Speleological and Karst Glossary of Florida and the Caribbean

Compiled by Sandra Poucher and Rick Copeland

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Cavers rappel into Deadman's Pit in Alachua County, Florida. Photograph by Sean Roberts.

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Foreword

The Florida Geological Survey, Division of Resource Assessment and Management of the Department of Environmental Protection, is proud to have participated in and contributed to the publication of the *Speleological and Karst Glossary of Florida and the Caribbean*. This glossary was compiled primarily by Sandra Poucher, educational outreach coordinator of the National Speleological Society, Cave Diving Section, and Rick Copeland of the Florida Geological Survey.

This publication stems from discussions prompted by the Florida Springs Initiative and from increased communication in recent years between the cave diving and geological communities. Hopefully, the glossary will assist Floridians in improving their overall understanding of the caves of the state and Caribbean region and increase the consistency in the usage of commonly used terms associated with the region's caves and conduits. The information will be useful for the citizens of Florida, including the academic, scientific, engineering, planning, environmental, and caving communities.

Walter Schmidt, Ph.D., PG
State Geologist and Chief
Florida Geological Survey
Tallahassee, Florida 2005

Acknowledgments

No great idea bursts forth without the collaboration of exceptionally perceptive minds. Several stars shine out in the creation of this project—first of all my co-compiler, Rick Copeland, who saw the relevance and kept this book alive through numerous revisions and lengthy e-mail sessions. Thanks to members of the Florida Committee for the Terminology of Cave and Karst Systems for their input, and in particular Buford Pruitt Jr. for having the ever-important eagle eye. Annette Long has been a lifelong inspiration as someone who sticks by her guns and her intuition in sustaining Florida's most precious of natural resources. It was Annette's use of the term Blue Baby Syndrome in a public hearing that made me realize how little I really knew about our water supply. Lifelong thanks to Martha Langston—Mom—for teaching me the importance of research and James Langston—Dad—with his challenge to think independently. And, most of all, thanks to my husband, Michael Poucher, who supported and encouraged me throughout this project.

—*Sandy Poucher*

My co-compiler, Sandy Poucher, was definitely the inspiration for this project. Like no one else, she saw a need for a glossary that could be used to translate ideas back and forth between the caving and scientific communities. Sandy was absolutely tireless and never stopped encouraging committee members to finish the numerous tasks needed to complete the glossary. I would like to thank the committee members, and especially Todd Kincaid, for their contributions regarding the many included terms. I would like to acknowledge Gareth Davies for his contribution regarding dye tracing terms. I want to acknowledge Malcolm Field and William Huth, as well as Buford Pruitt Jr., for their critical review of the manuscript. Finally, I want thank my daughter, Katie, and particularly my wife, Debbie, for their lifelong support of my professional activities.

—*Rick Copeland*

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Introduction

General

The Florida Geological Survey (FGS) and the Hydrogeology Consortium sponsored a workshop in Ocala, Florida, in April 2003, the second of two in a two-year period. The purpose of both was to provide a forum to facilitate discussion among scientists, resource managers, cavers, and the public regarding the significance of caves and springs, with emphasis on springs in Florida. The first workshop emphasized springs, while the second discussed the significance of caves in the management and protection of Florida's watersheds.

The latter workshop was divided into three panels: Bridging the Gap between Cavers and Scientists, Utilization of Cave Data in Hydrogeological Investigations, and Caver Resource Management: Politics, Public Relations, and Funding. Invited speakers discussed aspects of each panel theme, then each panel split into breakout sessions to discuss the issues further. Toward the end of the workshop, each panel made conclusions and recommendations to the larger group regarding panel themes.

One of the conclusions of the second workshop was that, because caves contain and support biota sensitive to pollution, the environmental health of caves is critically important to regulators in the management and protection of both springsheds and watersheds. In addition, it was noted that caves: (1) contain and support archeological and cultural artifacts; (2) can act as laboratories for medical, biological, geological, and hydrogeological and other scientific studies; (3) are valuable tools for understanding groundwater flow and contamination transport in karst systems; and therefore (4) are an important natural resource with uses that can significantly impact local and statewide economy.

Because of the importance of caves, and because cavers (both wet and dry) spend considerable time inside caves, it is imperative that they communicate their substantial knowledge of caves in a standardized manner with each other and with the scientific community. For these reasons, during the workshop it

was recommended that a cave glossary, emphasizing terms used in and near Florida, including the Caribbean, be developed. The FGS agreed to take the lead and in the summer of 2003 organized a committee to assist in generating the glossary. The Florida Committee for the Terminology for Cave and Karst Systems (FCTCKS) consisted of representatives from the dry caving and cave diving communities in addition to geologists with the FGS. Committee members decided that the two major purposes in publishing the glossary were:

1. to improve the overall understanding of wet and dry caves in Florida and the area near Florida within the Caribbean Sea, and
2. to improve consistency in the usage of terms associated with caves.

For a variety of reasons, the entire committee was never able to meet at one time. Nevertheless, between June 2003 and August 2004, several of the committee members were able to meet three times at Karst Environmental Services in High Springs, Florida, and once at the Silver River Museum in Ocala, Florida. All other communication was conducted via telephone and e-mail during that time.

The original glossary team included Rick Copeland (FGS), Sullivan Beck (past chair of the Florida Speleological Society), Tom Greenhalgh (FGS), Tom Morris (Karst Environmental Services), Michael Poucher (past chair of the Cave Diving Section of the National Speleological Society), and Wes Skiles (Karst Productions, Inc., and Karst Environmental Services). Seeking additional input and criticism, the team invited additional expertise from Jitka Hyniova (professional scientist and cave diver), Dr. Tom Iliffe (Texas A&M University), Dr. Todd Kincaid (geologic modeler), Jerry Murphy (professional geologist), Buford C. Pruitt, Jr. (professional biologist), and Sean Roberts (current chair of the Florida Speleological Society). Sandra Poucher and Rick Copeland served as compilers.

Karst and Caves

Much of the following regarding karst and caves is taken from Tarbuck and Lutgens (1997). The authors point out that the key to understanding karst landscapes and caves is to understand that groundwater dissolves certain types of rocks, especially limestones and dolomites. The primary mineral of limestone is calcite (a calcium carbonate), and for dolomite it is the mineral dolomite (a calcium-magnesium carbonate). As it turns out, limestone and dolomite are nearly insoluble in pure water. However, limestone, and to a lesser extent dolomite, readily dissolves in water containing small quantities of carbonic acid.

Most natural water contains this weak acid because rainwater leaches carbon dioxide from the air and from decaying plants and deposits it in groundwater. Thus, when groundwater comes in contact with the carbonate rocks, carbonic acid reacts with calcite and dolomite and is then carried away in solution.

A karst landscape, or karst topography, exhibits an irregular surface caused by rock dissolution. The irregular terrain is typically punctuated with many depressions called sinkholes, or simply sinks. In Florida, there are literally tens of thousands of these depressions varying in depth from just 1 or 2 meters (3–7 feet) to more than 75 meters (246 feet). In addition to the many depressions, Karst regions also typically show a lack of or reduction in surface drainage (streams). The reason for this is that following a significant rainfall event, runoff is quickly funneled below ground through the sinkholes until it finally reaches the water table. Where small streams do exist, their lengths are usually short.

Karst is named for the Krs region in the border area between Slovenia (formerly part of Yugoslavia) and Italy, where this type of landscape is very well developed. In the United States, karst landscapes occur in many areas that are underlain by limestone, including portions of Kentucky, Tennessee, Alabama, Florida, and southern Indiana. Generally speaking, arid and semiarid areas do not develop karst topography because there is insufficient groundwater. If solution features do exist in these dry regions, they are remnants of a time when rainfall was more abundant than today.

Sinkholes commonly form in one of two ways. First, they can form suddenly and without warning when the roof of a cavern collapses under its own weight, forming collapse sinkholes. These depressions are steep sided and deep when they are geologically young, but can fill with sediment over time to become shallowly sloped. When they form in populous areas, collapse sinkholes may represent serious geologic hazards.

Second, other sinks develop gradually over many years without any physical disturbance to the rock. In these situations, limestone immediately below the soil is dissolved by downward-moving rainwater that is freshly charged with carbon dioxide (dolines), forming doline sinkholes. These depressions are usually not deep relative to their widths and are characterized by gentle slopes.

Whether steep-sided or not, sinkholes can be the cause of ponds and lakes, but can also become environmental hazards. For example, occasionally sinkholes become plugged with clay and debris. When this occurs, small lakes or ponds can be created that then flood roads or other structures. Also, because sinkholes represent pathways from land surface to the water table, pollutants located nearby have a high potential for finding their way into the groundwater system. If that occurs, drinking water resources become threatened.

Karst Hydrogeology

In karst terrain, the interactions between surface water and groundwater are significant. During wet times, surface water often reverses flow, recharging our aquifers. Conversely, during dry times, the lakes and streams often exist only because they are maintained by groundwater discharging from the aquifers.

Groundwater flows through pore spaces in the rock material in what is generally termed primary and secondary porosity. Primary porosity is a feature of the soil or rock matrix itself (intergranular pore spaces), while secondary porosity is often due to fracturing in the rock and secondary dissolution of carbonate rock (e.g., limestone). Secondary porosity can range in size from micro scale to large caverns. It is the secondary porosity that interests cavers.

Regarding groundwater, the hydrogeology community is frequently interested in determining how it flows through subterranean pore spaces. To know the quantity, quality, and direction of groundwater flow, they are interested in the size, shape, and orientation of pore spaces. Cavers are experts in exploring and investigating secondary porosity in karst terrain.

Many geologists are also interested in the size, shape, and orientation of dry caves in order to understand past groundwater flow systems, predict current groundwater flow, and delineate large, regional fracture systems. Again, the caving community typically maps cave systems, but it is not unusual for cavers to solicit geologists with questions regarding caves. For example, why are caves oriented the way they are? What minerals and other chemicals are associated with this rock I found in a cave?

Cavers and cave divers are naturally inquisitive people. As they expand their territory in search of new caves, they begin by reading journals and articles to find new places to cave. They encounter new terminology, learning about speleology in the process. As they explore new territory, they encounter new creatures and natural phenomena and desire to share these experiences and better understand what is happening in their favorite caves. As awareness grows, so does the need for a reference to satisfy the desire to learn. The glossary becomes more useful as cavers become more involved and intellectual in their pursuits.

Thus, it is no surprise that the caving and hydrogeology communities need to understand each other's vocabulary and that both were eager to cooperate in developing this glossary. The glossary is a good reference for people outside the world of caving and cave diving. Anyone, from the hydrogeologist to the interested public, reading about a cave trip will better understand caving as a sport and as a culture, the cavers themselves, and the extensive language of caving.

Education

In light of the world's burgeoning population, there is an increasing demand for the earth's natural resources and a greater generation of wastes. Regarding the generation of wastes, societies need to understand that karst terrains are extremely susceptible to pollution. In order to address these demands, they must educate their citizens in many fields. Conservation and environmental protection are two fields that require input and cooperation among a variety of experts, including, but not limited to environmental managers, cavers, engineers, scientists, and politicians.

This glossary can be a useful tool for decision makers and politicians interested in pursuing an understanding of karst and groundwater sciences. It can also assist those seeking a better comprehension of the language used by the scientists, speleologists, and cavers who visit these realms. The glossary contains common terminology encountered in public forums, conferences, articles, reports, and daily conversation as well as a few scientific names and a comprehensive list of terms associated with caving, rappelling, and cave diving.

The language of government often has subtle and precise shades of meaning that differ from common understanding. The inclusion of legal and administrative terms is intended to clarify the meaning of this language for people not involved in these processes. Governmental terms can and do change and consideration was given to the permanence of these definitions. The overriding importance of including the terms took precedence and many on the regulatory side of karst and groundwater protection have expressed gratitude that this language will be made widely available in this format.

Words such as *aquifer* and *nitrate* are becoming more commonplace, indicating a growing public awareness of not just the terms, but also of what they represent. This glossary is the fulfillment of the wishes of many individuals and agencies to better assist and educate each other as well as the general public. Better communication precedes comprehensive understanding of the procedures of scientific study and of the natural and human processes in the dynamic interaction between above- and belowground, leading to the protection of resources that ultimately benefit everyone.

The youth of today will need to be as prepared as possible to address the many complex issues they will encounter in the future. For those living in karst environments, it is imperative that they understand the complexities of waste disposal. In addition, many adults of today are simply unaware of the significance that caves play in a karst environment. Therefore, it is crucially important that we educate our youth in, and offer our adults the opportunity to understand the significance of caves in karst environments. It is anticipated that this glossary will assist in this endeavor.

Most definitions used in the glossary were either taken or modified from numerous resources (more than 100 references). However, on occasion it was necessary for the FCTCKS to develop its own definition, or to modify a term from other sources. If a definition was generated or significantly modified by the committee, it appears in the glossary as (FCTCKS 2004).

Rick Copeland, Florida Geological Survey
Sandra Poucher, Educational Outreach Coordinator, NSS-CDS
Michael Poucher, NSS-CDS

Glossary

Abbreviations Used in the Definitions

abb. abbreviation
adj. adjective
cf. compare with the following related word
n. noun
syn. synonym
v. verb

50/50: A breathing gas mix of 50% oxygen and 50% nitrogen used for *decompression* (Huth 2005).

95s: Steel *cylinders* holding 95 cubic feet of breathing gas when filled to maximum recommended pressure (2640 *psi*). A popular size for *backmounts* and *sidemounts* by cave divers (FCTCKS 2005).

100%: A breathing gas of pure oxygen used during *decompression*. Because of oxygen's toxicity at depth, it is recommended to limit breathing pure oxygen to no deeper than 20 feet (FCTCKS 2005). See also O_2.

104s: Steel *cylinders* holding 104 cubic feet pf breathing gas when filled to maximum recommended pressure (2640 *psi*). A popular size for *backmounts* by cave divers (FCTCKS 2005).

A

AAUS: *Abb. American Academy of Underwater Sciences*.

A-frame: A structure utilizing two poles placed on the ground or on a cliff edge in an upside-down V configuration and guyed for stability, allowing ropes and cables to hang free (Smith and Padgett 1996: 340).

abandoned artesian well: Defined by Florida Statutes as an artesian well that (a) does not have a properly functioning valve; (b) is permanently out of use; (c) does not meet current well construction standards; (d) is discharging water containing greater than 500 milligrams per liter (500 ppm) of chloride into a drinking water aquifer; (e) is in such a state of disrepair that it cannot be used for its intended purpose without having an adverse impact upon an aquifer that serves as a source of drinking water or is likely to be such a source in

the future; or (f) does not have proper flow control on or below land surface (373.203 Florida Statutes).

abandoned water well: Defined by Florida Statutes as a well the use of which has been permanently discontinued or is in such a state of disrepair, as determined by a representative of the Florida Department of Environmental Protection, that continued use for the purpose of obtaining groundwater or disposing of water or liquid wastes is impractical (373.303 Florida Statutes).

abiotic: Pertaining to environmental factors or influences that are not living, such as climate and light. *Cf. biotic*.

Abney level: A tubular leveling device used principally by construction crews for short-distance surveys (Dasher 1994: 181).

abrasion: 1. With regard to cavers, a deteriorating and damaging effect to a rope that occurs when the rope is rubbed against a rough surface. 2. A superficial wound that affects only the outer layer of the skin (Smith and Padgett 1996: 340).

abrasion resistance: The ability or property of a product to retain its integrity while being rubbed against (Smith and Padgett 1996).

abseil: See *rappel*.

absolute atmosphere: *Syn. atmosphere absolute* (ATA).

absolute pressure: The total pressure, including atmospheric and hydrostatic pressures, exerted at any point (Heine 1995: 277).

absolute zero: The lowest temperature that could possibly be reached, at which all motion of particles theoretically ceases (for water: 0 Kelvin = –459.72°F = –273°C) (Heine 1995: 277).

absorbent: In *rebreathers*, a chemical compound used to remove carbon dioxide from gas (Bozanic 2002: 509). *Cf. scrubber*.

absorption: The process by which substances in gaseous, liquid, or solid form dissolve or mix with other substances (Field 1999).

abyss: A deep chasm (Smith and Padgett 1996: 340).

accessory cord: Small-diameter cord or rope used for nonlife-support activity such as lowering a gear bag or a piece of gear down a drop (Smith and Padgett 1996).

accidental: An animal in a cave that arrived there accidentally, by wandering in, falling in, or washing in (Zokaites and O'Malley 2000: 127). Species that do not normally inhabit caves but for one reason or another take refuge in them (Franz et al. 1994: 4). *Cf. cavernicoles*, *stygobiont*, *trogloxene*, *troglophile*, *troglobite*.

accident analysis: The review of accidents and fatalities that occurred while caving (both *cave diving* and *dry caving*) and determination of causes and prevention (FCTCKS 2004).

accretion: The process by which an inorganic body increases in size by the external addition of fresh particles, as by *adhesion* (Jackson 1997: 4).

acetylene: A flammable hydrocarbon gas, C_2H_2, produced by the reaction of water with calcium carbide and burned by a carbide light to produce a white, bright light (Smith and Padgett 1996).

acid, acidic: A condition derived by partial exchange of replaceable hydrogen; an element that is sour; on the *pH* scale, acid conditions are indicated by any pH less than 7.0, which is neutral (Waterwise 2003: 70).

acidity: 1. A measure of the number of free hydrogen ions (H^+) in a solution that can chemically react with other substances (US EPA 2003b). 2. The property of waters caused by the presence of mineral acids. Usually expressed in equivalent amounts of *calcium carbonate* (Field 2002).

acid rain: Precipitation containing harmful amounts of nitric and sulfuric acids formed primarily by nitrogen oxides and sulfur oxides released into the atmosphere when fossil fuels are burned. Rainfall with a *pH* of less than 7.0 (IFAS 2004 and 2005).

acquisition: The action of transferring interest for a parcel of land to a governmental or nonprofit land conservation agency for the preservation in perpetuity of the land for the protection of a particular species, natural area, or other environmental resource (Hillsborough County 2004).

acre-foot (**acre-ft**.): A unit of consumptive water use; one acre-foot is the volume of water covering one acre of land to a depth of one foot; equivalent to 43,560 cubic feet (1,233 cubic meters) or 325,851 gallons (Wyman and Stevenson 2001).

active cave: See *live cave*.

acute toxicity: Any poisonous effect produced within a short time after exposure to the toxic compound, usually within 24–96 hours (US EPA 1998).

adaptation: Changes in the structure or activities of an organism in response to changes in its habitat (FCTCKS 2005).

adhesion: 1. The molecular attraction between contiguous surfaces (Jackson 1997). 2. The attraction of water *molecules* to other materials as a result of hydrogen bonding (MSU 2000: 291).

adiabatic process: From Greek *adiabatos* (impassable; not to be passed). A change in a system involving no gain or loss of heat to the outside environment. In scuba diving, we see this process as warming during filling (compression) of gas in the tanks and cooling when the tanks are emptied (expansion) (FCTCKS 2005).

adsorption: Adherence of gas or liquid *molecules* to the surface of solids (Field 1999).

ADV: 1. *Abb*. *automatic deflation valve*. 2. *Abb*. *automatic diluent valve*.

adverse impact: The detrimental effect of an environmental change relative to desired or baseline conditions (SFWMD 2002).

aeration: The process of bringing air into contact with water, usually by bubbling air through the water, to remove dissolved gases like carbon dioxide and hydrogen sulfide or to oxidize dissolved materials like iron *compounds* (Driscoll 1986: 885).

aerial photography: Photography of the Earth's surface from a platform in or on an airplane, used in environmental assessment, location of geographic features, and topographic mapping (FCTCKS 2005).

aerobic: 1. Pertaining to an environment with oxygen, or to a process that requires or occurs only in the presence of oxygen. 2. Requiring oxygen to live (an *aerobe*) (FCTCKS 2005). *Cf. anaerobic*

AGE: *Abb. arterial gas embolism*.

age of water: 1. Length of time since water was recharged into an aquifer. 2. The time since recharge water was isolated from the atmosphere (Plummer et al. 1993). See *water age*.

aggressive: Pertaining to water with a high level of acidity (such as tannic water) capable of dissolving rock (FCTCKS 2005). *Cf. speleogenesis*.

agriculture water use: Water used for agricultural irrigation and nonirrigation purposes. Irrigation water use includes the artificial application of water on lands to assist in the growing of crops, plants, and pasture, or to maintain vegetative growth in recreational lands, parks, and golf courses. Nonirrigation water is used for livestock, fish, farming, and other farm needs (Florida Council of 100 2003: 31).

air: A gas mixture of 21 percent oxygen (O_2), 78 percent nitrogen (N_2), and other gases. Precisely, in a standard atmosphere (1.5°C, 29.92 inches Hg, and at sea level), air has 20.9476 percent oxygen, 78.084 percent nitrogen, 0.934 percent argon, 0.0314 percent carbon dioxide, 0.000524 percent helium, and small amounts of neon, methane, krypton, hydrogen, and xenon (Huth 2005).

air bell: See *air pocket*. *Syn*. air dome. Also see *habitat*.

air break: The act of switching from a gas with a high partial pressure of oxygen (ppO_2) used during decompression to a lower partial pressure oxygen (ppO_2) gas. Switching back and forth helps lessen the effects of oxygen toxicity (FCTCKS 2004).

air dome: See *air pocket*.

air embolism: Injury during ascent in which the diver holds his or her breath or ascends too quickly. The resulting expansion of air in the diver's bodily tissues can rupture lungs or other tissues (FCTCKS 2004). See *arterial gas embolism*.

air hog: A diver who uses much more of his/her air supply, reaching thirds much earlier than his buddy (FCTCKS 2004). See *Rule of Thirds*.

airlift: In *underwater archaeology*, creating suction via a vacuum using a long wide tube with a valve managed by a diver, to remove sediment from underwater excavation sites and to remove small objects from the excavation site for examination on the surface (FCTCKS 2005). *Cf. lift bag*.

air management: The planning and utilization of breathing gas for any dive, taking into account the divers' air consumption rates, total air supply, staged air supply, depth, flow strength, flow direction, configuration of the cave, dive objective, contingency plans, emergency plans, decompression requirements, additional equipment or techniques to be used, and safety margin (modified from Saltsman 1995).

air pocket: An enclosed air space above the water-filled passage of a flooded tunnel (Monroe 1970). *Syn. air bell.*

Al: See *aluminum*.

alcove: A side passage that is relatively short (or appears to be) and does not have an obvious continuation (Meth 2002).

algae: Photosynthetic, almost exclusively aquatic plants of a large and diverse division (Algae) of the thallophytes, including seaweeds and their freshwater allies. They range in size from simple unicellular forms to giant kelps several meters long, and display extremely varied life cycles and physiological processes, with, for example, different complexes of photosynthetic pigments. Algae range from the Precambrian. An individual plant is called an alga (Jackson 1997: 14).

algal bloom: Sudden noticeable abundant growth of algae in a body of water due to an increase in nutrients such as nitrates and/or phosphorous in warm water (FCTCKS 2005).

algorithm: A step-by-step method of computation (Morehead 1981: 23).

alidade: A telescopic surveying instrument mounted on a straightedge and used on a plane table (Dasher 1994: 181). Part of a *theodolite* (FCTCKS 2005).

alkaline: The condition of water or soil that contains an amount of alkali substances (various soluble salts) to raise the *pH* above 7.0; extreme alkalinity is caustic (Waterwise 2003: 70). *Syn*. *basic*.

alkalinity: The capacity of water to neutralize acid. Prevents the water *pH* levels from becoming too *basic* (high pH) or too *acidic* (low pH). Also adds carbon to the water. Alkalinity stabilizes water at pH levels around 7. However, when *acidity* is high in water the alkalinity decreases, which can cause harmful conditions for aquatic life (Lenntech 2005).

alluvial sinkhole: An ancient or relict sinkhole (paleosinkhole) that has been filled with soil and/or sediment. It may or may not have a surficial expression (SDII Global Corp. 2002). *Cf*. *paleosinkhole* and *relict sinkhole*.

alluvium: A general term for detrital, sedimentary deposits made by streams on riverbeds, flood plains, and alluvial plains (Bates and Jackson 1984).

alternobaric vertigo: Vertigo produced after a sudden release of pressure in an ear during an ascent (diving) (Heine 1995: 277).

aluminum (**Al**): A metal used to manufacture SCUBA tanks.

aluminum 80s: Popular *cylinder* size used by open water divers and as a *stage bottle* or *buddy bottle* by cave divers, with a volume of approximately 80 cubic feet at 3,000 psi (12 liter at 210 bar). The tank is *negatively buoyant* when full and *positively buoyant* when empty or nearly empty (FCTCKS 2005, Huth 2005).

aka: *Abb*. also known as.

ambient light: Light from an outside source, such as sunlight, that can be seen within the cave or cavern entrance (FCTCKS 2004).

ambient pressure: The pressure of the surrounding environment, at the depth or altitude of the diver (Balcombe et al. 1990: 262).

American Academy of Underwater Sciences (**AAUS**): A nonprofit organization with the goal of developing, reviewing, and revising standards for safe scientific diving certification and safe operation of scientific diving programs (FCTCKS 2005).

ammonia (**NH_3**): A gaseous compound of nitrogen and hydrogen, a common byproduct of animal waste. Ammonia readily converts to nitrate in soils and streams (Hughes et al. 2000).

amphipod: From Greek *amphi*: (around; both sides) and *podos* (feet). An invertebrate animal of the order Amphipoda (phylum Arthropoda: class Crustacea); these resemble *isopods* by the absence of a carapace and by the presence of unstalked sessile eyes, but differ from them in having bodies that are compressed laterally (i.e., side to side) rather than dorsoventrally (i.e., top to bottom) (Bates and Jackson 1987).

anadromous: A type of fish that spends its adult life at sea but returns to freshwater to spawn, such as mullet (FCTCKS 2005). *Cf. catadromous*.

anaerobe: An organism able to live without oxygen.

anaerobic: Pertaining to an environment without oxygen (such as water with no dissolved oxygen), or to a process occurring without oxygen (FCTCKS 2005). *Cf. aerobic*.

analog depth gauge: An instrument with hands that point to numbers as a direct result of mechanical force (Heine 1995: 277). *Cf. capillary depth gauge*, *diaphragm depth gauge*, *digital depth gauge*.

analyte: 1. The chemical of interest or concern for which a sample is collected and examined. 2. The object of a chemical analysis; the chemical for which a concentration is to be determined in samples of water, air, soil, or food (Wyman and Stevenson 2001).

anastomoses: Networks of tubes and openings found in *joint planes*, *fault planes*, and *bedding planes* (Rea 1992).

anastomotic caves: Caves consisting of arrays of curvilinear tubes that commonly intersect, forming many closed loops (braids). They usually form a two-dimensional array along a single favorable parting or low-angle fracture. Rare three-dimensional variants follow more than one geologic structure. Fracture-controlled segments may be present but do not dominate the pattern. Anastomotic mazes are usually super-posed on branchwork caves and rarely constitute entire cave systems (Prosser and Grey 1992: 226).

anchialine cave: From Greek *anchialos* (near the sea). Coined by L. B. Holthuis in 1973 in reference to inland coastal caves formed in limestone or volcanic rock that are flooded with brackish or salt water and tidally influenced (Iliffe 2005). *Cf. littoral cave*, *offshore spring*, *marine cave*, *submarine cave*.

anchor: 1. *n*. One point of attachment, usually a rock, tree, bolt hanger, I-beam, or similar secure attachment point. 2. *v*. To secure a rope, webbing, or hauling system (1 and 2, Smith and Padgett 1996). 3. An item that serves as a reference point from which other items in the series or other points in the scale are judged or compared (US EPA 2004b).

anchor angle: The resultant angle formed when an *anchor sling* is loaded. As a general rule this angle should be 90 degrees or less (Smith and Padgett 1996: 341).

anchor sling: A system of loops of webbing, rope, or other material used to provide an anchor point (FCTCKS 2006).

ancillary data: Related data; auxiliary data used to explain or describe specific data collected or displayed (FCTCKS 2005).

anhydrite (**$CaSO_4$**): A mineral consisting of *anhydrous* calcium sulfate. It represents gypsum without its water of crystallization, and it alters readily to gypsum, from which it differs in crystal form and in being harder and slightly less soluble. Anhydrite usually occurs in white or slightly colored, granular to compact masses, forming large beds or seams in sedimentary rocks or associated with gypsum and halite in evaporates (modified from Jackson 1997).

anhydrous: Without water. Minerals that do not contain water (FCTCKS 2005).

anion: An ion with a negative charge by virtue of having lost one or more electrons. *Cf. cation.*

anoxia: Total lack of oxygen (Mount and Gilliam 1993: 377).

anthodite: In a cave, *helictites* usually radiating from a common base and composed of needlelike *aragonite* crystals (Bates and Jackson 1987: 28).

anthropology: The scientific study of the origin and physical, social, and cultural development and behavior of humans (American Heritage Dictionary 1985: 114).

anticline: A fold, generally convex upward, whose core contains stratigraphically older rocks (Jackson 1997: 28).

APHA: *Abb.* American Public Health Association.

aphotic: Without light. Of or relating to the region of a body of water that is not reached by sunlight and in which *photosynthesis* is unable to occur. The Aphotic Zone of the ocean is water deeper than about 800 meters (2,624 feet), beyond which no light penetrates (Horton 2000).

applied force: In caving, the force generators involved in *fall factors* (Smith and Padgett 1996).

applied research: Research designed to produce results that may be applied to real world situations (US EPA 2004b).

aquatic: 1. Pertaining to water (Morehead 1981: 36). 2. Living or growing in or on water (American Heritage Dictionary 1985: 123).

aquatic assemblage: A group of organisms in populations interacting in a given body of water; for example, a fish assemblage or a benthic macroinvertebrate assemblage (US EPA 2005a).

aquatic life criteria: Water-quality guidelines for the protection of aquatic life. Refers to criteria established by the U.S. Environmental Protection Agency (US EPA) (Hughes et al. 2000). *Cf. water quality criteria*, *water quality standard.*

aquatic life use: A beneficial use designation in which the body of water provides suitable habitat for survival and reproduction of desirable fish, shellfish, and other aquatic organisms (US EPA 2005a).

aqueous: Pertaining to, similar to, containing, or dissolved in water; watery (American Heritage Dictionary 1985: 123).

aqueous solubility: A calculation of the amount of a compound that will dissolve in water at a given temperature (FCTCKS 2005). See *solubility*.

aquiclude: A saturated geologic unit incapable of transmitting significant quantities of water under ordinary hydraulic gradients (Freeze and Cherry 1979: 47). The term has been replaced by *confining bed*.

aquifer: A body of soil, sediment, or rock saturated with water and sufficiently permeable to allow production of water from wells (SDII Global Corp. 2002).

aquifer compaction: The reduction in bulk volume or thickness of a body of fine-grained sediments contained within a confined aquifer or aquifer system. The compaction of these fine-grained sediments results in *subsidence*, and sometimes fissuring, of the land surface (SFWMD 2005b).

aquifer storage and recovery (**ASR**): Storage of injected water in an acceptable aquifer when water is available for use at a later time. In essence, use of the aquifer as a reservoir (SWFWMD 2000).

aquifer system: A heterogeneous body of intercalated permeable and less permeable material that acts as a water-yielding hydraulic unit of regional extent (Jackson 1997: 32).

aquifuge: See *aquiclude*. *Syn*. *confining unit*.

aquitard: A confining bed that retards but does not prevent the flow of water to or from an adjacent *aquifer*; a leaky confining bed. It does not readily yield water to wells or springs, but may serve as a storage unit for *groundwater* (Bates and Jackson 1987). This term has been replaced with the term *confining unit*.

Ar: See *argon*.

aragonite: A white, yellowish, or gray form of the mineral *calcium carbonate* ($CaCO_3$). Aragonite has a greater density and hardness, and a less distinct cleavage than calcite, another calcium carbonate mineral, and is also less stable and less common. It occurs as a deposit from hot springs, and is a major constituent of shallow marine mud and the upper parts of coral reefs. It is also an important constituent of the pearl, and of some shells (Jackson 1997).

archaebacteria: From Greek *archaios* (ancient). Considered ancient life forms that evolved separately from bacteria and *blue-green algae* (Princeton University 2003). *Syn*. archaeobacteria, archeobacteria. *Cf*. *eubacteria*, *extremophiles*.

archaeology: The study of past cultures through their surviving relicts (Morehead 1981: 36). See also *underwater archaeology*.

Archimedes Principle: Any object wholly or partially immersed in a fluid is buoyed up by a force equal to the weight of the fluid displaced by the object (Heine 1995: 277).

argon (**Ar**): A gas used to inflate drysuits because of its superior thermal insulation qualities (FCTCKS 2004).

arid: The property of dry climates and regions with a net deficiency of moisture (Field 2002: 12). *Syn*. *xeric*.

arrest a fall: To stop from falling (Smith and Padgett 1996: 341).

arsenic (**As**): A naturally occurring metallic element, poisonous when used with other elements; used in manufacturing glass and as a pesticide and herbicide; prone to *bioaccumulation* and a known carcinogen (Princeton University 2003).

arterial gas embolism (**AGE**): Bubbles in the bloodstream causing an obstruction to a blood vessel. This is almost always caused by ascending too rapidly while diving, causing lung tissue to rupture and allowing air into the blood vessels (FCTCKS 2004).

artesian: Pertaining to a condition in which the *potentiometric surface* is above the top of the aquifer (Field 1999). *Syn*. *confined*.

artesian aquifer: An aquifer bounded above and below by impermeable beds, or by beds of distinctly lower permeability than that of the aquifer itself; an aquifer containing *groundwater* (Jackson 1997). *Syn*. *confined aquifer*.

artesian well: 1. A *well* deriving its water from a confined *aquifer* in which the water level stands above the ground surface (Field 2002). *Syn*. flowing artesian well. 2. An artificial hole in the ground from which water supplies may be obtained and which penetrates any water-bearing rock, the water in which is raised to the surface by natural flow, or which rises to an elevation above the top of the water-bearing bed. Any holes, drilled as a source of water, that penetrate any water-bearing beds that are a part of the artesian water system of Florida, as determined by representatives of the Florida Geological Survey or the Department of Environmental Protection (373.203 Florida Statutes).

arthropod: Any one of a group of solitary marine, freshwater, and aerial invertebrates belonging to the phylum Arthropoda, characterized chiefly by jointed appendages and segmented bodies. They are a common group of animals inhabiting caves (Bates and Jackson 1987).

artifact: An object made or used by humans (FCTCKS 2005).

artificial recharge: The deliberate addition by humans of water to an aquifer. Two common recharge methods are injecting water through wells and pumping water over the land to allow infiltration (Wyman and Stevenson 2001).

artificial tracer: See *deliberate tracer*.

As: Symbol for *arsenic*.

ascender: A hand-sized mechanical device used for climbing ropes, belays, and hauling rope. A metal frame, usually made of aluminum, surrounds the rope and provides a handlelike grip. A spring-loaded or weight-loaded offset *cam* mounted inside the frame allows the ascender to slide up the rope but holds it tightly in place on the rope when weight is applied (Smith and Padgett 1996 and Stone and AmEnde 2002).

ascender box: Chest-mounted roller(s) used with some climbing systems, mounted high on the chest to assist the climber in remaining upright (parallel to the rope) and to reduce friction (Smith and Padgett 1996: 341).

ascending: 1. The act of climbing a rope using mechanical ascenders or knots (Smith and Padgett 1996: 341). 2. In diving, the act of rising within the water column (FCTCKS 2004).

aspect: 1. The direction a slope faces: north, northeast, east, southeast, south, southwest, north, northwest (FCTCKS 2005). *Syn*. *orientation*. 2. One of the ways in which a thing may be viewed or contemplated (Morehead 1981: 40).

asphyxia: Suffocation occurring from a blockage of the windpipe. *Drowning* is a special case of asphyxia (Heine 1995: 277).

ASR: *Abb*. *aquifer storage and recovery*.

assimilative capacity: 1. The potential of a body of water to receive *effluents*, or pollutants, without apparent adverse effects. 2. The *biochemical oxygen demand*

rate that a stream can sustain without an unacceptable drop in dissolved oxygen (Wyman and Stevenson 2001).

association: A general term for the relationship among variables (US EPA 2004b).

ASTM: *Abb.* American Society for Testing and Materials.

ATA: *Abb. atmosphere absolute.*

ATM, atm: *Abb. atmosphere.*

atmosphere (**ATM**, **atm**): The mixture of gases that surrounds the Earth, held by gravity. It consists by volume of about 78% nitrogen, 21% oxygen, 0.9% argon, 0.03% carbon dioxide, and minute quantities of helium, krypton, neon, and xenon (Bates and Jackson 1987: 43). See also *air*.

atmosphere absolute (**ATA, ata**): A measure of the total pressure in units of 14.7 psi (1 atmosphere = 14.7 pounds per square inch) (Saltsman 1995).

atmospheric pressure: The pressure, or force per unit area, exerted by the atmosphere on any surface beneath or within it. Normal pressure at sea level is 1013.25 millibars, or 1013.250 dynes per cm^2, equivalent to 14.66 pounds per in^2. Other equivalent common measures are 76.0 cm (29.92 inches) of mercury and 1033.3 cm (33.9 feet) of water (Jackson 1997: 41).

attenuation: 1. A reduction in the amplitude or energy of a signal, such as might be produced by passage though a filter (Jackson 1997: 42). 2. The process of reduction of a compound's concentration over time. This can be through *absorption*, *degradation*, dilution, or transformation (Lenntech 2005).

Atterberg limits: In a *sediment*, the water-content boundaries between the semiliquid and plastic states (known as the liquid limit) and between the plastic and semisolid states (known as the plastic limit) (Jackson 1997: 42).

attribute: 1. The properties of an object (FCTCKS 2005). 2. A measurable component of a biological system (US EPA 2005a).

audit: The systematic examination of records and the investigation of other evidence to determine the propriety, compliance, and adequacy of programs, systems, and operations. The auditing process may include tools and techniques available from such diverse areas as engineering, economics, statistics, and accounting (US EPA 2004b).

aufwuchs: See *epilithon*. *Syn. periphyton*.

autogenic: Pertaining to an ecologic succession that resulted from factors originating within the natural community and altering its habitat (Jackson 1997: 44).

automatic belay: A *belay* system that does not require a *belayer* to activate (Smith and Padgett 1996).

automatic deflation valve (**ADV**): Device on a *buoyancy compensator* that allows for rapid air purging (Huth 2005).

automatic diluent valve (**ADV**): A device on a *rebreather* that adds *diluent* to the breathing mix (Huth 2005).

autonomous underwater vehicle (**AUV**): Remote controlled underwater vehicle with a camera and often data collection features used in environments consid-

ered too dangerous for divers, such as at great depths or in sea caves with strong surf (FCTCKS 2005). See *remotely operated vehicle* (*ROV*).

autotroph: From Greek *autos* (self) + *trophos* (nourishment; to feed; feeder). An organism capable of manufacturing its food from simple raw materials (such as ammonia or carbon dioxide), using light or chemical compounds as an energy source (FCTCKS 2005). *Cf. heterotroph*.

AUV: *Abb. autonomous underwater vehicle*.

available supply: The greatest amount of an accessible water supply including surface water, *groundwater*, and any water purchased (FCTCKS 2005).

aven: 1. A vertical shaft open to the surface (Jackson 1997: 45). 2. A hole in the roof of a cave passage that may be either a large blind roof-pocket or a tributary inlet shaft into the cave system. A feature described as an aven when seen from below may equally be described as a shaft when seen from above, and the naming of such a feature commonly depends purely upon the direction of exploration. Many avens close upward to impenetrable fissures but may still be important hydrological routes; few caves are without them (Catherman 2004). *Cf. dome pit*. 3. A dome or vertical extension up from a cave passage or chamber, not open to the surface, though many sometimes lead to an upper passage (Padgett and Smith 1992: 316). *Cf. blind shaft*.

autotroph: An organism that makes its own food from light or chemical energy.

average-daily demand: A water system's average daily use based on total annual water production (total annual gallons or cubic feet divided by 365) (FCTCKS 2005).

average discharge: As used by the U.S. Geological Survey, the arithmetic average of all complete water years of record of surface water discharge whether consecutive or not. The term "mean," on the other hand, is used for monthly averages and for annual mean discharges (USGS 2004b).

AWTP: *Abb.* advanced wastewater treatment plant.

azimuth: *Compass* direction. The horizontal angle, ranging between 0° and 360°, measured between magnetic north and the target station (Dasher 1994: 181).

B

backflow: A reverse flow created by a difference in water pressure that causes water to flow back into the distribution pipes of a drinking water supply from an unintended source (Wyman and Stevenson 2001: 34). *Syn.* back siphonage.

back gas: The gas breathed from the diver's primary set of tanks, usually *doubles* mounted on the diver's back (FCTCKS 2004).

backmount: A passage large enough for a diver wearing double tanks on the back to swim comfortably through (FCTCKS 2004). *Cf. sidemount*.

backmounts: Breathing *cylinders* worn on a diver's back (Balcombe et al. 1990: 262).

backplate: A molded metal (stainless steel or aluminum) plate that rests between the diver's back and the *wings*, providing support for the *harness* and *tanks* (FCTCKS 2004).

backscatter: The reflection of light from material in suspension in the water (Balcombe et al. 1990: 262).

backsight (**back-sight**): A *compass* or *clinometer* sighting made in the direction opposite to the survey's direction-of-travel; i.e., from the *to-station* to the *from-station* (Dasher 1994: 181).

backup: Redundant equipment or procedures for safety purposes (FCTCKS 2005). *Cf. redundant system*, *redundancy*.

backup knot: A knot used to insure that the first knot maintains its integrity by minimizing the opportunity for the main knot to slip apart (Smith and Padgett 1996: 342).

backup light: A secondary light source carried on the dive in case the primary light fails. Redundancy dictates cave divers carry at least three light sources, therefore most cave divers will have two backup lights on any dive (Farr 2003).

bacon: A *speleothem* that is a thin sheet of semitranslucent *dripstone* hanging lengthwise from the cave ceiling and having alternating bands of color, such as light *calcite* and dark iron deposits. Remarkable in its resemblance to the edible food bacon (FCTCKS 2005). *Syn*. bacon rind.

bacon rind: See *bacon*.

bacteria: Single-celled *microorganisms* that lack chlorophyll and an evident nucleus (Bates and Jackson 1984: 40).

bacterial phages: Viruses that attack specific bacteria, used as *deliberate tracers* in groundwater tracing. In dye tracing studies, the phages are injected into an injection point along with the dye. At the discharge point, the person checking the results would check for the dyes and the bacteria. If the phages are present, then they traveled along with the bacteria and in effect are used as confirmation of the dye trace (FCTCKS 2005). *Syn*. bacteriophage.

bacterial water contamination: The introduction of unwanted bacteria into a water body (Lenntech 2005).

bacteriophage: See *bacterial phage*.

bad air: In a cave, an atmosphere with reduced levels of oxygen (O_2) or elevated levels of carbon dioxide ($CO_{2)}$ or other gases (Smith and Padgett 1996).

bajar: (Spanish) *v*. To descend or go down (Smith and Padgett 1996).

bailout bottle: An additional SCUBA tank and regulator taken on a dive as an emergency supply of breathing gas (Stone and AmEnde 2002). *Cf. buddy bottle*, *pony bottle*.

balcony: A projection from the wall of a cave large enough to support one or more people (Monroe 1970).

BAR: Unit of pressure equivalent to 10^5 Newton per square meter (approximately one *atmosphere*). Equivalent to 1.013 ata; an imperial unit of measure (Balcombe et al. 1990, Huth 2005).

barbels: Whiskerlike fleshy feelers located at the chin and mouth of some fish, particularly catfish (FCTCKS 2005).

bare karst: See *exposed karst*.

"**barf**": A term used (shouted) when a ridge-walking Florida caver either wants

to know where the other cavers in the group are located, or to announce to the other cavers that he or she has found a cave (FCTCKS 2004).

barotrauma: Physical damage to the body as a direct result of pressure change (Heine 1995: 277). *Cf*. *squeeze*.

basalt: A dark-colored igneous rock, commonly volcanic, composed primarily of calcic plagioclase and pyroxene (Bates and Jackson 1984).

base: 1. Foundation or establishment point for an idea, concept, survey, or other information. 2. A compound that yields hydroxide ions or attracts hydrogen ions when dissolved in water. A substance that is neutral (with a pH greater than 7.0) (FCTCKS 2005). *Syn*. *basicity*.

base flow: Sustained or fair-weather flow of a stream, not attributable to direct runoff from precipitation or snow melt, whether or not affected by the works of man. It is the surface water flow derived from and sustained by groundwater discharge (Langbein and Iseri 1960, Field 2002).

baseline data: Collected information regarding the biological, chemical, and physical properties of an ecosystem, often prior to an activity that could result in the pollution of that ecosystem but also as background data for comparisons over time (Wyman and Stevenson 2001).

baseline period: A specified period of time during which collected data are used for comparisons with future data (SFWMD 2002).

basement: The crust of the Earth below sedimentary deposits (Jackson 1997).

basic: Having a pH greater than 7 (FCTCKS 2005). *Syn*. *alkaline*. See *base*. *Cf*. *acidic*.

basic ascender: See *jammer*.

basicity: See *base*.

basin: 1. See *drainage basin*. 2. The open water area outside a submerged cave or cavern (FCTCKS 2004).

basin (**groundwater**): See *drainage basin*.

basin (**surface water**): See *drainage basin*.

bat: A mammal of the order Chiroptera, from the Latin *chiros* (hand) and *ptera* (wing), found worldwide in temperate and tropical climates. The only mammals capable of true flight, with forelimbs having membranes stretched between the elongated fingers on each hand. Nocturnal, bats use echolocation as a guide in flight and to identify food sources. Note that although bats are not *troglodytic*, several species are commonly found in Florida caves, which use caves as shelter, roosts for hibernation, or as maternity roosts (Franz et al. 1994, FCTCKS 2005).

bat gate: See *gate*.

bathymetry: The science of measuring underwater surface features (i.e., a lake bed) (FCTCKS 2005).

bathymetric map: A map of the underwater topography of a body of water (FCTCKS 2005).

BC: *Abb*. *buoyancy compensator*.

BCD: *Abb*. buoyancy compensation device. See *buoyancy compensator*.

