross section in a given time. It is calculated in units of tons per day as follows: concentration (mg/L) X discharge (cubic feet/second) times 0.0027.

**Suspended-Sediment Load** — A term that refers to material in suspension. The term needs to be qualified, however, such as “annual suspended-sediment load” or “sand-size suspended-sediment load,” and so on. It is not synonymous with either *Suspended-Sediment Discharge* or *Concentration*.

**Suspended Solids (SS)** — Solids which are not in true solution and which can be removed by filtration. Such suspended solids usually contribute directly to turbidity. Defined in waste management, these are small particles of solid pollutants that resist separation by conventional methods. Suspended solids (along with *Biochemical Oxygen Demand* — *BOD*) is a measurement of water quality and an indicator of treatment plant efficiency. Also see *Suspended Particulate Matter*.

**Suspended, Total** — The total amount of a given constituent in the part of a representative suspended-sediment sample that is retained on a 0.45-micrometer membrane filter. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. Knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to determine when the results should be reported as “suspended, total”. Determinations of “suspended, total” constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by the difference, based on

determinations of (1) dissolved and (2) total concentrations of the constituent.

**Suspended Water** — Underground water held in the *Zone of Aeration* by molecular attraction exerted on the water by the rock and earth materials and by the attraction exerted by the water particles on one another. It includes seeping water and stored water.

**Suspension** — A dispersion of solid particles which are large enough to be seen and will settle out on standing. The medium of dispersion is liquid.

**Suspensoids** — *Colloidal* particles which remain in suspension under all conditions and will combine or react only to a limited extent with the liquid in which they exist.

**Sustainability** — (Ecosystem) Management practices that do not take more from an ecosystem than it can provide. Theoretically, sustainable management practices can continue in perpetuity, since they do not lead to exhaustion of natural resources.

**Sustainable Development** — Describes those efforts to guide economic growth, especially in less-developed countries, in an environmentally sound manner, with an emphasis on natural resource conservation.

**Sustainable Management** — A method of exploiting a resource that can be carried on indefinitely. For example, the removal of water from an aquifer in excess of recharge is, in the long term, not a sustainable management method.

**Sustained Overdraft** — A long-term withdrawal from the aquifer of more water than is being recharged. Also see *Ground Water Mining*.

**Sustained Yield** — (1) (General) Achievement and maintenance, in perpetuity, of a high-level annual or regular periodic output or harvest of the various renewable land and water resources. (2) (Hydrology) The amount of water that may be removed (say, through groundwater pumping) from an hydrographic area during a period of time without affecting future yields. Under such conditions, sustained yield is approximately equal to annual recharge. Contrast with *Groundwater Mining*. (3) (Ecology) The perpetual output of a renewable resource, achieved and maintained at a given management intensity, without impairment of the productivity of the land.

**Swale** — (1) A slight depression, sometimes swampy, in the midst of generally level land. (2) A shallow depression in an undulating ground moraine due to uneven glacial deposition. (3) A long, narrow, generally shallow, trough-like depression between tow beach ridges, and aligned roughly parallel to the coastline. (4) A piece of meadow, often a slight depression or valley, as in a plain or moor, marshy and rank with vegetation. Swales usually carry flows only during or immediately after rainfall or snowmelt events. Swales vary in size from small conveyances providing drainage along roadways and behind or between buildings to larger waterways.

**Swamp** — A term frequently associated with *Wetlands*. Wet, spongy land; low saturated ground, and ground that is covered intermittently with standing water, sometimes inundated and characteristically dominated by trees or shrubs, but without appreciable peat deposits. Swamps may be fresh or salt water and tidal or non-tidal. It differs from a *Bog* in not having an acid substratum.

**Swash** — (1a) A splash of water or other liquid hitting a solid surface; (1b) The sound made by such a splash. (2a) A narrow channel through which tides flow; (2b) A bar over which waves wash freely.

**Swash Marks** — The wavy lines of fine sand or bits of debris left on the beach at the upward limit of the rush of water following the breaking of a wave.

**Sweet (Water)** — Water that is pleasing to the senses; agreeable and not saline or polluted; drinkable; *Potable*. Also see *Freshwater*.

**Swell** — (1) To rise or extend above the surrounding level, as clouds. To rise in swells, as the sea. (2) A long wave on water that moves continuously without breaking.

**Swill** — (1) To flood with water, as for washing. (2) Semiliquid waste material consisting of food scraps and free liquids.

**Swim (Swimming)** — To move through water by means of the limbs, fins, or tail.

**Synecology** — The study of different natural communities or *Ecosystems*.

**Synoptic Studies** — Short-term investigations of specific water-quality conditions during selected seasonal or hydrologic periods to provide improved spatial resolution for critical water-quality conditions. For the period and conditions sampled, they assess the spatial distribution of selected water-quality conditions in relation to causative factors, such as land use and contaminant sources.

**Synthetic Organic Chemicals (SOCs)** — Man-made chemicals containing carbon including pesticides, herbicides, and polychlorinated biphenyls (PCBs). The *U.S. Environmental Protection Agency (EPA)* maintains a listing of SOC's that are regulated with respect to *Maximum Contaminant Levels (MCLs)* as part of the *Safe Drinking Water Act (SDWA)*.

**Synthetic Seawater** — An artificial product of the approximate ionic composition of seawater.

**System Design Capacity** — (Water Quality) Plant design capacity plus any blending water added to the desalting

plant product.

**System Head Curve** — A curve of system head comprising total static head and head loss in the system versus flow through the system.

**System with a Single Service Connection** — A system that supplies drinking water to consumers via a single service line.

**Systemic** — Any chemical that is absorbed into a plant's system, either to kill organisms that feed on the plant or to kill the plant itself. There are systemic insecticides, fungicides, and herbicides.