BCRA: *Abb*. British Cave Research Association.

bearing: A *compass* reading, referenced to magnetic north or south, where the compass dial is divided into four equal quadrants. It is commonly used to refer to the horizontal compass direction measured in 0 to 360 degrees (Dasher 1994, FCTCKS 2005).

bed: The smallest formal *lithostratigraphic* unit of sedimentary rocks (Bates and Jackson 1987).

bedding plane: A surface or layer in a rock unit that separates strata of different characteristics (Field 2002).

bedding squeeze: See *squeeze*.

bed load (**bedload**): Sediment comprising heavy or large particles transported by flowing water on or near the bottom (FCTCKS 2005).

bedrock: A general term for the rock that underlies soil or other unconsolidated, superficial material (Jackson 1997: 61).

belay: A method of protecting a climber or a person on rappel in case of a fall. A safety rope attached to the harness is fed out or taken in by the *belayer* as the climber or person on rappel moves. By controlling tension on the rope, the belayer can stop the climber or person rappelling from falling (Padgett and Smith 1992). See "*on belay*."

belayer: The person who controls the tension on the rope of a climber or a person rappelling (Smith and Padgett 1996).

belaying: The act of maintaining a belay or safety (Smith and Padgett 1996: 342).

bellholes: Cylindrical, symmetrical holes in cave ceilings. Believed created by bats roosting consistently in one place and eroding the rock over time with their claws and their acidic breath and urine. This hypothesis is further supported by the presence of bell basins often found directly underneath bellholes containing bat guano and decreasing in frequency (along with the bellholes) with distance from the entrance (Wilford 1966).

belly crawl: A cave passage that is so low you can travel through it only by squirming along in a prone position. Ceiling height is usually less than 18 inches (45.7 cm). (Catherman 2005)

benchmark: 1. Any fixed point within a cave used for reference, typically in *survey* (FCTCKS 2004). 2. A measure of progress toward a goal taken at regular intervals prior to the anticipated attainment of the goal (US EPA 2004b).

benchmark (**station**): A permanent survey station of known position, used as a reference point for subsequent surveys (Dasher 1994: 181).

bends: Colloquialism. *Syn*. *caisson disease*, decompression illness, *decompression sickness*.

bent: Colloquialism. Having or having had symptoms of *decompression sickness* (FCTCKS 2005).

benthic: From Greek *benthos* (bottom). Referring to the habitat or the organisms living on or in the substrate, or bottom, of a stream, pond, lake, or the ocean (Jackson 1997).

benthic invertebrate: An insect, mollusk, crustacean, worm, or other organism

without a backbone that lives in, on, or near the bottom of streams, lakes, or oceans (USGS 2004b).

benthic macroinvertebrates: See *benthos*.

benthic zone: Lower regions and bottom of a water body (FCTCKS 2005). See *benthos*.

benthos: Those forms of aquatic life that are bottom dwelling; also, the ocean bottom itself. Certain fish that are closely associated with the benthos may be included (Jackson 1997: 63). *Syn*. benthic macroinvertebrates, *infauna*, macrobenthos (US EPA 2005a).

benzene (**C_6H_6**): The simplest aromatic hydrocarbon. A colorless flammable toxic liquid made from petroleum and coal and used in manufacturing as a solvent and in gasoline; a known human carcinogen. Prolonged exposure leads to harmful effects. Benzene has a long history of use as a solvent and as a starting compound for the synthesis of a variety of other materials and is now also used extensively in the rubber, paint, and plastic industries. The liquid is volatile, and emissions are regulated as toxic air pollutants. (Wyman and Stevenson 2001, US EPA 2004).

best management practices (**BMP**): A practice or combination of practices, including preventative actions or structural improvements, based on sound science and professional judgment to be the most effective and practicable onsite means of preventing negative water quality impacts (FDEP and FDCA 2002).

bezel: A rotating ring on a *compass* or watch that can be set as a reference (Heine 1995: 277).

bias: An error in data gathering or analysis caused by faulty program design, mistakes by personnel, or limitations imposed by available instrumentation (Wyman and Stevenson 2001: 42).

bicarbonate: A salt containing the anion HCO_3. When acid is added, this ion breaks into H_2O and CO_2, and acts as a buffer (Lenntech 2005).

bight: A U-shaped bend formed in a rope by grasping a middle section of the rope with one hand (Smith and Padgett 1996: 342).

biner: Short for *carabiner* (Smith and Padgett 1996: 342).

bioaccumulation: The progressive increase in the amount of a chemical in an organism that results when the uptake, or absorption, of the substance exceeds its breakdown or excretion rate. Chemicals likely to be biologically accumulated are not readily decomposed in either the environment or an organism and are likely stored in fatty tissue (Wyman and Stevenson 2001). *Syn*. bioconcentration, biological accumulation, biological amplification, biological concentration. *Cf*. *biomagnification*.

bioassessment: See *biological assessment*.

bioavailability: The degree to which chemicals can be taken up by organisms (US EPA 2005a).

biocalcarenite: A *calcarenite* containing abundant fossils or fossil fragments; rarely used (Jackson 1997).

biochemical oxygen demand: *Syn*. *biological oxygen demand*.

biocriteria: See *biological criteria*.

biodegradable: Pertaining to substances that can be broken down or decompose by natural processes (FCTCKS 2005).

biodiversity: See *biological diversity*.

biogenic: Created or produced by living organisms; having a biological origin (FCTCKS 2005).

biogeochemistry: The study of the transformation and movement of biological, geological, and chemical materials to and from the *lithosphere*, the *atmosphere*, the *hydrosphere*, and the bodies of living organisms (Wyman and Stevenson 2001).

biological accumulation: See *bioaccumulation*.

biological assessment (**bioassessment**): Evaluation of the biological condition of a body of water using biological surveys and other direct measurements of resident biota in surface waters (US EPA 2005a). See *habitat assessment*.

biological concentration: See *biomagnification*.

biological criteria (**biocriteria**): Numerical values or narrative descriptions that depict the biological integrity of aquatic communities (US EPA 2003b). See *narrative biological criteria*, *narrative standard*, *water quality standard*.

biological diversity (**biodiversity**): The variety of different species, the genetic variability of each species, and the variety of different ecosystems that they form. Diversity can be categorized in terms of the number of species, the variety in the area's plant and animal communities, the genetic variability of the animals, or a combination of these elements (IFAS 2004 and 2005).

biological magnification (**biomagnification**): See *biomagnification*.

biological monitoring (**biomonitoring**): Use of a biological entity as a detector and its response as a measure to determine environmental conditions. Toxicity tests and ambient *biological surveys* are common biological monitoring methods (US EPA 2005).

biological oxidation: Any series of reactions in or by biological organisms that results in the metabolism, degradation, or decomposition of organic *molecules*. Processes that require the participation of living organisms (Wyman and Stevenson 2001). *Cf*. *oxidation*.

biological oxygen demand (**BOD**)- The amount of dissolved oxygen in a given quantity of water and the rate of metabolism of the oxygen by aquatic microorganisms (aerobic decomposers) (FCTCKS 2005). *Syn*. biochemical oxygen demand.

biological survey (**biosurvey**): Collecting, processing, and analyzing a representative portion of the resident community to determine its structural and/or functional characteristics (US EPA 2005a).

biomagnification: An increase in the concentration of heavy metals (such as mercury) or organic contaminants (such as chlorinated hydrocarbons) in organisms as a result of their consumption within the food chain. Chemicals likely to undergo biomagnification are not readily decomposed in the environment or metabolized by an organism and are usually stored in the fatty tissues (Wyman

and Stevenson 2001). *Syn*. biological concentration, biological magnification. *Cf*. *bioaccumulation*.

biomass: The total weight of living organisms in a given ecosystem, at a particular time and trophic level, usually organic and renewable (Elliott 1999).

biomonitoring: See *biological monitoring*.

biorecon: Biological reconnaissance. A screening tool version of the Stream Condition Index (SCI), where only four dip-net sweeps of the most productive habitats are sampled. The organisms are sorted in the field and identified in the laboratory. Thresholds specific to this method have been established. If a measured site exceeds the threshold in two out of the three metrics calculated (a subset of the seven metrics used in the SCI), the site is considered healthy (FDEP 2004e).

bioregion: An area where the groups of plants and animals and the physical features (such as depth, sediment type, and climatic regime) are sufficiently distinct from the surroundings at a chosen scale (AMNH 2002).

biospeleology: The scientific study of cave and the organisms that live in caves (FCTCKS 2005).

biosphere: The totality of life on Earth; the parts of the solid Earth, *hydrosphere,* and atmosphere in which living organisms can be found (Tarbuck and Lutgens 1997: 616).

biostratigraphic zones: See *zonation*.

biostratigraphy: The element of *stratigraphy* that deals with the distribution of fossils in the stratigraphic record and the organization of *strata* into units on the basis of fossils contained (Jackson 1997).

biosurvey: See *biological survey*.

biota: All living organisms of an area; flora and fauna collectively (Jackson 1997: 68).

biotic: Having to do with life, living organisms, and live systems (FCTCKS 2005). *Cf*. *abiotic*.

biotic community: *Syn*. *community*.

bivalve: 1. Having a shell composed of two distinct and usually moveable parts, equal or subequal, that open and shut. 2. A bivalve animal, such as a rostroconch, a brachiopod, or an ostracod; specifically a mollusk of the class Bivalvia (Pelecypoda), including the clams, oysters, scallops, and mussels (Jackson 1997: 70).

blackwater (**black water**): 1. Tannin-stained water that appears dark relative to clearer waters observed in spring conduits, caves, and spring runs. Rivers and streams containing water with a pH less than 6 and a color value greater than 275 platinum-cobalt units (Paulic and Hand 1996). 2. Sewage released from toilets (Wyman and Stevenson 2001: 49). *Cf*. *gray water*, *tannic water*.

blade: In a cave, a thin sharp projection jutting out from a roof, wall, or floor, of which it is an integral part, generally the remains of a partition or bridge (Field 2002: 20).

Blaney-Criddle equation: An equation used to estimate the rate of evaporation for a given vegetation type. Another equation often used in such studies is the *Thornthwaite equation* (Wanielista et al. 1997).

blind shaft: A cylindrical shaft in a cave extending up but not reaching the surface; narrow and tall (FCTCKS 2005). *Cf. chimney*, *shaft*.

blind (karst) valley: A stream valley that terminates abruptly at a *sinkhole* or *swallow hole* (modified from SDII Global Corp. 2002).

blitz a cave: *Syn*. trash a cave, *trash*.

block: 1. *Pulley*. 2. Large section of trunk wood. 3. See *ascender box* (Smith and Padgett 1996: 342). See *block and tackle*.

block and tackle: 1. A mechanical advantage pulley system. Most often a standard block and tackle system uses two double sheave pulleys and produces a mechanical advantage of 4 to 1 (Smith and Padgett 1996: 342). 2. A series of pulleys linked together by a rope to give increased lifting ability depending on the configuration of pulleys. Block refers to the pulleys. Tackle refers to the rope (FCTCKS 2004).

blowhole: A hole to the surface in the roof of a cave through which water or air forcibly and loudly blows (FCTCKS 2005).

blowing cave: A cave with strong air flow blowing in or out of the entrance for extended periods. Changes in barometric pressure are believed to be the cause. "If it blows, it goes" (McClurg 1996). *Cf*. breathing cave.

blowing well: A well that will draw in and emit air with noticeable force owing to changes in barometric pressure or tidal action on the underlying aquifer (Catherman 2005).

blown out: Colloquialism. Descriptive term used when referring to a submerged cave system that has lowered or zero *visibility* as a result of human or natural causes. Normally due to algal blooms, rainfall and flooding events, or the use of poor diving techniques that stir up silt and sediments (FCTCKS 2004). See *zero visibility*.

"blue baby syndrome": Methemoglobinemia. A condition most common in babies and certain elderly people that can be caused by ingestion of high amounts of *nitrate*, which results in the blood losing its ability to effectively carry oxygen. Because nitrate poisoning limits blood's ability to carry oxygen, this syndrome causes the baby to look blue hued (USGS 2004b, US EPA 1998).

blue hole: Flooded cave system, at or below sea level and usually located in salt water (typically in the Caribbean), formed by freshwater when sea levels were lower. Known as blue holes for their intense blue water as compared to the surrounding seawater or vegetation (Farr 2003, FCTCKS 2004). *Syn*. *submarine cave*. *Cf*. *anchialine cave*, *littoral cave*, *marine cave*, *offshore spring*.

BMP: *Abb*. See *best management practices*.

bobbin: A descending device of European origin utilizing two fixed-friction wheels (capstans) made of aluminum. The rappel rope is snaked through the device (Smith and Padgett 1996: 343).

BOD: *Abb*. See *biochemical oxygen demand*.

body belay: A belay where the rope is wrapped around the belayer's body to gener-

ate friction to stop a fall. Friction is generated between the rope and parts of the belayer's body (Smith and Padgett 1996).

bog: See *fen*.

boil: Variable discharge from a spring in which hydrostatic pressure is great enough to cause a turbulent discharge (Field 1999). *Syn*. boiling spring, *spring boil*. *Cf*. *sand boil*.

boiling hole: A common term for blue holes that discharge with enough force to cause the water to appear to be boiling on the surface. A Jamaican term for a *resurgence* (FCTCKS 2005). See *boil*.

bolt: A device placed into rock that can be used as an *anchor* in conjunction with a hanger (Smith and Padgett 1996: 343).

booties: Worn on feet and made of *neoprene* to protect the feet from cold water and chafing against the fins during the dive. A drysuit has attached feet so booties are not necessary. A wetsuit does not have attached feet, and booties are essential (FCTCKS 2004)

booty: n. *Syn*. virgin cave, *virgin passage* (Rea 1992).

borehole: 1. A hole or well made with drilling equipment (Wyman and Stevenson 2001). 2. Synonym for a well-developed phreatic tube passage large enough for a human to walk or swim through (Lowe and Waltham 1995).

bottle, bottles: In diving, used synonymously with *tank* and *cylinder*, although usually denoting a smaller tank for special uses or used during decompression (FCTCKS 2005). See *bailout bottle*, *buddy bottle*, *pony bottle, stage bottle*.

bottled water: Water meeting all applicable federal and state standards, sealed in a sanitary container, and sold for human consumption (Wyman and Stevenson 2001).

bottom belay: A belay done from the bottom of the rope where the belayer can apply more or less tension on the rope to correspondingly slow or speed up the descent. During a rappel a belayer can pull down on the bottom of a rope and bind up or cause additional friction in the rappel device arresting the descent of the person on rope (Smith and Padgett 1996).

bottomed out: Colloquialism. Reaching the bottom of a pit or the lowest point of a dry or submerged cave (FCTCKS 2005).

bottom gas: *Syn*. *bottom mix*.

bottomland forest: See *bottomland hardwoods*.

bottomland hardwoods: Forested wetlands common along rivers in the southeastern United States. The areas are flooded part of the year and typically include stands of deciduous trees, those with broad leaves that drop in winter. These forests provide valuable wildlife habitat (Wyman and Stevenson 2001). *Syn*. bottomland forest.

bottom mix: A breathing mix used at the deepest portion or "working depth" of the dive (Mount and Gilliam 1993: 377). *Syn*. bottom gas.

bottom time (BT): The time from the beginning of a dive to arrival at the deepest decompression stop (Farr 2003: 122).

bottom timer: A simple dive computer that records current depth, maximum depth, and time (FCTCKS 2004).

boulder zone: A highly porous and permeable cavernous zone of limestone within the lower Floridan aquifer system (SFWMD 2005a).

bounce: The act of rappelling into a pit and immediately ascending to the surface (Smith and Padgett 1996).

bounce dive: A dive that involves rapid descent to depth, followed by a short time at depth, then a return to the surface. It is also sometimes used to refer to a part of the dive following the same pattern. For example, if your dive puts you near the ceiling at a depth of 90 fsw (27 msw), with the floor below at 160 fsw (48.8 msw), a rapid trip to briefly scout the 160 fsw (48.8 msw) area could be called a bounce (Saltsman 1995: 201).

bowline: A reliable knot used to form a loop and commonly used to secure a rope to a rigging point, especially when used with a backup knot (Smith and Padgett 1996).

Boyle's Law: For any gas at a constant temperature, the volume will vary inversely with the absolute pressure while the density will vary directly with the absolute pressure (Heine 1995: 277).

brackish: Pertaining to water with a chloride level greater than 250 milligrams per liter (250 ppm) and less 19,000 milligrams per liter (19,000 ppm). Water with salinity intermediate between seawater and freshwater (containing from 1,000 to 10,000 milligrams per liter of dissolved solids) (SFWMD 2005b, USGS 2004b). *Cf. freshwater*, *saline water*, *seawater*.

bradycardia: Slowing of the heart rate caused by cold water contact on the face and body (Heine 1995: 277).

braided passage: A cave passage that is intertwined and mazelike, similar to branchwork passage (FCTCKS 2005). See *branchwork cave*.

braided sheath: The woven outer covering that protects the inner core of a climbing rope (Smith and Padgett 1996).

braided stream: A stream characterized by an interlacing or tangled network of several small branching and reuniting shallow channels (USGS 2004b).

brake bar: A short metal bar with a hole at one end where it is threaded into a *rack* or a *carabiner*. On the other end is a slot, which fits snugly against the other arm of the *rappel* device. These bars provide the primary source of friction for both the carabiner (or brake-bar rig) and the rappel rack. Some variations are constructed differently (Padgett and Smith 1992: 318).

brake-bar rack: A friction rappelling device composed of an elongated U-shaped metal rod together with four or more metal brake bars hinged at right angles to one side of the U-shaped rod and extending across to overlap on the other leg of the U-shaped rod. There are numerous variations on the theme. The U-shaped rod is usually made of 5/16–inch (0.8 cm) stainless steel. The end of one leg of the U-shaped rod may have an eye for attachment to a *sit harness*. The brake bars may be made of aluminum, steel, or stainless steel, and their cross sections may be solid round, solid square, hollow round, or hollow U-shaped. The brake-bar rack is the most versatile descending device, and is the *descender* of choice for on-rope rescues on account of its variable friction adjustment and ability to handle rescue loads (FCTCKS 2005).

brake hand: See *braking hand*.

braking hand: The hand that allows the rope to slide through it before it enters the rappel or *friction device*. Gripping the rope or pressing it against one's thigh can add substantial friction to the system (Smith and Padgett 1996: 343). *Syn*. brake hand, *control hand*.

branchwork cave: A branching system of underground conduits with passages that join successively to form larger passages (FCTCKS 2005). *Syn*. *dendritic*. *Cf*. *braided passage*, *maze cave*.

breakdown: 1. Large slabs, blocks, or chips of stone that have fallen from the ceiling or walls of a cave and are often challenging to explorers and evacuation teams (Smith and Padgett 1996). 2. The action of disassembling one's system of equipment after a cave dive (FCTCKS 2004).

breakdown, **terminal**: Breakdown that blocks the passage, preventing further access (FCTCKS 2004).

breakdown product: A compound derived by chemical, biological, or physical action upon a pesticide. The breakdown is a natural disintegration process that results in *compounds* different from the original compound that may be more or less toxic and more or less persistent than the original compound (USGS 2004b).

breaking strength: The point at which destructive testing destroys the object being tested (Smith and Padgett 1996: 343–344).

breakthrough curve: A plot of a *tracer* signal or concentration over time marking the tracer passage as measured at a single sampling location from background levels to peak concentration and back to background levels (FCTCKS 2005).

breath-hold diving: Diving while holding your breath (FCTCKS 2005). *Syn*. *free dive*, *skin diving*.

breathing cave: 1. Movement of air in and out of a cave entrance at intervals (Gillieson 1998: 304). *Syn*. cave breathing. 2. A cave whose entrance blows and sucks air at different times as a result of *adiabatic* atmospheric changes, temperature differences between two or more entrances, cross ventilation between two or more entrances, or the Venturi effect of in-cave stream waters "pulling" air through a cave with two or more entrances (FCTCKS 2005).

breathing loop: The hoses, *canister*, and *counterlung* in a *rebreather* along with the diver's lungs (Huth 2005).

breathing resistance: The work of breathing. A measure of the amount of effort required to breathe using a type of diving equipment (Bozanic 2002).

breccia: A coarse-grained clastic rock, composed of angular broken rock fragments held together by a mineral cement or a fine-grained matrix (Bates and Jackson 1984: 65). *Cf*. *rubble*.

bridge: May be a natural bridge of bedrock normally formed outside a cave entrance by partial collapse leaving an isolated roof segment. Rock bridges may also occur inside caves as a result of either surrounding phreatic dissolution or collapse between superimposed passages. Another common type inside a cave is a span of false floor where sediment is washed from below (Catherman 2005). *Cf*. *natural bridge*.

brine: Water that contains more than 35,000 milligrams per liter of dissolved solids (USGS 2004b).

Brunton compass: A type of surveying instrument, also called a hand-held transit. Can be used to measure *inclination*, *azimuth*, *dip*, and *strike* (Dasher 1994: 181).

BT: *Abb. bottom time.*

BTEX: Acronym used to refer to the common hydrocarbon constituents of gasoline: *benzene*, toluene, ethylbenzene, and xylene. When gasoline migrates into groundwater, analytical tests for these chemicals can be used to detect its presence (Wyman and Stevenson 2001: 53).

bubble: See *freshwater lens*.

bubble check: During the beginning of a dive, the mutual act of checking each other's gear for leaks (i.e., bubbles) (FCTCKS 2004).

buddy: A diving partner or team member (Huth 2005).

buddy bottle: 1. A *cylinder* of breathing gas taken on a long dive for emergency use only (Balcombe et al. 1990: 262). 2. A cylinder of breathing gas carried by a diver on *closed-circuit rebreather* whose buddy is diving open-circuit. Since the rebreather diver cannot share air from his own back gas, he can provide the bottle in an emergency (FCTCKS 2004). *Cf. bailout bottle*, *pony bottle.*

buddy system: A common safety measure whereby two people keep track of each other. In the confusion of a critical incident these precautions often prove invaluable when accounting for personnel (Smith and Padgett 1996: 344). *Syn.* buddy diving.

budget (**water use**): See *water budget*.

buffer: Undisturbed vegetative zone between a land use and a spring. These zones are meant as a protective barrier between the resources and harmful activities (FDEP and FDCA 2002: 112).

buffering: Creating an area of a specific size around a feature usually for the purpose of protecting from incompatible uses that may impact the area. For example, the area surrounding a spring or bordering a river may have a buffer that excludes septic systems (FCTCKS 2005).

bungee cord: Elastic cord used in rope climbing systems and for maintaining tension on components of a haul system. Used in cave diving to secure gear (Smith and Padgett 1996, FCTCKS 2005).

buoyancy: The ability of a diver to maintain a position within the water column, rising and falling within the water column by using air pressure within buoyancy compensation devices and the lungs (Saltsman 1995). See *buoyancy compensator*, *negative buoyancy*, *neutral buoyancy*, *positive buoyancy*.

buoyancy compensation device (BCD): See *buoyancy compensator*.

buoyancy compensator (**BC**): A piece of diving equipment containing a waterproof bladder and a mechanism for filling and purging gas supplied from the diver's *tanks*. The BC can resemble a variety of forms, with the vest-jacket and the wing styles being most common (Stone and AmEnde 2002, FCTCKS 2005). *Syn.* buoyancy compensation device (BCD).

buret: A graduated glass measuring tube used for measuring and releasing small and precise amounts of liquid (US EPA 2003b). *Syn*. burrette.

burette: See *buret*.

burst disk: A thin metal disk found in all U.S. valves as a safety feature designed to rupture and relieve excessive pressure in a *cylinder* (Heine 1995: 277).

butterfly knot: A midline loop knot (Smith and Padgett 1996: 344).

butt-mounted: Gear clipped across a cave diver's bottom (FCTCKS 2004).

C

Ca: See *calcium*.

cable ladder: 1. Ladder comprising two metal cables made usually of stainless steel with rungs of lightweight metal tubing such as aluminum, 15.2–20.3 centimeters (6–8 inches) wide, spaced about 45.7 cm (18 inches) apart. It can be rolled into a compact, lightweight bundle for transport ease (Catherman 2005). 2. Lightweight flexible ladder made with aluminum rungs and 3 mm (1/8 inch) aircraft cable. A common length is 10 meters (33 feet) (Smith and Padgett 1996: 344). *Cf*. *etrier*.

$CaCO_3$: See *calcium carbonate*. See also *aragonite*, *calcite*, *limestone*.

CADD: *Abb*. *computer aided drafting and design*.

Caecidotea: A genus of freshwater isopods that includes several cave-dwelling species. Currently known from numerous underwater caves and cave pools located in Central Florida north into the Florida panhandle and southern Georgia (FCTCKS 2004). See *Remasellus*.

caisson disease: *Syn*. *decompression sickness*. Named after the painful affliction incurred by caisson (bridge and tunnel) workers when working deep underwater and being raised to the level of the land surface. The increased air pressure at depth caused the worker's bodies to become saturated with nitrogen. When the workers were raised, the nitrogen came out of saturation, forming bubbles that caused localized injuries and great pain. The pain, felt mainly in joints, caused the workers to double over, leading to the common name of "the bends."(FCTCKS 2005).

calcarenite: A *limestone* consisting predominantly (more than 50 percent) of sand-sized *carbonate* grains; a consolidated calcareous *sand* (Jackson 1997).

calcareous: Containing *calcium carbonate* (FCTCKS 2004).

calcareous stream: *Syn*. *spring run* (FCTCKS 2004).

calcilutite: A *limestone* consisting predominantly (more than 50 percent) of detrital calcite particles of *silt* and/or *clay*; a consolidated *carbonate mud* (Jackson 1997). *Cf*. *micritic limestone*.

calcirudite: A limestone consisting predominantly (more than 50 percent) of detrital calcite particles larger than sand size (larger than 2 mm, about 1/12 inch, in diameter), and often also cemented with *calcareous* material, consolidated calcareous gravel or *rubble*, or a limestone conglomerate or *breccia* (Jackson 1997).

calcite: A common rock-forming mineral; CaCO3. It is trimorphous (formed as one-third of a mixture) with aragonite and vaterite. Calcite is usually white, colorless, or pale shades gray, yellow, and blue; it has perfect rhombohedral cleavage, and a vitreous luster, and it readily effervesces in cold dilute hydrochloric acid. It is the principal constituent of *limestone*; calcite also occurs crystalline in marble, loose and earthy in chalk, spongy in tufa, and stalactitic in cave deposits. It is commonly found as a cementing medium in clastic sedimentary rocks, and is a minor constituent of many igneous rocks. Calcite crystallizes in a variety of forms, such as nailhead spar, dogtooth spar, and Iceland spar (Jackson 1997).

calcite raft: A thin layer of crystalline carbonate material that floats on the surface of a still cave pool by surface tension (Rea 1992).

calcium (**Ca**): A white or silvery metallic element classified as an alkaline earth element. Calcium makes up 3 percent of the Earth's crust and is the fifth most abundant element there. Calcium is typically found in sedimentary minerals such as gypsum and fluorite, in *limestone* (*calcium carbonate*) and *stalactites* or *stalagmites*, and in the bones, teeth, and shells of animals. Calcium is essential for living organisms, a basic constituent of bone and teeth, and calcium ions are used by the body for functions such as transmission of nerve signals, muscle contraction, blood clotting, and proper heart function. Calcium imbalances can cause health problems. Calcium in the water can lead to *scale* and is an indicator of hard water (FCTCKS 2004).

calcium carbonate (**$CaCO_3$**): A component of mollusk shells and coral skeletons making up *chalk*, *limestone*, and marble. A salt that, when burned, yields lime. Creates a white precipitate that forms in hard water known as *scale*. Can be found in natural deposits or created either by the reaction of calcium chloride and sodium carbonate in water or by passing carbon dioxide through hydrated lime (FCTCKS 2004).

caliche: See *duricrust*.

call a dive: To end a dive at any time during the dive for any reason, by any member of a team of divers. Calling a dive usually refers to ending the penetration and returning to the point of entrance, but can also refer to canceling a dive before gearing up or getting into the water (FCTCKS 2004).

cam: 1. The working or moving part on most mechanical ascenders that pinches the rope against the shell or body of the ascender when a directional load is applied. 2. A generic term for an ascender using a cam device such as a *Gibbs ascender* (Smith and Padgett 1996).

***Cambarus* sp.**: See *crayfish*.

cam release: A lever found on most ascenders to release the capturing mechanism (Smith and Padgett 1996: 344).

cam straps: A quick strap used to attach dive equipment to a *tank*; consists of nylon *webbing* with a cam-style buckle (FCTCKS 2004).

canister: 1. Tubelike container that holds the batteries for the diver's *primary light* and to which the light head is attached through a cord (Huth 2005). See *canister light*. 2. In *rebreathers*, a device built to hold absorbent used to

remove carbon dioxide in exhaled breathing gas (Bozanic 2002: 523). *Syn*. stack.

canister light: A light used in cave diving in which the battery is held in a waterproof *canister* and a separate light head is attached to the battery via a waterproof cord (FCTCKS 2004).

canopy: 1. A *speleothem* of *flowstone* over a ledge with *stalactites* along the outer edge. 2. The treetop area of a forest. A canopy can make it difficult to find karst features from an airplane or aerial images (FCTCKS 2005).

canyon: A narrow chasm or valley with steep walls; frequently formed by running water (FCTCKS 2005).

CAPA: *Abb. critical aquifer protection area*.

capillary: Tiny blood vessel that joins arteries to veins in the body (Heine 1995: 277).

capillary action: The movement of water upward or through confined spaces as a result of cohesive forces and surface tension and despite gravity, such as through soil or fibers (FCTCKS 2005).

capillary depth gauge: An instrument that indicates depth via the compression of air in a transparent tube (Heine 1995: 277). *Cf. analog depth gauge*, *diaphragm depth gauge*, *digital depth gauge*.

capillary fringe: See *capillary zone*.

capillary zone: The soil area above the water table that can become saturated as a result of the cohesive forces of *capillary action* (FCTCKS 2005). *Syn*. capillary fringe.

capping (**a well**): See *plugging*.

capture (**stream**): The natural diversion of the *headwaters* of one stream into the channel of another stream having greater erosional activity and flowing at a lower lever; especially diversion affected by a stream eroding headward so rapidly as to tap and lead off the waters of another stream. In north Florida many streams have been captured (pirated) by underground flow paths (Jackson 1997, FCTCKS 2004). *Syn*. piracy, pirate stream.

carabiner: A metal link with a spring-loaded, hinged gate used for quickly connecting two or more pieces of equipment. It may be made of various alloys of steel, stainless steel, aluminum, or titanium. It may have a lock designed to prevent the gate from opening accidentally while in use. It comes in many shapes, including oval, D, and pear, and any of those may be twisted in order to change the direction of force vectors. It comes in many sizes, from hefty versions that can safely support hundreds of pounds to very small ones used for noncritical gear attachment. It is sometimes known as a karabina, crab, or krab (FCTCKS 2005).

carabiner wrap: An emergency rappel technique whereby the rope is wrapped around the spine of a carabiner. A single wrap produces a very fast rappel; two wraps can produce a controllable rappel. However, both are fixed friction (nonvariable) and both cause the rope to bend through a severe radius, possibly causing rope damage. Locking carbines are best if this technique must be used (Smith and Padgett 1996: 344).

carbide, calcium carbide (**CaC_2**): A chemical compound of carbon and metal. With the addition of water *acetylene* gas is created, used in caving and mining lamps (lights) (FCTCKS 2005).

carbide lamp: A lamp that produces an orange-white light by burning self-generated *acetylene* gas. Typically the lamp has an upper chamber filled with water and a lower chamber containing calcium carbide. Water is gravity-fed through a tube with an adjustable flow rate to the calcium carbide where a chemical reaction produces acetylene gas, which is then vented through a jet and burned using atmospheric oxygen. It often has a metal reflector to focus the light forward (FCTCKS 2005). *Cf. acetylene*.

carbon-14 dating: A method of determining an age in years by measuring the concentration of carbon-14 remaining in an organic material, usually formerly living matter, but also dissolved bicarbonate. The method is based on the assumption that assimilation of carbon-14 ceases abruptly on removal of the material from the Earth's carbon cycle (i.e., the death of the organism) and that it thereafter remains a closed system. The method is generally considered useful in determining ages in the range of 500–30,000 or 40,000 years (Jackson 1997).

carbonate: 1. A salt of carbonic acid; a compound containing the radical CO^{3-2}, such as calcium carbonate, $CaCO_3$. 2. A rock that consists mainly of carbonate minerals, such as *limestone* or *dolomite* (Field 2002). The carbonate ion forms a solid precipitant when combined with the dissolved ions of calcium or magnesium (Wyman and Stevenson 2001).

carbonate hardness: Water *hardness* caused by the *carbonate* and bicarbonate byproducts of calcium and magnesium (Lenntech 2005).

Carbonate Island Karst Model: A model for karst development on islands that is distinctly different from karst development found on continents and in the interior of larger islands. Defines the unique interaction between fresh and saline groundwater in immature rocks (Stafford et al. 2003: 17).

carbonation, groundwater: See *carbonic acid dissolution*.

carbon dioxide (**CO_2**): A gas formed during organic decomposition and respiration (Zokaites and O'Malley 2000: 127).

carbonic acid dissolution: *Dissolution* of *limestone* (*calcium carbonate*) by carbonic acid (H_2CO_3) created from the carbon dioxide reacting with water. The reaction can be considered in several ways but it is most simply represented as: $CaCO_3 + CO_2 + H_2O = Ca(HCO_3)_2$. The reaction is reversible. The solution containing the dissolved reaction product, usually termed calcium bicarbonate, can lose carbon dioxide to the atmosphere and precipitate calcium carbonate. This process is responsible for the development of *speleothems* underground and tufa or *travertine* at the surface (Catherman 2005).

carbon monoxide (**CO**): A colorless, odorless gas produced by incomplete combustion of carbon and similar products, such as gasoline. Can build up in caves and burns with a bright blue flame. Can be inadvertently compressed in divers' breathing mix when engine exhaust is too close to air compressors or compressor filters are faulty. Interferes with the blood's ability to carry oxygen to the

body's tissues and results in adverse health effects, leading to death by asphyxiation (FCTCKS 2004).

Caribbean karst: A descriptive term for *karst* found in relatively flat areas (e.g., Florida and Mexico's Yucatan peninsula) characterized by *sinkholes*, sinkhole ponds, disappearing streams, crystal clear springs, and underground caverns that are often filled with water (UWSP 2005). *Cf. temperate karst*, *tropical karst*.

Cartesian coordinate: Any two or three coordinates that locate a point in area or space and measure its distance from a given point of intersection in those planes (Burge 1988: 121). *Cf. polar coordinates, rectangular coordinate*.

Cartesian coordinate system: A coordinate system utilizing three distances; east-west, north-south, and vertical; all originating from a fixed point-of-origin (Dasher 1994: 181). *Syn. rectangular coordinate*, X, Y, Z coordinate system.

cartographer: A person who makes maps.

cartography: With reference to caves, exploring and surveying with attention to passage detail, recording data, plotting, and drafting (mapping) to produce a map showing the contours and details of the cave passages, names, North arrow, topographic contours, and other details (Catherman 2005).

catadromous: Spending life in freshwater and returning to salt water to spawn. Florida's freshwater eels are catadromous; females spend much of their lives within the springs, returning to the marine environment to spawn (FCTCKS 2004). *Cf. anadromous*.

catheter: Used by divers who have a *P-valve* in their *drysuits* to allow urination during a dive (FCTCKS 2004).

cation: An atom with a positive charge by virtue of having lost one or more electrons (FCTCKS 2005).

caustic cocktail: In a *rebreather*, a potentially life-threatening condition in which a caustic solution (formed by *absorbent* being dissolved in water in the breathing loop) is delivered to the diver through the mouthpiece (Bozanic 2002).

cave: A natural opening or series of openings to underground passages large enough to be entered by an adult person. Openings are usually referred to as *caverns*, while the *dark zone* past the reach of natural light is referred to as the cave (Monroe 1970, FCTCKS 2004).

cave adapted: See *troglomorphic adaptation*.

cave breathing: See *breathing cave*.

cave conservation: Managing caves with an overall awareness and concern for the cave ecosystem. Protecting and preserving the natural function of the cave ecosystem. Cave conservation includes good landowner relations, mapping and survey, comprehensive scientific study of the cave, and monitoring and protective regulations to minimize negative impacts (FCTCKS 2004).

cave coral: Small knobby or nodular *speleothems* consisting of short stalks with bulbous ends that grow in patches in cave pools or on surfaces within caves (Monroe 1970). *Syn.* popcorn.

cave country: In Florida cave diving, the geographical area in north central Florida encompassing the Suwannee, Santa Fe, and Withalacoochee Rivers. In

general, any area with a large concentration of dry or submerged cave passages (FCTCKS 2005).

cave depth: The total vertical extent of a cave, from the highest survey station to the lowest, measured only along the vertical plane (Dasher 1994: 181).

cave dive: Usually, any SCUBA or rebreather-supported dive under a naturally occurring rock ceiling (Prosser and Grey 1992).

cave diver: A trained person who enters a submerged cave for scientific, exploration, or recreational purposes (FCTCKS 2004).

cave flower: A long curving deposit of gypsum on a cave surface. Growth occurs at the attached end (Field 2002). *Syn*. gypsum flower.

cave-for-pay: The practice of leading people into caves for payment. This practice is discouraged because of the tendency for pursuit of financial gains to surpass cave conservation and safe caving practices (FCTCKS 2004).

cave formation: A secondary mineral deposit formed by accumulation from dripping or flowing water in a cave (Field 2002).

cave lake: Any underground lake. The water can be in a partially drained *phreatic cave*, and may then be the entrance to a sump, or it can be over its entire surface. In *vadose caves* lakes are most commonly formed by water collecting in ponds behind banks of sediment (Lowe and Waltham 1995). *Syn*. cave pool.

cave length: The total length of the cave, measured along the surveyed or slope distances, which excludes all splay shots, radial surveys, surface surveys, and portions of circumference surveys (Dasher 1994: 181).

cave life: Any life form indigenous to a cave or to a cave ecosystem (810.13 Florida Statutes).

cave pearl: A smooth, round *speleothem* found in shallow pools where water drips (FCTCKS 2005).

cave pool: See *cave lake*.

caver: A person who explores caves in a safe manner while showing respect for all aspects of the cave, other cavers, the land above the cave, and the cave owner (Rea 1992). *Syn*. *potholer*. *Cf*. *speleologist*, *spelunker*.

cave radio: Any of a number of methods of communicating from within caves to the surface; including radio location devices that send signals from a transmitter placed within the cave passage to a receiver on the surface and communication devices allowing underground and underwater teams to speak with each other and directly with support teams on the surface (FCTCKS 2006).

cave river: Any stream of water in a cave is called a river. A cave river may be a mere few centimeters or tens of meters wide and deep (Catherman 2005).

cavern: 1. A cave or conduit system with larger than average passages created by *dissolution* of *limestone* or other soluble rock (SDII Global Corp. 2002). 2. A natural cavity in rock, often at the edge of a rock formation, large enough to admit a person but not extensive enough to have a true dark zone. 3. In caving and cave diving, the area of the cave within reach of direct sunlight (Prosser and Grey 1992). *Cf*. *entrance room*.

cavern dive: A no-decompression dive during daylight hours within direct sight of the surface, limited in depth and penetration both vertically and horizontally,

in passages large enough for two divers to swim abreast with approximately 12 meters (40 feet) of *visibility* or better (Prosser and Grey 1992).

cavernicole: Organisms living in caves (FCTCKS 2005). *Cf. accidental*, *troglobites*, *troglophiles*, *trogloxenes*, *stygobiont*.

cavernicolous: *Troglobitic*; living in a cave (FCTCKS 2005).

cavernous porosity: A pore system having large, cavernous openings. The lower size limit, for field analysis, is practically set at approximately the smallest opening that an adult person can enter (Field 2002: 36).

cave spring: A spring found within a cave (FCTCKS 2005).

cave system: 1. An underground network of passages, chambers, or cavities. 2. Caves related to each other hydrologically, whether continuous or discontinuous from a single opening (both definitions from Field 2002: 36).

caving: Exploring, studying, and visiting caves (FCTCKS 2005). See *speleology*.

CC: *Abb*. closed circuit. See *closed circuit rebreather*.

C-card: Certification card. Divers receive a C-card when they have completed a particular course of training (FCTCKS 2004).

CCR: *Abb. closed circuit rebreather*.

CDS: *Abb*. Cave Diving Section of the National Speleological Society. *Syn*. *NSS-CDS*.

ceiling: 1. The roof of a cave passage (FCTCKS 2004). 2. The maximum depth to which a diver may ascend within the limits of his computer or decompression table (Mount and Gilliam 1993: 377).

ceiling percolation: Dislodging of silt, debris, and sometimes small rocks from the ceiling by rising bubbles from open-circuit SCUBA exhaust as divers travel through passages (FCTCKS 2004).

ceiling pocket: *Syn*. *pocket*.

ceiling walk: The action of traveling through an underwater passage upside down using ceiling projections to pull oneself forward. Also, the technique of traveling through an underwater cave using only fin tips against the ceiling for propulsion. Both methods are considered obsolete and discouraged on account of potential cave damage (FCTCKS 2004).

cenote: From Mayan *dzonot*. A deep, steep-walled natural well that extends below the water table; generally caused by collapse of a cave roof. Term used only for features in the Yucatan (Jackson 1997: 104).

census water: Streams, sloughs, estuaries, canals, and other moving bodies of water 61 meters (200 feet) wide and greater, and lakes, reservoirs, ponds, and other permanent bodies of water 4.5 acres (1.8 hectares) in area and greater (Wear and Greis 2002).

centi-: From Latin *centum* (hundred).

CEQ: *Abb*. *Council on Environmental Quality*.

cercarial dermatitis: See *swimmer's itch*.

cf.: From Latin *confer* (compare with).

CFC: See *chlorofluorocarbon*.

CFS: *Abb*. cubic feet per second.

CFR: *Abb*. U.S. Code of Federal Regulations.

CFU: See *colony forming unit*.

chain of custody: The documented handling of a collected sample or information from the person collecting the sample to the person performing the analysis (FCTCKS 2005).

chalk: A soft, pure, earthy, fine-textured, usually white to light gray or buff limestone of marine origin, consisting almost wholly (90–99 percent) of *calcite*, formed mainly by shallow-water accumulation of calcareous tests of floating *microorganisms* (chiefly foraminifers) and of comminuted remains of calcareous algae (such as coccoliths and rhabdoliths), set in a structureless matrix of very finely crystalline calcite (Jackson 1997).

chamber: 1. An enlargement of a cave passage, forming a room (Bates and Jackson 1984: 82). 2. A decompression chamber (FCTCKS 2004). *Syn*. *hyperbaric chamber*.

chamber ride: Time spent in a hyperbaric chamber for recompression due to a decompression injury or *decompression sickness* (FCTCKS 2004).

changeover: The act of reversing direction on a rope either from *prusik* (climbing) to *rappel* (descending) or rappel to prusik (Smith and Padgett 1996).

chart: The equivalent of a map for bodies of water and adjacent coastlines (Heine 1995: 277).

chelate: From Greek *chelé* (claw). In chemistry, nutrients combined in a ring that is easy for plants to absorb (FCTCKS 2005). *Cf*. *complexation*.

chemical oxygen demand (**COD**): An indicator of water or *effluent* quality, oxygen required for decomposition of compounds in water. Measured in milligrams per liter (mg/L) (FCTCKS 2005).

chemoautotroph: *Microorganism* that makes its own food and derives biologically useful energy from the oxidation of inorganic chemical substances, usually ammonia, sulfur, nitrite, and ferrous iron (Wyman and Stevenson 2001). *Syn*. *chemolithotrophic autotroph*, *Cf*. *extremophile*.

chemolithotrophic: Pertaining to obtaining energy from oxidation of inorganic *compounds* (Jackson 1997: 110). *Cf*. *extremophile*.

chert: A hard, extremely dense or compact, dull to semivitreous, microcrystalline or cryptocrystalline sedimentary rock, consisting dominantly of interlocking crystals of quartz less than about 30 microns (1 micron = 3.94 x 1^{0-5} inch) in diameter (Jackson 1997).

chest box: *Syn*. *chest harness*.

chest compressor: A low horizontal *belly crawl* passage that you can get through only by squeezing and often only by exhaling to reduce the size of your chest (not recommended) (Catherman 2005).

chest harness: Any harness that fits snugly under the arms and/or over the shoulders (Smith and Padgett 1996: 345). *Syn*. chest box

chest roller: A pulley mounted on a chest harness to assist keeping a climber upright on the rope when using *rope walker* systems (FCTCKS 2005). See *Simmons roller*.

CHHA: See *Coastal High Hazard Area*.

chicken loop: An ankle strap that secures foot loops to a rope climber's feet and ankles to prevent the foot loops from slipping off while ascending. These should be made of high strength *webbing* and cinch buckles (Smith and Padgett 1996).

chimney: A relatively narrow, vertical passage (FCTCKS 2005).

chimneying: To climb the walls of a narrow cave passage or vertical cleft in a cave wall by bridging the opening using opposing pressure with opposing arms and legs, or by putting back and hands against one wall and feet against the other (Catherman 2005).

chimney sink: A *cover-collapse sinkhole* that forms near a vertical *shaft* or *chimney*, typically developing where bedrock is near land surface. These features are common in the Gainesville area of Florida (SDII Global Corp. 2002).

Chiroptera: From Latin *chiros* (hand) + *ptera* (wing). The order of mammals comprising *bats*.

chloracne: A severe acnelike eruption that results from exposure to certain toxic compounds (such as *dioxins*, insecticides, herbicides, etc.). Exposure can be from breathing, touching, or ingesting toxic compounds, resulting in eruptions of whiteheads, blackheads, nodules and cysts, and blisters mainly on the cheeks (FCTCKS 2005).

chloride (Cl): One of seven major ions in most natural waters; element that dissolves from rock materials. The following contribute to an increase in chloride levels: aridity, return drainage from irrigation, sewage, drainage from oil wells, salt springs, and industrial waste. Increased levels of chloride heighten the corrosive effects of water; combined with sodium, causes a salty taste (USGS 2004a).

chlorination: Adding chlorine to water to kill or inactivate dangerous *microorganisms* or viruses. Chlorine can be used in various forms, such as chlorine gas, bleach, or solid chlorine (Wyman and Stevenson 2001).

chlorine (**Cl**): One of a group of elements classified as the halogens. The most common halogen; a greenish yellow gas with an irritating odor. Chlorine is very reactive; it forms salts with metals, forms acids when dissolved in water, and combines readily with hydrocarbons. Various forms of chlorine are used to disinfect water. Chlorine is produced by the electrolysis of brine (a concentrated salt solution)(Horton 2000).

chlorofluorocarbon (**CFC**): A class of volatile *compounds* consisting of carbon, chlorine, and fluorine. Commonly called freons, used in refrigeration mechanisms, as blowing agents in the fabrication of flexible and rigid foams, and, until banned from use several years ago, as propellants in spray cans (USGS 2004b).

chockstone: A fallen or wedged stone between two other larger stones or walls that can often be used as an acceptable *anchor* (Smith and Padgett 1996: 345).

choke: A restriction; debris or fill partially or entirely blocking a cave passage (FCTCKS 2005).

ciénaga: (Spanish) A marshy area where the ground is wet as a result of seepage or springs (USGS 2004b).

circa: Latin for in, at, or of approximately (Dasher 1994: 181).

circuit: A dive in which the entrance and exit points are the same, but a portion of the dive requires one-way travel, as opposed to returning by the same passage (Prosser and Grey 1992). *Cf. traverse*.

circumline: The survey line around the circumference of a circular area. Normally around the perimeter of a room or chamber when surveying (Burge 1988: 121).

circumneutral: Said of water with a *pH* between 5.5 and 7.4, "around neutral"; pH modifier used in the U.S. Fish and Wildlife Service wetland classification system (USGS 2004b).

circumsketch: The drawing or sketch of the outer limits or boundaries of a room or chamber beyond the *circumline* that is used as the reference (Burge 1988: 121).

cistern: A large tank used to store water, usually rainwater, for later use (Wyman and Stevenson 2001).

Cl: 1. Symbol for *chloride*. 2. Symbol for *chlorine*.

clarity: 1. In diving, referring to *visibility* within the water, water clarity (FCTCKS 2004). 2. The state or quality of being clear, lucidity (American Heritage Dictionary 1985: 278).

class: The third rank in the taxonomic system (kingdom, phylum, class, order, family, genus, species).

claustrophobia: The fear of tight or small places that can lead to panic in the victim (FCTCKS 2005).

claustrophobic: Suffering from *claustrophobia* (FCTCKS 2004).

clay: A detrital mineral particle of any composition having a diameter of less than 1/256 mm (.00015 inch) (Bates and Jackson 1984).

clay mineral: One of a complex and loosely defined group of finely crystalline, metacolloidal, or amorphous hydrous silicates, essentially of *aluminum* (and sometimes of magnesium and iron), and possessing a sheetlike structure (Bates and Jackson 1987).

clay mound: A *mound* of *clay* in a dry or submerged cave passage (FCTCKS 2005).

Clean Water Act (**CWA**): The basic federal water pollution control statute. Administered by the U.S. Environmental Protection Agency (US EPA). The Water Quality Act of 1965 began setting water quality standards, and the 1966 amendment increased federal funding for sewage treatment plants. The 1972 amendments established a goal of zero toxic discharges and "fishable" and "swimmable" surface waters. Additional amendments were passed in 1977 and 1987 (Wyman and Stevenson 2001).

clear to dark water reversal: Indicates a change in water clarity resulting from a change in the temperature or hydrostatic pressure that drives tannic surface water into the cave. *Syn*. water turning (FCTCKS 2004).

clear, clearing: v. In diving, the act of equalizing pressure within the ears and sinuses (FCTCKS 2005).

climb: 1. *v*. To ascend as on a rock, ladder, rope, mountain, etc. 2. *n*. Any vertical

challenge that requires rope to ascend (Smith and Padgett 1996). *Cf. drop*, *pit*.

clinometer: A calibrated instrument used for measuring vertical angles (Dasher 1994: 181). *Syn. inclinometer*.

closed circuit rebreather (**CCR**): A breathing apparatus that recirculates diver's breathing gas on exhalation. This type of apparatus is common in *rebreathers* and results in no exhalation bubbles (FCTCKS 2004). *Cf. semi-closed circuit rebreather*, *open circuit*. *Syn*. closed loop rebreather.

closed depression: An area of lower ground indicated on a topographic map by a *hachured* depression *contour line* forming a closed loop; e.g., hollow below the general land surface, with no surface outlet (Jackson 1997).

closed question: A question with more than one possible response from which one or more answers must be selected (US EPA 2004b). *Cf. close-ended question*, *open-ended question*.

close-ended question: A question with limited responses from predetermined categories (US EPA 2004b). *Cf. closed question*, *open-ended question*.

closed survey: A survey in a loop from one point or station, back to the same point or station (Catherman 2005). *Syn*. closed-loop survey.

closed traverse: A complete circuit of a survey where the surveyors tie in to another, previously defined survey station (Dasher 1994: 181). *Syn*. loop, tie-in point, "tying in" surveys.

clothespin: A nondirectional line marker used by cave divers (FCTCKS 2004). *Cf. cookie*.

cm: *Abb*. centimeter, equal to 0.01 meter and 0.3937 inch.

CNS: *Abb*. central nervous system.

CNS Toxicity: *Abb*. central nervous system toxicity. See *oxygen toxicity*.

CO: See *carbon monoxide*.

CO_2: See *carbon dioxide*.

coastal: Pertaining to a coast, bordering a coast, or located on or near a coast (Jackson 1997).

coastal marsh: A marsh bordering a saltwater or brackish water seacoast, often formed under the protection of a barrier beach, or enclosed in that sheltered part of an estuary (modified from Jackson 1997). *Syn*. salt marsh.

coastal waters: An informal term for Florida's territorial waters (FCTCKS 2005).

coastal zone: Lands and waters near the coast, whose uses and ecology are affected by the sea (Lenntech 2005).

cockpit karst: See *cone karst*.

COD: See *chemical oxygen demand*.

coding: Converting information into coded values for the purpose of data storage, management, and analysis (US EPA 2004b).

COE: *Abb*. U.S. Army Corps of Engineers.

cohesion: Ability of similar particles or molecules to stick together, or of a substance to bind to itself (FCTCKS 2005).

coliform bacteria: A group of rod-shaped bacteria that mostly inhabit the intestinal tract of humans and animals, but are also found in soil and water. While

harmless, coliform bacteria are used to indicate the possible presence of pathogenic organisms (e.g., fecal material) (Wyman and Stevenson 2001, US EPA 1998).

coliform index: A rating of the purity of water based on a count of coliform bacteria (Lenntech 2005).

coliform organisms: See *coliform bacteria*.

collapse chamber: An underground *chamber* containing large amounts of collapse material. The term is misused when describing the origin of cave chambers floored by collapse debris. Though wall and roof collapse are common modifying processes in larger chambers, it is important to remember that such collapse cannot form a chamber, it can take place only in a preexisting cavity (Lowe and Waltham 1995).

collapse sinkhole: A type of *sinkhole* formed by the collapse of the cover materials (soil, sediment, or rock) into a preexisting underground void that was created by *dissolution* of *limestone* or *dolostone* (SDII Global Corp. 2002). *Syn*. collapse sink. See *cover-collapse sinkhole* and *rock-collapse sinkhole*.

colloid: Small particles suspended in water (FCTCKS 2005).

colony forming unit (**CFU**): Usually applied to the measurement of fungi and other *microorganisms* in a sample of air, water, soil, or other material obtained from the environment (Wyman and Stevenson 2001).

column: 1. A *speleothem* formed when a *stalactite* and *stalagmite* grow together, or when one or the other grows to meet the opposite bedrock (Field 2002). 2. In submerged caves, any remnant rock reaching from the floor to the ceiling left as a result of the *dissolution* of surrounding rock (FCTCKS 2004). *Cf. pillar*.

command signal: In diving, a signal given to a buddy that must be returned to confirm understanding. Examples include: turn the dive, hold, OK, and exit (FCTCKS 2005).

commercial cave: See *show cave*.

commercial water use: Water for motels, hotels, restaurants, office buildings, commercial facilities, and civilian and military institutions (Florida Council of 100 2003: 31). *Syn*. commercial withdrawals.

common water facility: A potable water supply serving more than one dwelling unit (Hillsborough County 2004).

community: In ecology, the populations of all plant and animal species present in an ecosystem (Wyman and Stevenson 2001: 83). *Syn*. biotic community.

community water system: See *public water system*.

compaction: Increasing the density of the soil by compression of soil or soil layers, eliminating voids or air spaces between particles or layers (FCTCKS 2005).

comparison group: A group of subjects with characteristics similar to those of the experimental group (the group being studied). The comparison group may receive none or different treatment than the experimental group. As part of the evaluation process, the experimental and the comparison groups are assessed to determine changes resulting from treatment (US EPA 2004b). *Cf. control group*, *experimental group*.

compass: An instrument for measuring the direction to magnetic north. *Syn*. magnetic compass (Dasher 1994: 181). Mostly used in survey, also useful in determining where in the system the caver or cave diver is heading (FCTCKS 2004). *Cf. deviation*, *variation*.

compass card: That part of a compass which embodies the needle and the magnetic element that rotates seeking magnetic north (Burge 1988: 121).

compass rule closure: One of several methods of allocating errors and making corrections for drafting of traverse lines used in developing closed-loop surveys (*closed survey*) (Burge 1988: 121).

complexation: Electrostatic association of positively charged metal ions and negatively charged organic matter, usually with two or more points of attachment (Naval Weapons Station Seal Beach 2005). *Cf. chelate*.

composite measure: A measure composed of several alternative measures of the same sample or phenomenon (US EPA 2004b).

composite sample, **weighted**: A sample composed of two or more portions collected at specific times and added together in volumes related to the flow at time of collection (Eckhardt 2005). *Cf. grab sample*.

composite tank: Dive *cylinder* composed of reinforced fiber covering a metal core (Mount and Gilliam 1993: 377).

compound: A combination of elements, e.g. H_2O, water, is a compound of two atoms of hydrogen (H) and one atom of oxygen (O) (FCTCKS 2005).

computer: See *dive computer*.

Computer Aided Design and Drafting (**CADD**): The computer application of a drafting system that performs most drafting functions either automatically or at command of the operator (Burge 1988: 121).

concentration: The amount or mass of a substance present in a given volume or mass of sample. Usually expressed as microgram per liter (water sample) or micrograms per kilogram (sediment or tissue sample) (Hughes et al. 2000).

concentration gradient: A change in the concentration of a substance along a given distance (FCTCKS 2006).

concurrency: The local government comprehensive plan requirement of Chapter 163.3180, Florida Statutes, to ensure that public facilities and services needed to support a development will be available at the time of the development's demand for such facilities and services (FDOS 2001).

condensation: The process by which a vapor becomes a liquid or solid; the opposite of *evaporation* (modified from IFAS 2005).

conductance: The ability of a substance to conduct heat, electricity, or sound. Electrical conductivity (EC) is often used as a measure of *total dissolved solids*, expressed in microsiemens (micromhos) per centimeter (SFWMD 2003). See *specific conductance*.

conduction: The transmission of heat by direct material contact (e.g., water conducts heat from the diver's body) (Heine 1995).

conductivity: Similar to *conductance*, it is the ability of a substance to carry an electrical current. It is the reciprocal of electrical *resistivity* (Sienko and Plane 1961). *Syn*. *specific conductance*.

conduit: Large *dissolution* voids, including enlarged fissures and tubular tunnels. In some usage, the term is restricted to voids that are water filled. Conduits may include all voids greater than 10 cm (3.937 inches) in diameter, but another classification scheme places them between arbitrary limits of 100 cm to 10 cm (39.37 to 3.937 inches). Whichever value is accepted in a particular context, smaller voids are commonly termed subconduits (Field 1999). *Syn*. karst conduit.

conduit flow: Underground-water flow within *conduits*. It is similar to flow through a pipe in that it is generally turbulent, but can also be laminar smooth (Field 1999). *Syn*. *karst conduit flow*.

conduit surface: An opening from the submerged cave passage to the surface (FCTCKS 2004). *Cf*. *karst window*, *entrance*.

cone karst: A typical karst of the tropics, with cockpits separated by step-walled rounded hills, forming a pattern resembling a molded egg box (Bates and Jackson 1987). *Syn*. *cockpit karst*. See *mogote*, *tower karst*.

cone of depression: A depression in the *potentiometric surface* of a body of groundwater that has the shape of an inverted cone and develops around a well from which water is being withdrawn (Jackson 1997).

cone of influence: See *cone of depression*.

confined: See *artesian*.

confined aquifer: See *artesian aquifer*.

confining bed: *Syn*. *confining unit*.

confining layer: A layer of *sediment* or lithologic unit of low permeability that bounds (confines) an *aquifer* (Hughes et al. 2000).

confining unit: A hydrogeologic unit of impermeable or distinctly less permeable material stratigraphically adjacent or bounding one or more *aquifers*. This term replaces the terms *aquitard*, *aquifuge*, and *aquiclude* (Field 2002). *Syn*. confining bed.

confluence: The merging of streams of water or people (FCTCKS 2005).

conglomerate: A coarse-grained sedimentary rock comprising preexisting fragments of various composition and varying in size. Composed of rounded to slightly rounded angular fragments larger than 2 mm (.0833 inch) in diameter (*granules*, pebbles, cobbles, boulders) typically containing fine-grained particles (*sand*, *silt*, *clay*) in the interstices, and commonly cemented by *calcium carbonate*, *iron oxide*, silica, or hardened clay; the consolidated equivalent of gravel both in size range and in the essential roundness and sorting of its constituent particles. Conglomerates may be classified according to nature or composition of fragments, proportions of matrix, degree of size sorting, type of cement, and agent or environment of formation (Jackson 1997).

conjugate fractures: *Fractures* that are of the same age and deformational episode (Bates and Jackson 1987).

connectivity: The movement of organisms from place to place (such as between aquifers) through *dispersion* or *migration* (AMNH 2002).

consensus building: Eliciting common understanding and shared procedures and

goals among various individual people, agencies, organizations, or businesses involved in a shared concern (FCTCKS 2005).

conservation: Management of the human use of natural resources for protection, preservation, restoration, and sustainability with the greatest good for current and future uses (FCTCKS 2005).

consolidated rock: *Syn*. *bedrock*.

constituent: A chemical or biological substance in water, sediment, or biota that can be measured by an analytical method (USGS 2004b).

constraint: A limitation or obligation of any kind to be considered in planning, programming, scheduling, implementing, or evaluating programs (US EPA 2004b).

consultant: An individual who provides expert or professional advice or service, often in a paid capacity (US EPA 2004b).

consumptive use: Removal of water from its source by *evaporation*, *transpiration*, incorporation into crops or industrial products, or consumption by man or livestock (FCTCKS 2005).

consumptive use permit (**CUP**): Allows a user to withdraw a specified amount of water, either from the groundwater or from a lake or river. The water can be used to irrigate crops, nursery plants, or golf courses; manufacture various products, including citrus; operate industrial plants; and provide drinking water for domestic consumption. CUPs were created as the key mechanism by which the water management districts and the state can regulate the consumption of water from the most beneficial uses and in the best interest of the public (Florida Council of 100 2003: 31).

contaminant: A substance, chemical, or *microorganism* that makes the air, water, soil, or food supply impure, infected, radioactive, or lower in quality (Wyman and Stevenson 2001: 91). *Cf*. *pollutant*.

contamination: Degradation of water quality compared to original or natural conditions due to human activity (Hughes et al. 2000).

content analysis: A set of procedures for collecting and organizing unstructured information into a standard format that allows inference and meaning to be derived from the information (US EPA 2004b).

contour lines: Lines representing equal elevations of the Earth's surface (Rea 1992).

contributing area: The area in a drainage basin that contributes water to a streamflow or recharge to an aquifer (USGS 2004b).

control group: A group of subjects resembling the experimental group but not receiving treatment, used to assess the effect of treatment on the experimental group. The same information is collected on both the control group and the experimental group (US EPA 2004b). *Cf*. *comparison group*, *experimental group*.

control hand: In rappelling, the hand that provides breaking action on the standing line below the rappel device. The control hand's position is usually at the hip (Padgett and Smith 1992: 112–113). *Syn*. *braking hand*. *Cf*. *cradling hand*.

control structure: A manmade structure designed to regulate the level and/or flow of water in a canal (e.g., *weirs*, dams) (FDOS 2001).

conveyance: A channel or passage for conduction or transmission, as a pipe, canal, *conduit*, or ditch (Wear and Greis 2002).

cookie: A nondirectional circular line marker that replaces the *clothespin* (FCTCKS 2004).

copepod: Any crustacean belonging to the class Copepoda, characterized by the absence of both a carapace (shell covering the back) and compound eyes. The only known pre-Pleistocene fossil copepods have been found in Miocene lake deposits (Jackson 1997: 141).

coprolite: From Latin *copro* (feces; dung) + Greek *lithos* (stone). Fossilized animal excrement (FCTCKS 2005).

coprophage: From Latin *copro* (feces; dung) + Greek *phagos* (one that eats). An organism that feeds on dung (such as cave invertebrates that feed on *guano*, bat droppings) (FCTCKS 2005).

coquina: A detrital *limestone* composed wholly or chiefly of mechanically sorted sea shells, primarily of the genus *Coquina*, that experienced abrasion and transport before reaching the depositional site, and that is weakly to moderately cemented but not completely indurated; esp. a porous light-colored limestone composed of loosely aggregated shells and shell fragments, such as the relatively recent deposits occurring in Florida (Bates and Jackson 1987).

coral cave: Caves and voids in coral reefs formed by growth of corals over channels or grooves within the reef. Characterized by multiple and/or irregular openings that allow sunlight to illuminate the interior, white sand floors, and clear visibility. Considered an overhead environment and as such requires care and consideration while diving (Zumrick et al. 1988).

core: The central strands of the rope that provide its strength. The *sheath* acts to protect the core fibers from damage (FCTCKS 2005).

core sample: A sample of soil or sediment taken with the aid of a pipe or tube pushed or driven into the soil or sediment. The sample removed is taken from the sampling device in a cylindrical section in which positioning of layers of sediment is maintained (Wyman and Stevenson 2001).

correlation: The relationship or a connection between variables (Morehead 1981 and US EPA 2004b).

corrosion: A process of erosion whereby rocks and soils are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions such as *hydrolysis*, hydration, carbonation, and oxidation (Jackson 1997: 144).

cost-benefit: The ratio of the dollar value of benefits divided by cost. Allows comparisons between programs and alternative methods (US EPA 2004b).

cost-benefit analysis: Compares the present values of all benefits less those of related costs when the benefits can be valued in dollars in the same way as the costs. Performed in order to select the alternative that maximizes the benefits of a program (US EPA 2004b). *Syn. cost effectiveness*.

cost effectiveness: The comparison of total benefits to total costs. Costs are typically in dollars while benefits are often expressed in other measurement units (FCTCKS 2005).

Council on Environmental Quality (**CEQ**): Established in 1969 as part of the *National Environmental Policy Act* (NEPA). Coordinates federal environmental efforts. Reports annually to the President on the state of the environment, oversees federal agency implementation of the environmental impact assessment process, and acts as a referee when agencies disagree over the adequacy of assessments (White House 2005a).

counterlung: The *rebreather* component that provides a volume reservoir for exhaled gas as a diver breathes (Bozanic 2002: 513).

cover: Materials consisting of soil, sediment, or rock that overlie the soluble rock (*limestone*, *dolostone* etc.) in a karst terrain. In Florida, the cover includes the sand and clay deposits that overlie the limestone (SDII Global Corp. 2002).

coveralls: Protective overalls worn over regular clothing by cavers while exploring caves. Coveralls protect the caver from abrasions and provide limited thermal protection (FCTCKS 2004).

cover-collapse sinkhole: A *sinkhole* formed by cover materials (sand, clay, etc.) *raveling* into a void in the underlying limestone (SDII Global Corp. 2002). *Syn*. cover-collapse sink. *Cf. cover-subsidence sinkhole*, *solution sinkhole*, *sag depression*.

covered karst: A terrain of karst features, usually subdued, resulting from the development of solution features in limestone covered by soil, contrasting with naked karst, which is soil free (Jackson 1997: 147). *Cf. exposed karst*.

cover-subsidence sinkhole: A *sinkhole* that forms when the upper surface of the limestone is dissolved away, and cover materials slowly subside to fill the space once occupied by limestone. Voids may not be well developed in cover-subsidence sinkholes because of the continued downward movement of cover materials filling the space (SDII Global Corp. 2002). *Syn*. cover-subsidence sink. *Cf. cover-collapse sinkhole*, *solution sinkhole* and *sag depressions*.

cow's tail: A tether attached to a climber's seat harness and used for a variety of vertical obstacles, i.e., rebelays or horizontal traverse lines (Smith and Padgett 1996).

crack: A partial or incomplete *fracture* (Bates and Jackson 1987).

cradling hand: In *rappelling* while using a rappel rack, the hand that holds and moves the bars up and down and/or off and on to add and subtract friction with the rack. On other devices this hand is often the balance hand that is held above the rappel device (Padgett and Smith 1992: 113). *Cf. control hand*.

cramp: A muscle spasm producing pain and temporary disability (Heine 1995: 277).

Crangonyx: A genus of freshwater *amphipods* that includes several white to colorless cave-dwelling species. Currently known from numerous underwater caves and cave pools located in south Florida north into the panhandle and southern Georgia (FCTCKS 2004).

crawdad: *Syn*. *crayfish*, crawfish, mudbug.

crawfish: *Syn*. *crayfish*, crawdad, mudbug.

crawlway: A passage small enough to be negotiated on hands and knees (Field 2002). *Syn*. crawl. *Cf. squeeze*, *stooping*.

crayfish: 1. Freshwater *crustaceans* of the family Cambaridae (Arthropoda: Crustacea: Decapoda), resembling lobsters but considerably smaller (American Heritage Dictionary 1985: 337). Cave-adapted species are pale to colorless, and distributed variously within the Florida Aquifer, including caves and at spring entrances, throughout Florida and other locales. Three known cave-adapted genera are *Cambarus*, *Procambarus*, and *Troglocambarus* (Franz et al. 1994). *Syn*. crawdad, crawfish, mudbug.

Cretaceous: A period of geologic time ranging from about 140 (135 to 145) to 65 million years ago. During the Cretaceous, more of the Earth was underwater than today and the climate was warmer. Much cave-forming rock was deposited during this time (Stone and AmEnde 2002).

crevice: A high narrow passage or opening or *fissure* in the floor of a cave (McClurg 1996).

criterion: A standard rule or test on which a judgment or decision can be based (USGS 2004b).

critical aquifer protection area (**CAPA**): A recharge zone for certain sole source aquifers designated for additional protection under the *Safe Drinking Water Act* (Wyman and Stevenson 2001: 98).

critical water supply problem areas: See *water resource caution areas*.

critter count: Colloquialism. Collecting an inventory of the fauna within a cave or an area of a cave system by logging individual species and number and location encountered (FCTCKS 2005). See *biological survey*.

crossover: Crossing an obstacle, such as a knot or *rebelay* while on rope (Smith and Padgett 1996).

cross section: A diagram or drawing that shows features transected by a given plane (Jackson 1997: 151).

cross-sectional data: Observations collected on subjects or events at a single point in time (US EPA 2004b).

crotch strap: Bottom strap on a harness that connects, between the legs, the backplate or back part of the harness system with the front of the harness. A crotch strap keeps the harness in position on the diver's body, aiding in comfort and trim. A *scooter ring* is often attached to the front of the crotch strap (Huth 2005).

crustacean: Any organism within the class Crustacea (phylum Arthropoda), characterized by an outer shell, segmented body, and paired jointed legs (FCTCKS 2005).

Cryptosporidium: A *microorganism* in water that causes gastrointestinal illness in humans. It is commonly found in untreated surface water and can be removed by filtration. It is resistant to disinfectants such as *chlorine* (Lenntech 2005).

cryptozoa: 1. From Greek *kryptos* (hidden) + *-zoa* (animal; living thing). Organisms living out of sight in darkness in crevices, within the soil, and beneath objects, such as logs or stones (FCTCKS 2005). 2. A hemispherical or cabbage-like algal structure of variable size, spreading somewhat above its base, composed of irregular and concentric laminae of calcite of very unequal thickness traversed by minute canals that branch irregularly, produced by Cambrian and

Ordovician reef-forming calcareous alga of the genus *Cryptozoon* (Bates and Jackson 1987).

cubic foot per second (**ft^3/s**, **cfs**): Rate of water discharge representing a volume of one cubic foot passing a given point during one second, equivalent to approximately 7.48 gallons per second, 448.8 gallons per minute, or 0.02832 cubic meter per second. In a stream channel, a discharge of one cubic foot per second is equal to the discharge at a rectangular cross section, one foot wide and one foot deep, flowing at an average velocity of one foot per second (USGS 2004b).

cubic meter per second (**m^3/s**): A unit expressing rate of discharge, typically used in measuring streamflow. One cubic meter per second is equal to the discharge in a stream of a cross section one meter wide and one meter deep, flowing with an average velocity of one meter per second (approximately 35.31 cubic feet per second) (IFAS 2005).

cueva: (Spanish) Cave.

cultural eutrophication: Eutrophication accelerated by human activities (FCTCKS 2005). See *eutrophication*.

cultural resources: Physical remains of human activity that provide information about past cultures (FCTCKS 2005).

culture: The ideas, skills, arts, and customs of a people from a particular period or civilization (Zokaites and O'Malley 2000: 127).

cumulative: 1. Increasing or enlarging by accumulation or successive addition (American Heritage Dictionary 1985). 2. Summing or integrating all of the values (Burge 1988: 122).

CUP: *Abb. consumptive use permit*.

current: 1. The portion of a stream or body of water moving much faster than the rest of the water. The progress of the water is principally concentrated in the current (Lenntech 2005). 2. As used by cave divers, current usually refers to the flow of water. *Syn. flow*, *karst conduit flow* (FCTCKS 2004).

current markings: Markings on the floor and walls of caves giving an indication of the direction and velocity of water flow through the passages (FCTCKS 2005). See *scallops*.

curtain: *Syn. drapery*.

CWA: *Abb. Clean Water Act*.

cyanobacteria: A group of aquatic photosynthetic bacteria, usually one-celled, that often grow in colonies large enough to be visible (e.g., *stromatolites*). Often called blue-green algae, they form the oldest known fossils on Earth. Family Cyanophyta, includes species of *Lyngbya* and *Microcystis*. The presence of these algae causes the water to turn greenish and smell musty and they are a cause of *swimmer's itch* (FCTCKS 2005).

Cyanophyta: Obsolete classification now referred to as *cyanobacteria*.

cyanosis: Bluish discoloration of the skin that results from an oxygen deficiency in the blood (Mount and Gilliam 1993: 378).

cylinder, **cylinders**: A vessel that contains breathing gas under pressure (Heine 1995). *Syn. bottle*, *tank*.

cylinder bands: See *tank bands*.

cypress dome: Small, isolated, circular, depressional forested wetland in which cypress predominates, with a convex silhouette when viewed from a distance (USGS 2004b).

D

DACS: *Abb. Florida Department of Agriculture and Consumer Services.*

Dalton's Law: The total pressure exerted by a mixture of gases is equal to the sum of the pressure that would be exerted by each of the gases if it alone were present and occupied the volume (Heine 1995: 278).

dam: Any artificial or natural barrier across a watercourse that impounds surface water (Field 2002, 373.403 Florida Statutes). *Cf. weir.*

damped: Smoothed or dampened. A damped compass card is one that is controlled as to rate of turn; it moves slowly and does not oscillate (Burge 1988: 122).

DAN: *Abb. Diver's Alert Network.*

danglies: Equipment hanging below the diver's body. Cave divers clip and tuck their equipment on their harness to maintain a streamlined appearance. Danglies are entanglement hazards and can cause damage to the cave environment and the open water environment (such as coral reef structures) (FCTCKS 2004).

Darcy's Law: A derived formula for the flow of fluids on the assumption that the flow is laminar and that inertia can be neglected. The numerical formulation of this law is used generally in studies of groundwater. For example, the velocity of flow is proportional to the pressure gradient multiplied by the ratio of the permeability times density, divided by the viscosity of the fluid (Bates and Jackson 1987).

dark zone: The part of the cave beyond the reach of daylight (FCTCKS 2005). *Cf. twilight zone*, *transition zone.*

***Dasyscias franzi*,** shaggy ghostsnail: A *stygobitic* species of freshwater snail known (currently) only from the Blue Springs Cave System on the Econfina River in Florida (FCTCKS 2004).

data: 1. Documented information or evidence of any kind (US EPA 2004b).

data analysis: Systematically applying statistical and logical techniques to describe, summarize, and compare *data* (US EPA 2004b).

datasonde: A device that can work unattended (placed in the water and left for a period of time) to measure water quality parameters such as *pH*, *turbidity*, etc. (FCTCKS 2004). *Cf. sonde.*

datum: The reference point from which all distances and angles are measured. *Syn.* zero datum (Dasher 1994: 182).

DCA: *Abb. Florida Department of Community Affairs.*

DCI: *Abb.* decompression illness. *Syn.* bends, *decompression sickness.*

DCS: *Abb. decompression sickness. Syn.* bends, decompression illness.

DDT: Dichlorodiphenyltrichloroethane. An colorless, odorless, water-insoluble insecticide banned from use in the United States but still in use in other countries (FCTCKS 2005).

dead cave: A cave in which the *speleothems* have stopped growing because water is no longer reaching them (McClurg 1996: 236). *Syn*. *dry cave*. *Cf*. *live cave*.

dead reckoning: In navigation, determining position on the basis of the course steered and the speed through the water, without obtaining a fix (Maloney 1996).

debris: 1. Any material washed into a cave from some other locality. 2. Coarse rock fragments resulting from erosion and disintegration of bedrock (Field 2002: 55).

debris mound: *Syn*. *debris pile*.

debris pile: A cone-shaped pile of sediment formed from material washing into a cave. Usually found in the entrance sink or beneath openings. *Syn*. debris cone, debris mound (FCTCKS 2004).

debris slide: Very fast movement of soil, commonly containing a high concentration of water, down slopes under the influence of gravity; the initial sliding surface is generally 0.9–3.7 meters (3–12 feet) below the surface of the ground (UI 2005).

decapod: From Latin deca (ten) + poda (feet; foot). *Crustaceans* in the order Decapoda, having ten feet; includes shrimps, lobsters, and cave *crayfish* (FCTCKS 2004).

declination: The angular difference between true north and magnetic north (Dasher 1994: 182). Course versus heading. *Syn*. *magnetic declination*, *magnetic variation*.

deco: Short for *decompression stop* or time spent decompressing.

deco bell: See *habitat*.

decomposer: Organism that gains energy by breaking down the remains of dead organisms. Predominantly bacteria and fungi, decomposers are important in freeing the last of the minerals and nutrients from organics and recycling them back into the food web (FCTCKS 2004).

decompression: Process of allowing excess gases to leave the diver's body during a series of stops at decreasing depths during final ascent (FCTCKS 2004). *Syn*. offgassing, *outgassing*.

decompression chamber: *Syn*. *hyperbaric chamber*.

decompression computer: Device worn by divers that calculates the decompression required for the dive by keeping track of the depth and time, using a decompression *algorithm*. More sophisticated computers allow the diver to specify different *nitrox* or *trimix* mixtures used during the dive (FCTCKS 2004). *Syn*. *dive computer*.

decompression illness: A term encompassing both decompression sickness and similar altitude related injuries (e.g., Cerebral Arterial Gas Embolism). *Syn*. *decompression sickness* (FCTCKS 2005).

decompression sickness: A condition where pressure on a body is released faster than the gas dissolved can escape through the lungs. Generally nitrogen, which is not used by the body, although this can also be other gases, is compressed at depth and saturates tissues. A diver's ascent causes the gas to expand. Bubbles then form in the blood, often lodging in a diver's joints causing pain and potentially permanent damage or death. Can be avoided by following conservative *decompression tables*, ascending slowly, and maintaining good overall health (Stone and AmEnde 2002 and FCTCKS 2004). *Syn. bends*, *caisson disease*, *decompression illness*.

decompression stop: Actual point of depth in the water where a diver makes his stop during decompression (FCTCKS 2004).

decompression tables: Calculations designed for divers to keep track of decompression obligations. Provide surfacing procedures for specific dive profiles calculated to account for inert-gas uptake. Tables are created for a variety of depths and times for a given breathing gas mix or set of breathing gas mixtures (Prosser and Grey 1992).

decompression theory: A set of ideas that attempts to model the absorption of inert gases in the human body over a given period of time at given depths and to predict the time and rate at which a diver can ascend safely (FCTCKS 2005).

decoration: *Speleothems* created by precipitation of *calcite*, aragonite, or other minerals (Field 2002). *Syn. formation*, *speleothem*.

decrease in depth: To rise in the water column (FCTCKS 2004).

deep air diving: Generally refers to dives below 40 meters (130 feet) where the diver breathes air and not a gas mixture such as *heliox* or *trimix*. *Air* becomes increasingly narcotic at depths below 40 meters (130 feet) and makes this type of diving risky (FCTCKS 2005).

deep percolation: The movement of water below the lower limit of the *root zone* of plants into an *aquifer*. It is not available for *evapotranspiration* and is expressed in units of length (FCTCKS 2005).

deep stop: Decompression stops made at deeper depths than those traditionally dictated by classical (Haldane) *dive tables* or *algorithms*. They are fairly recent (last fifteen years) protocols, suggested by modern *decompression theory*, but backed up by extensive diver practice with success in technical diving. Deep stops usually reduce overall decompression time (Wienke 2003).

degradation: 1. A decrease in the quality of the environment. 2. The chemical, physical, or biological breakdown of a complex material into simpler components (Wyman and Stevenson 2001).

degree of saturation: *Syn. percent of saturation*.

dehydration: A loss of bodily fluids that can contribute to the onset of *decompression sickness* (Mount and Gilliam 1993: 378).

delay (lag) response: The time interval between the input of a phenomenon into a system and the output response (American Heritage Dictionary 1985).

deliberate tracer: Materials such as dyes, salts, radioactive compounds, and light insoluble solids deliberately added to surface water or groundwater that can be

identified if that same water is sampled at a different location downstream or down gradient from the injection point. Deliberate tracers are used to determine the source, velocity, pathway, and flow characteristics of flowing water. Desirable properties include: nontoxic, nonnatural, or very low-level natural constituents for the hydrologic system being evaluated, neutrally buoyant, clearly detectable at low concentrations, resistant to adsorptive loss or chemical, physical, or biological degradation, easy to use, and inexpensive. The most commonly used artificial tracers are fluorescent dyes such as Rhodamine WT (red), eosin (green), and uranine (green). Others include chlorine (salt), low-level radioactive compounds, bacterial phages (viruses that attack specific bacteria), microspheres (tiny plastic balls), and ping pong balls (Alexander and Quinlan 1992). *Cf. natural tracer*.

demand management: Practices' undertaken by water utilites to reduce the amount of demand by customers (FCTCKS 2005).

demand valve: Device that reduces the pressure of the gas within the breathing *cylinder* to ambient pressure and enables the diver to breathe on demand (Balcombe et al. 1990: 262). *Syn. regulator*.

dendritic: A treelike branching pattern characteristic of many caves.

denitrification: Bacterial conversion of nitrate or nitrite to nitrogen gas or gas end products, such as nitrogen (N_2) or oxides of nitrogen (NO, N_2O) (FCTCKS 2005).

density: Measure of mass per unit of volume.

DEP: *Abb. Florida Department of Environmental Protection*.

depletion: The withdrawal of water at a greater rate than its replenishment (Field 2002: 57).

deposition: The act of settling or forming (e.g., layering) by a natural process (Zokaites and O'Malley 2000).

depression: Any relatively sunken part of the Earth's surface, especially a low-lying area surrounded by higher ground and having no natural outlet for surface drainage, such as an interior basin or a karstic *sinkhole* (Bates and Jackson 1987: 176).

depth: The point below the surface reached during the course of a dive or a caving trip (Huth 2005, FCTCKS 2006).

depth gauge: 1. Any device used to measure depth such as, for example, water level in wells. 2. Specific gauge for measuring river stage. 3. Specific gauge used by divers to measure their depth in the water below the water surface at any time during the dive. Most depth gauges have a digital readout that displays the depth in meters or feet (Field 2002: 57, FCTCKS 2004).

depth timer: A simple wrist-worn gauge that displays the depth and the length of the dive (FCTCKS 2004). *Cf. bottom timer*, *decompression computer*, *dive computer*.

derig: The act of disassembling a rigged drop or haul system (Smith and Padgett 1996).

desalinization: Removing salt from seawater to create freshwater for drinking, irrigation and other uses (FCTCKS 2005).

descender: A *friction device* used to control one's speed when *rappelling*. Usually a *rack* or *figure 8* (Smith and Padgett 1996).

descriptive criteria: See *narrative standard*.

designated use: The purposes for which surface water bodies are used, as determined by the state water quality standards that apply. Under the *Clean Water Act*, states are required to classify bodies of water according to a primary use, such as recreational, then achieve and maintain environmental conditions to support the use or uses (Wyman and Stevenson 2001).

designed ecosystems: Human-made environments expected to comprise all trophic levels and support a diverse flora and fauna (FCTCKS 2005).

detect: To determine the presence of a compound (Hughes et al. 2000).

detection limit: The smallest amount of a material that can be detected by an instrument or method (Wyman and Stevenson 2001: 109).

detention pond: A relatively small storage lagoon for slowing stormwater runoff; it is filled with water for only a short time after a heavy rainfall. Pollutants are allowed to settle out, and the water is then gradually released to surface waters (Wyman and Stevenson 2001). *Syn*. detention basin. *Cf*. *retention pond*.

detention time: The interval in which stormwater or runoff is retained in a *detention pond* (Wyman and Stevenson 2001).

detritus: 1. A collective term for loose rock and mineral material that is worn off or removed by mechanical means, as by disintegration or *abrasion*; esp. fragmental material, such as *sand*, *silt*, and *clay*, derived from older rocks and moved from its place of origin (Jackson 1997: 173). 2. Dead organic matter that accumulates on the surface of the ground or the bottom of bodies of water derived from plant or animal body parts and excretions (Wyman and Stevenson 2001).

detritivore: An organism that feeds on decaying organic materials and the *decomposers* within it (FCTCKS 2005).

development: Usually urban development, but can encompass any form of human-induced changes to the natural landscape (FDOS 2001).

deviation: Error induced into a compass reading by the effect of nearby metal or a magnetic source (Heine 1995: 278).

dew point: The temperature to which air must be cooled, at a constant pressure, to become saturated with water and below which condensation occurs (Heine 1995: 278).

D-frame aquatic dip net: A D-shaped net used for collecting *macroinvertebrates* in water bodies where the bottom of the lake or stream is muddy. It is occasionally referred to as a D-Frame net (ANS 2005).

diaper sling: A simple harness made from a single piece of *webbing* or rope that is tied around the waist and legs (FCTCKS 2005).

diaphragm depth gauge: An instrument that uses the movement of a metal diaphragm in conjunction with mechanical linkage to indicate depth (Heine 1995: 278). *Cf*. *analog depth gauge*, *capillary depth gauge*, *digital depth gauge*.

diatom: A microscopic, single-celled organism of the class Bacillariophyceae, which grows in both marine and fresh water. Diatoms secrete walls of silica,

called frustules, in a great variety of forms. Frustules may accumulate in sediments in enormous numbers (Jackson 1997: 176).

diatometer sampler: An instrument used to help determine pollution levels in bodies of water by studying *diatoms* that colonize on the instrument. Scientists place the diatometer in the water and leave it there for about two weeks. After the scientists retrieve the diatometer, they study the slides that contain diatoms. By examining the kinds of species and diversity of diatoms present, scientists can make conclusions about the quality of the water body (ANS 2005).

dichlorodiphenyltrichloroethane: See *DDT*.

diffuse circulation: See *diffuse flow*.

diffuse flow: Groundwater flow conditions that are generally slow moving, may be laminar (*Reynolds number* much less than 1.0), have uniform discharge, and a slow response to storms (Field 1999). *Syn*. diffuse circulation.

diffusion: The scattering of light. Also the movement of *molecules* in a liquid or gas from a region of high concentration to a region of lower concentration (Heine 1995: 278).

dig: An excavation to explore or extend a cave or to unearth artifacts or bones. A dig can be informal, a group of cavers digging out passages to pursue a *lead* in a cave, or formal, an archaeological team studying a site of Mayan activity in a Mexican cave (FCTCKS 2005).

digital depth gauge: An instrument that uses a pressure transducer, electronics, and a battery to display depth in a digital form (Heine 1995: 278). *Cf. analog depth gauge*, *capillary depth gauge*, *diaphragm depth gauge*.

digitizing: The process of converting images or data to a digital format (FCTCKS 2005).

diluent: A breathing gas, commonly *air*, *nitrox*, or *heliox*, used to dilute the concentration of pure oxygen in a *rebreather*. Diluent contains a small amount of oxygen so that in an emergency the diluent can be breathed (Stone and AmEnde 2002).

DIN: *Abb*. Deutsche Industrie Norme (German Industry Standard). An internationally accepted standard of manufacturing. When applied colloquially to *cylinder* taps and demand valve first stages, DIN indicates the screw-in linkage used to seal against pressures higher than 200 bar (Balcombe et al. 1990: 262). *Cf. yoke*.

dioxin: Any of a family of *compounds* known chemically as dibenzo-p-dioxins (chlorinated and polychlorinated). Unintentionally produced as byproducts of incineration and combustion processes, chlorine bleaching in pulp and paper mills, and as contaminants in certain chlorinated organic chemicals and during chlorination by waste and drinking water. Concern about them arises from their potential toxicity and contamination in commercial products (such as waste treatment and pulp and paper manufacture). Exposure occurs mainly from eating meat, dairy products, and fish that contain the chemicals. Most common effect of exposure is *chloracne* and skin rashes, with the potential for liver damage (ATSDR 2005, IFAS 2005).

dip: 1. The maximum angle of a structural surface, e.g., a bedding or fault plane, measured perpendicular to the strike of the structure and in the vertical plane. 2. A low place or marked depression in the land surface (Jackson 1997: 180).

direct benefit: A result closely related to a program or procedure by cause and effect (US EPA 2004b).

direct cost: Resources that must be committed to implement a program (US EPA 2004b).

direct water use: The direct use of water (e.g., washing, bathing, cooking) (MSU 2000). See *domestic use*. *Cf. indirect water use*.

discharge: 1. Movement of surface water in a stream or river or from a well or spring. *Cf. spring magnitude*. 2. The amount of water carried past a given point in a given amount of time, measured in cubic meters per second (cubic feet per second), gallons per minute or millions of gallons per day. *Syn. flow*. 3. The intentional or accidental release of liquid or gaseous waste from a point source (FCTCKS 2006). *Cf. point source pollution*.

discharge area: Area where subsurface water is discharged to the land surface, to surface water, or to the atmosphere (USGS 2004b).

discharge rate: The rate of flow at a given instant in terms of volume per unit of time. *Syn*. flux. Regarding groundwater, it is the rate of flow at a given instant in time of water. It is the net loss of water from an aquifer. The volume of fluid passing a point per unit of time, commonly expressed in cubic feet per second, million gallons per day, gallons per minute, or seconds per minute per day (Bates and Jackson 1984, Freeze and Cherry 1979, USGS 2004b).

dispersion: 1. The extent to which a liquid substance introduced into a groundwater system spreads as it moves through the system (USGS 2004b). 2. See *mechanical dispersion*.

dissipate: 1. To scatter or dispel. 2. To come to an end or vanish (Morehead 1981).

dissolution: The process of dissolving into a homogeneous solution, as when an *acidic* solution dissolves *limestone*. In *karst*, refers to the process of dissolving rock to produce landforms, in contrast to *solution*, the chemical product of dissolution (Jackson 1997: 185). See *carbonic acid dissolution*.

dissolved oxygen (**DO**): The amount of molecular oxygen (O_2) dissolved in water. The units, often not expressed, are milligrams of oxygen per liter of water. Dissolved oxygen is an important measure of the suitability of water for aquatic organisms. A level of 8.0 or 9.0 represents the concentration that one would expect to encounter in streams that have not been polluted with organic waste common in domestic sewage. Waters with a DO value of 4.0 and below are not suitable for habitation by many forms of animal life, whereas Florida surface freshwaters considered to be of good quality have DO levels between 4.0 and 8.0 (FCTCKS 2005, Wyman and Stevenson 2001: 115).

dissolved solids (**DS**): Very small particles of organic and inorganic material contained in water. Excessive amounts make water unfit to drink or limits its use in industrial processes (IFAS 2005). See. *total dissolved solids*.

distance marker: Permanently placed line arrows marked with the distance to the nearest cave entrance (FCTCKS 2004).

distillation: Water treatment method where water is boiled to steam and condensed in a separate reservoir. Contaminants with higher boiling points than water do not vaporize and remain in the boiling flask (Eckhardt 2005).

District Water Management Plan (**DWMP**): Regional water resource plan developed by the district under Chapter 373.036, Florida Statutes (373.019 Florida Statutes).

diurnal: Occurring during the day, e.g., pertaining to animals that are active during the day and sleep at night (Zokaites and O'Malley 2000: 127).

dive computer: A waterproof wrist-worn computer with software that monitors and displays various aspects of a dive, e.g., depth, time, and *decompression*. Dive computers can do many things, from calculating depth and time to calculating decompression tables with different gases breathed at different depths (Balcombe et al. 1990, FCTCKS 2004). *Syn*. *decompression computer*.

dive plan: Pre-dive agreement among dive team members as to distance, procedure, safety, decompression, and other factors concerning the dive (FCTCKS 2004).

dive profile: The depth and time measurements of a particular dive (Mount and Gilliam 1993: 378). *Syn*. *profile*.

diver propulsion vehicle (**DPV**): A battery-powered underwater vehicle used to shorten the travel time or extend the distance a diver can travel. Also called a scooter and often referred to by the make or brand. Scooters run at various speeds, from one to three knots, for 45 minutes or more (FCTCKS 2004).

Diver's Alert Network (**DAN**): A nonprofit organization founded in 1980 that provides emergency medical advice and assistance for underwater diving injuries, and underwrites a wide range of research, education, and training programs that promote safe diving (Curley 2005).

diversion: Modification to or alteration of the natural course of a stream; usually for the purpose of water supply (FCTCKS 2005).

dive slate: A small rectangular piece of plastic on which divers are able to write with a pencil while underwater (FCTCKS 2004). *Syn*. slate.

dive/surface valve (**DSV**): On a *rebreather*, a valve that opens or closes the mouthpiece. The mouthpiece is open when in the diver's mouth to allow the diver to breath and closed when the mouthpiece is removed from the diver's mouth to prevent water from entering through the mouthpiece to the breathing loop (FCTCKS 2005).

divining rod: A device for locating water underground. Can be a forked stick held by the forked ends, in which case the free end dips down when over water, or two metal sticks, bent at a 90-degree angle, one stick held in each hand, which cross when over water (FCTCKS 2006). *Syn.* dowsing rod.

division: The second rank for classifying all but animals and certain unicellular organisms (which use the equivalent *phylum*) in the taxonomic system (kingdom, division, class, order, family, genus, species).

DNR: *Abb*. Florida Department of Natural Resources.

DO: *Abb*. *dissolved oxygen*.

documentation: Written or otherwise documented verification of the results of a study. Can consist of written reports as well as photographs, videos, maps, sketches (FCTCKS 2004).

document review: A technique of data collection involving the examination of existing records or documents (US EPA 2004b).

dogtooth spar: A variety of calcite in sharply pointed crystals in the form resembling the teeth of a dog (Bates and Jackson 1987).

doline: A bowl- or funnel-shaped hollow in limestone topography, ranging in diameter from a few meters to a kilometer, and in depth to several hundred meters (Monroe 1970). See *sinkhole*.

doline karst: *Karst* dominated by closed depressions, mainly *dolines*, perforating a simple surface (Meth 2002).

dolomite: A common rock-forming rhombohedral mineral: (Ca, Mg $(CO_3)_2$). Part of the magnesium may be replaced by ferrous iron and less frequently by manganese. Dolomite is white, colorless, or tinged yellow, brown, pink, or gray (Jackson 1997). *Cf. dolostone*.

dolomitized limestone: Under certain geologic conditions, *calcium carbonate* (limestone, $CaCO_3$) undergoes a chemical reaction where magnesium (Mg) substitutes for the calcium (Ca) ion. The amount of substitution varies. Thus, depending on the amount of substitution, limestone can be called limestone, dolomitized limestone, and dolostone (FCTCKS 2005). *Cf. dolostone, limestone*.

dolostone: A sedimentary rock composed predominantly of the mineral dolomite (Ca, $Mg(CO_3)_2$). While soluble, dolostone is less likely to contain well-developed karst features than limestone. *Dolomite* is a mineral whereas dolostone is considered a rock (made up entirely of dolomite) (SDII Global Corp. 2002, FCTCKS 2005). *Cf. dolomitized limestone*, *limestone*.

dome: A large hemispherical area in the roof of a cave (FCTCKS 2005). *Syn. aven*.

dome-pit: A shaft intersected by a passage near the middle so some of the shaft extends above and some extends below (Rea 1992). *Cf. aven*.

domestic use: The use of water for the individual personal household purposes of drinking, bathing, cooking, or sanitation. All other uses shall not be considered domestic (373.019 Florida Statutes). See *direct water use*.

domestic wastewater: See *wastewater*.

Dorf marker: Duct tape directional markers attached to the guideline; named after cave diver Lewis Holtzendorff, who developed the use of the markers (FCTCKS 2004).

DOT: *Abb*. Florida Department of Transportation.

double bungee system: A rope-walking system composed of a foot *ascender* and a knee ascender connected with a piece of *bungee cord* that runs through a pulley on a single or double roller *chest harness* (Smith and Padgett 1996).

double rappel: Using the two ends of a single rope that is securely fastened in the middle to *rappel* or to climb (FCTCKS 2005).

doubles: Two steel *tanks* banded together and worn on a diver's back. The air supply can be accessed from both tanks via a manifold or independently (FCTCKS 2004).

double stage diving: Refers to the wearing of two *stage bottles* primarily for decompression or stage diving (Prosser and Grey 1992). See *stage diving*.

down-climbing: Descending a rope using ascending equipment. Usually done for short descents when it is not practical to *changeover* (FCTCKS 2005). *Syn*. *descending*.

downstream: With regard to caving, the direction of water flow from an opening in a submerged passage; the water flow away from the entrance and relative to the entry point or direction of travel (FCTCKS 2004).

downstream valve: A valve that opens in the direction of gas flow (Heine 1995: 278).

dowsing: See *water dowsing*.

dowsing rod: See *divining rod*.

DPV: *Abb*. *diver propulsion vehicle*.

drag: The force of resistance to movement (Heine 1995: 278).

drag line: In cave rescue, a piece of *webbing* or rope attached to the *yoke* at the head of a litter to assist in the movement of a patient in difficult areas (Smith and Padgett 1996: 348).

drainage: 1. The manner in which the waters of an area pass or flow off by surface streams or subsurface conduits. 2. The process of surface discharge of water from an area by the stream flow and sheet flow, and the removal of excess water from soil by downward flow (Bates and Jackson 1987).

drainage area: See *drainage basin*.

drainage basin: 1. A region or area bounded by a drainage divide and occupied by a drainage system; specifically that tract of country that gathers water originating as precipitation and contributes it to a particular stream channel or system of channels, or to a lake, sinkhole, reservoir, or body of water, including groundwater (Bates and Jackson 1987). Regarding a *groundwater basin*, Bates and Jackson (1987) describe it as an aquifer or system of aquifers, whether basin shaped or not, that has reasonably well-defined boundaries and more or less definite areas of recharge and discharge. For a spring drainage basing definition, see *spring recharge basin*. *Syn*. *springshed*. 2. Called a basin by cave divers. *Syn*. *groundwater basin*.

drainage well: A well drilled to transport water from the surface into an underground geological formation. The chief drawback to such systems is that they allow rapid migration of surface pollutants into groundwater (Wyman and Stevenson 2001).

drapery: A thin translucent sheet of *travertine* formed when drops of water flow down an inclined cave ceiling and leave behind a sinuous trail of calcite (Jackson 1997: 191). *Cf*. *bacon*, *curtain*.

DRASTIC: Acronym for seven key factors that determine aquifer vulnerability, identified by the U.S. Environmental Protection Agency (US EPA), working

with the National Water Well Association and other experts: (1) Depth to groundwater, (2) Recharge rate to groundwater, (3) Aquifer media, (4) Soil type, (5) Topography, (6) Impact of the vadose zone, and (7) Conductivity of the aquifer. Each of these factors is assigned a combination of weights and ratings, and a numerical index called the DRASTIC index is computed (FDEP and FDCA 2002: 112). *Cf. Florida Aquifer Vulnerability Assessment*.

drawdown: 1. The lowering of the water level in a well as a result of withdrawal. 2. The difference between the static (undisturbed) water table and that of the water level in a pumped well (Jackson 1997).

dredging: The excavation, by any means, in surface waters or wetlands, as delineated in s. 373.421(1). Also the excavation, or creation, of a water body which is, or is to be, connected to surface waters or wetlands, as delineated in s. 373.421(1), directly or via an excavated water body or series of water bodies (373.403 Florida Statutes). *Cf. filling*.

dress: To align and orient all parts of a knot to function correctly (Smith and Padgett 1996). *Cf. set a knot*.

D-ring: 1. A *carabiner* that is shaped like the letter D. 2. D-shaped rings sewn into a harness. 3. In cave diving, D-shaped metal rings sewn into the harness or attached to *tanks* used as attachment points for gear (Smith and Padgett 1996: 347, FCTCKS 2004).

drinking-water standard or **guideline**: A threshold concentration in a public drinking-water supply, designed to protect human health. As defined here, standards are U.S. Environmental Protection Agency regulations that specify the maximum contamination levels for public water systems required to protect the public welfare; guidelines have no regulatory status and are issued in an advisory capacity (Hughes et al. 2000).

driphole: A hole formed by water dripping on rock or clay on the cave floor or a hole through which water drops from precipitated *speleothems* (as from soda straws) (Monroe 1970).

dripline: A line on the ground at a cave entrance formed by water dripping from the rock above. Useful in cave survey to define the beginning of the cave. Everything within the dripline is considered part of the cave (Field 2002). *Syn. lintel line*.

dripstone: A general term for *calcite* or other mineral deposit formed in caves by dripping water, including *stalactites* and *stalagmites* (Jackson 1997: 193). *Cf. flowstone*.

drop: A steeply descending slope, pitch, or *pit*. To descend a drop, it is usually necessary to rig a rope. An ascent is known as a *climb* (Padgett and Smith 1992: 320). *Syn*. pit.

drop down: 1. A feature of a cave passage where a tunnel branches off through the cave floor to a deeper section of the same system. 2. Lowering oneself in the water column (FCTCKS 2004).

drop weight: A *weight* carried at the beginning of the dive to assist the diver in reaching depth. The weight is then dropped, to be retrieved on the return trip to the surface. It takes advantage of the fact that the increase in pressure at

depth compresses certain equipment, such as wetsuits, making the diver less buoyant (FCTCKS 2005).

drop zone: The area underneath persons climbing, rappelling, or doing other activities at height. This area is considered dangerous because of the potential for falling objects (FCTCKS 2005). *Syn*. *rockfall zone*.

drought: In general, an extended period of dry weather, or a period of deficient rainfall that may extend over an indefinite number of days. There is not a quantitative standard to determine the degree of deficiency needed to constitute a drought. Qualitatively, a drought may be defined by its effect as a dry period of sufficient length and severity to cause at least partial crop failure, or having impacted the ability to meet normal water demand (Jackson 1997).

drowning: Death caused by aspiration of fluid (Heine 1995: 278). See *asphyxia*.

dry cave: 1. In cave diving, any cave or passage above the water surface (FCTCKS 2004). 2. A cave without a running stream or without actively forming *speleothems* (Field 2002, Jackson 1997). *Syn*. *dead cave*.

drysuit: A waterproof garment made of *neoprene*, compressed neoprene, or various shell fabrics, with rubber seals at the neck and wrists, that provides cave divers with extra thermal protection by keeping them dry during the dive and adding an insulating layer of air or other gases. Drysuits must have the capacity to be inflated so that the diver can maintain comfort under increasing compression with depth. A drysuit adds buoyancy, and *redundancy* for a diver's *wings* (FCTCKS 2004).

dry valley: A valley that is devoid or almost devoid of running water (Jackson 1997: 194).

DS: *Abb*. *dissolved solids*.

DSV: 1. *Abb*. *dive/surface valve*. 2. *Abb*. dive support vessel.

DTW: *Abb*. depth to water table.

duck-under: 1. A place where water is close to or in contact with the roof of a cave for a short distance so that it can be passed only by quick submersion (Field 2002). 2. A ceiling projection that protrudes noticeably into an already submerged cave passage, causing divers to duck underneath (FCTCKS 2004).

duckweed: Very small, floating, aquatic flowering plants in the genera *Lemna* and *Spirodela* (FCTCKS 2005).

dumb end: In survey, the person holding the beginning end of a measuring tape while the *tape person* measures and records the distance (FCTCKS 2004).

dump valve: In cave diving, a colloquial term for the exhaust valve on a buoyancy compensator or a drysuit (Balcombe et al. 1990: 262). *Syn*. pressure relief valve.

duricrust: A deposit of precipitated minerals, mainly *calcite*, formed in the soil or in near-surface layers in arid or semiarid zones at the *horizon* where ascendant capillary water evaporates and salts held in solution are deposited. In Florida, seasonal rainfall and intense *evaporation* may form similar semi-concrete soils within the *epikarst* (Field 1999).

DWMP: *Abb*. *District Water Management Plan*.

dye gauging: See *tracer-flow method*.

dye tracing: See *tracer-flow method*.

dye trap: A device, usually comprising cotton or charcoal, used to capture and store dye from flowing water such that the dye can be detected in a laboratory (FCTCKS 2005).

dynamic: Active; aggressive or potent; having force and energy; able to adjust to changing circumstances (FCTCKS 2005).

dynamic rope: A term referring to high-stretch rope used by climbers for its superior ability to absorb the energy of a fall by elongating. A rope that stretches more than 10% of its length with a suspended 80 kg (176 pound) mass is classified as high-stretch rope (Smith and Padgett 1996). *Cf. static rope*.

dystrophic: Pertaining to organically rich, acidic, shallow freshwater colored by tannins (FCTCKS 2005). *Cf. eutrophic*, *mesotrophic*, *oligotrophic*.

E

EAD: *Abb. equivalent air depth*.

EAN21: Symbol for *enriched air nitrox* with an *oxygen* mixture at 21%. *Syn. air*. See *EANx*.

EAN32: *Syn. NOAA nitrox I*.

EAN36: *Syn. NOAA nitrox II*.

EANx: *Abb.* enriched air nitrox (where x equals the percent of oxygen). For example, EAN21, with 21% oxygen, is *air*. *Syn. nitrox*.

EAR: *Abb. evaluation and appraisal reports*.

easement/drainage: An easement required for the installation of stormwater sewers or drainage ditches, or required for the preservation or maintenance of a natural stream or water course or other drainage facility (Hillsborough County 2004).

easting: 1. The distance to a point east of the point of origin of a map or a grid. 2. The east-west component of a survey leg (or of a series of legs). East is positive, west is negative (Field 2002). *Cf. northing*, *vertical angle*.

EC: *Abb.* electrical conductivity.

echolocation: The ability of an animal to orient itself by receiving the reflection of sounds it produces, such as bats and dolphins (Zokaites and O'Malley 2000: 127).

ecological association: A relatively stable community of different species living in a characteristic habitat (Meth 2002).

ecological integrity: The condition of an unimpaired ecosystem as measured by combined chemical, physical (including physical habitat), and biological attributes (US EPA 2005a).

ecological toxicity testing: Testing an ecological system for toxic *contaminants* (FCTCKS 2004).

ecological value: The value of functions performed by uplands, wetlands, and other surface waters to the abundance, diversity, and habitats of fish, wildlife, and listed species. These functions include, but are not limited to, cover and refuge; breeding, nesting, denning, and nursery areas; corridors for wildlife

movement; food chain support; and natural water storage, natural flow attenuation, and water quality improvement, which enhances fish, wildlife, and listed species utilization (373.403 Florida Statutes).

ecosystem: The interacting system of a biological community and its nonliving environmental surroundings (FDEP and FDCA 2002: 112). *Syn*. *habitat*.

ecosystem management: An integration of ecological, economic, and social goals in a comprehensive approach to management of natural resources. Implicit is the recognition that sustained progress toward social goals cannot be made in a deteriorating environment. The goals of ecosystem management revolve around accommodating human use to the viability of the natural environment (Wyman and Stevenson 2001).

ecotone: A boundary area shared by two or more distinct ecological communities (FCTCKS 2005).

ecotourism: A tourism market based on an area's natural resources that attempts to minimize the ecological impact of the tourism (AMNH 2002).

EDB: See *ethylene dibromide*.

edema: Swelling caused by excessive amounts of fluid in the tissues (Heine 1995: 278).

effective precipitation: 1. The portion of precipitation that produces *runoff*. 2. The portion of precipitation falling on an irrigated area that meets the demands of *consumptive use* (FCTCKS 2005).

effluent: 1. *Discharge* of water or other fluids from a spring (Field 2002: 67). 2. A liquid discharged as waste, such as contaminated water from a factory or the outflow from a sewage works; water discharged from a storm sewer or from land after irrigation (Bates and Jackson 1987: 209). *Cf*. *waste water*.

effluent stream: A stream or reach of a stream receiving water from the *zone of saturation* and providing base flow; its channel lies below the water table (Bates and Jackson 1987). *Syn*. gaining stream.

e.g.: From Latin *exempli gratia* (for example).

egress: A way for going out; an exit (Morehead 1981: 176). *Cf*. *entrance*, *ingress*.

Eh: Symbol for oxidation-reduction potential. See *redox potential*.

EIA: *Abb*. *environmental impact assessment*.

EIS: 1. *Abb*. environmental impact statement. 2. *Abb*. environmental impact study. See *environmental impact assessment*.

ejidos: (Yucatan) Common or public land. Communal ranches and land owned by a collection of families or townsfolk. Divers and cavers should request permission from the residents of an ejido prior to entering *caves* or *cenotes* on the property. Ejidos were created after the Mexican Revolution by the Land and Agrarian Reform Laws (FCTCKS 2005).

elbow pads: See *knee pads and elbow pads*.

electrical conductivity: See *conductance*.

electrical resistivity: 1. The resistance of electrical current through a material measured in ohms. 2. In geology, a method of detecting subterranean features by measuring the potential field of current traveling underground. The field

changes when it encounters physical contrasts underground. Air-filled voids do not pass an electrical charge as well as liquid-filled areas (FCTCKS 2006).

elephant tracks: Colloquialism among the caving community, refers to obvious paths or places where people have gone before (Smith and Padgett 1996).

elevation: 1. The height of a point above or below a *datum* (Dasher 1994: 182). 2. Height above sea level. 3. A side view such as a *profile* view of a cave pit. 4. Markings denoting progress climbing a rope (Smith and Padgett 1996: 349).

embolus: Obstruction in the circulatory system (Heine 1995: 278).

empirical research: Research using data derived from observation or experience (US EPA 2004b).

END: 1. *Abb. equivalent narcotic depth*. 2. *Abb*. equivalent nitrogen depth.

endangered species: A species of plant or animal that is presently in such small numbers that the species is in danger of disappearing from either all or a significant part of its natural range (Wyman and Stevenson 2001: 129). *Cf. threatened species*.

Endangered Species Act (**ESA**): Established in 1973 to conserve the ecosystems upon which *endangered* and *threatened* species depend and to conserve and recover listed species. Administered by the U.S. Fish and Wildlife Service, Department of the Interior, and the National Oceanic and Atmospheric Administration (NOAA) Fisheries, Department of Commerce (US FWS 2005a).

endemic (**endemism**): Species restricted to a particular geographic area; for aquatic species, usually limited to one or a few small streams, a single drainage, or an ecological section (Wear and Greis 2002). Georgia blind salamander (*Haideotriton wallacei*) and the Squirrel Chimney cave shrimp (*Palaemonetes cummingi*) are examples of endemic species (Wear and Greis 2002, FCTCKS 2004). *Cf. precinctive*.

endogean: Pertaining to the domain immediately beneath the ground surface, i.e., in the soil or plant litter (Meth 2002). *Cf. epigean*, *hypogean*.

end use: The specific purpose for which water is being used (FCTCKS 2005). *Cf. water use*.

enriched air nitrox (**EANx**): See *nitrox*.

enrichment: See *eutrophication*, *nutrient loading*.

entrance: The access point to enter the cave system (FCTCKS 2004). *Syn. ingress*. *Cf. egress*.

entrance room: A room occurring just inside the entrance of a cave (FCTCKS 2004). *Cf. cavern*.

environmental impact assessment (**EIA**): Environmental review process to verify proposals for development and the effect on the environment (FCTCKS 2005). *Syn*. environmental impact statement (EIS), environmental impact study (EIS).

environmental impact statement (**EIS**): See *environmental impact assessment*.

environmental impact study (**EIS**): See *environmental impact assessment*.

environmental monitoring: The process of checking, observing, or keeping track of something for a specified period of time or at specified intervals (IFAS 2005).

Environmental Regulatory Commission (**ERC**): The Florida Environmental Regulation Commission is the rule-making arm of the Florida *Department of Environmental Protection* (FDEP) for rules that establish environmental standards, such as the department's water body classifications and its air and water quality standards. The commission's membership is composed of seven citizens of the state appointed by the governor, subject to confirmation by the Senate for four-year terms. Members are selected from within the boundaries of the five *water management districts*, with no more than two members from any one district. Membership is representative of the many diverse economic and social interests in the state (FDEP 2004b).

Eocene: A series of the *Tertiary System*, above the Paleocene and below the Oligocene; also the time during which those rocks were formed, the Eocene Epoch, thought to have occurred approximately 55–35 million years ago (Jackson 1997).

eosin: Also known as CI Acid Red 87. A type of fluorescent dye used in groundwater tracing appearing green at low concentrations (FCTCKS 2005). See *deliberate tracer*. *Cf. fluorescent dye*, *phloxene*, *Rhodamine WT*, *uranine*.

EPA: *Abb*. U.S. Environmental Protection Agency (US EPA).

epigean: Pertaining to the biological domain at the ground surface or above it (Meth 2002). *Cf. endogean*, *hypogean*.

epikarst: 1. The zone of weathering that penetrates the upper surface of a *limestone stratum*. Weathering of limestone results in development of rubble, fine-grained carbonate-rich *silt*, *clay*, and *karren* (including pinnacles and valleys in the limestone rock surface) (SDII Global Corp. 2002). 2. An intensely dissolved zone consisting of an intricate network of intersecting, roofless, dissolution-widened fissures, cavities, and tubes dissolved into the uppermost part of the *carbonate* bedrock. *Dissolution* features are organized to move infiltrating water laterally to down-gradient seeps and springs or to collector structures such as shafts that conduct the water farther into the subsurface (Huntoon 1995).

epilimnion: The warmer layer of water above a *thermocline* (Heine 1995: 278).

epilithon: Surface film on stones, consisting of algae, bacteria, fungi, and other organisms and organic matter (UI 2005). *Syn*. *periphyton*, aufwuchs.

epiphreatic: See *karst hydrographic zone*.

equalize: Techniques used to eliminate the pressure differential formed in the ears when descending under water. Failure to equalize the ears when descending in the water results in increasing pain and possible rupture of the eardrum due to pressure (Huth 2005).

equipotential line: A contour line on the potentiometric surface; a line along which the pressure head of groundwater in an aquifer is the same. Fluid flow is normal (perpendicular) to these lines in the direction of decreasing fluid potential (Jackson 1997: 214). *Syn*. *isopotential line*.

equity: Equal opportunity or access to the use of a resource and benefits to be derived from the use of a resource. Often used mistakenly to refer to protecting the vested interest of groups with relative greater economic, social, and political influence. Sometimes confused with the concept of fairness, which refers

to the proportional distribution of benefits and costs of resource use (FDOS 2001).

equivalent air depth (**EAD**): A dive using *nitrox* or another mixed gas decreases the diver's exposure to nitrogen and thus decreases the decompression obligation. The equivalent air depth is the calculated depth that the diver would have been able to attain with the same nitrogen exposure, if diving on air (Farr 2003: 123).

equivalent narcotic depth (**END**): The depth at which breathing air (21% oxygen, 79% nitrogen) would cause as much narcosis as a given helium-based gas mixture. Based on the fraction of nitrogen gas in percent (FN_2), END = [(FN_2/0.79) × (Depth + 10 msw)] – 10 msw (London 2004).

equivalent residential connection (**ERC**): One ERC is equal to the quantity of wastewater generated by a single family residence on an average daily basis as established by a county administrator (Hillsborough County 2004).

ERC: *Abb*. 1. *equivalent residential connection*. 2. *Environmental Regulatory Commission*.

erosion: The general process or the group of processes whereby the materials of the Earth's crust are loosened, dissolved, or worn away, and simultaneously moved from one place to another, by natural agencies, which include weathering, solution, corrosion, and transportation (Bates and Jackson 1987).

ERP: 1. *Abb*. Environmental Results Program, administered by the Environmental Protection Agency. 2. *Abb*. Environmental Resource Permitting, administered by the Department of Environmental Protection.

ESA: *Abb*. *Endangered Species Act*.

escarpment: A long, more or less continuous cliff or relatively steep slope facing in one general direction, breaking the continuity of the land by separating two level or gently sloping surfaces, and produced by erosion or by faulting (Jackson 1997: 216). The Cody Scarp in northern Florida is an example of an erosional escarpment.

Eschericha coli (***E. coli***): Coliform bacterium often associated with human and animal waste and found in the intestinal tract. Its presence is tested by health departments and private laboratories to measure the purity of water (Lenntech 2005).

Essential Wildlife Habitat: Land or water bodies that are necessary, because of the habitat they provide, to maintain populations of endangered or threatened species or species of special concern (Hillsborough County 2004).

estavelle: 1. A spring that reverses flow, causing surface waters to flow into the conduit system because of relative changes in the elevation of groundwater and stream stage (SDII Global Corp. 2002). 2. An intermittent spring resurgence or *exsurgence*, active only in wet seasons (Field 1999). Generally, an estavelle is located near streams or rivers. When the water level of the stream is high (e.g., during flood stage), surface water directly recharges the *aquifer*.

estuarine: Of or relating to an estuary (FCTCKS 2004). See *estuary*.

estuary: The seaward end or the widened funnel-shaped tidal mouth of a river val-

ley where fresh water comes into contact with seawater and where tidal effects are evident; e.g., a tidal river, or partially enclosed coastal body of water where the tide meets the current of a stream (Jackson 1997: 217).

et al.: Latin *et alii* or *et alia* (and others).

ethylene dibromide (**EDB**): A toxic and carcinogenic chemical used as an agricultural fumigant and in some industrial processes. It has been banned in the United States for most agricultural uses. A number of Florida's rural drinking-water wells are contaminated with the chemical (IFAS 2005).

etiquette: The conventional requirements of polite behavior; properties of conduct; good manners (Morehead 1981: 189). Used to explain, often to members new to caving, cave diving, and other sports, the correct approach and respect for the site and other users (i.e., *pit etiquette*) (FCTCKS 2005).

etrier: A multistep makeshift ladder made from *webbing* (Smith and Padgett 1996: 349). *Cf. cable ladder*.

eubacteria: From Greek *eu* (true; truly). All bacteria other than the *archaebacteria*.

euphoria: A feeling of elation and well-being (Heine 1995: 278). Euphoria is a potential indicator of *nitrogen narcosis*.

eutrophic: From Latin *eu* (true; truly) + *trophic* (nutritious). Habitats, usually aquatic, rich in nutrients such as nitrogen and phosphorous with high biological productivity and periods of low dissolved oxygen (FCTCKS 2005). *Cf. dystrophic*, *mesotrophic*, *oligotrophic*.

eutrophication: The accumulation of nutrients or the process of over-enriching a body of water, leading to overgrowth of algae and plant life and loss of dissolved oxygen (FCTCKS 2004). *Syn. enrichment*, *nutrient-loading*.

evacuation: 1. The moving of a patient and manpower out of danger, where comprehensive and sanitary care can begin (Smith and Padgett 1996). 2. The act of emptying or removing the contents of (American Heritage Dictionary 1985: 469).

evaluation and appraisal report (**EAR**): A local government's self-assessment of the success or failure of its comprehensive plan, pursuant to Chapter 163.3191, Florida Statutes (FDOS 2001).

evaporation: The process, also called vaporization, by which a substance passes from the liquid state to the vapor state. It is limited by some to vaporization of a liquid, in contrast to *sublimation*, which is the vaporization of a solid (Bates and Jackson 1987).

evapotranspiration: Loss of water from a land area through *transpiration* of plants and *evaporation* from the soil and surface-water bodies. Also, the volume of water lost through evapotranspiration (Bates and Jackson 1987).

exclusionary zoning: Zoning practices that close housing and land markets to families with low and moderate incomes, including: zoning vacant residential land for large minimum lot size, thus reducing the supply of developable lots and increasing their cost; zoning for exclusively single-family residences, thus zoning out people who cannot afford their own homes; zoning for excessively large minimum house size; imposing unduly expensive subdivision regulations

that shift the burden of public improvements to the new homeowners (FDOS 2001).

excursion: The *leaching* of a *contaminant* beyond a given boundary (FCTCKS 2005).

existence value: Nonmonetary value assigned to wildlife beyond the terms of economic, recreational, or aesthetic considerations. The importance placed on the continued survival of a species independent of what it can do for humans (Wyman and Stevenson 2001).

exit: *Syn*. *egress*. A command signal in diving to stop the dive and return to the entrance (FCTCKS 2005).

expansion bolt: A type of *anchor* for ropes and ladders. It is placed into a predrilled hole and expands when driven in. Natural anchors are preferred to bolts (McClurg 1996: 237).

experimental group: A group of individuals participating in a program or study being evaluated or studied. Responses of an experimental group to a treatment are usually compared to those of a *control group* or *comparison group* (US EPA 2004b).

exploration: Activities leading to the discovery and description of new caves or parts of caves (FCTCKS 2004).

exploration reel: Large dive reel with knotted or marked line used in the exploration of cave. The line is typically marked every ten feet for distance estimates during exploration and survey (FCTCKS 2005). *Cf*. *gap reel*, *jump reel*, *primary reel*, *safety reel*, *spool*.

exposed karst: A general term for outcropping of bare karstic rock at the surface of the ground. Karst topography in which the cover is absent (Field 2002). *Syn*. bare karst, naked karst. *Cf*. *covered karst*.

exsurgence: A spring or seep in karstic terrain not clearly connected with swallets (*swallow holes* or *ponors*) at a higher level (Field 1999).

extended section: In creating cave maps, the result of straightening out a map section composed of several parts into one common plane. Usually the plane is vertical and the length of the section equals the plan lengths of the passages and chambers comprising it (Meth 2002).

externalities: The cost or benefit of some activity that affects persons not involved directly with the activity. Called a negative externality if costs are imposed, for example, a decrease in the value of residential property near a new industrial facility, or a positive externality, as in the aesthetic and economic benefits accruing to the neighbors of a person repainting his or her home. The goal of environmental quality management is to internalize externalities, that is, push the cost of pollution back to the polluters (Wyman and Stevenson 2001: 142). *Cf*. *full-cost accounting*.

external validity: The extent to which the findings of an investigation or a research study can be applied (or generalized) to circumstances or situations other than those that were the subject of the study (US EPA 2004b). *Cf*. *internal validity*.

extirpation: The elimination of a species from part of its range (Wear and Greis 2002).

extremophile: General term for microbes discovered to exist in environments previously believed adverse to life. *Microorganisms* have been found in places of extreme heat, acidity, salinity, pressure, and other constraints, giving potential evidence of microbial life on other planets (Taylor 2000). *Cf. archaebacteria*, *chemoautotroph*, *eubacteria*, *methanogens*.

F

FAC: *Abb*. Florida Administrative Code.

facultative: Said of an organism capable of growth under a number of specific conditions; adaptable to alternate environments (Jackson 1997: 226).

facultative anaerobe: An organism that can grow in the presence of oxygen (*aerobic* environments) or in the absence of oxygen (*anaerobic* environments) (FCTCKS 2005).

fall factor: The length of a fall divided by the length of the rope in actual use (Smith and Padgett 1996).

false floor: In a cave, a floor or ledge consisting of a thin layer of calcite or lava under which supporting rock or sediment has eroded away (FCTCKS 2005).

family: The fifth rank in the taxonomic system (kingdom, phylum or division, class, order, family, genus, species).

FAS: *Abb*. *Floridan aquifer system*.

FASS: *Abb*. Florida Agricultural and Statistics Service, a division of the Florida Department of Agriculture and Consumer Services.

fault: A discrete surface or a zone of discrete surfaces separating two rock masses across which one mass has slid past the other (Jackson 1997: 229).

fault cave: A natural underground open space associated with a fault, generally with a connection to the surface and large enough for a person to enter. The most common type of cave is formed in *limestone* by *dissolution* (Bates and Jackson 1987).

fault plane: A fault surface that is more or less planar (Jackson 1997: 229).

FAVA: *Abb*. *Florida Aquifer Vulnerability Assessment*.

FCS: *Abb*. *Florida Cave Survey*.

FCTCKS: *Abb*. *Florida Committee for the Terminology of Cave and Karst Systems*.

FDACS: *Abb*. *Florida Department of Agriculture and Consumer Services*.

FDCA: *Abb*. *Florida Department of Community Affairs*.

FDEP: *Abb*. *Florida Department of Environmental Protection*.

FDNR: *Abb*. Florida Department of Natural Resources.

FDOT: *Abb*. Florida Department of Transportation.

Fe: Symbol for the chemical element iron. From Latin *ferrum*.

feasibility study: A study of the applicability or practicality of a proposed action or plan (US EPA 2004b).

Federal Cave Resources Protection Act: Established November 18, 1988, and amended in 1990 to secure, protect, and preserve significant caves on federal lands for the perpetual use, enjoyment, and benefit of all people, and to foster increased cooperation and exchange of information between governmental

authorities and those who utilize caves located on federal lands for scientific, education, or recreational purposes. The act is intended to protect significant caves on federal lands by identifying their location, regulating their use, requiring permits for removal of their resources, and prohibiting destructive acts. It requires that caves be considered in the preparation and implementation of land management plans, and allows for cave location to be kept confidential (16 USC Chapter 63 ss 4301–4310, Public Law 100–691, November 18, 1988).

feed, feeding: In climbing, the act of coaxing a rope through a device, over an edge, or into a bag (Smith and Padgett 1996: 350).

fee simple acquisition: The outright purchase of land. Gives the owner (a local government, for example) full control over all rights (FDEP and FDCA 2002). *Syn*. fee simple purchase.

fen: A waterlogged, spongy ground containing alkaline decaying vegetation, characterized by reeds, that may develop into peat. It can sometimes be caused by *seeps* spread across karst regions (Bates and Jackson 1987). *Syn*. *bog*.

fermentation, **anaerobic**: Process in which carbohydrates are converted in the absence of oxygen to hydrocarbons (such as methane) (Eckhardt 2005).

ferric oxide (**Fe_2O_3**): *Hematite*. Insoluble *compound* of iron and oxygen, found where ferrous compounds in groundwater reach an oxygen-containing atmosphere (UI 2005). *Cf*. *iron oxide*. *Syn*. rust.

ferrous: Descriptive of iron *compounds* in dissolved form (UI 2005).

FFM: *Abb*. *full face mask*.

ffw: *Abb*. feet of fresh water, referring to depth.

FGS: *Abb*. Florida Geological Survey.

FHBM: See *flood hazard boundary map*.

field notes: A written record of observations, conversations, situational details, and thoughts during the study period (US EPA 2004b).

field sampling plan: A document that describes exactly where and how samples are to be collected, preserved, packaged, and shipped to the laboratory. The plan also describes all required field tests and the chain-of-custody procedures. (Navy Labs 1996). *Syn*. sampling plan.

figure 8: 1. In climbing, a descending device shaped like the number 8, allowing only fixed friction. 2. A particular knot with a myriad of applications in rescue and rigging (Smith and Padgett 1996: 350).

figure 9: Knots formed very much like a *figure 8*, but with an extra half-turn around the standing part of the line. This knot unties more easily than the figure 8 after it has been loaded (Smith and Padgett 1996).

fill: 1. Transported materials such as clay, sand, silt, and/or gravel washed or carried into a cave, covering the bedrock floor. Can partially or entirely block cave passages. 2. The addition of soil or other material to wetlands to raise the ground level, making the land suitable for farming or development (FCTCKS 2005).

filling: Depositing, by any means, materials into surface waters or wetlands (per 373.403 Florida Statutes).

filter fluorometer: A device consisting of a light source and filters used to detect fluorescent compounds within a predetermined range of excitation and emission wavelengths. The excitation filter transmits light in only the excitation wavelength range of the fluorescent compounds to be measured. The emission filter allows only emitted light from the sample that falls within the emission wavelength of the target compound to pass through to a detector that measures the intensity of the emitted fluorescence (FCTCKS 2005).

fin straps: Thin adjustable rubber straps used to securely hold the fins to the diver's feet (FCTCKS 2005). *Cf. spring straps*.

fins: Worn on the diver's feet to assist the diver in moving through the water by finning or "kicking" (FCTCKS 2004).

first magnitude spring: A spring with a flow-rate of 100 cubic feet per second (64.6 million gallons per day) or more (FDEP and FDCA 2002: 112).

first stage: In diving, a regulator attached to the valve of a SCUBA *tank*. The first stage reduces the pressure of the air in the tank, providing a usable pressure for accessories such as inflation hoses and the *second stage* (breathing *regulator*) (FCTCKS 2004).

fissure: Any discontinuity within the rock mass that is either initially open or capable of being opened by *dissolution* to provide a route for water movement. Fissures in this sense, applied generally to *karst*, therefore include the primary sedimentary bedding planes as well as *tectonic faults* and *joints* (). A fissure is often filled with mineral-bearing material (Field 1999, Jackson 1997: 237). *Cf. conduit*, *fracture*. *Syn*. *rift*.

fissure cave: A cave developed along a *fissure* (FCTCKS 2005).

fissure crack: *Syn*. *fissure*.

fixed friction: Friction that is constant as that achieved with a *figure 8* (Smith and Padgett 1996: 351).

fixed friction device: When placed on a rope, a device that gives essentially the same amount of friction from the top to the bottom of the drop. Friction can be varied before the rappel by the method of attachment to the rope, the size of the rope, or by adding tension to increase friction within the device (Smith and Padgett 1996).

fixed line: Mainline. A rope that is securely anchored (Smith and Padgett 1996: 351). *Syn*. *main line*.

flagging: Colorful ribbon or other material or objects, sometimes reflective, that marks a route. Also, the act of placing flagging markers or *flagging tape* (Smith and Padgett 1996).

flagging tape: Colorful ribbon often used to mark survey stations or routes through a cave, although care should be taken to remove it once its purpose is served. Flagging tape can be used to mark passages in a search for a missing person, even if you are familiar with the cave. Flagging tape can be used on the surface to mark entrances, routes to entrances, or other significant features (FCTCKS 2004).

flat webbing: Woven nylon strap (Smith and Padgett 1996). *Syn*. *tubular webbing*.

flocculent: Chemical precipitate that forms small particles so nearly dense as water that they remain suspended in the water column for some time. Eventually they do settle out (FCTCKS 2004).

flood: An overflow or inundation that comes from a river or other body of water and causes or threatens damage. It can be any relatively high streamflow overtopping the natural or artificial banks in any reach of a stream. It is also a relatively high flow as measured by either gauge height or discharge quantity (Eckhardt 2005).

floodplain: The flat, low-lying portion of a stream valley subject to periodic inundation by floodwater (Tarbuck and Lutgens 1997).

floodplain management regulations: Federal, state, or local regulations that provide standards for the purpose of flood damage prevention and reduction (Hillsborough County 2004).

floodway: The channel of a river, watercourse, or intermittent watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without increasing the water surface elevation (Hillsborough County 2004).

Florida Aquifer Vulnerability Assessment (**FAVA**) **model**: A model developed by the Florida Geological Survey that uses existing *geographical information system* (GIS) data to predict the vulnerability of Florida's major aquifer systems to contamination originating from land surface (Arthur 2001). *Cf. DRASTIC.*

Florida Cave Survey: An informal group of cavers dedicated to the documentation of Florida's dry and submerged caves (FCTCKS 2005).

Florida Committee for the Terminology of Cave and Karst Systems (**FCTCKS**): Ad hoc committee organized to develop this glossary (FCTCKS 2004).

Florida Department of Agriculture and Consumer Services (**DACS**): A department of the state government that communicates the needs of the agricultural industry to the legislature, the Florida Department of Environmental Protection, and the water management districts. It also ensures participation of agriculture in the development and implementation of water policy decisions. FDACS also oversees Florida's soil and water conservation districts, which coordinate closely with the federal Natural Resources Conservation Service (NRCS) (SFWMD 2005a).

Florida Department of Community Affairs (**DCA**): A department of the state government responsible for the quality of life of the citizens of Florida. Responsibilities include keeping citizens safe, water and air pure, beaches pristine, and housing affordable. It is also the lead agency in planning Florida's growth (FDCA 2005).

Florida Department of Environmental Protection (**DEP**): Florida's lead agency for environmental management and stewardship. The DEP protects, conserves, and manages Florida's natural resources and enforces the state's environmental laws (FDEP 2004f).

Floridan aquifer system: A thick *carbonate* sequence of permeable rock that includes all or part of the *Paleocene* to early *Miocene* series and functions regionally as a water-yielding hydraulic unit in Florida and portions of the southeastern United States (SEGS 1986).

Florida water plan: The state-level water resource plan developed by the Florida Department of Environmental Protection under Chapter 373.036, Florida Statutes (373.019 Florida Statutes). The state water use plan, together with the water quality standards and water classifications adopted by the Department of Environmental Protection (SWFWMD 2000: 7–5).

flow: 1.The rate of water discharged from a source expressed in volume with respect to time (Eckhardt 2005). 2. Used by cave divers synonymously with *current* when referring to subsurface water movement within a passage or system (i.e., a high-flow system). (FCTCKS 2004). *Syn*. *karst conduit flow*, *subsurface flow*.

flowing artesian well: See *artesian well*.

flow level: The amount of water flowing from a specific body of water such as a stream or a spring, usually measured in cubic feet per second or millions of gallons per day (FDEP 2005).

flow path: An imaginary line tracing the passageway that a particle of groundwater would follow as it flows through an aquifer (Fetter 2001).

flow rate: The amount of water transmitted, as through a pipe, appliance, irrigation system, or cave conduit; measured in gallons per minute, hour, or cycle (FCTCKS 2005).

flowstone: A general term for any deposit of *calcium carbonate* or other mineral formed by flowing water on the walls or floor of a cave (Jackson 1997: 242). *Cf*. *dripstone*, *travertine*.

fluid potential: A physical quantity, capable of measurement at every point in a flow system, whose properties are such that flow always occurs from regions in which the quantity has high values to those in which it has lower values, regardless of the direction in space (Freeze and Cherry 1979).

FLUM: *Abb*. future land use map, included in the adopted local comprehensive plan (FDEP and FDCA 2002: 112).

fluorescence: The emission of electromagnetic radiation, especially of visible light, resulting from the absorption of incident radiation and persisting only as long as the stimulating radiation is continued (Bates and Jackson 1987: 250).

fluorescent dye: A material in either liquid or powder form that absorbs the light energy of a specific wavelength (excitation wavelength) and re-emits light energy at longer but equally specific wavelengths (emission wavelength). Fluorescent dyes are the most commonly used groundwater tracers because they are readily soluble in water, adequately conservative, unambiguously and inexpensively detectable at very small concentrations, readily available and relatively inexpensive, and intrinsically nontoxic (FCTCKS 2005). *Cf*. *eosin*, *phloxene*, *Rhodamine WT*, *uranine*.

fluorometer: An instrument for measuring the fluorescence of water, used in water tracing and dye gauging. Selected filters are used to control the excitation and emission ranges for specific fluorescent dyes (Field 2002). See *filter fluorometer*, *fluorescent dye*, *tracer-flow method*.

flute (**fluting**): A *speleothem* consisting of shallow concave vertical channeling on columns, walls, or other vertical surfaces (FCTCKS 2005).

flutter kick: The most common fin stroke used by divers, whereby both legs alternately perform the same motion. It is perhaps the most natural finning action and is particularly powerful for forward motion. However, the downward thrust in the water causes silt disturbance and other, or modified, finning actions are therefore preferred. The modified flutter kick, for example, uses bent knees, producing a significant improvement (Farr 2003: 123). *Cf. frog kick*, *modified flutter kick*, *shuffle kick*.

fluvial: 1. Of or pertaining to a river or rivers. 2. Existing, growing, or living in or about a stream or river. 3. Produced by the action of a stream or river (Jackson 1997: 243).

flux: See *discharge*.

FO_2: *Abb*. fraction of oxygen. The percentage of oxygen in a breathing gas expressed as a decimal fraction (Bozanic 2002: 515).

foot hold: See *hand holds and foot holds*.

foraminifer: Any *protozoan* belonging to the subclass Sarcodina, order Foraminifera, characterized by the presence of a hard covering (test) and one to many chambers composed of secreted calcite (rarely silica or aragonite) or of agglutinated particles (Bates and Jackson 1987: 254).

forecasting: Estimating the likelihood of an event taking place in the future, based on available data (US EPA 2004b).

foresight: A compass or clinometer sighting made along the survey's direction-of-travel; i.e., from the *from-station* to the *to-station* (Dasher 1994: 182).

formation: 1. A body of rock identified by lithic characteristics and *stratigraphic* position and is mappable at the earth's surface or traceable in the subsurface (Jackson 1997). 2. See *cave formation*, *speleothem*.

fossil: Any remains, trace, or imprint of a plant or animal that has been preserved in the earth's crust since some past geologic or prehistoric time; loosely, an evidence of past life (Bates and Jackson 1987: 256).

foundation knot: The primary load bearing knot (Smith and Padgett 1996).

fountain: (Jamaica) *Syn*. *boil*.

fracture: Cracks formed by natural stresses in soil, sediment, or rock. They are found throughout the state of Florida (SDII Global Corp. 2002). *Syn*. *joint*.

fracture trace: A confirmed pattern observed through remote sensing (aerial photography or satellite imagery) owing its origin to jointing or fracturing in underlying soils, sediments, or bedrock (SDII Global Corp. 2002). See *photolineament*.

free climbing: 1. Climbing on a rope when one's feet don't touch the wall. 2. Climbing a route without the use of aid, but still using protection and a belay line (Smith and Padgett 1996: 351).

free dive: A short dive made without the use of breathing apparatus (Balcombe et al. 1990: 262). *Syn*. *breath-hold diving*, *skin diving*.

free drop: A drop where the rope hangs free, not touching rocks or walls (Smith and Padgett 1996). *Syn*. free pitch.

free flow: An unwanted loss of air from a SCUBA *regulator*. Free flows can be

caused by a variety of reasons, such as mechanical failure or debris caught in the regulator (Stone and AmEnde 2002).

free pitch: See *free drop*.

French wrap: A method of *self-belaying* in which a caver or climber wraps a continuous loop of line several times around the *rappel* rope and attaches to his/her *sit harness* by a *carabiner*. Used as a safety in addition to rappelling gear typically used (Birkhimer 2005).

freshwater: 1. Water without significant amounts of dissolved sodium chloride (salt). Water characteristic of rain, rivers, ponds, and most lakes (Wyman and Stevenson 2001: 158). 2. Water containing less than 1,000 milligrams per liter of dissolved solids; generally more than 500 milligrams per liter is considered undesirable for drinking and many industrial uses (Field 2002: 79). *Cf. brackish*, *saltwater*, *seawater*.

freshwater estuary: An estuary into which a river pours with sufficient volume to exclude salt water (Bates and Jackson 1987).

freshwater lens: Freshwater floating on denser salt water. Usually occurs on islands or peninsulas where the freshwater gets deeper as one goes farther inland from the seawater. Viewed from the side, the freshwater resembles a convex lens where the middle is thick and tapers out to a thin layer as it contacts salt water (FCTCKS 2005).

freshwater marsh: Herbaceous plant community occurring on lands where the soil is saturated or submerged during part of the year. Freshwater marshes include a number of vegetative types such as flag marshes (dominated by pickerelweed, arrowhead, and other nongrass herbs), sawgrass marshes, bulrush marshes, and shrub marshes (Hillsborough County 2004).

friable: Said of a rock or mineral that crumbles naturally or is easily broken, pulverized, or reduced to powder, such as a soft or poorly cemented sandstone (Jackson 1997: 252).

friability: The degree to which a solid can be crushed and powdered. The condition of being friable (Wyman and Stevenson 2001, Jackson 1997).

friction: Resistance of motion caused by the rubbing of two things together (Smith and Padgett 1996: 351).

friction device: A rappel device. A device used to retard or slow the rate at which a rope passes through it while descending (Smith and Padgett 1996). *Cf. braking hand*, *leg wrap*, *rappel device*.

frog: Both a noun that describes a way of arranging one's ascenders, and a verb that describes the act of ascending via that setup. The word is derived from the motion that its namesake amphibian makes when swimming or jumping (Stone and AmEnde 2002, FCTCKS 2005). *Syn. frog system*, *rope walker*, *sit-stand*.

frog kick: A fin stroke where each leg performs a mirror image of the other at the same time, virtually the same action as in breaststroke swimming. It is an extremely powerful action, which, given that it drives the water horizontally backwards rather than downwards, produces little silt disturbance. This stroke

is often the primary method of swimming in the overhead environment (Farr 2003: 123). *Cf. flutter kick*, *modified flutter kick*, *shuffle kick*.

frog system: A sit-stand rope climbing system having European origins (Smith and Padgett 1996: 351). See *frog*.

from-station: The rearward station along a survey, from which most of the measurements are taken (Dasher 1994: 182).

FS: *Abb*. Florida Statutes.

fsw: *Abb*. feet of saltwater (or seawater), referring to depth.

full cost accounting: An economic tool taking into account the externalities involved in the production, use, and disposal of goods and services over time. Externalities are given prices to reflect their costs, including energy sources used, the environmental damage caused by the production, and the costs of disposal or recycling when the product is no longer usable. Natural or renewable resources, traditionally viewed as "free goods," are redefined as assets, having substantial value to an enterprise and being appropriately allocated in the calculation of profit and loss (FDOS 2001). *Cf. externalities*.

full face mask (**FFM**): A *mask* that covers the diver's eyes, nose, and mouth. Can be used for both communication and gas switching during extremely long or complicated *decompression* schedules. The full face mask allows a diver to continue to breathe even if the diver has lost consciousness (FCTCKS 2004).

G

gaining stream: See *effluent stream*.

gallery: A cave *chamber* that is large and nearly horizontal. May be adorned with *speleothems* (Monroe 1970). *Cf. hall*.

gap: In cave diving, a deliberate separation between the ends of two permanent guidelines, for example in the entrance to a sink that occurs in a passage where one line ends on one side of the sink and another starts on the other side of the sink. A temporary line must always be laid to bridge the gap, normally from a small separate reel, called a jump or *gap reel*, to maintain a continual physical connection to the cave entrance (Farr 2003). *Cf. jump*.

gap reel: Small reels, holding 9.2–15.2 meters (30–50 feet) of line, designed to bridge the breach either between the ends of two separate lines, to close the gap between two lines, or to form a jump between the middle of one line to the end or middle of another (Prosser and Grey 1992). *Cf. exploration reel*, *jump reel*, *primary reel*, *safety reel*, *spool*.

gas: The breathing mixture used by a diver (Huth 2005).

Gas Chromatography-Mass Spectrometry (**GC/MS**): A sensitive and accurate analytical technique, used mainly for organic *compounds*, in which the gas effluent from a gas chromatograph is piped to a mass spectrometer for additional analysis, which typically includes precise identification of the organic constituents in a sample (Wyman and Stevenson 2001: 162).

gas switching: In cave diving, switching breathing gases while underwater. Usually refers to the switch from back gas or travel mix to the oxygen mix used

during *decompression*, but can also refer to switching among multiple *bottles* containing a variety of gases during more complicated deep dives (FCTCKS 2004).

gastropod: From Latin *gastro* (stomach) + *poda* (foot). A member of the Gastropoda, a class within the phylum Mollusca, having a body contained in an asymmetric helical coiled shell with apex pointing toward the posterior away from the head (e.g., snail), or having no shell (e.g., slug). The head is distinct; it can be moved independently of the rest of the body (Jackson 1997).

gate: Any structure or device located to limit or prohibit access or entry to a cave (810.13 Florida Statutes). Gates are constructed with consideration for the cave ecosystem; for example, bat-friendly gates allow ingress and egress of bats while restricting the entrance of humans. Many gates have locks and are managed by landowners or other individuals or a local *grotto* (FCTCKS 2004).

gauge: 1. *v*. To estimate. 2. *n*. A device for measuring discharge, pressure, etc. (FCTCKS 2006). See *submersible pressure gauge*.

gear modification: The act of changing gear around to fit a certain diving style or specific cave environment (FCTCKS 2004).

gear up, **gearing up**: Assembling equipment and gear in preparation for a caving trip or a cave dive (FCTCKS 2004).

genus (pl. **genera**): Sixth rank in the taxonomic system (kingdom, phylum or division, class, order, family, genus, species). The genus and species names together constitute the "specific name," a unique name for each known organism that is alive or has become extinct (Field 2002).

geoarchaeology: The study of geological environments as they pertain to *archaeology* (FCTCKS 2005).

geographic information system (**GIS**): A computer-based tool for mapping and analyzing data in a geographic context. Integrates database operations and statistical analysis with specific points in maps. Used as a comprehensive tracking and planning tool (FCTCKS 2004).

geology: The study of the planet Earth: the materials of which it is made, the processes that act on these materials, the products formed, and the history of the planet and its life forms since its origin (Jackson 1997).

Giardia lamblia: *Protozoan* parasite associated with human infections acquired by drinking water that is either not filtered or not chlorinated (Wyman and Stevenson 2001: 166).

Gibbs ascender: An offset cam ascending device that grips the rope, developed by Charlie Gibbs in the late 1960s (Smith and Padgett 1996). *Cf*. *prusik*.

GIS: *Abb*. *geographic information system*.

global positioning system (**GPS**): A system maintained by the U.S. Department of Defense that utilizes high-frequency, high-altitude satellites to broadcast an exact time signal used by a receiving device to determine latitude, longitude, and elevation (Dasher 1994: 182).

gloves: *Neoprene* gloves worn by divers. Useful in warmth retention, but not usually worn by cave divers because they limit the sense of touch and ability to feel the guideline. May be essential in colder water temperatures or on dives

involving long *decompression*. Also used by cavers to avoid leaving sweat and oils from hand contact with sensitive formations (FCTCKS 2004).

go, going: n. Previously unexplored continuing cave passages (FCTCKS 2004). *Cf. lead*.

goal-oriented dive: Any dive requiring the performance of a specific task or tasks over and above the skills and techniques required for the dive itself (e.g., exploration and survey dives, sampling and data-collection, etc.) (FCTCKS 2004). *Cf. multitasking*.

goethite: A yellowish, reddish, or brownish black iron hydroxide mineral (α-FeO(OH)). It is the most common constituent of many forms of natural rust or of *limonite* (Bates and Jackson 1987). *Cf. phreatite*.

gold line: A 7/16–inch, 3–strand, twist-laid, gold-colored nylon rope initially used by North American cavers when they wanted something better than manila rope. 2. Also, a 3–strand, twist-laid, gold-colored nylon rope formerly used in *single rope technique* by U.S. cavers (Smith and Padgett 1992). 3. A highly visible nylon line used by cave divers for navigation within a submerged cave system. Usually used to denote the main route through the cave, and usually in well-explored areas. Consists of a 4 mm (0.16 inch) braided sheath with a twisted core (FCTCKS 2004).

golden rule (of cave diving): In cave diving, anyone can *turn the dive* at any time for any reason (FCTCKS 2005).

gour: *Flowstone* deposit, usually *calcite*, built up along the edge of a *cave lake* as a result of precipitation from a thin film of water overflowing from the pool (Lowe and Waltham 1995). *Cf. rimstone*, *rimstone dam*.

GPM: *Abb*. gallons per minute.

GPR: *Abb*. *ground penetrating radar*.

GPS: *Abb*. *global positioning system*.

grab sample: A sample that is representative of one specific sample site location at a specific time. A single sample that is collected at one point in time and place (Navy Labs 1996). *Cf. composite sample*.

grade: 1. Inclination or slope (Field 2002). 2. Rating developed by the British Cave Research Association within a set of standards expressing accuracy and classification of survey detail and commonly used by cavers (Tables 1.1 and 1.2) (Burge 1988: 15–16). Cf. *stick map*.

gradient: A rate of inclination, a slope; an ascending or descending part; an incline (UI 2005).

granularity: Containing small units. A gauge with a scale calibrated in one-unit increments would have a higher degree of granularity than one calibrated in ten-unit increments (Burge 1988: 122).

granule: A mineral particle larger than sand, 2 to 4 mm (.08 to .16 inches) in diameter.

gravel: An unconsolidated, natural accumulation of typically rounded rock fragments resulting from erosion, consisting predominantly of particles larger than *sand* (diameter greater than 2 mm, or 0.08 inch), such as boulders, cobbles,

Table 1.1. Map Grading System of the British Cave Research Association

Grade 1	A sketch of low accuracy where no measurements have been made.
Grade 2	May be used, if necessary, to describe a sketch that is intermediate between grades 1 and 3.
Grade 3	A rough magnetic survey. Horizontal and vertical angles measured to ±2.5 degrees; distances measured to ±50 cm (±20 in); station position error less than ±50 cm (± 20 in).
Grade 4	May be used, if necessary, to describe a survey that fails to attain all of the requirements of grade 5 but is more accurate than grade 3.
Grade 5	A magnetic survey, horizontal and vertical angles accurate to ±1 degree; distances accurate to ± 10 cm; station position error less than ±10 cm (±3.9 in).
Grade 6	A magnetic survey that is more accurate than grade 5.
Grade X	A survey based primarily on the use of a theodolite instead of a compass.

Table 1.2. Classification of Survey Detail

Class A	All details based on memory
Class B	Passage details estimated and recorded in the cave
Class C	Measurements of detail made at survey stations only
Class D	Measurements of detail made at survey stations and whenever necessary between stations to show significant changes in passage shape, size, direction, etc.

pebbles, granules, or any combination of these fragments; the unconsolidated equivalent of conglomerate. In Great Britain, the range 2–10 mm (0.08–0.39 inch) has been used (Jackson 1997).

gray water: Domestic wastewater from showers, tubs, sinks, and clothes washers, sources other than toilets. (Wyman and Stevenson 2001: 170). *Cf. black water*.

grid: Two intersecting sets of regularly spaced lines aligned at constant angles. Used for measurements in two dimensions (Dasher 1994: 183).

grid north: The direction of a north-south grid line on a map. Except for the north-south grid line through the point of origin of the grid, it will differ slightly from true north (Meth 2002).

grid system: In underwater archaeology, a grid built from various materials (aluminum frame, string and rebar, PVC, etc.) used to map excavation sites (FCTCKS 2005).

grotto: 1. A local club, or group, of the National Speleological Society, comprising individuals who reside in the same general locality (FCTCKS 2005). 2. A small cave, natural or artificial. 3. A room in a cave system with many *decorations* (Field 1999).

ground penetrating radar (**GPR**): A device using radio waves to detect subsurface features (FCTCKS 2004).

groundwater: 1. That part of subsurface water in the *zone of saturation*. 2. Loosely, all subsurface water as distinct from surface water (Jackson 1997). *Syn*. phreatic water, *phreatic zone*, zone of saturation.

groundwater age: Duration of time since water was *recharged* into an *aquifer*; more specifically, the time since the *recharge water* was isolated from the atmosphere (Plummer et al. 1993). See *age of water*.

groundwater basin: See *drainage basin*.

groundwater carbonation: See *carbonation*, *groundwater*.

groundwater discharge: Flow of water from the *zone of saturation* (Field 2002: 86).

groundwater divide: A ridge in the water table, or potentiometric surface, from which groundwater moves away in both directions (Bates and Jackson 1984).

groundwater level: The measurement, in feet, of the elevation of the top of an *aquifer*, as measured in a network of groundwater monitoring wells and/or supply wells. The level can fluctuate in response to aquifer *recharge* and groundwater withdrawals (Scott et al. 2004: 351).

groundwater system: All the components of subsurface materials that relate to water, including *aquifers* (confined and unconfined), *zones of saturation*, and *water tables* (MSU 2000: 292).

groundwater tracing: See *water tracing*.

groundwater under the direct influence of surface water: Any water beneath the surface of the ground with (a) significant occurrence of insects or other *macroorganisms*, *algae*, or large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium*, or (b) significant and relatively rapid shifts in water characteristics such as *turbidity*, temperature, *conductivity*, or pH that closely correlate to climate or surface water conditions (FDEP 2004d).

groundwater velocity: The rate at which groundwater travels along a defined pathway (FCTCKS 2005).

groundwater withdrawal: The act of removing water from aquifers by pumping from a well, whether a small domestic supply well or a large public supply well (FDEP and FDCA 2002: 113).

grouting: Sealing off or stopping water flow or strengthening unstable rock or soil by injecting cement, clay, or other fillers into drilled holes (FCTCKS 2005).

guano: The accumulation of dung from *bats*. It is often partly mineralized, and includes rock fragments and animal remains (e.g., bones). Guano also may contain products of reactions between the excretions and the rock (Field 2002).

guide: A person leading another person or group through a cave or on a cave dive. The guide is responsible for the safety of the person or group and the cave (FCTCKS 2004). *Syn*. leader.

guideline: A permanent or temporary line secured in submerged cave passages to provide cave divers with a single continuous path to open water (Zumrick et al. 1988). *Syn*. *line*. *Cf*. *main line*.

gully: A channel worn into the soil by running water; a ravine that is shallow and wide (FCTCKS 2005).

gypsum: The mineral hydrated calcium sulfate, $CaSO_4 \cdot 2(H_2O)$ (Field 2002).
gypsum flower: See *cave flower*.

H

habitat: 1. The immediate surroundings of a biological organism with everything necessary to sustain life (Meth 2002). *Cf. ecosystem*. 2. An underwater dwelling for divers in *saturation* and *decompression*. Also used in reference to deco habitat, a shallow-water dry station for more comfortable decompression (Mount and Gilliam 1993). *Syn*. air bell, deco bell.
habitat assessment: An assessment and physical/chemical characterization conducted in conjunction with certain *macroinvertebrate* sampling. Overall habitat quality is determined by measuring several attributes known to have potential effects on the stream or lake *biota* (FDEP 2004e). See *biological assessment*.
habitat fragmentation: The process by which isolated patches of habitat are created through land clearing and deforestation (FDEP 2005).
habitat suitability indices (**HSI**): U.S. Fish and Wildlife Service models used for determining species-habitat relationships before and after proposed land use changes (NWRC 2003).
hachure: Shading on a drawing or map by the use of lines; hatching (Morehead 1981: 245).
Haideotriton wallacei (Georgia blind cave salamander): A species of blind cave salamander currently known only from caves in the Florida panhandle and southern Georgia (FCTCKS 2004).
Haldanian theory: A theory by John S. Haldane, a British physiologist, describing gas absorption and elimination by body tissues; forms the basis for *decompression tables* (Heine 1995: 278).
half-blind valley: A blind valley whose stream may overflow and continue overland during floods when the sinking stream cannot manage all the water (Bates and Jackson 1987).
half life: The time required for one-half of a radioactive substance to degrade to another nuclear form or to lose one-half of its activity, or for one-half of a chemical material to be degraded, transformed, or eliminated in the environment or in the body. Each radioactive substance has a predictable rate of decay, from millionths of a second to millions of years. Half-lives of chemical materials in the environment vary with the type of chemical, and the biological, chemical, and physical conditions present where the chemical is released (Wyman and Stevenson 2001: 175).
half-times: The rate of absorption or elimination of gas in tissues at an exponential rate. A "5 minute" tissue is 50% saturated in 5 minutes, 75% saturated in 10 minutes, etc., until essentially saturated after six half-times (Heine 1995: 278).
hall: In a cave, a lofty chamber that is much longer than it is wide (Field 2002: 91). *Cf. gallery*.

halocline: A locally steep *salinity* gradient along the interface between fresh *groundwater* and saline groundwater, such as is found at the base of the freshwater lens common beneath many *limestone* islands. Water mixing and microbial activity are important influences on *dissolution* along the halocline, as shown in *blue holes* (). Separate and distinct layers of water frequently found in coastal caves. The layers are stratified as a result of density differences (salt water is denser than freshwater) (Field 2002, London 2004).

hammock: From Native American *hummoka* (an island of hardwood trees within a pine-dominated or treeless environment). A hardwood plant community in Florida and neotropical islands. (FCTCKS 2004).

hand fanning: Underwater, using one's hand to wave away light sediment that has settled on features or objects (FCTCKS 2005).

hand holds and foot holds: Small ledges, holes, knobs, or crevices a caver can use when *climbing*, *scrambling*, or *chimneying* (McClurg 1996).

handle: The part of an implement, instrument, tool, or weapon made to be gripped by the hand (Morehead 1981: 247).

handled ascender: A rope-ascending device that has a handle grip (Smith and Padgett 1996: 352).

hand line: A safety line on a slope where the possibility of slipping or losing one's balance is possible, but where the use of a rope-climbing system is hardly merited (Smith and Padgett 1996: 352–353).

hand signal: Hand gestures used between dive buddies to facilitate communication during the dive (FCTCKS 2004). *Cf. light signals*.

hanging survey: Any *survey* not connected into a previously defined survey (Dasher 1994: 183).

hang time: Colloquialism for time spent in *decompression*.

hardness: A characteristic of water caused by various salts and calcium, magnesium, and iron hazardous waste (e.g., bicarbonates, sulfates, chlorides, and nitrates), which because of its quantity, concentration, or physical, chemical, or infectious characteristics, may cause mortality (death), injury, or serious illness (US EPA 1998). *Syn. hard water*. *Cf. carbonate hardness*.

hard water: Water containing a high level of calcium, magnesium, and other minerals. Hard water reduces the cleansing power of soap and produces scale in hot water lines and appliances (Eckhardt 2005). *Cf. hardness*, *soft water*.

harness: 1. In diving, a continuous length of nylon webbed material, usually 2 inches (5.1 cm) wide, used to attach the diver's *wings*, backplate, and *tanks* to his or her body. Consists of shoulder straps and a waist belt and contains buckles for attaching various items and loose gear (Prosser and Grey 1992). 2. A system of straps and *webbing* that a caver wears that provides connection points for *belay* lines, climbing systems, and a number of other uses (Smith and Padgett 1996).

harness induced pathology: The restricting straps of a harness blocking the normal blood flow when a person sits in a *sit harness* too long, compartmentalizing the blood. The restricted blood is kept from the normal cleaning processes of the kidneys and when the harness is eventually removed, this toxic blood

slams into the heart and can cause death. Experiments have shown that this problem can give rise for concern after only ten minutes (Smith and Padgett 1996: 353).

Hawthorn Group: The Upper Oligocene to Lower Pliocene Hawthorn Group consists of mixed siliciclastics: *clay*, *silt*, and *sand* carbonates: *limestone* and *dolostone*. The group overlies the *Eocene* and *Oligocene* carbonates that comprise the upper portion of the *Floridian Aquifer System*. It extends over much of Florida, southern Georgia, and southeastern South Carolina. In Florida, the Hawthorn Group extends from the Apalachicola River to the Keys. It is absent over most of the Gulf region of north-central Florida (Scott 2006).

HC: Symbol for *hydrocarbon*.

He: Symbol for *helium*.

head: 1. The source, as of a stream (Morehead 1981: 251). 2. The bathroom on a boat (FCTCKS 2005).

heading: A navigational course to be followed (Heine 1995: 278). *Cf. declination*.

headlight: A light worn on the head or mounted on a helmet (FCTCKS 2005). *Cf. helmet light*.

head loss: The loss of energy in a hydraulic system caused by friction between the moving fluid (water) and the pipe or conduit as well as by other, smaller factors, such as changes in pipe diameter, bends and valves (Wyman and Stevenson 2001).

headwater: The upper reach of a stream (Field 2002: 92). *Syn*. head water, *rheogenesis*.

heat exhaustion: An illness characterized by fatigue, weakness, and collapse caused by inadequate fluid intake to compensate for loss of fluids from perspiration (Heine 1995: 279).

height: The vertical distance to the cave ceiling from a datum or survey station (Dasher 1994: 183).

helictite: A *speleothem* of *calcite* appearing to defy gravity, being twisted, curved, or angular in projection. Helictites form on cave walls, ceilings, and *stalactites*. They have a tiny central canal. *Cf. anthodite*, *heligmite* (Field 2002).

heligmite: A *helictite* that grows on a cave floor or a shelf. It is usually thin, curved, and angular (Monroe 1970).

heliox: Used in diving, a breathing mix composed of helium and oxygen. Designed to reduce narcotic effects of nitrogen. Heliox mixtures used for diving often contain a lower percentage of oxygen than found in air to avoid the increasing toxicity of oxygen at depth (Farr 2003). *Cf. nitrox*, *normoxic*, *trimix*.

helium (**He**): A nontoxic, colorless, odorless, tasteless, inert, lightweight gas used to reduce *nitrogen*, and thus the risk of *nitrogen narcosis*, in breathing gases for deep dives. Mixtures of helium, nitrogen, and oxygen (or air) are referred to as *trimix* (Huth 2005).

helmet: A miner's, climber's or other kind of nonmetallic protective helmet used in caving and rappelling. The caving helmet usually has a quick-release chin strap, little or no sun visor, and one or more lights, and meets UIAA standards for recreational use. Some cave divers wear a helmet, particularly when using a

diver propulsion vehicle. Construction helmets can be used but are not recommended by caving organizations on accout of their primitive suspensions and weak materials (Field 2002, FCTCKS 2004).

helmet light: A light mounted on a helmet (FCTCKS 2004). *Cf. head light*.

hematite (**Fe_2O_3**): The principal form of iron ore; consists of *ferric oxide* in crystalline form; occurs in a red earthy form (Princeton University 2003). *Cf. iron oxide*. *Syn*. rust.

Henry's Law: The amount of gas that will dissolve in a liquid at a given temperature is almost directly proportional to the partial pressure of that gas (Heine 1995: 279).

herbicide: Chemical substances created to kill or inhibit the growth of unwanted plants (FCTCKS 2005).

Hess Sampler: An instrument used to collect *invertebrates* in shallow streams with gravel and pebble bottoms. Scientists pick up the rocks in the sampler and gently scrape them to dislodge *macroinvertebrates* attached to the rocks (ANS 2005).

Hester-Dendy Invertebrate Sampler: A multiplate artificial substrate used to collect attached one-celled organisms and (primarily) attached and free-living invertebrates (such as midge larvae) from standing water. The collected organisms are used in water quality assessments to determine *species richness*, *species density*, and *species diversity* at the sampling location (FCTCKS 2004).

heterotroph: From Greek *hetero* (other; different) + *trophe* (nutrient). An organism that cannot create its own food and that must consume other matter or organisms (FCTCKS 2005). *Cf. autotroph*.

HID: *Abb*. high intensity discharge.

HID light: *Abb*. *high intensity discharge light*.

high intensity discharge light (**HID light**): A light bulb type that uses an electric arc rather than a filament to produce light. They are more efficient and use smaller battery packs and tend to be favored by cave divers (FCTCKS 2004).

high pressure nervous syndrome (**HPNS**): A condition resulting from breathing helium under high pressure (i.e., at greater depth). Early symptoms of HPNS are sometimes seen at depths as shallow as 300 fsw (92 msw) but more commonly at more than 600 fsw (183 msw). The severity also depends on the mix of breathing gases; nitrogen can often moderate the affects of HPNS. Early symptoms include muscle tremors and impaired motor and problem solving skills, advancing to euphoria, nausea, vomiting, lack of appetite, and drowsiness. Symptoms sometimes moderate or entirely disappear with continued exposure (Elliott 2002).

histo: *Syn*. *histoplasmosis*.

histoplasmosis (***Histoplasmosis capsulatum***): A lung disease caused by a fungus, usually mild in effect but known to be fatal. It may be contracted from breathing the dust from the air in bird- and bat-populated enclosed spaces such as caves and attics (Field 2002).

historical data: Data from previous studies, can range from handwritten field notes to published journal articles (US EPA 2005a).

hitch: A tie that fastens a rope to another rope or object. Hitches are not used in *single rope technique* because of their tendency to come untied when not under *load* (FCTCKS 2005).

hodag: A mythical creature found in air-filled caves that remains out of sight of cavers, but follows them around and messes with their gear when no one is looking (FCTCKS 2004). *Cf. scadgent*.

Hogarthian: A method of rigging cave diving gear that emphasizes simplicity and efficiency; from the middle name of cave diver William Hogarth Main (FCTCKS 2004).

hold: When climbing, a place to grab or hang. In diving, a *command signal* for a diver to remain in position, usually while the other diver checks a *lead* or performs a task (FCTCKS 2005).

hollow brake bars -Tubular steel or titanium *brake bars* used in a rappel rack that allow for efficient heat transfer from the brake bars into the atmosphere (Smith and Padgett 1996).

Holocene: The youngest Cenozoic epoch and series. Its boundary is not defined but by general agreement. It is the equivalent of modern "postglacial" conditions, as reflected in the rapid, final collapse of continental ice sheets approximately 11,000 years ago. Many object to a separate Holocene and extend the Pleistocene to the present day (Jackson 1997).

home brew: In diving, colloquial term applied to mixing breathing gas at home or at the dive site as opposed to getting *tanks* filled at a dive shop (Mount and Gilliam 1993).

hood: A lycra or *neoprene* head covering worn by divers to provide heat retention (FCTCKS 2004).

horizon: In geology, a specific layer of soil in a given vertical section. In archaeology, a specific layer of deposition or a specific time interval.

horizontal angle: The difference in direction of two survey lines measured clockwise in a horizontal plane (Field 2002: 93). *Cf. vertical angle*.

hot: Colloquialism in diving, see *hot mix*.

hot mix: A breathing gas mixture with a relatively high percent of oxygen considering the depth planned for the dive; a breathing gas mixture close to the *maximum operating depth* for the gas (Huth 2005). *Syn*. hot.

hoyo: (Spanish) hole; low area, valley; also, pit.

HP: *Abb*. high pressure.

HPNS: *Abb. high pressure nervous syndrome*.

HRT: See *hydrologic residence time*.

HSI: *Abb. habitat suitability indices*.

HUC: *Abb. hydrologic unit code*.

human system: Any part of the natural system that has been modified structurally for human economic or residential uses (FDOS 2001). *Cf. natural system*.

humidity, **relative**: See *relative humidity*.

hydration: The chemical combination of water with another substance (Horton 2000).

hydraulic conductivity: The volume of water at the existing *kinematic viscosity* that will move in a porous medium in a unit time under a *hydraulic gradient* through a unit area measured at right angles to the direction of flow. It is a function of liquid as well as of the porous medium (Bates and Jackson 1987).

hydraulic gradient: In an *aquifer*, the rate of change of total *head* per unit of distance of flow at a given point and in a given direction (Bates and Jackson 1987).

hydraulic resistivity: See *resistivity*.

hydraulics: The science concerned with fluids at rest or in motion (Wyman and Stevenson 2001: 187).

hydric: Characterized by abundant moisture; wet (FCTCKS 2005). *Cf. mesic*, *xeric*.

Hydrilla: An invasive, exotic, aquatic plant that is growing rampant in many springs and rivers (Scott et al. 2004: 351).

hydro: 1. Water. 2. Hydrogen (Morehead 1981: 266). 3. Short for *hydrostatic testing* (FCTCKS 2004).

hydrocarbon (**HC**): An organic molecule or *compound* gas, liquid, or solid containing carbon and hydrogen. Methane and petroleum are hydrocarbons (FCTCKS 2005).

hydrogen sulfide (**H_2S**): A colorless, flammable, toxic gas formed by the decay of certain organic materials. Characterized by a rotten egg odor. Hydrogen sulfide dissolves readily in water. Toxicity of water containing hydrogen sulfide depends on both the concentration of the solution and the length of exposure. Dissolved hydrogen sulfide increases the density of the water to a level between salt water and freshwater; H_2S will float on salt water and sink beneath freshwater, can have a milky appearance within the water. Caution is required diving in areas with H_2S because of differences in light refraction, *haloclines*, and potential toxicity (Saltsman 1995).

hydrogeology: The science that deals with subsurface waters and related geologic aspects of surface waters (Jackson 1997: 309).

hydrograph: A graph that measures changes in specific hydrologic aspects (flow, depth, velocity, etc.) at a point over a given amount of time (FCTCKS 2005).

"hydrolab": A handheld device for measuring water quality data such as temperature, conductivity, pH, dissolved oxygen, etc. (FCTCKS 2004). *Cf. datasonde*, *sonde*.

hydrologic cycle: The constant circulation of water from the sea, through the atmosphere, to the land, and its eventual return to the atmosphere by way of transpiration and evaporation from the sea and land surfaces (Bates and Jackson 1987: 319). *Syn*. water cycle.

hydrologic residence time: The average length of time that water resides in a body of water or specified area (SFWMD 2002).

hydrologic unit: A geographic area representing part or all of a surface *drainage basin* or distinct hydrologic feature as delineated by the U.S. Office of Water Data Coordination on state hydrologic unit maps. Each hydrologic unit is iden-

tified by an eight-digit number; in this assessment, hydrologic units are also referred to as *watersheds* (Wear and Greis 2002).

hydrologic unit code (**HUC**): An eight-digit code used to catalog *watersheds* (Wear and Greis 2002).

hydrology: The science that deals with global water (both liquid and solid), its properties, circulation, and distribution, on and under the earth's surface and in the atmosphere, from the moment of its *precipitation* until it is returned to the atmosphere through *evapotranspiration* or is discharged into the ocean (Bates and Jackson 1987: 319). See *karst hydrology*.

hydrolysis: From Greek *hydro* (water) + *lysis* (breaking; losing). The breakdown or dissolution of material due to the addition of water (FCTCKS 2005).

hydropattern: The full range of hydrologic parameters known as hydropattern, which includes the depth of water, duration of inundation, and the timing and distribution of freshwater flow. Hydropattern encompasses the more commonly used word *hydroperiod*, which is the area's annual period of inundation (Everglades Commission 2005).

hydroperiod: 1. The pattern of water level rise and fall over time (FDEP and FDCA 2002: 113). 2. The frequency and duration of inundation or saturation of an ecosystem. In the context of characterizing wetlands, that length of time during the year that the substrate is either saturated or covered with water (SFWMD 2005b: 113).

hydrophilic: Having a great affinity for water (Field 2002: 96).

hydrophobic: 1. A chemical that does not dissolve readily in water (Wyman and Stevenson 2001: 188). 2. The repelling of water (Field 2002: 96).

hydrophyte: A plant adapted to growing in water or periodically submerged environments (FCTCKS 2005).

hydrosphere: All components of water on Earth including underground, ice, and atmospheric forms (FCTCKS 2005). *Cf. lithosphere*.

hydrostatic pressure: The pressure exerted by the water at any given point in a body of water at rest. The hydrostatic pressure of *groundwater* is generally due to the weight of water at higher levels in the saturated zone (Jackson 1997).

hydrostatic testing: A test required by the U.S. Department of Transportation performed every five years on steel *tanks* to verify the viability of the metal under pressure (FCTCKS 2004).

hydrox: A breathing mixture of hydrogen and oxygen (Mount and Gilliam 1993: 379).

hyperbaric chamber: A chamber that can be pressurized with air to simulate the pressure a diver would encounter at various depths underwater. Divers suffering *decompression sickness* are repressurized in a chamber to redissolve the bubbles in their blood. The chamber is then slowly depressurized at a rate that does not allow bubbles to re-form (Stone and AmEnde 2002). *Syn*. chamber, decompression chamber. *Cf. chamber ride*.

hypercapnia: A build-up of CO_2 in a diver's body. Symptoms include shortness of breath, confusion, drowsiness, rigidity, spasms, loss of consciousness, and headache (FCTCKS 2004).

hyperoxia: A condition in which the diver's body receives excessive oxygen in the bloodstream. The oxygen can become toxic at high partial pressures (Jones 2005). *Cf. hypoxia*.

hyperoxic: Any gas mix containing more than 21% oxygen (FCTCKS 2004).

hypogean: From Greek *hypo-* (below; under) + *ge* (earth). Pertaining to the subterranean environment (below the *endogean*) including the dark zone of caves (Field 2002). *Cf. epigean*.

hyporheos: The saturated zone beneath a river or stream consisting of substrate, such as sand, gravel, and rock, with water-filled *interstitial* pores. The zone often extends beyond the width of the stream channel and is typically used by certain aquatic organisms during their normal life cycle and as a refuge (UI 2005). *Syn*. hyporheic zone.

hypothermia: A dangerous condition caused by being wet and cold. A common complication of a cave accident or of not dressing properly for the cave. It can kill if not handled properly (Rea 1992).

hypothesis: A specific statement regarding the relationship between two variables. In evaluation research, this typically involves a prediction that the activity, program, or treatment will cause a specific outcome. Hypotheses are confirmed or denied based on *empirical evidence* (US EPA 2004b).

hypoxia: 1. A condition in which natural surface waters have a low concentration of dissolved oxygen (about 2 milligrams per liter, or 2 ppm, compared with a normal level of 5–10 milligrams per liter, 5–10 ppm). Most game and commercial species of fish avoid waters that are hypoxic. Phreatic cave waters in Florida generally have around 2 milligrams per liter (2 ppm) dissolved oxygen. The crustaceans therein are adapted to the low dissolved oxygen and are relatively unaffected by levels of 1.5–2.0 milligrams per liter (1.5 to 2.0 ppm) (FCTCKS 2005, Wyman and Stevenson 2001). 2. A condition in which the body does not receive enough oxygen to functioning. Low oxygen concentrations in a diver's breathing gas combined with heavy exercise may cause a diver to black out or die. Hypoxia is the number one killer of *rebreather* divers (Jones 2005, Stone and AmEnde 2002). *Cf. hyperoxia*.

hypoxic: Any gas mix containing less than 21% oxygen (FCTCKS 2004).

hypoxic water: See *hypoxia*.

I

IAS *Abb. intermediate aquifer system*.

IBI: *Abb. index of biological integrity*.

ibid.: Latin *ibidem* (in the same place).

ICU: 1. *Abb. intermediate confining unit*. 2. *Abb*. intensive care unit.

identifier: Unique character or number assigned to a particular individual or object (FCTCKS 2005).

idiot bar: A straight-slotted second *brake bar* designed to prevent backward rigging of the *rappel rack* (Smith and Padgett 1996: 354).

i.e.: Latin *id est* (that is).

IFAS: *Abb*. Institute of Food and Agricultural Sciences, a federal-state-county partnership within the University of Florida promoting knowledge in agriculture, natural resources, and life sciences.

Imhoff cone: A clear, cone-shaped plastic container used to measure the volume of solids that settle in a specific volume of water (Lenntech 2005).

impact: 1. A change in the chemical, physical (including habitat), or biological quality or condition of a body of water caused by external sources (US EPA 2005a). 2. The effectiveness of the remedy of a program on a problem or condition (US EPA 2004b).

impact evaluation: Assessment of the effectiveness of an activity or program in terms of end results, including intended and unintended results, and the comparison between the results and the effect of no action in absence of the program (US EPA 2004b).

impaired waterbody: Any body of water of the United States that does not attain water quality standards (as defined in 40 CFR part 131) as the result of an individual pollutant, multiple pollutants, pollution, or an unknown cause of impairment. Where a waterbody receives a thermal discharge from one or more point sources, impaired means that the waterbody does not have or maintain a balanced indigenous population of shellfish, fish, and wildlife (US EPA 2005b). *Cf. threatened waterbody*, *total maximum daily load*.

impermeable: Not permitting the passage of fluids. In the case of geologic formations, an impermeable layer of earth is one through which groundwater cannot pass (Scott et al. 2004: 351).

impervious: Not permitting the flow of water (Field 2002: 98).

implementation strategy: The plan for development of an action or program and the procedure to ensure fulfillment of intended functions or services (US EPA 2004b).

implemented: Developed or put into place (US EPA 2004b).

impoundment: Any lake, reservoir, pond, or other containment of surface water occupying a bed or depression in the earth's surface and having a discernable shoreline (373.019 Florida Statutes). *Cf. surface water*.

INAH: (Mexico) *Abb*. Instituto Nacional de Antropología e Historia.

inclination: The vertical angle between a horizontal plane and the target station (Dasher 1994: 183).

inclinometer: See *clinometer*.

independent doubles: Two diver-carried *tanks* not connected via a *manifold*, may be either back mounted (*backmounts)* or side mounted (*sidemounts)* (FCTCKS 2004). *Syn*. twin cylinders, twins.

independent scientific peer review: In water-quality studies, the review of scientific data, theories, and methodologies by a panel of independent, recognized experts in the fields of *hydrology*, *hydrogeology*, *limnology*, and other scientific disciplines relevant to matters being reviewed under Chapter 373.042, Florida Statutes (373.019 Florida Statutes). *Cf. quality assurance and quality control*, *legally defensible*, *scientifically defensible*.

independent testing: Testing conducted by a group or agency unassociated with the manufacturer (Bozanic 2002: 517).

indeterminate flow direction: Flow direction that is unknown and cannot be determined by topography or location of sources. Indeterminate flow direction can be influenced by multiple sources or features (such as a sinkhole and a neighboring spring having flow in opposite directions) (FCTCKS 2005).

index: 1. An alphabetized list of items and their locations. 2. A quality, trait, or character. (Morehead 1981: 276).

index fossil: The fossil of an organism known to have lived at a particular time, used comparatively to determine dates of rock (FCTCKS 2005).

index of biological integrity (IBI): An integrative expression of site condition across multiple *metrics*. An index of biological integrity is often composed of at lease seven metrics. The plural form is indices or indexes (US EPA 2005a).

indicator: 1. In biology, an organism or community of organisms whose characteristics show the presence of specific environmental conditions or contamination. 2. In chemistry, a substance that shows a visible change, usually a color shift, at a specific point in a reaction. 3. In monitoring, a device that presents the result of some measurement (Wyman and Stevenson 2001: 193).

indicator constituents: See *indicator parameters*.

indicator organism: *Microorganisms* that, if present above certain levels, indicate contamination. The *coliform bacteria* are used commonly as indicators because the test for this class of organisms is reliable, relatively inexpensive, and produces timely results (Wyman and Stevenson 2001: 193).

indicator parameters: Groundwater quality measurements specified in a permit. The parameter may be an analysis of general water quality, such as *specific conductance*, or measurements of specific chemical constituents, such as *arsenic*, *benzene*, or chloroform. The data recovered from are compared to background levels to determine the possibility of adverse influence by the development (Wyman and Stevenson 2001). *Syn*. indicator constituents.

indicator species: A species limited to a particular area or set of circumstances whose absence or presence is used to determine the health of or to categorize an environment (FCTCKS 2005).

indicator test: Test for a specific contaminant, group of contaminants, or constituent that signals the presence of something else (Lenntech 2005).

indigenous: Having originated in and being produced, growing, living, or occurring naturally in a particular region or environment (FDEP 2004b).

indirect benefit: A result associated with a program, but not the intended objective or goal (US EPA 2004b).

indirect cost: The cost associated with the impact or consequences of a program (US EPA 2004b).

indirect water use: Uses of water that are not immediately apparent to the consumer. For example, a person indirectly uses water when driving a car because water was used in the production process of steel and other parts of the vehicle (MSU 2000: 292). *Cf. direct water use*.

individual private well: A potable water supply from a well with one connection serving a single unit. (Hillsborough County 2004). *Syn*. *individual water supply*

individual sewage disposal: The treatment of sewage in septic tanks and the disposal of the *effluent* by absorption fields (Hillsborough County 2004).

individual water supply: A potable water supply furnished by a well on an individual lot (Hillsborough County 2004). *Syn*. *individual private well*

indurated: Said of a rock or soil hardened or consolidated by pressure, cementation, or heat (Jackson 1997: 324).

inert: A substance that does not normally combine with other substances. Not chemically or physically active (Heine 1995, US EPA 2003b).

inert gas: Gases in the breathing mix that are not metabolized, such as *nitrogen* or *helium* (Mount and Gilliam 1993: 379).

inert gas narcosis: The intoxicating effects of inert gases such as nitrogen when the diver is exposed to elevated partial pressures at depth (Mount and Gilliam 1993: 379).

infauna: Aquatic animals that live within rather than on the bottom sediment (Bates and Jackson 1987).

infiltration: The flow of a fluid into a solid substance through pores or small openings; specifically the movement of water into soil or porous rock (Bates and Jackson 1987: 334). See *percolation*.

infiltration rate: The amount of *infiltration* per unit of time, expressed in depth of water per unit time (e.g., cm/sec; in/hr) (FCTCKS 2005).

inflation hose: Connects a *first stage* regulator to a diver's *buoyancy compensator* or *drysuit* to provide inflation (FCTCKS 2004).

inflation valve: Press-button valve on drysuit or buoyancy compensator controlling gas injection under pressure into the *drysuit* or *buoyancy compensator*, to adjust buoyancy (Balcombe et al. 1990).

inflow cave: A cave into which a stream enters or formerly entered (Field 2002).

influent stream: A stream or reach of a stream that contributes water to the *zone of saturation*. Its channel lies above the water table, and for this reason, water flows from the stream into the bank and subsurface (Jackson 1997: 325). *Syn*. losing stream.

ingress: Entry point or place a person enters (Smith and Padgett 1996: 355). *Syn*. *entrance*. *Cf*. *egress*.

injection well: A boring through which fluids are injected into the ground for a variety of purposes, including *dye tracing*, waste disposal, enhanced recovery of crude oil, or solution mining (Wyman and Stevenson 2001).

inorganic: Of or related to chemicals that do not contain carbon atoms. Mercury, lime, copper, and ammonia are examples of inorganic materials (Wyman and Stevenson 2001: 197). *Cf*. *organic*.

insect: An *invertebrate* within the class Insecta (phylum Arthropoda), having a segmented body and three pairs of legs (FCTCKS 2005).

isotopes: Atoms of the same element having different forms.

instrumentation bias: Error introduced into a study by a change in the measurement instrument during the course of the study (US EPA 2004b).

instrument person: The member of the survey crew who reads the *compass* and/or the *clinometer* (Dasher 1994: 183).

integrated regulator: A SCUBA regulator that is incorporated into an item of diving equipment, such as a buoyancy compensator low-pressure inflator (Heine 1995: 279).

integrated resource planning: The management of two or more resources in the same general area; commonly includes water, soil, timber, grazing land, fish, wildlife, and recreation (IFAS 2005).

interflow: Subsurface flow occurring between the time of a precipitation event and flow into the water table or surface waterbody (FCTCKS 2005).

intermediate aquifer system: *Syn. intermediate confining unit*.

intermediate confining unit: Includes all rocks that lie between and collectively retard the exchange of water between the overlying surficial *aquifer* system and the underlying *Floridian aquifer system*. These rocks in general consist of fine-grained clastic deposits interlayered with *carbonate* strata. Although it consists of both confining units and aquifers, for the sake of simplicity, it is occasionally referred to as the intermediate aquifer system (SEGS 1986). *Syn*. intermediate aquifer system.

intermediate flow systems: See *regional groundwater flow*.

intermediate pressure: The pressure being delivered to the *second stage* by the *first stage* of a *regulator* (Huth 2005).

internal abrasion: The slow deterioration of internal rope fibers on account of dirt and grit. Using a dirty rope accelerates this process (Smith and Padgett 1996).

internal validity: The extent to which an inquiry establishes the causes of an effect as a result of the study or program; the accuracy of a study (US EPA 2004b). *Cf. external validity*.

interpolation: The method of estimating or using an *algorithm* to create missing data by using intermediate values between known values (FCTCKS 2005). *Cf. kriging*.

interstitial medium: The space between grains of sand, fine gravel, or detritus, filled with air or water (Field 2002).

interstratal karst: *Syn. subjacent karst*.

intrusion: See *river intrusion*.

invasive species: Nonnative species of plants or animals that outcompete *native species* in a specific habitat (FDEP 2005).

invertebrate: An animal that does not belong to the phylum Vertebrata (kingdom Animalia); without a backbone; e.g., annelids (earthworm), mollusks (snail), and arthropods (insect). The great majority of animals on Earth and the main form of life found in caves (Meth 2002, Jackson 1997).

inverted siphon: A water-trap, a *sump*.

inverting a knot: A situation where a knot's inherent load-bearing structure changes and the knot falls apart (Smith and Padgett 1996).

ion: An atom or group of atoms electrically charged through the loss or gain of electrons (FCTCKS 2005).

iron oxide: Any of several naturally occurring compounds of iron and oxygen (such as *hematite*, Fe_2O_3) (FCTCKS 2005). *Cf. ferric oxide*. *Syn*. rust.

irrigation: The replacement or addition of water available to plants through channels and ditches, by sprayers and sprinklers, or by using drip irrigation technology to apply water to the ground at the base of a plant (FCTCKS 2005).

***Islandiana* sp**. (Marianna Cave sheetweb weaver spider): A troglobitic spider currently known only from Miller Cave in Florida Caverns State Park, Jackson County, Florida (FCTCKS 2004).

iso-: Greek *iso*- (equal; similar).

isobath: A line on a map connecting bodies of water of equal depth (FCTCKS 2005).

isolation manifold: A hollow metal pipe connecting two SCUBA *tanks* that equalizes the pressure in the tanks and allows gas to flow from both tanks simultaneously. A valve in the middle of the pipe, when closed, isolates the tanks and allows them to be operated independently (FCTCKS 2004).

isopod: From Greek *iso*- (equal, same) + *podas* (feet). An *invertebrate* animal of the order Isopoda (phylum Arthropoda: class Crustacea: subclass Malacostraca) having seven pairs of legs (e.g., roly polys, wood lice), usually aquatic and commonly found under logs and in caves (Meth 2002, FCTCKS 2005). See *Remasellus*.

isopotential line: Equipotential contour line on the *potentiometric surface*; a line along which the pressure head of groundwater in an aquifer is the same. Fluid flow is normal to these lines in the direction of decreasing fluid potential (Bates and Jackson 1987).

IUCRR: *Abb*. International Underwater Cave Rescue and Recovery.

J

jammer: A device used for ascending a rope. Also called a basic *ascender* (Smith and Padgett 1996).

joint: 1. A break or fracture of geological origin in the continuity of a body of rock in a series of rock units, generally at an angle to the bedding planes, but not attended by a visible movement parallel to the surface of the discontinuity (Field 2002, Rea 1992). 2. The cracks and *fissures* formed in soils, sediments, or rocks by natural stresses (SDII Global Corp. 2002). *Syn*. *fracture*.

joint plane: The plane in which a joint has formed (Meth 2002).

joint plane cave: A cavity developed along a joint or fissure, high in relation to width, along steeply dipping joint planes (Field 2002).

jumar: Used synonymously with *ascender*. Originally used to describe a piece of gear manufactured in Switzerland, but now used generically to apply to a variety of handled ascent safety devices. Consists of a handled ascender with a spring-loaded offset cam, a finger-operated safety catch, a full-hand enclosed

handle, and several attachment holes. Proven reliable through many years of use by cavers, mountaineers, and rescue teams (FCTCKS 2004). *Syn*. *quick attachment safety* (QAS).

jump: Connecting the middle or end of one *guideline* to the middle or end of another guideline (Prosser and Grey 1992: 53). *Cf*. *gap*, *visual jump*.

jump reel: A small reel, usually more maneuverable than a search/safety reel, carried to bridge gaps in the line within an underwater cave (Balcombe et al. 1990: 263). *Cf*. *exploration reel*, *gap reel*, *primary reel*, *safety reel*, *spool*.

junction: The intersection of two or more passages (FCTCKS 2005).

J valve: Archaic SCUBA *cylinder* on/off valve with reserve mechanism (Heine 1995).

K

k: Symbol for *kinetic energy*.

Ka: Abbreviation of kiloannum, a thousand years. It is used to denote thousands of years before the present (Jackson 1997).

karabiner: See *carabiner*.

karren: Features that develop on the upper surface of *limestone* or other soluble rock as it is weathered. These features are prevalent in the Guilin area in China and in western Ireland, where they are sometimes referred to as burren. In Florida, karren are usually buried under the cover materials and consist of pinnacles and depressions in the rock surface. The depressions may or may not be related to *sinkhole* activity (SDII Global Corp. 2002).

karst (*adj*. **karstic**): 1. Landforms that have been modified by *dissolution* of soluble rock (*limestone* or *dolostone*) (SDII Global Corp. 2002). 2. A terrain where the topography is formed by the dissolving of rock, usually limestone or dolostone, and is characterized by solutional surface features, subterranean drainage, and caves (Rea 1992).

karst conduit: See *conduit*.

karst conduit flow: Underground-water flow within conduits. Conduit flow is generally turbulent, but can also be laminar (Field 2002: 46). The term *flow* is used synonymously by cave divers (FCTCKS 2005). *Syn*. *conduit flow*.

karst geomorphology: The scientific study of karst landforms (both on the surface and underground) and the processes that contribute to their development (Meth 2002).

karst hydrographic zone: The three vertically aligned subterranean divisions of karst: upper unsaturated zone, intermittently saturated epiphreatic or floodwater zone, and lower saturated (*phreatic*) zone (Meth 2002).

karst hydrology: The scientific study of the movement of water through a karst system, and the storage of water in it (Meth 2002). See *hydrology*.

karstic aquifer: An *aquifer* partially or wholly within karst rocks with a permeability structure that includes abundant interconnected conduits dissolved from the host rock. The interconnected conduits are organized and facilitate

the circulation of fluid in the down-gradient direction, wherein the permeability structure evolved as a consequence of *dissolution* by fluid (Huntoon 1995).

karstification: A cyclic process where phases of active solutional development of karst are followed by infilling of karst conduits and voids (Meth 2002).

karst plain: A large geographical area of karst (FCTCKS 2005).

karst terrane: A *terrane*, generally underlain by *limestone* or *dolostone*, in which the topography is chiefly formed by the *dissolution* of rocks, and which may be characterized by *sinkholes*, sinking streams, closed depressions, subterranean drainage, and caves (Copeland 2003).

karst window: 1. A depression opening that reveals portions of a subterranean flow, or the unroofed portion of a cave (a vertical window). 2. An opening in natural *limestone* walls, formed by the joining of subterranean karst *grottos* as a result of *dissolution* processes (a horizontal window) (Field 1999). Note the Florida Geological Survey (FGS) believes that flow through an exposed conduit in the aquifer is different from flow onto the Earth's surface. For this reason, the FGS does not consider a karst window to be a spring. It is an exception to the definition of *spring*.

katharobic: Descriptive of a group of *protozoans* found in springs and small springs with oxygen-rich water (UI 2005).

kernmantel: A rope with plaited sheath, or mantle, around a core of parallel or twisted strands used in caving (Field 2002, Padgett and Smith 1992). *Cf. laid rope*.

keyhole: Cave passage or a feature of caves resembling an old-fashioned keyhole, with a circular passage connected to the top of a vertically narrow passage (FCTCKS 2004).

kinematic viscosity: The *viscosity* of a fluid divided by the mass density of the fluid; the time it takes a given quantity of liquid to flow through a capillary tube at a given temperature. *Cf. hydraulic conductivity*.

kinetic energy (**k**): The energy inherent in a substance because of its motion, expressed as a function of its velocity and mass, or $MV^2/2$ (Wyman and Stevenson 2001: 208).

kinetic rate coefficient: A number that describes the rate at which a water constituent such as a *biochemical oxygen demand* or dissolved oxygen rises or falls (Lenntech 2005).

kinetic theory of gases: The basic explanation of the behavior of gases under all variations of temperature and pressure (Heine 1995: 279).

kingdom: The first rank in the taxonomic system (kingdom, phylum or division, class, order, family, genus, species).

kit: (British) Complete set of gear (FCTCKS 2005).

Kjeldahl nitrogen: The amount of nitrogen contained in organic materials determined by a method based on the digestion of the sample in a sulfuric acid–based reagent that converts the nitrogenous organic material to carbon dioxide, water, and ammonia. Subsequently, the ammonia is quantified. Named for Johann Kjedahl (1849–1900) (Wyman and Stevenson 2001: 208).

knee pads and elbow pads: Provides protection to a caver while moving through the cave by adding padding to the elbows and knees (for instance, while moving through a *crawlway*). Protective gear should be chosen to fit the type of caving being done and the personal needs of the caver. Not all cavers like wearing elbow pads and knee pads, and they are chosen based on personal experience (FCTCKS 2004).

knots: Various methods of securing or tying ropes or *webbing* material together (Field 2002).

knotted line: A line with knots every three meters (ten feet) used by cave divers as a rudimentary measure of distance in exploration. Other methods of marking line for exploration include using duct tape, marking the line with ink, and intertwining line or duct tape (FCTCKS 2004). *Cf. exploration reel*

kriging: An *interpolation* technique for estimating unknown data from known values in which the values are weighted (FCTCKS 2005).

K valve: The on/off valve on a SCUBA *cylinder* (FCTCKS 2005).

L

labile phosphorous: Phosphorous that can be assimilated easily by aquatic *biota* (SFWMD 2002).

labyrinth: See *maze cave*, *network*.

lacustrine: From Latin lacus (lake). Referring to lakes (UI 2005). *Cf. marine*, *palustrine*.

ladder: In caving, a flexible lightweight ladder of galvanized or stainless steel wires and aluminum alloy rungs (Field 2002: 112). See also *cable ladder*.

laid rope: Rope with the bundles all twisting in the same direction. Commonly a laid rope has three primary bundles wrapping around each other in the same direction of spiral (Smith and Padgett 1996: 355–356). *Cf. kernmantel.*

lake: 1. Any inland body of standing water occupying a depression in the earth's surface, generally of appreciable size (larger than a pond) and too deep to permit vegetation (excluding *subaqueous* vegetation) to take root completely across the expanse of water; the water of a reservoir behind a dam, or a lake basin intermittently or formerly covered by water (Jackson 1997: 354). 2. In a cave, a body of standing water (no matter how small) in a cave (Field 2002). *Syn*. *cave lake*.

laminar flow: Flow in which the *head loss* is proportional to the power of velocity. Water flowing in a laminar manner will have streamlines that remain distinct and the flow direction at every point remains unchanged through time. *Darcy's Law* strictly applies under laminar flow conditions only (Field 1999). *Syn*. streamline flow, viscous flow. *Cf. turbulent flow*.

land acre yield: See *acre-foot*.

land development regulations (**LDRs**): Regulations, including zoning, adopted by a local government to implement a comprehensive plan (FDEP and FDCA 2002: 113).

landowner relations: The consideration given a landowner when diving or caving on his or her property. It involves courtesy, legality, and common sense when dealing with individual or agency landowners (FCTCKS 2004).

Langelier Index (**LI**): An expression of the ability of water to dissolve or deposit *calcium carbonate scale* in pipes. Used to stabilize water to control corrosion and deposition of scale. A positive value indicates a tendency to form scale, a negative value means the water will dissolve scale and may be corrosive. Named for W. F. Langlier, who devised the index in 1949 (Wyman and Stevenson 2001). *Syn*. stability index.

latitude: The angular distance, measured in degrees, north or south of the equator (Dasher 1994).

lava tube: A hollow space beneath the surface of a solidified lava flow, formed by the withdrawal of molten lava after the formation of the surficial crust (Bates and Jackson 1987: 372). *Syn*. volcanic cave.

lay: 1. The way in which strands of a rope or cable are twisted (Field 2002: 113). 2. The nature of the twist of a rope: hard, soft, left, right, long, short (Smith and Padgett 1996).

lay line: In cave diving, to place line in a newly discovered cave or to replace line in passages where it has become frayed or broken (FCTCKS 2004).

LCI: *Abb*. Lake Condition Index.

LD: *Abb*. *lethal dose*.

LD50: See *lethal dose*.

LDRs: See *land development regulations*.

leachate: 1. Materials in solution removed from soil, rock, or waste. 2. A liquid that has percolated through solid rock or waste and has extracted dissolved or suspended materials (Field 2002: 114).

leaching: 1. The separation, selective removal, or dissolving-out of soluble constituents from soil, rock, or ore by natural action of *percolating* water. 2. The removal in solution of nutritive or harmful constituents (such as mineral salts and organic matter) from an upper to a lower soil horizon by the action of percolating water, either naturally (by rainwater) or artificially (by irrigation) (Bates and Jackson 1987).

lead: 1. *n*. In caving and cave diving, a potentially previously unexplored tunnel, fissure, or other feature possibly leading to continuing passage (FCTCKS 2004). *Cf*. *go*, *going*. *Syn*. virgin lead. 2. *v*. To go before as a guide; conduct; influence; induce. 3. *v*. To go or be first in (Morehead 1981).

lead-acid cell: A rechargeable type of battery used with an electric light (FCTCKS 2004).

leader: *Syn*. *guide*.

leakance: The movement of water between *aquifers* or aquifer systems (SFWMD 2005b).

leaky aquifer: A confined aquifer whose *confining unit* conducts significant quantities of water into or out of the aquifer (Jackson 1997).

LED: *Abb*. *light emitting diode*.

left-right: In cave surveying, horizontal passage dimensions as marked in the survey book. "Left" is the horizontal distance between the survey station and the left wall; "right" is the horizontal distance between the station and the right wall (Dasher 1994: 183).

leg: A survey leg, the measurement between successive survey stations in a cave survey (Field 2002).

legally defensible: A statement or finding upheld under current legislation. Related to concept of "reasonableness" (FCTCKS 2004). *Cf. scientifically defensible*.

leg wrap: While on *rappel*, wrapping the rope that is below the *descender* around one leg to increase friction, often used when there is insufficient friction from the descender (FCTCKS 2005).

Lemna gibba (**duckweed**): The scientific name of a species of small, stemless, free-floating plant used in experiments to determine the toxicity of pollutants to aquatic life. The species is found in still waters, even those contaminated with sewage (Wyman and Stevenson 2001).

lentic water: The standing water of ponds, lakes, swamps, or marshes (Wyman and Stevenson 2001: 214). *Cf. lotic water*.

lepidocrocite: A translucent ruby red or blood red to reddish brown orthorhombic mineral (γ-FeO(OH)). It is trimorphous (i.e., occurring in three forms) with akaganeite and goethite, and is associated with *limonite* in iron ores (Jackson 1997). *Cf. goethite*.

less-than-fee-simple acquisition: When considering property ownership as a bundle of rights, to purchase some portion of the bundle of rights but not all (e.g., easements, development rights, etc.) (FDEP and FDCA 2002: 113).

lethal dose (LD): The absorbed amount of a chemical agent sufficient to cause death. The inclusion of a subscript number with the LD designation indicates the percentage of the exposed population that dies within a certain period as a result of the exposure. For example, LD_{50} (also expressed as LD50) indicates a 50% fatality rate (Wyman and Stevenson 2001: 214).

leucophor: One of a family of optical brightening agents that have been used with some degree of success in water-tracing experiments. It has no color, but is detected by its distinctive fluorescence under ultraviolet light (Field 2002: 114). *Cf. eosin*, *fluorescent dye*, *phloxene*, *Rhodamine WT*, *tracer*, *uranine*, *water tracing*.

levee: An artificial embankment built along the bank of a watercourse or an arm of the sea, to protect land from inundation or to confine streamflow to its channel (Jackson 1997: 366).

level: 1. In a cave, a group of passages developed in the same horizontal plane. 2. The relation of a cave floor to an outside surface (Monroe 1970). 3. An instrument that establishes a horizontal line of sight or that defines points at identical elevations (Dasher 1994: 183).

LI: See *Langelier Index*.

LID: See *low impact development*.

life line (**lifeline**): 1. Term used by rescue and professional groups, referring to a

horizontal line between two fixed points similar to a *tyrolean*. It should be capable of supporting 5,400 pounds in the center. 2. (British) A safety rope used in vertical work or in other dangerous situations. 3. Occupational Safety and Health Administration (OSHA): A safety line that backs up platforms, ladders, etc. Must be attached with a separate harness or belt (Padgett and Smith 1992: 324–325).

lift bag: A bag or bags inflated underwater to lift an object from the bottom. Also used as a *decompression* surface float (Mount and Gilliam 1993). In underwater archaeology, *cf. airlift*.

light emitting diode (LED): A small long-lasting light used as an electronic display or an indicator light (Jones 2005).

lights: 1. In dry caving, every caver needs a minimum of three light sources (one or two lights mounted to the helmet, or one or two backup light sources in pack). Typically, two of them (primary and secondary) should be mounted on the helmet for hands-free operation. The type of light available depends on the type of caving being done. In Florida both primary and secondary light sources should be electrical. New multi-Light Emitting Diode (LED) lights are bright enough to act as the primary, and have the advantage of very long burn time, but traditional bulbs are significantly cheaper. Either will work. LED lights are recommended for secondary light because of their long burn times. 2. Cave divers also follow the *rule of three*, carrying one large long-burning primary light and two alternate light sources attached within reach on their harness. Ideally, every team member carries the same *primary light* (measured in watts), so that no one member's light is swallowed by the beam of the other diver(s) (FCTCKS 2004). *Cf. light signals*.

lights out drill: A cave diving drill to practice emergency procedures for following the permanent *guideline* out of the cave in the event of a total light failure or silt-out of the cave (FCTCKS 2005).

light signal: A signal to another diver by use of the *dive light*. For example, swinging the light to create a circle with the beam questions the buddy whether or not things are proceeding well. The buddy must respond also with a circular beam to indicate that he has received the signal and confirms. The lack of a response indicates that the buddy may be having difficulties (FCTCKS 2004). *Cf. hand signals*.

lignite: Imperfectly formed coal, resembling wood (Morehead 1981: 310).

limestone: A sedimentary rock composed primarily of the mineral *calcite* ($CaCO_3$). Limestone is soluble and often develops *karst* features when weathered (SDII Global Corp. 2002). *Cf. dolomite*, *dolomitized limestone*, *dolostone*.

limestone cave: Limestone is relatively soluble and is the most common rock type in which caves develop (Meth 2002).

limnocrene: Spring pool (UI 2005).

limnology: The study of all aspects of inland water ecosystems (FCTCKS 2005).

limonite: A widely occurring *iron oxide* ore; a mixture of *goethite*, *hematite*, and *lepidocrocite* (Princeton University 2003).

line: *Syn. guideline*, *main line*.

line arrow: Small, rigid, plastic triangle placed on a *guideline* to point toward the exit. It may be permanent (pointing toward the nearest exit) or a temporary marker (to be removed on the outward journey) (Farr 2003: 124). *Cf. Dorf marker*.

line arrow direction: Indicates the direction of the closest opening to the surface. Two arrows placed back-to-back indicate the midpoint between two openings (FCTCKS 2004).

line drill: Practice procedures for line following or line recovery, i.e., *lights out drill* or line recovery drill (*lost line drill*) (FCTCKS 2004).

line marker: A *line arrow*, clothespin, *cookie*, or other marker placed on the line as a point of reference (FCTCKS 2004).

line of sight: A visually aligned line between a sighting instrument and a target (Dasher 1994: 183).

line placement: Protocols for correctly placing line in a cave. Proper line placement avoids entanglement hazards, slack line, and *line traps* (FCTCKS 2004).

line plot: A map consisting of only survey stations connected, in order, with a series of straight lines (Dasher 1994: 183).

line recovery drill: See *lost line drill*.

line trap: When placing line during a cave dive, current or other forces (such as stretching the line around a corner without wrapping it first) can cause the line to move into small cracks in the rock and low areas of the passage. When necessary to exit in low *visibility* following the line by feel, the divers will perceive the line as passing through impassable rock (Saltsman 1995).

lintel line: See *dripline*.

LiOH: Symbol for *lithium hydroxide*.

lip: The edge of a vertical pitch, drop, or pit (Smith and Padgett 1996).

listed species: In Florida, all species of plants and animals listed as threatened, endangered, or species of special concern in Chapter 39, Florida Administrative Code, or Chapter 581, Florida Statutes, and occurring in a particular county (Hillsborough County 2004).

liter: The basic unit of measurement for volume in the metric system; equal to 61.025 cubic inches or 1.0567 liquid quarts (IFAS 2005).

lithic: A stone or something made of stone (FCTCKS 2006).

lithification: The conversion of a newly deposited sediment into solid rock, involving such processes as cementation, compaction, and crystallization. It may be concurrent with, soon after, or long after deposition (Bates and Jackson 1984).

lithify: To change a stone, or to petrify; esp. to consolidate from a loose sediment to a solid rock (Jackson 1997: 371).

lithium hydroxide (**LiOH**): A highly reactive chemical substance that absorbs carbon dioxide from the gas in the breathing loop of a *rebreather* and gives off water in exchange (Stone and AmEnde 2002: 315). *Cf. absorbent*.

lithology: The description of rocks, especially in hand specimens and in outcrop, on the basis of such characteristics as color, mineral composition, and grain size (Jackson 1997).

lithosphere: The solid portion of the earth, as compared with the atmosphere and the hydrosphere (Jackson 1997: 372). *Cf. hydrosphere*.

lithostratigraphy: The element of *stratigraphy* that deals with the lithology of strata and their organization of the rocks of the Earth's crust into distinctive named units on the basis of the lithologic character of the rocks and their stratigraphic relations (Jackson 1997: 372).

littoral: From Latin *littoralis* (seashore). 1. Of or pertaining to the zone of natural waters that are shallow enough for sunlight to penetrate to the bottom. Often supporting macrophytic vegetation; may be fresh or salt water (FCTCKS 2004). 2. Pertaining to the *benthic* aquatic environment of depth zone between high water and low water; also pertaining to the organisms of that environment (Bates and Jackson 1987). *Cf. anchialine cave*, *offshore spring*. 3. Shoreward region of a lake, where rooted vegetation may be present (Jackson 1997).

littoral cave: A *sea cave*; a cave formed by the action of waves and tides eroding hollows into the shore (FCTCKS 2005). *Cf. anchialine cave*, *marine cave*, *offshore spring*, *submarine cave*.

live cave: A cave in which there is a river action or active deposition of *speleothems* (Field 2002: 116). *Syn.* active cave. *Cf. dead cave*, *dry cave*.

load: 1. A mass or weight that applies force to a system (FCTCKS 2005). 2. The material that is moved or carried by a natural transporting agent, such as a stream, a glacier, the wind, or waves, tides, and currents. 3. The quantity or amount of such material at any given time (Jackson 1997: 373). *Syn.* sediment load. *Cf. bed load*.

load bearing: An object or device that supports a *load* (FCTCKS 2005).

loading: The amount of pollutants entering a system (concentration × flow rate) (FDEP and FDCA 2002: 113).

load sharing: Two or more *anchors* that share a *load* (FCTCKS 2005).

local flow systems: Systems that have their *recharge areas* at topographic high points and their *discharge areas* in adjacent topographic lows (Fetter 2001). *Cf. regional groundwater flow*.

locking carabiner: A *carabiner* with a locking device to insure it does not open accidentally (Smith and Padgett 1996).

locking off: Securing a *rappel device* so that it no longer moves (Smith and Padgett 1996: 357).

loess: A widespread, homogeneous, commonly nonstratified, porous, friable, slightly coherent, usually highly calcareous, fine-grained blank deposit (generally less than 30 meters [984 feet] thick), consisting predominantly of silt with subordinate grain sizes ranging from *clay* to fine *sand* (Jackson 1997).

long hose: The longer hose running from the *first stage* to the *second stage* primary *regulator*, typically five or seven feet long. A long hose allows an out-of-air buddy to share air while following the diver out of the overhead environment (FCTCKS 2004).

longitude: The angular distance, measured in degrees, east or west of the *prime meridian* (Dasher 1994).

longitudinal profile: Graphical representation of stream decrease in elevation or cave passage depths and ceilings (UI 2005).

longitudinal section: A section along the length of a cave passage or chamber or combination of these, or along a survey traverse in a cave (Meth 2002). *Syn*. long section.

longitudinal study: The study of the same group over a period of time; generally used in studies of change (US EPA 2004b).

long section: *Syn*. *longitudinal section*.

loop: *Syn*. *closed traverse*.

loop error: The error in easting, northing, and vertical that results when a survey, in forming a loop, closes on itself (Meth 2002).

loop volume: The volume of gas in the breathing loop of a *rebreather* (Huth 2005).

losing stream: See *influent stream*.

lost line drill: A cave diving drill to practice emergency procedures for finding the permanent *guideline* in the event that it has broken or the dive team does not know its location (FCTCKS 2005). *Syn*. line recovery drill.

lost river: *Syn*. *swallow hole*.

lotic water: The flowing water of rivers and streams (Wyman and Stevenson 2001: 221). *Cf*. *lentic water*.

low impact development (LID): A strategy that uses a variety of techniques (site design, *stormwater treatment trains*, and pollution prevention) to develop a site in an environmentally sensitive manner (FDEP and FDCA 2002: 113).

low pressure inflator: A valve on a buoyancy compensator that controls low-pressure air from a SCUBA regulator and can be manually opened to inflate the *buoyancy compensator* (Heine 1995: 279).

LP: *Abb*. low pressure.

LSA: *Abb*. land surface altitude.

lubber line: The line across a *compass* that is sighted for direction. The direction the compass is pointing as opposed to that of the needle, which always seeks north (Burge 1988: 122).

luminescence: The emission of light of a different wavelength by a substance that has received energy or electromagnetic radiation from an external stimulus, also the light so produced. It occurs at temperatures lower than those required for incandescence (Jackson 1997: 379).

***Lyngbya* sp.**: See *Cyanobacteria*.

M

m: *Abb*. meter(s).

Ma: Abbreviation for megaannum, a million years, where annum is age in years before present (Jackson 1997).

MA: *Abb*. *mechanical advantage*.

macrobenthos: See *benthos*.

macroinvertebrate: An animal that lacks a backbone and can be seen by the naked eye (e.g., *crayfish*, *isopods*, mollusks) (FCTCKS 2005). *Cf. microinvertebrates*.

macrophyte: A large plant (FCTCKS 2005).

magnetic compass: An instrument used to determine direction by means of a free-swinging horizontal magnetic needle that aligns itself to the earth's magnetic field (Dasher 1994: 184). *Syn. compass*.

magnetic declination: *Syn. declination*.

magnetic deviation: The change in magnetic direction of a compass as caused by an external magnetic field (Burge 1988: 122).

magnetic north: The northerly direction of the earth's magnetic field as indicated by the north-seeking end of a magnetic compass needle; differs from true north by the angle of declination (Dasher 1994: 184).

magnetic variation: The change in magnetic direction of a compass by the relationship of a given location to the north pole. Although this variation changes slowly over years, it is generally considered a constant for any one location (Burge 1988: 122). *Cf. variation*.

magnitude: See *spring magnitude*.

main line (**mainline**): In cave diving, the line in the main passage of the cave system. Many popular cave diving sites are using *gold line* as the main line because it is easier to see (FCTCKS 2004). *Syn. guideline*. In caving, synonymous with *fixed line*.

main passage: The larger, or *trunk*, *passages* used by cave divers for recreation or travel through a cave system (FCTCKS 2004). *Syn.* main tunnel.

malaria: A disease caused by protozoans transmitted by the bite of an infected *Anopheles* mosquito; marked by chills and fever (Princeton University 2003).

management plan: A plan prepared to address preservation, restoration, and management of significant or essential wildlife habitat. The management plan describes and depicts the location of areas to be preserved, including any protective *buffers*. The plan indicates the location of individuals of listed species, their nest sites, dens, burrows, feeding locations, roosting and perching areas, and trails, as appropriate. The plan identifies habitat management activities and contains an action plan with specific implementation activities, schedules, and assignments of responsibilities (Hillsborough County 2004).

manifold: The metal bar that runs between the two *tanks* worn on a diver's back and connects the two gas sources, allowing them to be used as one (FCTCKS 2004). *Cf. isolation manifold*.

mantle: 1. The protective *sheath* on the outside of a rope that protects the *core*. *Syn. sheath*. 2. In geology, the earth's crust (FCTCKS 2005).

manure: The fecal and urinary defecation of livestock and poultry (US EPA 1998).

map: A proportional representation in two dimensions of a cave or geographic feature (Dasher 1994: 184).

marble: A metamorphic rock consisting predominantly of fine- to coarse-grained recrystallized *calcite* and/or *dolomite* (Bates and Jackson 1984: 311).

marine: From Latin *mari* (sea). Referring to the sea (FCTCKS 2005). *Cf. lacustrine*, *palustrine*.

marine cave: A cave containing salt water of marine origin; includes *anchialine caves, offshore springs*, and *submarine caves* or *blue holes* (Stock et al. 1986).

marker number: A number used as a reference for a feature marked or indicated by a line marker (FCTCKS 2004).

marl: An old term loosely applied to a variety of materials, mostly unconsolidated earth deposits consisting chiefly of an intimate mixture of clay and calcium carbonate, usually including shell fragments and sometimes glauconite. It is formed under marine and especially freshwater conditions. It has been used as a fertilizer for acid soils (Bates and Jackson 1984: 312).

marsh: A wetland dominated by herbaceous vegetation (FCTCKS 2005).

mask: A piece of diving gear with a clear faceplate and rubber skirting that creates a watertight seal with the diver's face to allow the diver to see under water. The mask is held in place with a strap that fits around the back of the diver's head. The diver has the ability to control the pressure in the mask by inhaling or exhaling through the nose (FCTCKS 2004). *Cf. full face mask*.

Material Safety Data Sheet (**MSDS**): A document detailing the composition, health and environmental hazards, safety precautions, and first aid for a chemical or *compound* manufactured and offered for sale (Bozanic 2002: 518).

maximum contaminant level (**MCL**): Maximum allowable concentration of a *contaminant* in water that is delivered to any user of a public water system. MCLs are enforceable standards established by the U.S. Environmental Protection Agency (Hughes et al. 2000).

maximum daily load: See *total maximum daily load*.

maximum depth: The deepest depth a diver reaches during a dive (FCTCKS 2004).

maximum operating depth (**MOD**): The maximum depth attainable by a diver, determined by the partial pressure of oxygen the breathing gas contains (Farr 2003).

maze cave: A cave with an essentially horizontal network of interconnecting and connecting passage loops (Field 2002). *Syn*. labyrinth, *network*. *Cf. branchwork cave*.

MCL: *Abb*. *maximum contaminant level*.

mean: A measure of central tendency, the arithmetic average. Something midway between two extremes (Morehead 1981, US EPA 2004b).

meander: An overdeveloped curve in a river course on the surface or caused by more erosion on the outside than on the inside of the bend (Field 2002).

meander niche: A crescent-shaped part of a cave formed by a stream winding and eroding the cave (FCTCKS 2005).

mean sea level: 1. The average height of the surface of the sea for all stages of the tide over a 19–year period, usually determined from hourly height observations on an open coast or in adjacent waters having free access to the sea. It is adopted as a datum plane (Jackson 1997). 2. The averaged sea level of the Arctic

Ocean, the Atlantic Ocean, the Gulf of Mexico, and the Pacific Ocean (Dasher 1994: 184).

mechanical advantage (**MA**): In caving, the advantage created by using a block and tackle or pulley system to lift large loads with minimal effort. In general, the advantage created when using a machine such as a pulley or lever to do work (FCTCKS 2005).

mechanical ascender: Any manufactured ascending device using a cam system to lock onto the rope (FCTCKS 2005).

mechanical dispersion: The mixing of a *tracer* with water molecules. Dependent upon the motion of water (or another fluid); the higher the velocity, the greater the dispersion (FCTCKS 2005). *Cf. molecular diffusion*, *Peclet number*.

median: A measure of central tendency, the value of the case marking the midpoint of an ordered list of values of all cases (US EPA 2004b).

mediastinal emphysema: A lung overexpansion injury characterized by air in the middle of the chest (Heine 1995: 279). *Cf. subcutaneous emphysema*.

mesic: Applied to a terrestrial environment that has moderate amounts of rainfall and soil moisture (Waterwise 2003). *Cf. hydric*, *xeric*.

mesotrophic: Describing bodies of water with moderate nutrients and productivity, intermediate between *oligotrophic* and *eutrophic* waters (FCTCKS 2005).

meta-analysis: The systematic analysis of a set of existing evaluations of similar programs in order to draw general conclusions, develop support for hypotheses, and/or produce an estimate of overall program effects (US EPA 2004b).

metabolic rate: The rate at which an organism transforms food into energy and body tissue. Most cave animals, particularly the *obligates* in the *dark zone*, have a reduced metabolic rate (Meth 2002).

metadata: Specific information describing data, such as author, content, origin (FCTCKS 2005).

meter (**m**): A unit of distance equal to 3.28 feet, slightly more than one yard.

methanogen: *Archaebacteria* found in *anaerobic* environments such as animal intestinal tracts or sediments or sewage and capable of producing methane; a source of natural gas (Princeton University 2003). *Cf. extremophile*.

methanogenic: Methane producers (FCTCKS 2004).

methanotrophic: Methane consumers (FCTCKS 2004).

methemoglobinemia: See *blue baby syndrome*.

methodology: Any system of principles, practices, and/or procedures applied to a scientific pursuit or branch of knowledge (American Heritage Dictionary 1985).

metric: A calculated term of enumeration representing some aspect of biological assemblage, function, or other measurable aspect characteristic of the *biota* that changes in some predictable way with increased human influence. A *multimetric* approach involves combinations of metrics to provide an integrative assessment of the status of aquatic resources (US EPA 2005a).

MFL: *Abb. minimum flows and levels*.

Mg: 1. Symbol for magnesium. 2. *Abb*. milligram. 3. *Abb*. million gallons (of water).

MGD: *Abb*. million gallons per day.

mg/L (**mg/l**): *Abb*. milligrams per liter.

micrite: A descriptive term for the semiopaque crystalline matrix of limestones, consisting of *carbonate* mud with crystals less than 4 micrometers in diameter, and interpreted as a lithified ooze (Jackson 1997).

micritic limestone: A *limestone* consisting of more than 90% *micrite* (Jackson 1997: 406).

microbe: See *microorganism*.

microbial: Relating to microbes, or *microorganisms* (FCTCKS 2005).

microblasting: Use of small charge explosives to enlarge an opening to allow human passage to potentially larger cave passages. This action is controversial for conservation reasons (FCTCKS 2004).

microclimate: The distinctive climate of a given small area or *habitat* such as a cave or a pool within a cave (FCTCKS 2005).

microcrustacean: Small crustacean, including *ostracods*, *copepods*, and cladocerans (UI 2005).

microhabitat: The individual faunal habitat or niche within a larger cave environment (Meth 2002).

microinvertebrates: Animals without backbones that are not large enough to be seen by the unaided eye (US EPA 2005a). *Cf*. *macroinvertebrates*.

micrometer (μm): A unit of length equaling one-millionth of a meter (about 1/25,000 of an inch). Airborne particle diameters are commonly expressed in micrometers (Wyman and Stevenson 2001 and UI 2005). *Syn*. micron.

micron: See *micrometer*.

microorganism: A living organism that can be seen only through a microscope; a microscopic organism (FCTCKS 2005). *Syn*. microbe, micro-organism.

microsphere: Microscopic, biologically inert, neutrally buoyant spheres used for *groundwater tracing* that can be identified and counted in a water sample (FCTCKS 2005).

milli-(**m**-): From Latin *mille* (thousand).

milligrams per liter (**mg/L**): A unit expressing the concentration of chemical constituents in solution as weight (milligrams) of solute per unit volume (liter) of water. One thousand micrograms per liter (μg/L) is equivalent to one milligram per liter. For concentrations less than 7,000 mg/L, the numerical value is the same as for concentrations in parts per million (USGS 2004b).

migration: Systematic movement or spread from one place to another either temporarily or permanently (FCTCKS 2006). *Cf*. *dispersion*.

mineral: A naturally occurring inorganic element or *compound* having a periodically repeating arrangement of atoms and characteristic chemical composition, resulting in distinctive physical properties (Jackson 1997: 410).

minimally impaired: Sites or conditions with slight disturbances relative to the overall area of the study (US EPA 2005a).

minimum flows and levels (**MFL**): The limit at which further withdrawals of water would be significantly harmful to the water resources or ecology of the area (373.042 Florida Statutes).

minute volume (**MV**): See *respiratory minute volume*.

Miocene: A series of the *Tertiary period*, above the *Oligocene* and below the *Pliocene*; also the corresponding time during which the rocks of this series were formed (Miocene Epoch), approximately 23–5.3 million years ago (Jackson 1997).

mission: The specific responsibility of a goal or endeavor clearly indicating the task and the purpose (US EPA 2004b).

Mitchell system: A rope-climbing system utilizing two *ascenders* with two straps extending to the climber's boots and a double- roller *chest harness* (Smith and Padgett 1996: 358).

mitigation: Actions taken to lessen the actual or foreseen adverse environmental impact of a project or activity (Wyman and Stevenson 2001: 240).

mitigation banking: The creation, enhancement, or restoration of *wetlands* to offset the loss of wetlands by development (Wyman and Stevenson 2001: 240).

mitigation credit: A unit of measure that represents the increase in ecological value resulting from restoration, enhancement, preservation, or creation activities (FDOS 2001).

mixed gas: Any breathing mixture other than compressed air. The most common are *heliox*, *nitrox*, and *trimix*, all of which may be blended differently depending on the requirements of the dive (Farr 2003: 125).

MOD: *Abb*. *maximum operating depth*.

mode: A measure of central tendency, the value of a variable that occurs most frequently (US EPA 2004b).

model: 1. *n*. A simplified representation of an object or natural phenomenon. The model can take many possible forms: a set of equations or a physical, miniature version of a system constructed to allow estimates of the actual phenomenon when the values of certain variables are changed. 2. *v*. Using a model, for example, to model the atmospheric dispersion of the emissions from a smokestack (Wyman and Stevenson 2001: 242).

modeling: One of the most powerful aspects of *geographic information system* technology; the ability of the software to analyze data, create simulations, and make predictions (FCTCKS 2005).

MODFLOW: MODular three-dimensional finite-difference groundwater FLOW model. A fine-scale model code created by the U.S. Geological Survey. Water management districts use this model for subregional and groundwater modeling (SFWMD 2005a).

modification: The act of adapting equipment for specialized uses. Cave diving uses many pieces of equipment modified from open water gear (FCTCKS 2004).

modified flutter kick: With the diver in a horizontal or slightly feet-up position, the knees are bent vertically at a right angle to the torso. With the thighs kept stationary, propulsion comes from fin motion generated by the action of the calves and ankles, or in cases of extreme silt, action of the ankles only (Prosser and Grey 1992). *Cf*. *flutter kick*, *frog kick*, *shuffle kick*.

mogote: (Caribbean) *Karst* tower. Isolated limestone pinnacle in a karst landscape. Also locally called haystacks (FCTCKS 2005). See *cone karst*, *tower karst*.

molecular diffusion: The process whereby molecules move under the influence of their *kinetic energy* in the direction of their concentration gradient. The molecules move from areas with higher concentrations to areas with lower concentrations. Acts independently of water flow; greater diffusion occurs under slow velocity and long periods of time (FCTCKS 2005). *Cf. mechanical dispersion*, *Peclet number*.

molecule: The smallest part of an element or a compound (FCTCKS 2005).

monitoring: An ongoing process of reviewing a program's activities or a particular research study to determine whether set standards or requirements are being met (US EPA 2004b).

monitor well: A well used to monitor hydrologic data, such as water levels or water quality parameters (SWFWMD 2005).

moonmilk: 1. A white, moist, plastic *calcareous* cave deposit composed of *calcite*, huntite, or magnesite. 2. Deposits consisting mainly of very fine particles of calcium and magnesium *carbonate* precipitated from water in caves and caverns. When suspended, the particles give the water the appearance of milk. 3. A variety of hydrocarbonates some of which are associated with particular species of bacteria (Field 2002).

morphology: The study of the physical form of lands or regions. Also, the form and structure of any natural phenomena, e.g., of plant or animal design (Meth 2002).

mother lode passage: Colloquialism. Refers to a large previously undiscovered *trunk* passage (FCTCKS 2004). *Syn*. mother load passage. See virgin cave, *virgin passage*, *scoop booty*.

mottling: Variegated coloring (Morehead 1981).

mound: In caving, a cone-shaped feature within a passage. Typically made up of *clay*, debris, or *silt* (FCTCKS 2005). *Cf. debris pile*.

MSDS: *Abb. Material Safety Data Sheet*.

MSW: *Abb*. meters salt (or sea) water.

muck: Dark, fine-textured well-decomposed organic material, intermixed with a high percentage of mineral matter, usually silt; it forms surface deposits in some poorly drained areas, e.g., areas of permafrost and lake bottoms (Jackson 1997: 422).

mud: A slimy, sticky, or slippery mixture of water and *silt*- or *clay*-sized earth material, with a consistency ranging from semifluid to soft and plastic; a wet, soft soil or earthy mass; mire, sludge (Jackson 1997: 422).

mud pendulite: A *pendulite* with the knob coated in mud (Field 2002: 126).

mud puppy: Colloquialism. A diver whose lack of proper swimming technique disturbs large quantities of silt and debris (FCTCKS 2004). *Cf. wallow*.

mudbug: *Syn*. *crayfish*, crawfish, crawdad.

multidrop: A vertical section of cave that requires rigging two or more drops to reach the bottom (FCTCKS 2005).

multilevel dive: A type of dive that will not conform to a maximum depth and time *profile*. Ideally, such dives are conducted with the deepest sections first

and then the diver ascends progressively to various shallower depths (Mount and Gilliam 1993: 379).

multimetric: Analysis techniques using several measurable characteristics of a biological assemblage (US EPA 2005a).

multiple stage diving: The act of wearing two or more *stage bottles* for *decompression* or stage diving (Prosser and Grey 1992). See *stage diving*.

multitasking: Handling or attempting to handle more than one task at the same time, usually while undertaking an activity such as caving or diving. Multitasking can add complications, creating mistakes leading to anything from incorrect data collection to life-threatening distractions (FCTCKS 2004). *Cf. goal-oriented dive*.

mung: Colloquialism. 1. The bacterial growth that covers the walls, ceiling, and floor of many submerged caves (FCTCKS 2004). 2. Organic debris on cave and cavern floors (e.g., leaves, sticks) (Orlowski 2005).

municipal sewage: Wastewater originating in residences and businesses. On average, each person produces 100 gallons of wastewater per day (Wyman and Stevenson 2001: 246).

municipal water facility: Water service provided by the city or county and meeting the requirements of a Public Water Supply (Hillsborough County 2004).

Mylar: A trade name for a strong, durable, translucent, plastic-like substance used as a drafting medium as opposed to paper, which is much less durable (Burge 1988: 122). *Cf. vellum*.

***Myotis* sp.**: Several small insectivorous species of bat often found occupying large colonial roosts in relatively few Florida caves. Includes *Myotis austroriparious* (southeastern brown bat), which uses caves mostly in central to northern Florida for maternity roosts in the early to late springtime, and *Myotis grisescens* (Indiana grey bat), whose range extends south into northernmost Florida (Franz et al. 1994).

mysid: Tiny shrimplike *crustacean* that makes up the food source of many fish (FCTCKS 2004).

N

N: Symbol for *nitrogen*.

NACD: *Abb*. National Association for Cave Diving.

naked karst: See *exposed karst*.

narced: See *narked*.

narked: Colloquialism indicating a diver was or suspects he was experiencing symptoms of *nitrogen narcosis* during a dive (FCTCKS 2005). *Syn*. narced.

narrative biological criteria: General statements of attainable or attained conditions of biological integrity and water quality for a given designated aquatic life use (US EPA 2005a). *Syn*. narrative criteria. See *biological criteria*, *narrative standard*, *water quality standard*.

narrative criteria: See *narrative biological criteria*, *narrative standard*.

narrative standard: Water quality standards that use descriptions to define acceptable levels of quality; for example, water quality shall be "suitable for wildlife habitat." The Clean Water Act also provides for numerical water quality standards, which define allowable pollutant levels in terms of certain chemical-specific concentrations, for example, phosphorous levels of less than five parts per million, daily average (Wyman and Stevenson 2001). *Syn*. narrative criteria, descriptive criteria. See *biological criteria*, *narrative biological criteria*, *water quality criteria*.

National Environmental Policy Act (**NEPA**): Established in 1969, to declare a national policy that will encourage productive and enjoyable harmony between man and his environment; to promote efforts to prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the nation; and to establish a *Council on Environmental Quality* (White House 2005b).

National Geodetic Vertical Datum (**NGVD**): A nationally established reference for elevation data relative to sea level (SFWMD 2005b).

National Speleological Society: A nonprofit organization devoted to study, exploration, and preservation of caves (FCTCKS 2005).

National Wetlands Inventory (**NWI**): A program initiated in 1975 in response to a dramatic loss of wetlands across the United States; produces and provides detailed information on the characteristics, extent, and status of wetlands throughout the United States (US FWS 2005b, 2005c).

native species: A species within its known historical range and with no evidence of humans having introduced it (Wear and Greis 2002). *Cf*. *indigenous*.

natural bridge: 1. Any archlike rock formation created by erosive agencies and spanning a ravine or valley. 2. In a limestone terrane, the remnant of the roof of an underground cave or tunnel that has collapsed (Jackson 1997: 428). *Syn*. *bridge*.

natural plant communities: Naturally occurring stands of native plant associations exhibiting minimal signs of anthropogenic disturbance. Specific community types can be identified by characteristic dominant plant species composition (Hillsborough County 2004).

Natural Resource Conservation Service (**NRCS**): An agency of the U.S. Department of Agriculture (USDA) that provides technical assistance for soil and water conservation, natural resource surveys, and community resource protection (SFWMD 2005a).

natural selection: The process by which individuals with the best features to live in a particular environment survive at least long enough to pass on those features to their offspring (Zokaites and O'Malley 2000: 128).

natural system: A self-sustaining living system that supports an interdependent network of aquatic, wetland-dependent, and upland living resources (FDOS 2001). *Cf*. *human system*.

natural tracer: Naturally occurring component of a water sample used to deter-

mine information about the source and age of the water. The most commonly used natural tracers are *isotopes* and chemical compounds that originate in the atmosphere and become incorporated in the rainfall that recharges an aquifer. Of those types and substances, the isotopes of oxygen ($^{16}O/^{18}O$) and hydrogen ($^{2}H/^{3}H$), and chlorofluorocarbons (CFC) are the most commonly used. Isotopes of other elements such as radon, sulfur, chlorine, lead, strontium, helium, and carbon are also fairly common (Fritz and Fontes 1980). *Cf. deliberate tracer*.

navigation (**in cave**): In caving, the ability to successfully find the correct route into and out of the cave using one or more methods including memory, referencing, lines, line markers, and compass (FCTCKS 2004).

NDL: *Abb. no decompression limit*.

necrophage: From Greek *nekros* (dead body) + *phagos* (one that eats). An organism that feeds on carrion (FCTCKS 2004).

negative: In diving, see *negative buoyancy*.

negative buoyancy: Sinking in the water (FCTCKS 2005). *Syn*. negative, negatively buoyant. *Cf. neutral buoyancy*, *positive buoyancy*.

negatively buoyant: See *negative buoyancy*.

nekton: Group of aquatic organisms capable of swimming (UI 2005). *Cf. plankton*.

neoprene: Neoprene or polychloroprene; an extremely versatile synthetic rubber used in the manufacture of *wetsuits* and *drysuits* for underwater exposure protection (Huth 2005).

neoteny: The condition of retaining larval form and behavior as a mature individual; the adult retention of juvenile characteristics. Some salamanders in particular are neotenic (FCTCKS 2004).

NEPA: *Abb. National Environmental Policy Act*.

network: A complex pattern of repeatedly connecting passages in a cave (Field 2002). *Syn*. labyrinth, *maze cave*.

neutral buoyancy: The condition where the object neither rises nor sinks in the water (Stone and AmEnde 2002: 315). *Syn*. neutral, neutrally buoyant. *Cf. negative buoyancy*, *positive buoyancy*.

neutrally buoyant: See *neutral buoyancy*.

NGVD: *Abb. National Geodetic Vertical Datum*.

NiCAD: Nickel cadmium; a type of rechargeable battery for dive lights (Huth 2005).

niche: An organism's place in the ecosystem. Characterized by its lifestyle, habitat, food, and interactions with other organisms and its surroundings (Meth 2002).

NiMH: Nickel metal hydride; a type of rechargeable battery for dive lights (Huth 2005).

nitrate (**NO_3**): One of a sequence of related nitrogen *compounds* often found in soils and in Florida's groundwater. Others include nitrogen gas (N_2), nitrogen dioxide gas (NO_2), ammonia (NH_3) and ammonium (NH_4), nitrite (NO_2), a

number of other inorganic compounds, and many organics. Of significance in groundwater are nitrate, nitrite, ammonium, and dissolved organic-nitrogen compounds, including amino acids and proteins. The organic nitrogen is generally reported as total *Kjeldahl nitrogen* (TKN). The Florida Department of Environmental Protection generally measures nitrate in the laboratory as nitrate plus nitrite as nitrogen (NO_3 + NO_2 as N). Major sources of nitrate in groundwater include fertilizers, septic tanks, and animal waste. After groundwater discharges from an aquifer, an excess of nitrate can encourage algal and aquatic plant growth, and may lead to *eutrophication* of surface water (Upchurch et al. 1992).

nitrification: The conversion of ammonia to nitrate and/or nitrite through oxidation by bacteria (FCTCKS 2005).

nitrite (**NO_2**): An oxidized nitrogen *molecule* with the chemical formula NO_2. Nitrite can be formed from *nitrate* (NO_3) by microbial action in soil, water, or the human digestive tract. Excessive nitrite levels in rural well water can cause methemoglobinemia (also known as *blue baby syndrome*), typically in infants, by the interaction of nitrite with blood hemoglobin (Wyman and Stevenson 2001). *Cf. nitrate*.

nitrogen (**N**): An element essential to the growth and development of plants; occurs in manure and chemical fertilizer and, in excess, can cause waters to become polluted by promoting excessive growth of algae and other aquatic plants (IFAS 2005).

nitrogen fixation: The conversion of elemental *nitrogen* (N) from the atmosphere to organic combinations or to the forms readily usable in biological processes (UI 2005).

nitrogen narcosis: The progressive impairment of mental capacity, brought on by a diver breathing a high partial pressure of nitrogen (Farr 2003). *Syn*. rapture of the deep.

nitrox: A breathable gas mixture consisting primarily of nitrogen and oxygen. Typically a mixture with more than 21% oxygen. Also called Enriched Air Nitrox or EANx (Farr 2003). See *NOAA nitrox I*, *NOAA nitrox II*. *Cf. normoxic*, *heliox*, *trimix*.

NOAA nitrox I: *Nitrox* consisting of 32% oxygen and 68% nitrogen, the most prevalent nitrox in scientific and sport diving for depths to 130 fsw (Mount and Gilliam 1993: 380). *Syn*. Safe Air, enriched air, EANx.

NOAA nitrox II: *Nitrox* consisting of 36% oxygen and 64% nitrogen, depth limit approximately 110 fsw (Mount and Gilliam 1993: 380).

no decompression limit (**NDL**): Maximum amount of time during a dive allowed at depth without requiring *decompression stops* during *ascent* (London 2004).

no-mount: Pertaining to ongoing cave passage or a restriction small enough in size that a diver is required to push his *tank* or tanks in front of him as he negotiates the passage or restriction. Also refers to the technique of *no-mount diving* (FCTCKS 2004). *Cf. tanks-off restriction*.

no-mount diving: The technique of cave diving while pushing a tank or tanks in front of the diver. No-mount diving is practiced, usually solo, in the pursuit

of exploration of new passage or in the negotiation of a restriction. This is an extremely advanced form of cave diving (FCTCKS 2005).

nonartesian: A condition in which the upper surface of the *zone of saturation* forms a water table that is under atmospheric pressure (Bates and Jackson 1987). *Syn*. unconfined.

nonartesian aquifer: An aquifer having a water table; an aquifer containing unconfined groundwater (Bates and Jackson 1987). *Syn*. *water-table aquifer*, *unconfined aquifer*. *Cf*. *surficial aquifer*.

nonlocking carabiner: A *carabiner* that does not have a locking gate (FCTCKS 2005).

nonpoint source pollution: *Pollution* that does not result from a discharge at a specific, single location or point, but generally results from land runoff (i.e., from homes, parking lots, building sites, etc.), precipitation, atmospheric deposition, or percolation. Pollution from nonpoint sources occurs when the rate at which pollutant materials entering water bodies or groundwater exceeds natural levels (FDEP and FDCA 2002: 113). *Cf*. *point source pollution*.

nonpotable: Describes water that is undrinkable because it may contain excessive levels of infectious agents, hazardous chemicals, or other substances (Wyman and Stevenson 2001: 260–261).

nonrenewable resource: A natural resource such as coal or mineral ores that is not replaceable after its removal. In contrast, food crops and timber forests are *renewable resources* (Wyman and Stevenson 2001: 261).

normoxic: A breathing mixture that yields a percentage or partial pressure of oxygen at normal levels (i.e., 21%) (Mount and Gilliam 1993: 380). *Cf*. *nitrox*, *heliox*, *trimix*.

northing: 1. The distance of a point north of the point of origin of the grid of a map. 2. The south-north component of a survey leg, or of a series of two or more legs, or of a complete traverse; north is positive, south is negative (Field 2002). *Cf*. *easting*, *vertical angle*.

Northwest Florida Water Management District (**NWFWMD**): Located in the panhandle of Florida, one of the state's five water management districts and responsible for, but not restricted to: ensuring adequate water supply, protecting natural systems, minimizing the harm due to flooding, and improving and maintaining water quality (FCTCKS 2004).

nothephreatic: The slow, almost still, percolation of water through the *phreatic zone* (FCTCKS 2005).

NRCS: *Abb*. *Natural Resource Conservation Service*.

NSS: *Abb*. *National Speleological Society*.

NSS-CDS: *Abb*. Cave Diving Section of the *National Speleological Society*. *Syn*. *CDS*.

null: The "mute" or silent position detected by a magnetic *cave radio*. Nulls are located where the receiving antenna is exactly parallel with the magnetic flux lines from the transmitter (Dasher 1994: 184).

numbering: Assigning a unique identifying number to a cave entrance (Field 2002).

nursery colony: An area where mother bats keep their pups together with other pups (Zokaites and O'Malley 2000: 128).

nutrient: Any element or compound essential for the growth of living organisms. Common nutrients in fertilizer include nitrogen, phosphorus, and potassium (Hughes et al. 2000).

nutrient loading: The introduction of excessive amounts of nutrients such as nitrogen or phosphorous from fertilizers into the soil or water (FDEP 2005). *Syn*. *enrichment*, *eutrophication*.

NWFWMD: *Abb*. *Northwest Florida Water Management District*.

NWI: *Abb*. *National Wetlands Inventory*.

nymph: Juvenile stage of certain insects that do not pass through a larval stage.

O

O: Symbol for the chemical element *oxygen*.

O_2: *Abb*. *oxygen*. Typically used colloquially among divers to refer to *100%* oxygen used as a breathing gas during *decompression* (FCTCKS 2005).

objective: Specific results or effects that must be achieved in pursuing the ultimate goal of a program's activities or a research study (US EPA 2004b).

obligate: A species unable to live outside of a given environment; applied to animals living in the *dark zone* of caves that may display *troglomorphic adaptations* (Meth 2002). See *troglobite*, *stygobite*.

observation: A data collection strategy in which the activities of subjects are visually examined. The observer refrains from interfering or influencing any subject behaviors (US EPA 2004b).

OC: *Abb*. *open circuit*.

octopus: Twin regulators drawing air through the same first stage and *cylinder* and therefore *redundancy* is not complete (Farr 2003: 125).

"**off belay**": A command given when the belayer is no longer belaying the person on rope, or given by the safety officer when all rescuers and the patient are secure after a raising or lowering situation (Smith and Padgett 1996).

offgassing: *Syn*. *decompression*, outgassing. *Cf*. *on gassing*.

"**off rappel**": A command given when the person rappelling has finished the rappel and is off the rope and clear of the *drop zone* (FCTCKS 2005). *Syn*. "*off rope*."

"**off rope**": A signal given when someone has removed himself from the rope and is clear of the *drop zone* or edge safety area (Smith and Padgett 1996: 359). *Cf*. "*on rope*."

offshoot: Cave conduit or passage branching from the main *trunk* that may or may not lead to continuing passable conduits (FCTCKS 2004).

offshore spring: A spring with point of discharge seaward of the mean low-tide level (Copeland 2003). *Syn*. submarine spring. *Cf*. *anchialine cave*, *blue hole*, *littoral cave*, *marine cave*, *submarine cave*.

OFW: *Abb*. *Outstanding Florida Waters*.

"OK": A *command signal* confirming that everyone is comfortable with continuing the dive (FCTCKS 2005).

OK the line: The practice of making an "OK" signal with the thumb and forefinger around the line to maintain contact in the event of a loss of *visibility* (FCTCKS 2004).

Oligocene: A series of the *Tertiary System*, above the *Eocene* and below the *Miocene*; also, the time during which those rocks were formed (Oligocene Epoch), approximately 35–23 million years ago (Jackson 1997).

oligotrophic: From Greek *oligo* (few;small) + *trophe* (food; nutrients). Describing bodies of water poor in nutrients with low *primary productivity* and a corresponding high level of dissolved oxygen (FCTCKS 2005). *Cf. eutrophic*, *mesotrophic*.

"**on belay**": Response to "*on rope*" ("rappelling"), meaning the belayer is ready to apply a bottom belay if needed (Padgett and Smith 1992: 277). *Cf. belay*.

on gassing: The absorption of nitrogen into various tissues that takes place as the *partial pressure* of nitrogen increases with depth (Huth 2005). *Cf. offgassing*.

"**on rappel**": Verbal command given when beginning a descent on rope (FCTCKS 2005).

"**on rope**": The verbal command given when one enters the one-body-length distance from the edge of a *drop* with the intent of attaching oneself to the rope. From the bottom this command should be given when one enters the rock-fall zone with the intent of climbing the rope (Smith and Padgett 1996: 359). *Syn. rappelling*. *Cf.* "off rope."

onshore spring: A spring with point of discharge landward of the mean low-tide level (Copeland 2003).

OOA emergency: *Syn*. out of air emergency.

oolite: A sedimentary rock, usually a *limestone*, made up chiefly of ooliths (a small round accretionary body) cemented together (Bates and Jackson 1984).

ooze: 1. *n*. Soft mud or slime. 2. *v*. Seep or leak slowly (Morehead 1981).

op. cit.: Latin *opere citato* (in the work cited) (Dasher 1994).

open-air pit: A pit where the sky is visible from the bottom (Smith and Padgett 1996: 359). *Cf. pit*.

open circuit (**OC**): A type of breathing apparatus in which fresh breathing gas is supplied from the breathing mix in the tank or tanks and all the diver's exhaled gas is expelled into the surrounding water (FCTCKS 2004). *Cf. rebreather*, *semi-closed circuit rebreather*, *closed-circuit rebreather*.

open-ended question: A question that does not have a set of possible answers, allowing the respondent to answer freely (US EPA 2004b). *Cf. close-ended question*, *closed question*.

open traverse: A *traverse* that does not close onto a station of known coordinates and orientation or onto itself (Meth 2002). *Syn*. open traverse order.

open water: Any water environment without an *overhead* impediment (FCTCKS 2004).

order: The fourth rank in the taxonomic system (kingdom, phylum or division, class, order, family, genus, species).

organic: 1. *adj*. Pertaining or relating to a compound containing carbon, especially as an essential component. Organic *compounds* usually have hydrogen bonded to the carbon atom. 2. *n*. A substance containing carbon, as in such expressions as "organic-rich shale" (Jackson 1997: 451). *Cf. inorganic*.

orientation: The assignment of a direction in space, the relationship of an object to the points of the compass (Field 2002).

O-ring: Circular rubber ring used as a seal for water- and air-tight connections on light canisters, *diver propulsion vehicle* bodies, gas hoses, *tank* valves, and other diving and caving equipment (FCTCKS 2004).

orthogonal: At right angle to, perpendicular to, across, broadside (Burge 1988: 122).

OSHA: *Abb*. Occupational Safety and Health Administration.

osmosis: The diffusion of water through a membrane (MSU 2000: 292).

OSTDS: *Abb*. onsite sewage treatment and disposal system. *Syn*. *septic system*.

ostracod: Any aquatic *crustacean* belonging to the subclass Ostracoda, characterized by a bivalve, generally calcified carapace with hinge along the dorsal margin. Most ostracods are microscopic (0.4–1.5 mm or 0.016–0.06 inch long) although freshwater forms up to 5 mm (0.2 inch) long and marine forms up to 30 mm (1.18 inches) long are known; also spelled ostracode (Jackson 1997).

OTU: *Abb*. *oxygen toxicity unit*.

out: The direction in which a caver or cave diver exits the cave (FCTCKS 2004).

outcome: The results of a program's operations or activities or of a research study (US EPA 2004b).

outcome evaluation: An assessment of the reasons for different outcomes and objectives (e.g., why the number and quality of permits issued exceeded or fell short of an objective). May include an examination of program processes and activities to understand how outcomes are achieved and how quality and productivity could be improved (US EPA 2004b).

outflow cave: A cave from which a stream flows or formerly flowed (Field 2002).

outgassing: Gas dissolved in a liquid coming out of solution (Heine 1995: 279). *Cf. decompression*, *offgassing*.

Outstanding Florida Waters (**OFW**): A water body designated worthy of special protection because of its natural attributes. This special designation by the Florida Department of Environmental Protection is applied to certain waters and intended to protect existing good water quality (FDEP 2004a).

overdraft: Groundwater withdrawal in excess of the amount that can be withdrawn from a groundwater basin annually without producing an undesired result (SWFWMD 2000: 7–6). *Cf. over-withdrawal*.

overflow passage: Typically parallel streams that can be at various levels and act to take additional flow along the principal flow path in times of elevated flow. In underwater caves, during normal flow, these passages tend to have little to no flow while the primary passage continues to transfer flow. Peacock, Bonnet, Hart, and Devils Eye Spring Groups in Florida are all excellent example of braided flow in which exist both a principal flow path and overflows (FCTCKS 2004).

overflow stream: A stream valley that is down gradient of a *swallow hole*, swallet, or blind valley and that carries water only when the *recharge* capacity of the swallow hole is exceeded. In Florida, the term is sometimes used to identify an overflow, or paleo-overflow, stream valley (SDII Global Corp. 2002). *Syn*. trace.

overhang: 1. A simple cave or rock shelter in which no part is in the *dark zone*. 2. A ladder or rope that hangs over a ledge or shelf of rock that projects past the rest of the rock face below and thereby hangs free (Meth 2002).

overhead: A natural or manmade impediment between a diver and the surface (i.e., the cave ceiling or the body of a wreck). Diving with a *decompression* obligation can also be considered overhead, since the decompression is obligatory (FCTCKS 2004).

overhead environment: See *overhead*.

overlay zones: A planning technique employed to describe uses that may be allowable within a given district, provided that approval is received to "overlay" a special category on top of the underlying zoning category. A local government can then impose a new set of regulations on a special area within an existing district. This allows local government to provide additional protection, above and beyond the provisions of the underlying zoning district, to such areas as historic districts, wetlands, or special land features (FDOS 2001).

overwithdrawal: Withdrawal of groundwater over a period of time that exceeds the *recharge* rate of the supply *aquifer* (US EPA 1998). *Cf*. *overdraft*.

OW: *Abb*. open water.

oxidation: An orderly arrangement of reactions involving several different types of chemical conversions: (a) loss of electrons by a chemical (the most common definition), (b) combination of oxygen and another chemical, (c) removal of hydrogen atoms from organic *compounds* during biological metabolism, (d) burning of some material, (e) biological metabolism that results in the decomposition of organic material, (f) metabolic conversions in toxic materials in biological organisms, (g) stabilization of organic pollutants during wastewater treatment, (h) conversion of plant matter to compost, (i) decomposition of pollutants or toxins that contaminate the environment (Wyman and Stevenson 2001: 273). See *reduction*.

oxygen ($\mathbf{O_2}$): 1. A colorless, odorless, tasteless gas essential to life making up approximately 21% of air. Oxygen can be toxic if breathed at high pressures or for extended periods (Huth 2005). 2. In diving, 100% oxygen breathed during *decompression* stops at a depth of 6 meters (20 feet) or shallower (FCTCKS 2005).

oxygen analyzer: Used to measure the percent of oxygen in a breathing gas mixture (Huth 2005).

oxygen cleaning: A process used to prepare components used in systems exposed to gas containing high fractions of oxygen at high pressures (Bozanic 2002: 520).

oxygen depletion: The removal of *dissolved oxygen* from a body of water as a result of bacterial metabolism of organic *compounds* added to the water (Wyman and Stevenson 2001).

oxygen sensor: A sensor used to measure the partial pressure of oxygen in a gas (Bozanic 2002: 521).

oxygen toxicity: Injury caused by breathing a gas mix with higher oxygen than allowable for the depth. Dive planning and use of analyzers to verify the gas mix can help prevent this type of occurrence (FCTCKS 2004). *Cf. pulmonary oxygen toxicity*.

oxygen toxicity unit (**OTU**): A rough measurement of long-term exposure to low partial pressures of oxygen. The units are viewed only as guidelines to help gauge whole body oxygen toxicity. They are based on the exposure to 1 ATA of oxygen for 1 minute = 1 OTU (Elliott 2002).

P

P: Symbol for *phosphorous*.

pack: A bag or sack, usually heavy canvas, that can be closed securely against abrasion, mud, and dust commonly encountered while caving. Used to carry rope, *rope pads*, snacks, water, and other gear and supplies (FCTCKS 2004).

pad: See *rope pad*. *Cf. knee pads and elbow pads*.

padding deco: When a diver voluntarily adds time to his or her decompression obligation (FCTCKS 2005).

Palaemonetes cummingi (Squirrel Chimney Cave shrimp): A troglobitic freshwater shrimp currently known only from Squirrel Chimney Cave in Alachua County, Florida (FCTCKS 2004).

Paleocene: The lowermost series of the *Tertiary System*, above the *Cretaceous* and below the *Eocene*; also the time during which those rocks were formed, the Paleocene Epoch, estimated to have occurred approximately 65–55 million years ago (Jackson 1997).

paleokarst: Descriptive of either an ancient karst terrain or features associated with an ancient karst terrain, including old sinkholes and other karst features that are no longer actively forming. In west-central Florida, pertains to sinkholes that formed decades to millions of years ago and are no longer active (SDII Global Corp. 2002). *Cf. relict karst*.

paleosinkhole: An ancient, no longer active sinkhole (SDII Global Corp. 2002). *Cf. relict sinkhole* and *alluvial sinkhole*.

paleosoils: See *paleosols*.

paleosols: A soil that formed on a landscape in the past with distinctive morphological features resulting from a soil-forming environment that no longer exists at the site (Jackson 1997: 461).

palustrine: From Latin *palus* (marsh). Relating to a freshwater environment, such as a marsh, fen, lake, pond, bog, or swamp (IFAS 2004). Cf. *lacustrine*, *marine*.

parameter: 1. A numerical quantity that characterizes a *population* or a *data*. Parameters are estimated by the corresponding statistics calculated from samples taken (Jackson 1997).

partial pressure: The percentage by volume of a particular molecular gas within a breathing mixture (Balcombe et al. 1990: 263).

particulate: In cave diving, small particles of *silt*, *sand*, or *debris* that settle on surfaces within the cave passages and are easily disturbed. Also, those particles that rain down from the ceiling as a result of being dislodged by a diver's exhaust bubbles (FCTCKS 2004). *Cf. ceiling percolation*, *settling*.

parts per billion (**ppb**): A unit of measure commonly employed to express the number of parts (e.g., grams) of a chemical contained within a billion parts of gas (air), liquid (water), or solid (soil). (Wyman and Stevenson 2001: 281). See *concentration*.

parts per million (**ppm**): A unit of measure commonly employed to express the number of parts (e.g., grams) of a chemical contained within a million parts of gas (air), liquid (water), or solid (soil). (Wyman and Stevenson 2001: 281). See *concentration*.

passage: Any negotiable part of a cave system, though the usage is commonly restricted to those elements that tend toward the horizontal rather than vertical or subvertical sections (US EPA 2002). *Syn. tunnel.*

pathogen: A *microorganism*, such as bacterium or fungus, that has the capacity to cause disease under normal conditions (Wyman and Stevenson 2001: 281).

Pe: Symbol for *Peclet number*.

Peclet number (**Pe**): In *water tracing*, a number used to measure the relative importance of *mechanical dispersion* compared to *molecular diffusion* and often used in describing *breakthrough curves*. Mechanical dispersion is the mixing of the *tracer* and water molecules. Molecular diffusion is the movement of molecules under the influence of their kinetic activity in the direction of their *concentration gradient*, independent of the flow movement of water. If the water velocity is slow, diffusion dominates relative to (mechanical) dispersion. If water velocity is fast, mechanical dispersion dominates. The Peclet number is dimensionless. $Pe = vd/D^*$, where v is the average velocity of groundwater flow, d is the average particle diameter of the rock matrix material, and D^* is the molecular diffusion coefficient (Freeze and Cherry 1979).

pendant: *Syn. rock pendant*.

pendulite: A *stalactite* that has been partly submerged and the submerged part covered with precipitates to give the appearance of a drumstick (Meth 2002).

penetration: In caving or cave diving, the distance a team has progressed into a cave as measured from the entrance (FCTCKS 2004).

per capita use rate: The amount of water used by each person each day, expressed in gallons (MSU 2000: 292).

percent saturation: The amount of a solid or liquid dissolved in a solution compared with the total amount of material that could be dissolved (Wyman and Stevenson 2001).

perched aquifer: An aquifer containing unconfined (*nonartesian*) groundwater held above a lower body of groundwater by an *unsaturated zone*; often a result of clay lenses in the soil strata (US EPA 1998).

percolation: 1. Slow laminar movement of water through small openings within a porous material. *Syn*. *infiltration* (Bates and Jackson 1984: 376). 2. Materials dislodged by a diver's exhalation bubbles (Saltsman 1995). *Syn*. *ceiling percolation*.

percolation water: *Syn*. seepage water, *vadose seepage*. See *percolation*.

perennial stream: Streams that flow throughout the year (Wear and Greis 2002).

periphyton: The biological community of *algae* and other organisms attached to surfaces (e.g., stems and leaves of plants) in aquatic environments. The principal food of many *benthic* insects and other invertebrates (UI 2005). *Syn*. aufwuchs, *epilithon*.

permanent line: Guidelines intended to remain in caves indefinitely (Prosser and Grey 1992: 89). *Syn*. line, *gold line*, *guideline*, *main line*.

permeability: The capacity of a porous rock, sediment, or soil to transmit a fluid; a measure of the relative ease of fluid flow under unequal pressure (Bates and Jackson 1984).

persistence: The relative ability of a chemical to remain chemically stable after release into the environment (Wyman and Stevenson 2001: 284).

person: Any and all persons, natural and artificial, including any individual, firm, association, organization, partnership, business trust, corporation, company, the United States of America, and the state and all political subdivisions, regions, districts, municipalities, and public agencies thereof. The enumeration herein is not intended to be exclusive or exhaustive (373.019 Florida Statutes).

pesticide: A substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. Also, any substance or mixture of substances intended to regulate plant or leaf growth. Pesticides can accumulate in the food chain and/or contaminate the environment if misused (IFAS 2005).

pH (**potential of hydrogen**): The negative $\log_{10}$ of the hydrogen-ion activity in solution; a measure of the *acidity* or *basicity* of a solution. The numeric value of the pH scale is from 0 to 14, with the neutral point at 7.0. Values lower than 7.0 indicate the presence of acids and greater than 7.0 the presence of alkalis (bases). In natural systems, pH is rarely less than 3 or greater than 11 (Bates and Jackson 1987).

phloxene: Also known as CI Acid Red 92. A type of fluorescent dye used in groundwater tracing that appears red in low concentrations (FCTCKS 2005). *Cf*. *eosin*, *fluorescene dye*, *Rhodamine WT*, *uranine*.

phosphate: Reported as orthophosphate (PO_4), an essential nutrient of all living organisms. The Florida Department of Environmental Protection laboratory generally measures PO_4 or elemental phosphorous (P). The source of phosphate in groundwater is often from phosphate-bearing sediments found throughout the *Hawthorn Group*, a series of phosphate-bearing *Miocene* sediments. Weathering of the Hawthorn introduces phosphate into groundwater and surface water. Other sources include organic and inorganic fertilizers,

animal waste, human waste, and industrial waste. In excess, phosphate can cause run-away plant growth and *eutrophication* of surface water (Upchurch et al. 1992).

phosphorescence: A type of luminescence in which the stimulated substance continues to emit light after the external stimulus has ceased; also the light so produced. The duration of the emission is temperature dependent, and has a characteristic rate of decay (Bates and Jackson 1987: 499). *Cf. fluorescence*.

phosphorous (**P**): A nutrient essential for plant growth that can contribute to *eutrophication* and plays a key role in stimulating aquatic growth in lakes and streams (Hughes et al. 2000).

photolineament: A natural linear feature on the land surface that has been identified from aerial photographs or other images. Photolineaments are identified by alignments within or between lakes and wetlands, sinkholes, stream segments, soils, and vegetation patterns. Photolineaments are also known as photolinears. Note that photolinears may or may not represent geologic features, so the term is not synonymous with fracture trace. See *fracture trace* (SDII Global Corp. 2002).

photo point: Predetermined places within an environment where photographs or video are taken periodically to document changes in the conditions (FCTCKS 2004).

photosynthesis: A process in green plants and some bacteria during which light energy is absorbed by chlorophyll-containing *molecules* and converted to chemical energy (the light reaction). During the process, carbon dioxide is reduced and combined with other chemical elements to provide the organic intermediates that form plant biomass (the dark reaction). Green plants release molecular oxygen (O_2), which they derive from water during the light reaction (Wyman and Stevenson 2001: 289–290).

phreas: *Syn*. *zone of saturation*.

phreatic: Pertaining to *groundwater*. *Syn*. *zone of saturation*.

phreatic cave: A cave that forms below the water table (Fetter 2001: 312).

phreatic development: Features, including cave passages, created by the flow of water at or below the water table. Phreatic development typically assumes the process is by *solution* (FCTCKS 2004).

phreatic passage: Cave passage formed below the water table in a *limestone aquifer* (Balcombe et al. 1990: 263).

phreatic tube: A cave passage or tunnel that has a large vertical component or keyhole shape (Huth 2005). See *keyhole*.

phreatic zone: All of the water in the *zone of saturation* (Bates and Jackson 1984). *Syn*. *groundwater*, zone of saturation. *Cf. vadose zone*, *unsaturated zone*.

phreatite: Reddish brown to black crust that forms on the bedrock of a submerged cave composed mostly of *iron oxide*. The term is also applied to bacteria in caves with a rough, bubbly looking (botryoidal) appearance (London 2004). *Cf. goethite*.

phreatobia: An animal association found in water separating grains of sand or fine gravel (Meth 2002).

phreatophytes: Plants that send their roots into or below the *capillary zone* to use *groundwater* (MSU 2000: 293).

phylum: The second rank for animals in the taxonomic system (kingdom, phylum, class, order, family, genus, species). *Cf. division*.

phytoplankton: Single-celled microscopic plants floating in water bodies (FCTCKS 2005). See *plankton*.

picometer (**pm**): A unit of measurement equivalent to one-trillionth (10^{-9}) of a meter, or 3.94 x 10^{-11} inches.

piezometer: A small-diameter well for measuring the hydraulic *head* of *groundwater* or to monitor groundwater quality (FCTCKS 2005).

piezometric surface: *Syn*. *potentiometric surface*.

pigtail: A short piece of rope hanging next to the main rope, used to assist climbers on and off the main rope when the rope is heavy or the edge is troublesome (Smith and Padgett 1996: 360).

pillar: 1. In caves, remnants of bedrock joining the cave floor and ceiling. 2. A column of rock remaining after solution of the surrounding rock. 3. A tall, thin *stalagmite* that does not reach the roof of the cave (Field 2002). *Cf. column*.

pilot-valve regulator: A *regulator second-stage* main valve that is opened and closed using air pressure rather than mechanical leverage (Heine 1995: 280).

pinching off: Colloquialism. Said of a passage that becomes progressively smaller and smaller until it is no longer passable by humans (FCTCKS 2004). *Cf. choke*, *restriction*.

pinnacle karst: Tropical landscape of near vertical-sided spires. *Syn*. arête karst (Meth 2002).

pipe: In karst terminology, a generally small semicircular conduit through which water and soil can pass. Pipes are often nearly vertical and they have nearly vertical steep sides (SDII Global Corp. 2002). *Cf. pit*.

pipet: An eyedropper-like instrument that can measure very small amounts of a liquid (US EPA 2003b).

***Pipistrellus* sp**. (pipistrelle bat): A genus of small insect-eating solitary bats often found sheltering in caves and in hollows in the sides of pits or sheer sinkholes (FCTCKS 2004).

piracy: See *capture* (*stream*).

pirate stream: See *capture* (*stream*).

pit: A vertical hole in the ground requiring *single rope technique* to descend (Smith and Padgett 1996). *Syn*. *drop*. *Cf. pipe*.

pitch: (British) A vertical or nearly vertical part of a cave that normally requires rope, ladders, or equipment to climb or descend (Field 2002).

pit etiquette: The correct mode of behavior when using a *pit* for vertical caving or practice (FCTCKS 2005). *Cf. etiquette*.

piton: A solid or folded metal spike of steel or another alloy, driven into a crack in a rock to form an *anchor* (Field 2002).

PL: *Abb*. public law.

placement: Of line, as in cave diving, see *line placement* (FCTCKS 2005).

plankton: From Greek *planktos* (drifter; wanderer). Minute plant (phytoplankton)

and animal organisms (zooplankton) that are found in aquatic ecosystems and that drift or weakly swim (Bates and Jackson 1987).

plankton net: A device used by biologists for collecting small organisms in aquatic environments (FCTCKS 2004).

planned development: Land under unified control to be planned and developed as a whole in a single development operation or a definitely programmed series of development operations or phases. A planned development: (a) includes principal and accessory structures and uses substantially related to the character and purposes of the planned development; (b) is built according to general and detailed plans including not only streets, utilities, lots and building location, and the like, but also site plans for all buildings as per intended location, construction, use, and relation to each other, and plans for other uses and improvements on the land as related to the buildings; (c) includes a program for the provisions, operations, and maintenance of such areas, facilities, and improvements for common use by some or all of the occupants of the planned development district, but which will not be provided, operated, or maintained at general public expense (Hillsborough County 2004). See also *sustainable development*.

plan, **plan view**: One of the principal views of a cave map, displaying the cave as if the roof were removed (Dasher 1994: 184). *Cf. profile*.

plat: A plan or map of a piece of land (Waterwise 2003: 70).

platinum cobalt units: American Public Health Association (APHA) standards for determining color intensity of liquids. The platinum-cobalt color standards contain carefully controlled amounts of potassium chloroplatinate and cobaltous chloride. Each platinum-cobalt color unit is equivalent to 1 mg of platinum per liter of solution (1 ppm), and the standards are named accordingly. Colors having hues other than light yellow or reddish yellow cannot be determined with these standards (ACS 2000). *Syn*. APHA standards, Hazen standards.

Pleistocene: Cenozoic epoch, younger than *Miocene* and older than *Holocene*. Some consider it to include the Holocene as well. Also, equivalent to the lithologic series (approximately 1.8 million to 11.5 thousand years ago, if the Holocene is a separate epoch) (Jackson 1997).

Pliocene: The uppermost series of the *Tertiary System*, above the *Miocene* and below the *Pleistocene*; also the time during which those rocks were formed, the Pliocene Epoch, approximately 5.3–1.8 million years ago (Jackson 1997).

plot: In surveying, to mark the location of the survey *stations* on the map (Dasher 1994: 184).

plumb: The use of a hanging weight to determine exact vertical alignment (Burge 1988: 122).

pm: *Abb*. *picometer*.

pN_2: *Abb*. partial pressure of nitrogen.

pO_2: *Abb*. partial pressure of oxygen. *Syn*. *ppO_2*.

pO_2 limit: The partial pressure of *oxygen* above which oxygen exposure is considered unsafe. Most agencies recommend a limit of 1.4 atm pO_2 for recreational diving (Bozanic 2002: 521).

pocket: A solution hole or depression in the ceiling, floor, or walls of a cave noted for its smooth shape and lack of vertical features associated with descending *vadose water* (Field 2002 and Rea 1992).

point: *Syn*. survey point, survey station, *station*.

point source pollution: *Pollutants* that come from a concentrated originating point such as a pipe from a factory or a large registered feedlot with a specific point of discharge (FDEP and FDCA 2002: 113). *Cf*. *nonpoint source pollution*.

poisonwood (***Metopium toxiferum***): A slender shrub with white flowers of the Yucatan and Caribbean region that grows in open areas. Contact with the sap of this plant causes a rash that escalates in severity, causing blistering that can last for weeks (FCTCKS 2005). *Syn*. poison bark.

polar coordinate: Either of two numbers that locate a point in a place by its distance from a fixed point on a line and the angle this line makes with a fixed line (Burge 1988: 122). *Cf*. *Cartesian coordinate*, *rectangular coordinate*.

political subdivision: A city, town, country, district, or other public body created by or pursuant to state law, or any combination thereof acting cooperatively or jointly (373.403 Florida Statutes).

polje: A flat-bottomed *sinkhole* complex formed by the coalescence of several smaller sinkholes. Smaller than a *karst plain*. Poljes are flat bottomed because of subsequent sedimentation, usually by a lake. Payne's Prairie in Alachua County is an example (SDII Global Corp. 2002).

pollutant: Any material that causes harm to the environment (FCTCKS 2005). *Cf*. *contaminant*.

pollute: 1. To make physically impure or unclean. 2. To pollute is to introduce any substance that alters some aspect of the environment in a manner to make it unfit for a particular use (Bates and Jackson 1987).

pollution: The contamination of the environment by unwanted or undesirable materials (FCTCKS 2005).

pollution plume: An area of a stream or aquifer containing degraded water resulting from migration of a *pollutant* (US EPA 1998).

polychlorinated biphenyl (**PCB**): A diverse mixture of aromatic *compounds* that in the past were used extensively as insulating and cooling agents in electrical transformers, as plasticizers in waxes, and in the manufacture of paper and inks. The compounds are very stable, are widely distributed in the environment, and exhibit *bioaccumulation* in mammals. Excessive exposures cause a severe acne-like eruption (*chloracne*) in humans, and the material has been shown to induce cancer development in mammals. The U.S. Environmental Protection Agency has written extensive regulations for the manufacture, use, marking, storage, disposal, and cleanup of PCBs. They are found under Title 40, Part 761, of the Code of Federal Regulations (Wyman and Stevenson 2001: 295).

ponging: Colloquialism used on the Yucatan peninsula. Describes the sound of SCUBA *cylinders* hitting the limestone walls of a submerged cave as well as the action of using the bottom of a SCUBA tank to break away limestone, enlarging

cave passage. Percussion creates a distinctive "pong" sound. Ponging in shallow caves can cause collapse (FCTCKS 2005).

ponor: A hole in the bottom or side of a closed depression through which water passes to or from an underground channel (Field 1999: 130). *Syn*. *swallow hole*.

pony bottle: A very small (13 cubic feet or 0.3681 cubic meter), oftentimes a quarter of the size of a normal, full-sized SCUBA tank used for a variety of purposes, such as providing the small amounts of gas required by a *rebreather*, diving very short *sumps*, or inflating *drysuits* (Stone and AmEnde 2002). *Cf*. *bailout bottle*, *buddy bottle*.

pool: A basin of water that has little or no current (FCTCKS 2005).

pool deposit: Any sediment accumulated in a pool in a cave (FCTCKS 2005).

popcorn: See *cave coral*.

population: Individuals of a species in a given locality that form an interbreeding group, separated by physical barriers from other such populations (e.g., populations of the same species in two separate caves) (Field 2002).

porosity: The percentage of the bulk volume of a rock or soil that is occupied interstices (voids), whether isolated or connected (Jackson 1997: 503).

porthole: A small circular or nearly circular natural opening in a thin rock wall in a cave (Field 2002). *Cf*. *window*.

positive: In diving, see *positively buoyant*.

positive buoyancy: Rising in the water (FCTCKS 2005). *Syn*. positive, positively buoyant. *Cf*. *negative buoyancy*, *neutral buoyancy*.

positively buoyant: See *positive buoyancy*.

potable water: Water that is safe and palatable for human use; freshwater in which any concentrations of pathogenic organisms and dissolved toxic constituents have been reduced to safe levels, and which is, or has been treated so as to be tolerably low in objectionable taste, odor, color, or turbidity and to a temperature suitable for the intended use (Bates and Jackson 1987: 523).

potassium nitrate (**KNO_3**): See *saltpeter*.

potential of hydrogen: See *pH*.

potentiometric surface: An imaginary surface representing the total *head* of *groundwater* and defined by the level to which water will rise in a well. The water table is a particular potentiometric surface. It is sometimes referred to as the piezometric surface (Jackson 1997).

pothole: 1. (British) Sinkhole. 2. A small, rounded hole worn into the bedrock or sediment by a swirling current (Field 2002).

potholer: (British) Colloquialism used synonymously with *caver* and *speleologist* (Field 2002).

ppb: *Abb*. *parts per billion*.

ppm: *Abb*. *parts per million*.

ppO_2: *Abb*. for partial pressure of oxygen. Consideration of the pressure of oxygen in a mix helps a diver avoid *oxygen toxicity* during a dive (FCTCKS 2004). *Syn*. pO_2. *Cf*. *hypoxia*, *hypercapnia*.

ppt: *Abb*. parts per thousand.

precinctive: Taxa that are indigenous and "known from no other area" (Franz et al. 1994: 4). Preferred to the term *endemic*.

precipitate: The solid that settles from a liquid suspension. The solid produced by a chemical reaction involving chemicals in solution (Wyman and Stevenson 2001: 299).

precipitation: 1. Moisture falling from the atmosphere in the form of rain, snow, sleet, or hail (US EPA 1998). 2. The process of forming a *precipitate*.

precycling: The practice of making purchases on the basis of the potential to recycle the product after use (Wyman and Stevenson 2001: 299).

predator: An organism that preys on other organisms (FCTCKS 2005).

preferential path: A course that is preferred to others (American Heritage Dictionary 1985: 976).

prehistoric: Relating to or existing in times predating written history. Generally refers to those North American cultures existing prior to AD 1540 (Wear and Greis 2002).

Preservation 2000 (**P-2000**): One of two major State of Florida funding sources for the acquisition and protection of significant environmental lands by *water management districts* (SWFWMD 2005).

pressure: See *hydrostatic pressure*.

pressure gauge: A gauge that shows the pressure in a SCUBA tank, usually in *psi*. Essential for monitoring gas supply during the dive (FCTCKS 2004). *Syn*. submersible pressure gauge.

pressure relief valve: See *dump valve*.

pressure wave (**P wave**): The type of seismic body wave involving particular motion (alternating compression and expansion) in the direction of propagation (Bates and Jackson 1987).

primary: In cave diving, usually refers to the main breathing *regulator* in use during a dive. Can also refer to any equipment usually used during a dive (i.e., *primary light*, *primary reel*) (FCTCKS 2004).

primary data: *Data* collected by the researcher specifically for the research project (US EPA 2004b). *Cf. secondary data*.

primary light: A cave diver's main source of light past the cavern zone. Usually consists of a waterproof cylinder, called a *canister*, containing batteries, attached to the diver's *harness*. A cord from the canister provides power to a handheld light source and deflector. A cave diver carries a primary light and at least two *backup lights*. Typically 35–100 watts incandescent or 10–21 watts *HID* (FCTCKS 2004).

primary porosity: The porosity that developed during the final stages of sedimentation or that was present within sedimentary particles at the time of deposition (Jackson 1997). *Cf. secondary porosity*.

primary productivity: The *biomass* produced by the photosynthesizing plant components of an ecosystem (AMNH 2002). *Cf. productivity*.

primary reel: The *reel* a diver uses to make a physical connection between *open water* and the *main line* in a cave. The line in the caves is sometimes placed well

into the cave to discourage untrained divers from venturing into the *overhead environment*. By running a line from the open water to the main line, a diver has a continuous physical connection to open water (FCTCKS 2004). *Cf. exploration reel*, *gap reel*, *jump reel*, *safety reel*, *spool*.

primary tie-off: In cave diving, the first *tie-off* when heading into an *overhead* environment. The primary tie-off is made just inside or just outside the *cavern* zone, where an unobstructed ascent to the surface is possible. The *line* is run into the cavern and cave, where a *secondary tie-off* is made, securing the line out of the way of other lines and dive teams. The line is then run into the cave and either attached to the *main line* or, in the case of exploration or temporary lines, placed in the cave as the main line (Huth 2005).

primary zone: See *springshed protection zone*.

prime meridian: A great circle passing through the earth's poles, used as a starting point for measuring *longitude*. The prime meridian used by most western countries passes through Greenwich, England (Dasher 1994: 185).

principal aquifer: The *aquifer* in a given area that is the important economic source of water to wells for drinking, irrigation, etc. (US EPA 1998). *Cf. secondary aquifer*.

prismatic compass: A *compass* with a prism attached so that the *compass card* can be read at the same time as the compass is directed into the line of sight to a distant point (Field 2002: 148).

probability distribution: The probability that particular attributes or ranges of attributes for a random variable will be, or have been, observed (US EPA 2004b).

probability sample: *Syn. scientific sample*.

***Procambarus* sp.**: See *crayfish*.

process water: Any water that comes in contact with a raw material or product (i.e., mixing cement). The water is often released as *wastewater* after use (Wyman and Stevenson 2001).

productivity: The rate of production of *biomass* (AMNH 2002). *Cf. primary productivity*.

profile: 1. One of the principal views of a cave map; in particular, the view that displays the cave as if the front wall were removed (Dasher 1994: 185). *Syn.* profile view. *Cf. plan view*. 2. A diver's depth during the time of the dive (FCTCKS 2004). *Syn. dive profile*.

profile view: See *profile*.

projected section: In mapping, projecting a series of passages on a single plane. Usually the plane is vertical with the trend of the cave. Horizontal distances are not correct, vertical distances are, and slopes appear distorted (Field 2002).

project study plan (**PSP**): The plan of study used to define and manage the development and conduct of a feasibility study conducted by the U.S. Corps of Engineers. Documents the assumptions, work tasks, products, and level of detail that will be necessary during the feasibility study to determine the existing and future "without project" conditions, formulate a range of alternatives, assess their effects, and present a clear rationale for the selection of water resource

development plan(s). Includes the baseline cost, schedule, and assignment of responsibilities for the study (Everglades Commission 2005).

propagating: 1. Cause to multiply by natural processes. 2. Spread, disseminate (Morehead 1981: 423).

protocol: The plan for a medical or scientific experiment (American Heritage Dictionary 1985: 996).

protozoa: Single-celled organisms belonging to the phylum Protozoa, characterized by the absence of tissues and organs. Some members of the phylum have both plant and animal affinities; other members are characterized by their development of calcareous and siliceous skeletons (Jackson 1997).

prusik (**prusiking**): *v*. The act of climbing using three Prusik hitches in a classic fashion (Smith and Padgett 1996). *Cf. rappel*.

Prusik hitch: A friction knot or ascending knot commonly used in belaying and climbing. Popularized by Dr. Karl Prusik in 1931, but first described in Ashley, where it was called the Magnus hitch (Ashley 1944, Smith and Padgett 1996).

Prusik knot: A friction knot used in climbing. Tied by looping a smaller diameter rope around a larger rope. The knot can slide along a rope when no weight is applied, but grips when a pull is applied (Field 2002).

Prusik loop: An endless loop used to make a *Prusik hitch* (Smith and Padgett 1996: 361).

Prusik sling: A *sling* fastened by a *Prusik knot* to a rope (Field 2002: 148).

pseudokarst: A landscape with features similar to *karst* produced by processes other than the dissolving of rock, such as the rough surface above a lava field, where the ceilings of *lava tubes* have collapsed (Jackson 1997).

Pseudosinella pecki (Marianna Cave springtail): A species of pale to colorless troglobitic freshwater springtail insect known from the *springs* and *cave lakes* in Jackson County, Florida, and nearby areas of southern Alabama and Georgia (FCTCKS 2004).

psi: *Abb*. pounds per square inch.

PSP: *Abb*. *project study plan*.

public law: A law dealing with the state or government and its relationships with individuals or other governments (American Heritage Dictionary 1985: 1001).

public water supply: Water withdrawn by public or private water suppliers and delivered to users who do not supply their own water (Florida Council of 100 2003: 31).

public water system: According to the U.S. Safe Drinking Water Act, a drinking water conveyance system serving as least 15 service connections used by residents annually or regularly serving at least 25 residents annually (FCTCKS 2005).

public water use: Water supplied from a *public water supply* and used for such purposes as fire fighting, street washing, and municipal parks and swimming pools (Florida Council of 100 2003: 31).

puff: A loose piece of fluffy fiber emerging from the *sheath* of a rope, an indication that internal fibers have broken or abraded (Smith and Padgett 1996).

pull and glide: A technique by which a diver uses handholds within the cave to pull against a high flow of water. It is generally discouraged, except when absolutely necessary to make forward progress, because of the potential for adverse impacts to the cave (FCTCKS 2004).

pull-down: A double line hooked over a limb or horn of rock that can be rappelled upon and afterward pulled off the limb or horn by pulling down on one of the two lines (Smith and Padgett 1996: 361).

pulley: A mechanical device with a concave wheel for altering the direction of a moving rope or cable (Smith and Padgett 1996: 361).

pulmonary oxygen toxicity: Damage to the lungs and air passages caused by long exposure to *oxygen partial pressures* above 0.5 (London 2004).

pup: A baby bat (Zokaites and O'Malley 2000: 128).

push, as in **to push a passage**: Colloquialism. To explore new unknown areas in a cave (Smith and Padgett 1996). See *mother lode passage*, *scoop booty*, virgin cave, *virgin passage*.

push dive: A dive for the purpose of exploring a new cave passage, or to test the limits of known parameters (i.e., depth) (FCTCKS 2005). See *push*.

P-valve: Device installed in the leg of a *drysuit* that enables divers to urinate. A *catheter* is used to make the connection between the diver and the drysuit (FCTCKS 2004).

P-wave: See *pressure wave*.

Q

QA: *Abb. quality assurance.*

QA/QC: *Abb. quality assurance and quality control.*

QAS: *Abb. quick attachment safety.*

QC: *Abb. quality control.*

QRSS: *Abb. Quintana Roo Speleological Survey.*

qualitative analysis: An analysis that ascertains the nature of the characteristics of the subject being measured or studied (US EPA 2004b).

qualitative data: Information that is difficult to measure, count, or express in numerical terms (US EPA 2004b).

qualitative research: Research involving detailed verbal descriptions of characteristics, cases, and settings. Typically uses observation, interviewing, and document review to collect data (US EPA 2004b).

qualitative tracing: The simplest but least informative type of *tracer* test used to determine if an upstream point of injection is connected to a downstream sampling point, through the use of some form of tracer collector that can be left for long periods of time and then tested for the presence or absence of the tracer. Simplicity is the most significant advantage of a qualitative test wherein many locations can be sampled with minimum resources. Diminished defensibility is the most significant drawback wherein over broad time periods, it is often impossible to be certain that there are not other sources of the injected

tracer or that detection of small amounts is not simply due to fluctuations in background levels (FCTCKS 2005). *Cf. quantitative tracing*.

qualitative water assessment: Analyses of water used to describe the visible or aesthetic characteristics of water (Lenntech 2005).

quality assurance (**QA**): A system of protocols and procedures (such as sampling at the right place and/or time using the correct equipment and techniques) implemented to meet expected standards of quality needed to fulfill study objectives and control unmeasurable components of a study (USGS 2004a).

quality assurance and quality control (**QA/QC**): All methods and procedures used to obtain accurate and reliable results from environmental sampling and analysis. Includes rules for when, where, and how samples are taken; sample storage, preservation, and transport; and, during the analysis, the use of blanks, duplicates, and split samples (Wyman and Stevenson 2001: 311). *Cf. independent scientific peer review*, *legally defensible*, *scientifically defensible*.

quality control (**QC**): A system of activities (such as collection of blank or replicate samples) whose purpose is to control the quality of environmental data by generating a set of data that will be used to estimate the magnitude of the bias and variability that result from the procedures used to obtain the data (USGS 2004a).

quantify: To attach numbers to an observation (US EPA 2004b).

quantitative analysis: Analysis that ascertains the magnitude, amount, or size of the characteristics of a subject being studied (US EPA 2004b).

quantitative data: Information that can be expressed in numerical terms, counted, or compared on a scale (US EPA 2004b).

quantitative research: Research that examines phenomena through the numerical representation of observations and statistical analysis (US EPA 2004b).

quantitative tracing: Tracer tests involving the collection of numerous water samples and the observation of the trend in tracer signal or concentration in the samples from background levels to peak concentration and back to background levels as the tracer passes an observation point. Benefits of quantitative tracing include: increased confidence and defensibility of tracer detection, more accurate calculation of groundwater velocity, and the ability to calculate other hydraulic parameters including longitudinal dispersion, *Reynold's number* and *Peclet number*, and *discharge* (FCTCKS 2005).

quantitative water assessment: Use of analyses of water properties and concentrations of *compounds* and *contaminants* in order to define water quality numerically (Lenntech 2005).

Quaternary: The upper system of the Cenozoic, above the Tertiary; also, the time during which those rocks were formed between 1.6 million years ago and the present. It consists of two grossly unequal series, the *Pleistocene* and the *Holocene* (Jackson 1997).

quick attachment safety (**QAS**): A handled *ascender* attached to the harness using a short length of rope. The ascender is clipped to the rope as a safety while ascending, or while temporarily stopped during a rappel to perform a task (FCTCKS 2005).

quick link: In rappelling, an American name for an oval screw link or Maillon Rapide (Smith and Padgett 1996: 361).

Quintana Roo Speleological Survey (**QRSS**): An organization created in 1990 to support safe exploration, survey, and cartography of underwater caves and cenotes of Quintana Roo, Mexico. Also supports scientific and archaeological work concerning caves and *cenotes* within the state of Quintana Roo (FCTCKS 2005).

R

rack: See *rappel rack*.

radon (**^{222}Rn**): Isotope of importance in caving, generated in rocks and soil by the decay of another radon isotope (^{226}Rn) from ^{238}U (i.e., uranium). ^{222}Rn is a gas, and has a half-life of 3.8 days. If inhaled into the lungs in high concentrations, it can cause cancer (Drever 1988).

raft: A *speleothem* consisting of a thin layer of crystalline *calcite* that forms and floats on the surface of a *cave lake*, supported by *surface tension*. It sinks if the water surface is disturbed. It may form many layers in a dried out lake. The calcite is precipitated by evaporation of the lake water, and rafts are found mostly in arid regions or caves with powerful drafts (Hill and Forti 1997, Field 2002).

random sampling: A procedure for sampling from a population that gives each unit in the population a known probability of being selected into the sample (US EPA 2004b).

Rapid-Rate Infiltration Basin (**RIB**): An artificial impoundment that provides for fluid losses through percolation/seepage as well as through losses by evaporation (SFWMD 2005b). *Syn*. Rapid Infiltration Basin (RIB).

rappel (**rappelling**): To make a controlled descent on a rope using friction obtained by passing the rope through any of various devices (e.g., *rack*, *descender*, *carabiners*). Safety considerations in caving would preclude rappelling without a mechanical device (Field 2002). As a command, synonymous with "*on rope*." *Syn*. abseil (European term). *Cf*. *prusik*.

rappel device: Any device used to generate friction on a rope to control the rate of descent of a person sliding down a rope (Smith and Padgett 1996).

rappelling: See *rappel*.

rappel rack: A U-shaped device with bars attached that allows a rope to be threaded through and provides variable friction for rappelling down a rope (FCTCKS 2005). *Syn*. rack.

rapture of the deep: See *nitrogen narcosis*.

rare: A classification reflecting a species' scarcity in a given area. (Wear and Greis 2002).

rare species: Any native or once-native *species* of wild plant or animal that exists in small numbers and has been determined to need monitoring (may include peripheral species). The Georgia blind cave salamander (*Haideotriton wallacei*) would fit this description (Wear and Greis 2002).

raveling: The process by which water transports soil particles down into cavities in underlying strata. *Sand*, because it is typically damp and the grains are angular, in Florida does not easily ravel without moving water. Clay-rich strata, because of cohesiveness, are more difficult to ravel than sandy soils (SDII Global Corp. 2002). *Cf. soil piping*.

raw water: Groundwater or surface water before it is treated for use as a public water supply (Wyman and Stevenson 2001: 317).

Re: Symbol for *Reynold's number*.

reasonable-beneficial use: Doctrine of water use set forth in Florida law whereby use of water must be both reasonable and beneficial (Florida Council of 100 2003: 31).

rebelay: An intermediate anchor point on a rope used to avoid a rub point or obstacle, or to divide a *drop* into segments so that more than one person can climb, or rappel, at the same time (FCTCKS 2005).

rebreather: An alternative to SCUBA that recycles the diver's exhaled gas by removing the exhaled CO_2 and adding additional O_2. Rebreathers can greatly extend the time a diver can spend underwater with a given gas supply. The bubbles normally exhausted by open-circuit scuba are reduced or eliminated depending on whether the rebreather is closed circuit or semi-closed circuit (FCTCKS 2004). *Cf. closed circuit rebreather*, *semi-closed circuit rebreather*.

receiving waters: Any surface water body into which treated or untreated wastewater is discharged (Wyman and Stevenson 2001: 318).

recharge: The processes involved in the addition of water to the *zone of saturation*, naturally by *precipitation* or *runoff*, or artificially by spreading or injection; also the amount of water added (Jackson 1997).

recharge area: An area in which there are downward components of hydraulic *head* in the *aquifer*. Infiltration moves downward into the deeper parts of an aquifer in a recharge area (Fetter 2001: 237). An area in which water reaches the *zone of saturation* by surface infiltration (Field 2002: 154).

recharge basin: 1. The area within which water seeps into the ground and recharges the groundwater flowing to a specific spring (FDEP 2005). 2. A synthetic lake or reservoir designed to allow infiltration of water into the ground to recharge an underlying aquifer (Wyman and Stevenson 2001: 318).

recharge water: Water added to an *aquifer*, such as through percolation or injection (FCTCKS 2004). See *recharge*.

recharge zones: A land area into which water can infiltrate into an aquifer relatively easily. The infiltration replenishes the aquifer. This process occurs naturally when rainfall filters down through the soil or rock into an *aquifer*, usually in the higher gradient section overlying the aquifer; artificial recharge is through injection wells or by spreading water over groundwater reservoirs for any given area (Wyman and Stevenson 2001, US EPA 1998). *Syn. recharge area*.

reclaimed water: Water that has received at least secondary *wastewater treatment* and basic disinfection and is reused after flowing out of a domestic wastewater treatment facility (Florida Council of 100 2003: 31). *Cf. wastewater treatment*, *effluent*, *reuse*.

reclamation: Restoring land to the natural state after destruction associated with some economic activity such as surface mining. (Wyman and Stevenson 2001: 319).

recompression: The accepted treatment for *decompression sickness* and *Arterial Gas Embolism*. Treatment is instituted by "returning" to higher pressure in a metal chamber capable of simulating the hyperbaric environment (i.e., *hyperbaric chamber*) (Mount and Gilliam 1993: 380).

recovery: Removal of a dead victim (Smith and Padgett 1996: 362). *Cf. rescue*.

recreational water use: Water used in association with landscaping of public parks, golf course facilities, public ball fields, or football fields (FDOS 2001).

rectangular coordinate: A Cartesian coordinate of a Cartesian coordinate system whose straight-line axes or coordinate planes are perpendicular (Burge 1988: 123). See also *Cartesian coordinate*, *polar coordinate*.

recycled water: See *reuse*.

redirection: See *rebelay*.

redox potential (**Eh**): 1. A measure of the relative tendency of *groundwater* to accept or transfer electrons (volts) (Naval Weapons Station Seal Beach 2005). 2. An expression of the oxidizing or reducing power of a *solution* (Wyman and Stevenson 2001: 321).

reduction: A chemical reaction during which electrons are added to an atom or a *molecule*. For organic *compounds*, the addition of electrons is frequently accompanied by the addition of hydrogen atoms. (Wyman and Stevenson 2001: 321).

redundancy: 1. The concept of carrying enough life-support equipment to enable any one part to become redundant during a dive without endangering the diver's life (Balcombe et al. 1990: 263). 2. Backup equipment is carried in the event of failure or loss of any critical items during the dive; the principle is termed redundancy. Each item must be totally separate and able to be used as a full replacement (Farr 2003: 125).

redundant: See *redundancy*.

redundant system: Any system that provides an alternative to a critical part of the system where failure would result in serious injury or death (FCTCKS 2005). *Syn. redundancy*.

reel: A piece of gear containing spooled *guideline* used by cave divers. Different reels are used for different purposes (e.g., an *exploration reel* would contain a large amount of line for line placement when exploring previously undiscovered passages.) (Prosser and Grey 1992). *Cf. exploration reel*, *gap reel*, *jump reel*, *primary reel*, *safety reel*, *spool*.

reference condition: A set of selected measurements or conditions of unimpaired or minimally *impaired waterbodies* characteristic of a waterbody type in a region (US EPA 2005a).

reference site: A specific location on an unimpaired or minimally *impaired waterbody* representative of the expected biological integrity of other locations on the same waterbody or nearby waterbodies (US EPA 2005a).

regional groundwater flow: Relatively large-flow systems with the *recharge area* within the basin divide and the discharge area at the valley bottom. In contrast to *local flow systems*, have their recharge areas at topographic high points and their discharge areas in adjacent topographic lows. (Fetter 2001).

regression: The retreat or contraction of the sea from land areas, and the consequent evidence of such withdrawal (such as enlargement of the area of deltaic deposition (Jackson 1997: 539).

regulator: In diving, a valve that reduces pressure of gas flowing from a pressurized tank (the first stage) to the breathing regulator (the second stage), delivering such regulated gas on demand (Stone and AmEnde 2002). *Cf. demand valve*.

relative humidity: The ratio of the amount of air or weight or water vapor present in a specified volume of air to the maximal amount that can be held by the same volume of air at a specified temperature and pressure. Most caves have high humidity because climatic conditions tend to be constant with very little evaporative moisture loss (Wyman and Stevenson 2001, Meth 2002).

reliability: The extent to which a measurement yields consistent, stable, and uniform results over repeated observations of measurements under the same conditions each time (US EPA 2004b).

relict karst: *Karst* formed in an earlier geologic epoch and never covered by later deposits (Bates and Jackson 1987: 560). *Cf. paleokarst*.

relict sinkhole: An ancient *sinkhole* that is no longer active; may be expressed as a sinkhole lake, depression in the land surface, or loose soils in the subsurface. See *paleosinkhole*, *alluvial sinkhole* (SDII Global Corp. 2002).

relict species: A species that survives within a narrow ecological niche while extinct everywhere else (FCTCKS 2005).

Remasellus: A genus of freshwater isopods that includes cave-dwelling species. Currently known from groundwater habitats in karst areas from Central Florida north into the Florida panhandle and southern Georgia (Franz et al. 1994). See *isopod*.

remipede: A class of *crustaceans* resembling swimming centipedes and including more than a dozen living species from the Caribbean, Eastern Atlantic, and Australia. All living members are eyeless and inhabit *anchialine caves* connected to the sea. They are colorless and have a head and up to 41 similar body segments composing an elongate body. The swimming appendages are on the sides of each segment. These animals swim on their backs (Osborn 2002).

remotely operated vehicle (**ROV**): A remote controlled vehicle with a camera and often data-collection features used in environments considered too dangerous for humans, such as underwater at great depths or in outer space (FCTCKS 2005). See *autonomous underwater vehicle*.

repetitive dive: Any dive following a previous dive within a particular time frame. This will vary according to the decompression model used (Mount and Gilliam 1993: 380).

rescue: The removal of a live person from harm's way and transport to a place where recovery and care can begin (Smith and Padgett 1996). *Cf. recovery*.

reservation of water: That water which may be reserved from use (by the Florida Department of Environmental Protection or a water management district) in such locations and quantities, and for such seasons of the year, as may be required for the protection of fish and wildlife or the public health and safety (373.223 Florida Statutes).

reservoir: 1. A receptacle for the collection of small amounts of liquid. 2. A man-made or natural surface water impoundment area (Field 2002).

residual nitrogen: Nitrogen still dissolved in a diver's tissues after he or she has surfaced (London 2004).

residual nitrogen time (**RNT**): An amount of time, in minutes, that must be added to the *bottom time* of a *repetitive dive* to compensate for the nitrogen still in a diver's tissues from a previous dive (London 2004).

resilience: The ability of a biological community or ecosystem to recover its original condition after severe stress or perturbation (Wyman and Stevenson 2001). *Syn*. resilience stability. *Cf. resistance*.

resistance: The ability of a biological community or ecosystem to withstand stress or perturbation without adverse change to its structure or function (Wyman and Stevenson 2001). *Syn*. resistance stability. *Cf. resilience*.

resistive effort: See *work-of-breathing*.

resistivity: hydraulic—The property or capacity of a porous rock, sediment, or soil for restricting the flow of a fluid at a constant temperature (Bates and Jackson 1987). *Cf. electrical resistivity*.

resource: An asset available and anticipated for use (US EPA 2004b).

respiratory minute volume (**RMV**): The volume of air moved in one minute by breathing. In diving, RMV is equivalent to the *surface air consumption rate* multiplied by the depth in *atmospheres absolute* (FCTCKS 2005). *Syn*. minute volume.

response coefficient: Effects on jobs, wages, or incomes per unit of production or output, such as per million dollars of mineral extracted, million board feet harvested, or million recreation trips. (Wear and Greis 2002).

restoration: To recover the natural system's vitality and biological and hydrologic integrity in such a way that the stated levels of health and ecological function are maintained over time (FDOS 2001).

restriction: In cave diving, a restriction is any part of the passage that cannot be traveled by two divers abreast (FCTCKS 2004). *Syn. squeeze*.

resurgence: Re-emergence of groundwater through a karst feature, a part or all of whose waters are derived from surface inflow into ponors at higher levels (Field 1999). *Syn*. river rise.

retention pond: A permanent lake or pond used to slow stormwater runoff (Wyman and Stevenson 2001). *Syn*. retention basin. *Cf. detention pond*.

reuse: Water that has received at least secondary *wastewater treatment* and is reused after flowing out of a wastewater treatment facility (FDOS 2001). *Syn. reclaimed water*. 2. The use of any item more than once (FCTCKS 2005).

reverse block: A *squeeze* caused by *ascent* in which the pressure of a void or air space inside the body exceeds that of the ambient environment (Bozanic 2002: 523).

reverse flow: When the hydrostatic *head* of a groundwater system is exceeded by rising river levels, causing the system to temporarily experience reverse flow until the system reaches equilibrium. Many North Florida springs experience this phenomenon during flood (FCTCKS 2004). *Cf. siphon*.

reverse osmosis (**RO**): Any solution (such as water) forced by pressure through a semipermeable membrane to remove dissolved solids (e.g., dissolved salts and contaminants) (FCTCKS 2005). See *osmosis*.

Reynold's number (**Re**): A dimensionless number used as an index of fluid flow characteristics in a pipe, duct, or around an obstacle. For fluid flow in a conduit, a Reynold's number below about 2,100 is considered to be streamline, smooth, or *laminar flow*; above 4,000 is *turbulent flow*; 2,100–4,000 is a transition zone. For the flow of fluid around a particle, a Reynold's number less than 1.0 is considered laminar flow and as the value increases above 1.0 turbulence increases. The difference between the conditions for laminar flow around particles and in pipes is explained by the impact of inertial forces as the fluid flows around a particle compared to the straight flow in a pipe or duct (Horton 2000). Mathematically, $Re = [(\rho)(v)(d)]/\mu]$; where ρ is the fluid density, v is the characteristic fluid velocity, d is a representative diameter of the porous media, and μ is the viscosity (resistance to flow) of the fluid (Freeze and Cherry 1979: 72). *Cf. Peclet number*

rheogenesis: The origin of a stream or a river (UI 2005). *Syn. headwaters*.

Rhodamine WT: Also known as CI Acid Red 388. A type of fluorescent dye used in groundwater tracing that appears red at low concentrations (FCTCKS 2005). *Cf. eosin*, *fluorescent dye*, *phloxene*, *uranine*.

RIB: *Abb*. rapid infiltration basin, *rapid-rate infiltration basin*.

ridgeland caves: Caves hidden in *terrain* characterized by ridges (FCTCKS 2004).

ridgewalking: The practice of systematic wandering over a *karst terrain* to locate caves (Dasher 1994: 185).

rift: A high and narrow cave passage controlled by joints or faults (Field 2002). *Syn. fissure*.

rig: 1. *n*. A personal climbing or diving system. 2. *v*. To set up *anchors* and secure ropes for *rappelling*, *ascending*, hauling, and *belays* (Smith and Padgett 1996).

rigger: A person who installs a *rig* (FCTCKS 2005).

rigging: 1. In climbing, the process of establishing the *belays* for ropes and or ladders (Meth 2002). 2. A finished *rig* (FCTCKS 2005).

rigging point: A location that provides a secure point to *rig* (FCTCKS 2005).

rill: A small solution groove on the exposed surface of limestone. Most common in arid and semiarid regions (Monroe 1970).

rimstone: A *calcareous* deposit formed around springs and below cascades which impounds water in pools. Formation is due to precipitation from saturated bi-

carbonate waters or from deposits from water overflowing basins (Field 2002). *Syn*. *gour*.

rimstone dam: A ridge *rimstone*, often curved convexly downstream (Field 2002). *Cf*. *gour*.

rimstone pool: A pool enclosed by a rim of carbonate precipitated from karst water in the pool at points locally favoring the release of carbon dioxide (Field 2002). *Cf*. *cave lake*.

riparian: A legal concept that a property owner along the banks of a surface water body has the primary right to withdraw water for reasonable use. 2. Located along the banks of a body of water (including springs and swallets, or *swallow holes*) (FCTCKS 2005).

ripple marks: An undulatory surface or surface sculpture consisting of alternating subparallel small-scale ridges and hollows formed at the interface between a fluid (gas or liquid) and incoherent sedimentary material (esp. loose *sand*). It is produced underwater by currents or by the agitation of water in wave action, and generally trends at right angles or obliquely to the direction of flow of the moving fluid (Bates and Jackson 1987).

river intrusion: When the level of water in a river is high enough to reverse the hydraulic head, pushing surface water into the underground systems. The tannin staining the surface water washes in during the intrusion, creating low-*visibility* conditions within the submerged cave system (FCTCKS 2005).

river rise: See *resurgence*.

RMV: *Abb*. *respiratory minute volume*.

RNT: *Abb*. *residual nitrogen time*.

RO: *Abb*. *reverse osmosis*.

"**rock**": A warning signal shouted while on rope when a rock is dislodged or an object dropped (FCTCKS 2005).

rock-collapse sinkhole: A *collapse sinkhole* formed when the *limestone* or other soluble rock ceiling fails and collapses into a void (SDII Global Corp. 2002). *Syn*. rock-collapse sink.

rockfall zone: That area below a drop where there is danger from falling objects (Smith and Padgett 1996: 363). *Syn*. *drop zone*.

rock pendant: One of a group of isolated similarly proportioned smooth-surfaced projections surrounded by a complex of connected cavities on the roof of a cave. Formed by the rapid solution of the surrounding rock (Field 2002). *Syn*. pendant.

rockpile: A large pile of rocks within a cave (FCTCKS 2005). *Cf*. *breakdown*.

roll-off: An event in which the knob of a diver's tank valve handle rolls against a ceiling, wall, or other physical surface in a cave, closing the tank and cutting off the air supply from that tank (FCTCKS 2004).

roller: A pulley attached to the center of a rope climber's chest to help keep the climber upright (Smith and Padgett 1996). *Cf*. *Simmons roller*, *chest roller*.

room: A part of a cave wider than a passage (FCTCKS 2005). *Syn*. *chamber*.

root zone: The depth of soil penetrated by crop roots (US EPA 1998).

rope: 1. In caving, typically a static *kernmantle* rope of synthetic fibers used to climb or descend. 2. A warning command given before throwing a rope down a pit (FCTCKS 2005).

rope bag: A bag used to store rope and protect it from ultraviolet rays and abrasion while being transported (Smith and Padgett 1996).

rope management: The act of keeping ropes protected and tangle free while in use (Smith and Padgett 1996).

rope pad: Any device used to protect rope from abrasion. Common pads are canvas, heavy cloths, and fire or garden hoses (Smith and Padgett 1996). *Syn*. rope protector, rope protector pad.

rope protector: See *rope pad*.

rope protector pad: See *rope pad*.

rope walker: 1. Any rope-climbing system that allows a climber to ascend a rope using a motion similar to walking up stairs. 2. The original Gibbs knee-foot rope climbing system arrangement (Smith and Padgett 1996: 364). *Cf*. *sit-stand*, *frog*.

route: A course; line of travel (Morehead 1981: 461).

ROV: *Abb*. *remotely operated vehicle*.

rubble: In the context of *karst*, the gravel-like debris that forms as *limestone* is weathered (SDII Global Corp. 2002).

Rule of Thirds: A rule that limits a diver's air supply on a cave dive: one-third for penetration, one-third for exiting, and one-third for emergencies or a buddy's emergencies. Other factors, such as the relative difficulty of the exit or the difficulty of exiting under emergency circumstances, can greatly increase the need for additional reserve beyond the minimum recommendations. Conceived by Sheck Exley (Prosser and Grey 1992). *Syn*. thirds, thirds rule.

runaway rappel: An out-of-control *rappel* where *inertia* takes over. Recapturing the load becomes very difficult if not impossible (Smith and Padgett 1996: 364).

runner: A sling used to attach a rope or ladder to an *anchor* (McClurg 1996: 241).

runoff: That part of precipitation appearing in surface streams. It is more restricted than stream flow, as it does not include stream channels affected by artificial diversions, storage, or other works of man (Bates and Jackson 1987: 579).

rust: See *iron oxide*.

S

S: Symbol for the chemical element sulfur.

SAC rate: See *surface air consumption rate*.

sacrifice cave: A cave that is well known and severely impacted by use. The term implies the cave is "sacrificed" to casual or beginning cavers in order to preserve less well-known and better preserved caves. Use of this term is discouraged because it leads novice cavers and noncavers to believe the caves are purposely destroyed or being destroyed (FCTCKS 2004).

Safe Drinking Water Act (**SDWA**): A federal statute enacted in 1974, and subsequently amended, that requires the U.S. Environmental Protection Agency to set and enforce chemical and radioactivity standards for public drinking water supplies (Wyman and Stevenson 2001).

safety: 1. In climbing, a *belay*. 2. A lanyard, tether, or clip-in line to prevent falling (Smith and Padgett 1996: 364).

safety knot: A backup knot used to insure that the *foundation knot* remains secure (Smith and Padgett 1996: 364).

safety line: 1. A safety rope attached to a climber on the main rope or ladder and held by a person above (Field 2002). 2. Another word for the *guideline*, or *main line*, used in underwater caves (FCTCKS 2004).

safety reel: A small reel carried by cave divers to assist them with the recovery of lost line, or to keep them linked to the *main line* while making short forays away from it (Balcombe et al. 1990). *Syn*. search reel, safety spool. *Cf. exploration reel*, *gap reel*, *jump reel*, *primary reel*, *spool*.

safety stop: A brief stop during ascent on a no decompression dive. Usually around three minutes at 3.1–4.6 meters (10–15 feet) of depth (Saltsman 1995).

safe yield: The amount of water that can be removed from an *aquifer* or surface source without threatening the long-term supply available in the resource. If more water is removed from an aquifer during a year than the amount added to the aquifer over the same period, the yield is not safe and the aquifer is being depleted (Wyman and Stevenson 2001).

sag depression: Often the surficial manifestation of a solution or cover subsidence sinkhole. As underlying bedrock is dissolved away, the cover materials slowly sag, creating a depression. Because of the shallow water table, sags often become small circular wetlands (SDII Global Corp. 2002). *Cf. cover-collapse sinkhole*, *cover-subsidence sinkhole*, *solution sinkhole*.

Saint Johns River Water Management District: See *St. Johns River Water Management District*.

saline: Relating to or containing salts; salty (FCTCKS 2005).

saline water: Slightly saline water contains 1,000–3,000 milligrams per liter (mg/L) or parts per million (ppm) of dissolved solids; moderately saline water contains 3,000–10,000 mg/L (3,000–10,000 ppm); and highly saline water contains 10,000–35,000 mg/L (10,000–35,000 ppm) (FCTCKS 2005). Water with a chloride concentration greater than 250 mg/L (250 ppm) (SFWMD 2005b:115). The term saline water includes *brackish* water and *seawater* (FDOS 2001). Water having a *total dissolved solids* concentration greater than 500 mg/L (500 ppm) and less than that of seawater (SWFWMD 2000). *Cf. freshwater*.

saline water interface: The series of points along a freshwater aquifer where the *hydrostatic pressure* of that aquifer and intruding saltwater is equal. Location of the *halocline* (FCTCKS 2004, SWFWMD 2005).

saline water intrusion: See *saltwater intrusion*.

salinity: The measure of dissolved salts (i.e., sodium chloride) in water or soil. Measured by weight in parts per thousand or parts per million (milligrams per

liter) as total dissolved solids. Measured also by electrical conductivity. The salinity of ocean water is in the range 33–38 parts per thousand (ppt), with an average of 35 ppt (FCTCKS 2005).

salt marsh: See *coastal marsh*.

saltpeter: A potassium nitrate compound (KNO_3) often found in dry caves and used in making gun powder (Zokaites and O'Malley 2000: 128).

salt water: See *brackish*, *seawater*, *saline water*.

saltwater intrusion: The movement of seawater into inland coastal areas normally flooded with freshwater. The term is applied to the flooding of freshwater marshes by seawater, the migration of seawater up rivers and navigational channels, and the movement of seawater into freshwater aquifers (Wyman and Stevenson 2001). *Syn*. saline water intrusion and saltwater encroachment.

salt weathering: A process resulting from the growth or expansion of salt crystals in saline solutions, resulting in the loosening or detachment of rock from cave walls, cliff faces, etc. (FCTCKS 2005).

sample: A subset of the population. Elements are selected intentionally as representative of the population being studied (US EPA 2004b).

sampling plan: See *field sampling plan*.

sand: A rock fragment or detrital particle smaller than a *granule* and larger than a coarse *silt* grain, having a diameter in the range of 1/16–2 mm (62–2,000 microns) (4 to -1 phi units, or a size between that at the lower limit of *visibility* of an individual particle with the unaided eye and that of the head of a small wooden match) (Bates and Jackson 1987).

sand boil: A *spring* in which the vent has been filled in with sand. Spring discharge continuously suspends the sand particles that cover the spring. Thus the spring has a "boiling" appearance (Copeland 2003: 11). *Cf. boil*, *spring boil*.

saprophage: From Greek *sapros* (rotten) + *phagos* (one that eats). A *scavenger* that feeds on decaying organic material (Field 2002: 163).

SAS: *Abb. surficial aquifer system*.

saturated: 1. Unable to hold or contain more; full. 2. Soaked thoroughly with a liquid. 3. Referring to rock with water-filled voids. 4. Referring to water that has dissolved as much limestone or other material as it can under the prevailing conditions (Field 2002, Meth 2002).

saturated zone: See *zone of saturation*.

saturation: 1. The state of a compound or solution that is fully *saturated* (American Heritage Dictionary 1985: 1092). 2. Purity of color (FCTCKS 2004).

saturation, **zone of**: See *zone of saturation*.

scadgent: A mythical creature, a cross between a bat and a cockroach, that hangs upside down on underwater cave ceilings waiting for unsuspecting divers. Scadgents typically prey on inexperienced cave divers, causing line entanglements, *silt outs*, and regulator *free-flows*. The existence of scadgents was first speculated in the early 1970s after cave divers encountered a series of inexplicable problems during training. Although no one has ever actually seen a scadgent, cave divers remain convinced that they do exist (FCTCKS 2004). *Cf. hodag*.

scale: 1. A straight-edge graduated in numbered linear units. 2. The linear distance represented by a given unit on a map (Dasher 1994). 3. Deposit of solids (usually salts of calcium) that adhere to the inner surfaces of pipes, boilers, scrubbers, and mist control devices. *Hard water* leaves a deposit (scale) in steam irons, coffee makers and water heaters (Wyman and Stevenson 2001).

scale ratio: The difference between the actual size of a feature and its portrayed size on a map (Dasher 1994: 185).

scallop (**scalloping**): One of a mosaic of small shallow intersecting hollows formed on the surface of soluble rock by turbulent *dissolution* and abrasion by suspended solids. They are steeper on the upstream side, and are a rough indication of historic flow, with smaller scallops indicating higher flow. Spring caves that reverse flow when adjacent rivers flood back into the system may have steep sides on the downstream sides of the scallops because acidic river waters are more aggressive than CaCO3–saturated aquifer waters (Bates and Jackson 1987, FCTCKS 2005). *Cf. current marking*.

scanning spectrofluorophotometer (**SSS**): A device that uses mirrors, lenses, and slits to produce the precise excitation wavelength required to excite a specific *fluorescent dye* and then to measure the full emission spectra from a water sample, thereby providing for the precise identification of the dye in the sample and the measurement of its concentration (FCTCKS 2005).

scarp: A relatively straight, clifflike face or slope of considerable linear extent, breaking the general continuity of the land by separating surfaces lying at different levels, all along the margin of a plateau or mesa (Jackson 1997: 570).

scavenger: An animal that eats dead remains and wastes of other animals and plants. Sometimes called *coprophage*, *necrophage*, and *saprophage* (Field 2002).

SCI: *Abb. Stream Condition Index*.

scientifically defensible: Information that is supportable using accepted scientific methods of data collection and analysis (SFWMD 2002). *Cf. legally defensible*.

scientific diving: Any dive for the express purpose of collecting information, data, or samples to study and further understand the hydrology, ecosystem, and organisms. Scientific diving in karst environments includes *critter counts*, flow measurements, water sample collection, photographic inventory, dye tracing, etc. (FCTCKS 2005).

scientific sample: A group selected from a larger population by a random process. Each member of the population has a known probability of being selected (US EPA 2004b). *Syn.* probability sample, *random sample*. *Cf. systematic sample*.

scoop: Colloquialism. To be the first to explore or survey a new cave passage (Stone and AmEnde 2002). *Syn. scoop booty*.

scoop booty: Colloquialism. *v.* To explore virgin cave or *virgin passage* in a cave (FCTCKS 2004). *Syn. scoop*. See *push*, *mother lode passage*.

scooter: See *diver propulsion vehicle*.

scooter ring: A *D-ring* attached to the front of a *crotch strap* to which a diver clips a lanyard connected to the *diver propulsion vehicle* (FCTCKS 2005).

SCR: 1. *Abb*. surface consumption rate, see *surface air consumption rate*. 2. *Abb*. *semiclosed circuit rebreather.*

scramble: A half-sliding, half-climbing movement used to negotiate steep or muddy slopes (McClurg 1996: 242).

scrubber: In *rebreathers*, the chemical compound that removes carbon dioxide (CO_2) from the breathing loop. Found within the *canister* (Nuckols et al. 1996).

SCUBA: *Abb*. Self Contained Underwater Breathing Apparatus.

SCUBA cylinder: See *cylinder* or *tank*.

SCUBA tank: See *cylinder* or *tank*.

sculling: The practice of inexperienced divers of using a free hand in a finning motion. Also used by proficient divers to fine-tune their positions in a cave (FCTCKS 2004).

S-drill: A safety drill done before every dive where each diver in turn, donates his or her regulator to a buddy and swims for a short distance to simulate an out-of-air emergency (FCTCKS 2004).

sea cave: A cave in present-day or emerged sea cliffs, formed most commonly by wave attack but may have been formed by the usual karst solution processes. In karst areas, a "normal" cave may be exposed then modified by marine actions (Meth 2002). *Syn*. *littoral cave*. *Cf*. *anchialine cave*, *marine cave*, *offshore spring*, *submarine cave*.

search reel: See *safety reel*.

seat harness: See *sit harness*.

sea water: Water with a chloride concentration equal to or greater than 19,000 mg/L (19,000 ppm) (SFWMD 2005b). *Syn*. salt water. *Cf*. *freshwater*, *saline water*, *brackish*, *brine*.

Secchi depth: A crude measurement of the turbidity (cloudiness) of *surface water*. The depth to which a Secchi disc, which is about 20.3–30.5 cm (8–12 inches) in diameter and has a black-and-white pattern, can no longer be seen (Wyman and Stevenson 2001: 340).

Secchi disc: See *Secchi depth*.

secondary aquifer: Any *aquifer* that is not the main source of water to wells in a given area, including shallow and perched aquifers (US EPA 1998). *Cf*. *principal aquifer*.

secondary data: *Data* collected for another purpose, but reanalyzed in a subsequent study (US EPA 2004b). *Cf*. *primary data*.

secondary porosity: The porosity developed in a rock after its deposition or emplacement, through such processes as solution or fracturing (Jackson 1997: 576). *Cf*. *primary porosity*.

secondary tie-off: In cave diving, the second or subsequent *tie-off* made when running a *line* from the *primary tie-off* to the *main line* or when placing a new main line in a cave (FCTCKS 2005).

secondary treatment: See *wastewater treatment*.

secondary zone: See *springshed protection zone*.

second stage: A *regulator* that reduces the intermediate pressure of air supplied from the SCUBA tank provided via the first stage to a breathable pressure on demand (with each inhalation). The Primary second stage is the regulator a diver breathes out of during the dive. The Back up or Secondary is the backup to the primary regulator. A diver might breathe from the secondary if there is a problem with the primary (FCTCKS 2004). *Syn*. *regulator*, secondary.

section: 1. A plot of a particular distinct portion of a cave. 2. In U.S. land surveying, a plot equals one square mile or 640 acres (FCTCKS 2005).

sediment: Solid fragmental material that originates from weathering of rocks and is transported or deposited by air, water, or ice, or that accumulates by other natural agents, such as chemical precipitation from solution or secretion by organisms, and that form in layers on the Earth's surface at ordinary temperatures in a loose, unconsolidated form; e.g., *sand*, gravel, *silt*, *mud*, till, loess, and alluvium (Bates and Jackson 1987: 598).

sedimentation: The act or process of forming or accumulating sediment in layers, including such processes as the separation of rock particles from the material from which the sediment is derived, the transportation of these particles to the site of deposition, the actual deposition or settling of the particles, the chemical and other (diagenetic) changes occurring in the sediment, and the ultimate consolidation of the sediment into solid rock (Jackson 1997: 578).

sediment load: See *bed load* and *load*.

seep: 1. *v*. To move slowly through small openings of a porous material (Field 2002: 166). 2. *n*. A spring with one or more small openings from which water discharges diffusely ("oozes") from the groundwater environment. Discharge is from intergranular pore spaces in the matrix and flow is typically *laminar* (Copeland 2003: 11). *Cf*. *spring*.

seepage: 1. The infiltration or percolation of water through rock or soil to or from the surface and usually restricted to the very slow movement of groundwater. 2. The fluid or the amount of fluid discharged at a seep (Field 2002).

seepage water: *Syn*. percolating water, *seepage*. *Cf*. *percolation*.

seiche: The oscillation of the surface of a lake or a landlocked sea that is caused by wind blowing over water (Heine 1995: 280).

selenite: The clear, colorless variety of gypsum, a sedimentary rock (Bates and Jackson 1987).

self-belay: To stop or inhibit oneself from disaster (Smith and Padgett 1996: 365).

self-rescue: Saving oneself from a dangerous situation. In caving and cave diving, this is the preferred method of recovery from failure and the rationale of using *redundancy* wherever possible (FCTCKS 2005).

semiclosed circuit rebreather (**SCR**): A type of SCUBA equipment that recirculates some of the exhaled gas, and releases part to the ambient environment (Bozanic 2002: 523). *Syn*. semiclosed loop. *Cf*. *closed circuit rebreather*, *open circuit*.

semiclosed loop: See *semiclosed circuit rebreather*.

semiconfined aquifer: See *leaky aquifer*.

semiconfining layers: Layers with little or no horizontal flow that can store *groundwater* and also transmit it slowly from one aquifer to another. The rate of vertical flow is dependent on the head differential between the semiconfining units and those above and below them, as well as the vertical permeability of the sediments (SFWMD 2005a).

septic system: Apparatus used to treat sanitary waste from an individual residence or business. Such systems range from a simple underground tank with the overflow connected to a system of underground drain pipes to sophisticated mechanical units equipped with aeration devices and disinfection capability (Wyman and Stevenson 2001).

septic tank: A buried tank used to treat domestic wastes. The waste is deposited and retained in a covered tank to allow solids to settle to the bottom and to provide an environment for the decomposition of organic *compounds* by *anaerobic* bacteria. The liquid *effluent* that flows from the tank is allowed to seep into the soil (Wyman and Stevenson 2001).

set a knot: To tighten all parts of a knot to insure its correct function (FCTCKS 2005). *Cf. dress*.

setback: The physical distance that serves to minimize the effects of development activity or the secondary impacts of development on an adjacent property, structure, or natural resource, and within which it may be necessary to restrict activities (Hillsborough County 2004).

settling: The process of sinking or of a substance sinking in water. This occurs when the substance does not dissolve in water and its density is larger than that of water (Lenntech 2005). *Cf. particulate*.

sewage: See *wastewater*.

SFWMD: *Abb. South Florida Water Management District*.

shaft: A vertical or steeply inclined cylindrical cave passage, a *pit* (Field 2002, Rea 1992). *Cf. blind shaft*, *chimney*.

shallow water blackout: Loss of consciousness due to a lack of oxygen during a breath-hold dive, as a result of CO_2 buildup and resulting *hypercapnia*. Can occur at any depth, most often at shallow depths as a result of the physical effects and falling partial pressure of oxygen in the bloodstream on ascent. Sometimes caused when a skin diver hyperventilates just prior to diving, hoping to delay the buildup of CO_2 in the bloodstream and resulting urge to breathe (FCTCKS 2005).

Shannon-Weaver Index (**Shannon Weaver Diversity Index**): Developed in 1949 by C.E. Shannon and W. Weaver, and later replaced by *Habitat Suitability Indices* (*HSI*). A species diversity expression, equal to $-\Sigma p_i \log p_i$ where p_i is the number of individuals in a species ($_i$) divided by the total number of individuals in a community, and $\log p_i$ is the logarithm of p_i. The sum is taken for all $_i$ species in the community. The Shannon-Weaver index incorporates aspects of *species diversity* and *species richness* (Wyman and Stevenson 2001).

sheath: The protective braid around the core of a rope (Smith and Padgett 1996: 365). *Syn. mantle*.

sheer strength: Breaking strength determined when the direction of the test is at right angles with the orientation of the device being tested. Compare with *tensile strength* where the force is in line (Smith and Padgett 1996: 365).

sheet flow: The shallow, even flow of water over land as opposed to within defined channels or conduits; flooding (FCTCKS 2006). *Cf. stream flow*.

sherpa: Caving and cave diving slang for acting as a Sherpa; carrying lots of heavy gear or equipment, usually for a distance (FCTCKS 2004).

shield: A disk-shaped *speleothem* consisting of two thin parallel plates separated by a central crack. It is formed by water seeping through the central crack (Field 2002). *Syn*. stegmatite.

short hose: The hose to a breathing *regulator*, usually 22–40 inches long (FCTCKS 2004).

short hydroperiod: Pertaining to the Everglades, a *hydroperiod* of about seven or fewer months. Large annual variations are typical of individual locations because of year-to-year differences in rainfall (FDOS 2001).

shot: The act of getting a compass bearing from one station to the next station (FCTCKS 2004).

show cave: A cave accessible to the public for guided visits (Field 2002).

shuffle kick: A method of moving through a submerged cave where the diver's kick involves short shuffling motions of only a few inches of the calves. Useful in silty passages because the motion of this kick does not disturb the water as much as other kicking techniques (Prosser and Grey 1992). *Cf. flutter kick*, *frog kick*, *modified flutter kick*.

SI: *Abb*. 1) *surface interval*. 2) *Système International d'Unités*.

sidemounts: Breathing *cylinders* worn on the sides of the diver (Balcombe et al. 1990: 264). *Cf. backmounts*.

side tunnel: A passage branching off a main tunnel (FCTCKS 2004).

sieve bucket: A bucket with a screen bottom that is used to wash *macroinvertebrate* samples and remove excess *silt* and *mud* (US EPA 2003b).

significance level: The probability of rejecting a set of assumptions when they are in fact true (US EPA 2004b).

significant wildlife habitat: In Florida, the contiguous stands of natural plant communities that have the potential to support healthy and diverse populations of wildlife and have been identified in the Florida Game and Freshwater Fish Commission Natural Systems and Land Use Cover Inventory for each Florida county (Hillsborough County 2004).

silent bubbles: Microscopic bubbles formed within the body as a result of *decompression* and theorized to contribute to the larger bubbles that cause *decompression sickness* (Heine 1995: 280).

silt: 1. A rock fragment or detrital particle smaller than a very fine *sand* grain and larger than coarse *clay*, having a diameter in the range of 1/256 to 1/16 mm (4–62 microns) (8–4 phi units). The upper size limit is approximately the smallest size that can be distinguished with the unaided eye (Bates and Jackson 1987). 2. In cave diving, silt comprises sand, mud, or clay as a fine, loose sedi-

ment resting on the cave floor and other surfaces, easily disturbed by agitation of the water in the cave passage (FCTCKS 2004).

siltation: The settling of finely divided *particulate* (previously suspended solids) on the bottom of a lake, stream, reservoir, or submerged conduit system (Wyman and Stevenson 2001).

silting: 1. The deposition of silt in wells, caves or reservoirs (Field 2002: 168). 2. A disturbance of *silt* caused as a result of careless or improper cave diving technique resulting in compromised *visibility* (FCTCKS 2004).

silt mound: A *mound* of silt, typically in a submerged cave passage (FCTCKS 2005).

silt out (**silt-out**, **siltout**): Results when the motion of a diver in the water column disturbs fine sediment, causing a severe and dangerous decline in the *visibility* (Prosser and Grey 1992). *Cf. total silt out*.

silty restriction: A restriction further complicated by silty conditions (FCTCKS 2004). *Cf. silt*.

Simmons Roller: A *chest harness* made by Ron Simmons for climbing and now used generically for a variety of chest roller systems (Smith and Padgett 1996). *Cf. chest roller*, *roller*.

single file: Cave divers swimming one behind the other because of the restrictive size of the cave passage (FCTCKS 2004).

single rope technique (**SRT**): A variety of systems and methods for ascending and descending single fixed ropes (FCTCKS 2005).

single stage: Refers to a dive during which one *stage bottle* is used to supplement back gas (FCTCKS 2004).

sink: See *sinkhole*, also *streamsink*.

sinkhole: A landform created by subsidence of soil, sediment, or rock as underlying strata are dissolved by *groundwater*. Sinkholes can form by collapse into subterranean voids created by *dissolution* of *limestone* or *dolostone*, or by subsidence as these strata are slowly dissolved away (SDII Global Corp. 2002). See *doline*. *Syn*. sink. *Cf. streamsink*.

sinking stream: See *swallow hole*. *Syn*. *ponor*.

sinuous: Full of curves, winding or twisting (Morehead 1981: 490).

siphon: 1. In speleology, a cave passage in which the ceiling dips below a water surface. 2. A flooded cave passage, a gallery (conduit) in the form of a U with water moving only under pressure when the siphon is completely filled. 3. Site and origin of an intermittent spring; the section of a flooded cave or sump flooded passage (Field 1999: 151). 4. In cave diving, any passage that pulls water into the entrance, rather than springing, or blowing water out of the entrance (Saltsman 1995). *Syn*. syphon. *Cf. reverse flow*.

site development plan: A map or plan on which is delineated development activities and other such information as may be required, depicting all such activities and showing how they will impact the site and how such development is in compliance with all pertinent Florida County ordinances, resolutions, and policies (Hillsborough County 2004).

sit harness: An adjustable configuration of straps and *webbing* to form a secure, tight-fitting harness around one's hips, waist, and legs (Smith and Padgett 1996: 365–366). *Syn*. seat harness.

sit-stand: A rope climbing method where the climber alternately sits, then stands, to move up the rope using ascenders (FCTCKS 2005). *Cf*. *rope walker*, *frog*.

SJRWMD: *Abb*. *St*. *Johns River Water Management District*.

sketch: A schematic representation of a cave produced while surveying in the cave (Dasher 1994: 185).

skin diving: Diving without the aid of SCUBA (FCTCKS 2005). *Syn*. *free dive*, *breath-hold diving*.

skip breathing: The practice of inhaling, holding the inhalation for a period of time, and then exhaling in order to attempt to extend the time underwater by using less gas. This practice can lead to a buildup of CO_2 and symptoms of *hypercapnia* (Elliott 2002).

"**slack**": A command given when the person on rope wants tension on the *belay* rope released (Smith and Padgett 1996). *Cf*. "*tension*."

SLAPP: See *strategic lawsuits against public participation*.

slate: Plastic or PVC surface used for underwater writing with a pencil (Huth 2005).

sling: A short piece of nylon *webbing* used to attach ropes and cavers to *anchors*, or to attach safety lines, rappelling devices, and ascenders to cavers (McClurg 1996).

slough: A channel in which water moves sluggishly, or a place of deep muck, mud, or mire. Sloughs are wetland habitats that serve as channels for water draining off surrounding uplands and/or wetlands. Sloughs can vary widely in size, but are normally long and narrow and positioned lower in the landscape. Depending on the adjacent habitats, sloughs can exhibit temporary to almost permanent water regimes. As a result of this large range of *hydroperiods*, plant species can vary widely from spike rushes and various aquatic species in the wetter areas to beak rushes, low panicums, and yellow-eyed grass in the less frequently flooded communities (FDOS 2001). *Syn*. run. *Cf*. *spring run*.

snap-and-gap: Temporary connection device used to bridge *gaps* or *jumps* and speed up traveling while exploring nonrecreational low *visibility* caves (FCTCKS 2004).

sneak dive: A dive into an area where the diver does not have landowner permission (Huth 2005).

snorkeling: Swimming along the surface of the water to observe the submerged life while breathing air through a snorkel. Common equipment includes a bathing suit, mask, fins and snorkel, and sometimes a buoyancy vest. Some caves in the Yucatan allow snorkeling tours through half-submerged passages (FCTCKS 2005).

soda-lime: A chemical agent that reacts and bonds with carbon dioxide and is commonly used in the *scrubbers* of *rebreathers* (Huth 2005).

soda straw: A long, thin tubular *stalactite* that maintains the diameter of a drop of water and resembles a drinking straw in appearance (Jackson 1997: 603). Elongates as minerals are deposited at the lower tip by the seepage water dripping through its hollow interior (Meth 2002). *Syn*. *straw*. *Cf*. *stalactite*.

softening: The removal of metal ions such as calcium and magnesium from water supplies. Converting *hard water* to *soft water* (Wyman and Stevenson 2001: 355).

soft mount: Technique of diving using no metal-to-metal connections. Can be cut away with a knife (London 2004).

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 (Wyman and Stevenson 2001: 355). *Cf*. *hard water*.

soil cone: See *debris cone*.

soil piping: 1. A process whereby a cavity or small conduit is developed in an unconsolidated soil as a result of progressive sediment removal by seepage water. The cavity develops headwards, as the fine grains are removed first and the coarser material is then washed out of the growing cavity. This definition is often incorrectly applied to the formation of sinkhole development. Note: the migration of smaller particles through openings created by larger particles is of no consequence in terms of sinkhole development and should not be confused as such. 2. Formation of a passage of water under pressure in the form of conduits through permeable materials when the hydraulic head exceeds a certain critical value. 3. The mechanical washout of caves in gravels, soils, loess, etc., showing evidence of associated collapse (Field 1999).

solenoid: A valve on a *rebreather* that injects *oxygen* into the *breathing loop* (Huth 2005).

sole source aquifer: An aquifer designated by a provision of the *Safe Drinking Water Act* (the Gonzales Amendment) as the principal or only source of drinking water for a geographical area. 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 (Wyman and Stevenson 2001: 357). See *critical aquifer protection area*, *source water assessment program* and *source water protection program*.

solo diving: The practice of diving alone. Adequate equipment redundancy, careful preparation, and the relevant degree of experience can make this a safer procedure in some underwater caves (Balcombe et al. 1990: 264).

soluble: Capable of dissolving a liquid in water (FCTCKS 2004).

solubility: The relative capacity of a substance to dissolve in *solution*. Sugar has a high solubility in water, whereas gold has a low solubility in water (Wyman and Stevenson 2001).

solution: 1. A spontaneously forming homogeneous mixture of two or more substances, retaining its constitution in subdivision to molecular volumes, displaying no settling, and having various possible proportions of the constituents, which may be solids, liquids, gases, or combinations (American Heritage Dictionary 1985: 1164). 2. The process of chemical weathering by which mineral

and rock material passes into solution; e.g., removal of the *calcium carbonate* in limestone or chalk by carbonic acid derived from rainwater containing carbon dioxide acquired during its passage through the atmosphere (Jackson 1997: 606). 3. In karst rocks particularly, the change of bedrock from solid to liquid state by combination with water. In physical solution, ions of rock go directly into solution without transformation (Meth 2002).

solution cave: The most common type of cave, formed mostly through the *dissolution* of soluble rocks (Zokaites and O'Malley 2000: 129).

solution flute: See *flute* (*fluting*).

solution pipe: A vertical cylindrical shaft, often about 0.5 meters (1.6 feet) across and up to about 20 meters (65.6 feet) deep, attributed to solution, often without surface expression, filled with debris such as sand, clay, gravel, and bones (Field 2002). *Syn*. *solution tube*.

solution sinkhole: A sinkhole formed by slow subsidence of soil or sediment as the upper surface of the underlying, water-soluble sediment or rock is removed by *dissolution* (SDII Global Corp. 2002). *Cf*. *cover-collapse sinkhole*, *cover-subsidence sinkhole*, *sag depressions*.

solution tube: A more commonly-used term to describe a cylindrical hole or tunnel formed in limestone or other material created by the action of water. Solution tubes are often filled with sediment, which fall to a cave floor and form *mounds* (Field 2002). *Syn*. *solution pipe*. *Cf*. *soil piping*.

sonar: *Abb*. SOund NAvigation and Ranging. A tool used to detect features at depth underwater by sending sound waves to the bottom and detecting features using the echoes as they return (FCTCKS 2005).

sonde: A torpedo-shaped device placed in water to gather water-quality data. Sensors that collect water quality data are placed in probes that are then placed in a sonde (US EPA 2003a). *Cf*. *datasonde*, *hydrolab*.

SOP: *Abb*. standard operating procedure.

sorb: To take up and hold either by *absorption* or *adsorption* (US EPA 1998).

source aquifer: The aquifer from which the water in a spring originates (Copeland 2003: 12).

Source Water Assessment Program (**SWAP**): A Safe Drinking Water Act program that requires states to identify and describe the water sources for the drinking water supplies in the state, including the land above groundwater supplies and the watershed areas that feed *surface water* supplies; to identify significant potential sources of contamination of the water sources; and to investigate the susceptibility of water sources to that contamination (Wyman and Stevenson 2001: 360). See *source water protection area*, *Source Water Protection Program*, wellhead protection program.

source water protection area: Land identified under the *Source Water Assessment Program* required by the Safe Drinking Water Act that contains sources of potential contamination of the source water for an area's drinking water. The protection areas include land with potential sources of groundwater contamination and any watershed that contributes runoff that may contaminate *surface waters* used for drinking water supplies (Wyman and Stevenson 2001: 360).

Source Water Protection Program (**SWPP**): Under provisions of the Safe Drinking Water Act, after a state completes its Source Water Assessment Program, the next step is the implementation of protective measures for the source water serving as drinking water supplies. The SWPP is to be operated by state and local representatives, using regulations or voluntary measures to reduce or eliminate the potential threat to drinking water supplies within the state (Wyman and Stevenson 2001: 360). See *Source Water Protection Area*.

South Florida Water Management District (**SFWMD**): One of the state's five water management districts and responsible for, but not restricted to: ensuring adequate water supply, protecting natural systems, minimizing the harm due to flooding, and improving and maintaining water quality (FCTCKS 2004).

Southwest Florida Water Management District (**SWFWMD**): Located in the western and southwestern portion of the Florida peninsula, one of the state's five water management districts and responsible for, but not restricted to: ensuring adequate water supply, protecting natural systems, minimizing the harm due to flooding, and improving and maintaining water quality. Informally referred to as "swiftmud" as a colloquialism of the acronym (FCTCKS 2004).

spalling: The chipping, fracturing, or fragmentation and upward and outward heaving of rock caused by the interaction of a shock (compressional) wave at a free surface (Bates and Jackson 1987: 630).

species: 1. A group of organisms whose members breed naturally only with each other and resemble each other more closely than they resemble members of any other group. 2. The seventh and lowest rank in the taxonomic system (kingdom, phylum or division, class, order, family, genus, and species). The genus and species together constitute the "specific name," a unique name for all known organisms that are alive or have become extinct (Field 2002, Meth 2002).

species density: The total number of species in a given area.

species diversity: The abundance of varieties of a species in a given area. Similar to species richness but can also indicate non-native species and genetic variations in species.

species of special concern: Faunal species identified in Section 39–27.03–05 *Florida Administrative Code* that warrants special protection, recognition, or consideration because of its inherent significant vulnerability to habitat modification, environmental alteration, human disturbance, or substantial human exploitation that, in the foreseeable future, may result in its becoming a *threatened species*; may already meet certain criteria for designation as a threatened species but for which conclusive data are limited or lacking; may occupy such an unusually vital and essential ecological niche that should it decline significantly in numbers or distribution other species would be adversely affected to a significant degree; or has not sufficiently recovered from past population depletion (Hillsborough County 2004).

species richness: The number of species occurring in a particular area for a specified sampling period (SFWMD 2002).

specific conductance: A measure of the ability of water to conduct an electrical

current expressed in microsiemens (micromhos) per centimeter at 25°C. It is related to the amount of dissolved salts (ions) in the water (Field 2002). *Syn*. *conductivity*. *Cf*. *conductance*.

speleogen: A cave feature formed through erosion or by weathering within a cave. It is usually formed in the parent rock; e.g., *current markings*, *rock pendant*, *canyon*, *spongework*, *dome*, and *scalloping* (Meth 2002).

speleogensis: From Latin *speleo-* (cave, cavern) + *gensis* (birth, orgin). The origin and development of caves (McClurg 1996).

speleologist: A scientist engaged in the study and exploration of caves, caverns, and other openings, especially in karst, and their environment and biota (Field 2002). *Syn*. *caver*, *potholer*.

speleology: The scientific study of caves and their contents, including aspects of sciences such as geomorphology, geology, hydrology, chemistry, and biology, and also the many techniques of cave exploration. The exploration, description, and study of caves and related phenomena (Field 2002, Meth 2002).

speleothem: A secondary mineral deposit formed in caves and caverns, such as *stalactites* and *stalagmites*. Most are formed by calcite whose precipitation processes, related mainly to carbon dioxide levels in water, are the reverse of the dissolution of limestone. Considered a decoration and not a formation (Field 2002). *Cf*. *cave formation*.

spelunker: A term used to describe people going into caves with neither experience nor expertise. "Cavers rescue spelunkers" (FCTCKS 2004).

SPG: *Abb*. *submersible pressure gauge*.

splash cup: A shallow concave depression formed by water dripping from above, as can be found in the top of some *stalagmites* (FCTCKS 2005). *Cf*. *driphole*.

splice: 1. *v*. To join together, as two ropes or *guidelines*. 2. *n*. The connection of ropes (Morehead 1981).

split: Where a passage divides into two or more tunnels (FCTCKS 2004).

spongework: A highly complicated random system of tiny holes, tubes, and interconnected cavities formed by *phreatic* dissolution that can resemble Swiss cheese on cave walls (Field 2002, Rea 1992).

spool: A *reel* without a handle. Used mostly to bridge short *gaps* or *jumps* (FCTCKS 2005).

spring: A point where underground water emerges onto the Earth's surface (including the bottom of the ocean). The image of a trickle of water springing from a hillside hardly matches that of a vast cave pouring forth a river, but both are called springs. Springs may be *exsurgences* or *resurgences*, depending on the source of their water. They may also be part-time exsurgences and part-time resurgences. In some uses "spring" is restricted to the water that outflows, in other uses the word can refer to the water, the outlet, or the locality of the outflow (Field 1999: 157). Note that the Florida Geological Survey believes that flow through an exposed conduit in an aquifer is different from flow onto the Earth's surface and for this reason does not consider a *karst window* to be a spring. It is an exception to the definition of a spring.

spring boil: Variable discharge from a spring in which hydrostatic pressure is great enough to cause a turbulent discharge (Field 1999). *Syn*. *boil*, boiling spring. *Cf*. *sand boil*.

spring complex: See *spring group*. Note that the Florida Geological Survey encourages the use of spring group and discourages the use of this term.

spring group: A collection of individual spring *vents* and *seeps* that lie within a discrete spring recharge basin (or springshed) (Copeland 2003: 12). The individual vents and seeps of onshore spring groups almost always share a common spring run, or a tributary to the run. Spring group vents and seeps are often spread over an area of several square miles.

It should be emphasized that the term spring group will be restricted to those vents and seeps that discharge a well-defined *spring recharge basin*. The spring vents or seeps within a springshed may be referred to as springs. As an example, the Rainbow Springs Group includes several spring vents that drain the Rainbow Springs Group basin, and discharge into the Rainbow River spring run.

Note that a spring recharge basin is defined only by potentiometric data and not by chemical or other physical characteristics of the spring discharge. However, chemical and additional physical data can, and should, be used to better define individual spring vent basins within a spring group basin. This type of mapping was conducted for the Rainbow Springs Group in Marion County, Florida by Jones et al., (1996).

All springsheds have not been mapped. Therefore, if a springshed is not mapped, then it is acceptable to use the term "springs" to refer to multiple vents discharging into a common spring run.

spring magnitude: A category based on the volume of flow from a spring per unit time. The classification system (Table 2) used in Florida is based on Meinzer (1927).

Notes regarding magnitude: One discharge measurement is enough to place a spring into one of the eight magnitude categories. However, springs have dynamic flows. A spring categorized as a first-magnitude spring at one moment in time may not continue to remain in the same category. Therefore, the magnitude of the spring is based on the *median* value of all discharge measurements for the period of record (Copeland 2003: 13).

It is recognized that, historically, many springs in Florida have kept one magnitude category, even though discharge may have changed considerably from when magnitude was first assigned. For this reason, a historical category is acceptable in the Florida Springs Classification System. For example, the discharge of a spring may have been taken in 1946. At that time it was classified as a first-magnitude spring. No other measurement was taken until 2001. During that year, three discharge measurements were taken. The median value of all four measurements reveals that the spring should be reclassified to a second-magnitude spring in 2001. Nevertheless, it can still be considered a historical first-magnitude spring. The term "historical" refers to the period of time prior to the adoption of the Florida Springs Classification System (2003).

Table 2. Magnitudes of Springs

	Flow	
Magnitude	Metric Units	English Units
1	≥2.832 cms	≥100 cfs (≥64.6 mgd)
2	≥0.283–2.832 cms	≥10–100 cfs (≥ 6.46–64.6 mgd)
3	≥0.028–0.283 cms	≥1–10 cfs (≥0.646–6.46 mgd)
4	≥0.0063–0.028 cms	≥100 gpm–1 cfs (≥100 to 448 gpm)
5	≥0.631–6.308 lps	≥10–100 gpm
6	≥0.063–0.631 lps	≥1–10 gpm
7	≥0.473–3.785 lpm	≥1 pint/min–1 gpm
8	<0.473 lpm	<1 pint/min

cms = cubic meters per second; lps = liters per second; cfs = cubic feet per second; pint/min = pints per minute; mgd = million gallons per day; lpm = liters per minute; gpm = gallons per minute.

The location of a discharge measurement is critical for defining the magnitude of a spring. Whenever possible, a discharge measurement should be restricted to a *vent* or *seep*. However, this is often impractical. For example, the only place to take a measurement may be in a *spring run* downstream where multiple springs have discharged into the run. For this reason, whenever a discharge measurement or water sample is taken, the springs (vents or seeps) included in the measurement need to be reported. The exact location of the discharge measurement (using a Global Positional System with approved location specifications) and a standardized locational reference point for each measurement is encouraged.

spring pool: A small body of water, either artificially impounded or naturally occurring, that encompasses one or more spring vents. It contains spring *discharge* that flows into a *spring run* (Copeland 2003: 14).

spring recharge basin: Those areas within ground- and surface-water basins that contribute to the discharge of the spring. The position of the divide is *orthogonal* to isopotential lines (lines of equal potential) (Copeland 2003). *Syn*. *springshed*.

Note that the position of the recharge basin boundary is time dependent. That is, the boundary is representative of a "snapshot" in time, rather than permanent. Thus, the boundaries of springsheds are dynamic and vary as a result of a changing potentiometric surface. If a spring is found to drain one springshed during times of high potentiometry, and another basin during low times, then the spring should be connected with two spring basins in the spring database.

Whenever practical, descriptive aspects of the recharge basin should be noted in the spring database. The following are examples. The relative recharge to groundwater within the basin should be noted. Those portions of the basin where confined and unconfined groundwater conditions exist should also be recorded. Finally, groundwater vulnerability within the springshed should be

noted if possible. A potential tool to predict vulnerability is the *Florida Aquifer Vulnerability Assessment* (*FAVA*) *model* (Arthur 2001: 1).

spring run: A stream (river, creek, etc.) whose primary (>50%) source of water is from a spring, springs, or spring group (Copeland 2003: 14). *Syn*. spring-run stream.

For example, in Florida the Wakulla River, where the predominant source of water is from Wakulla Spring, is a spring run. However, farther downstream, where surface water tributaries contribute 50% or greater of the flow, the Wakulla River is no longer considered a spring run. A detailed hydrogeologic study (e.g., collection of discharge and seepage data) may be needed in order to identify boundaries of a spring run.

springs: Multiple spring *vents* or *seeps* located in proximity to each other.

The use of this term is discouraged, but for pragmatic reasons, it cannot be entirely dropped. For example, several vents may discharge into a common spring run and the collection of scientific data (e.g., water samples or discharge measurements) cannot be obtained from individual vents located in the run. However, it may be practical to obtain a composite water sample or composite flow measurement representing several vents. Under this situation, the term springs is acceptable. However, a list of each vent or seep represented by the composite sample should be recorded by the sampler, and ultimately placed into the spring database (Copeland 2003: 15). *Cf. spring group*.

spring seep: See *seep*.

springshed: See *spring recharge basin*.

Springshed Protection Zone: A land planning area wherein special features such as environmentally sensitive *karst* landscape and associated springs require differing or added types of management and protections. A springshed protection zone for the comprehensive plan and corresponding future land use map could be:

Primary Zone: Land, inclusive of springshed features, that is most sensitive to environmental contamination and merits special protection. This includes the principal areas of groundwater contribution and recharge, sinkholes, depressions, and stream-to-sink features, the areas around the spring itself, and the spring run. These are areas deserving critical protection actions. Compatible land use in this area includes very low-density and low-intensity uses such as conservation, recreation, and open space.

Secondary Zone: Land abutting the primary zone that is also vulnerable to contamination, but offers some limited opportunity for buffering impacts from potential sources of contamination. Compatible low-density and low-intensity land uses include conservation, recreation and open space, silviculture, rural pastures, and very low-density residential areas (FDEP and FDCA 2002: 113–114).

spring straps: Tightly coiled springs used to secure fins on a diver's feet. Coils are often but not always protected by plastic tubing (FCTCKS 2005). *Cf. fin straps*.

spring vent: See *vent*.

SPRTF: *Abb*. Springs Protection and Restoration Trust Fund.

squeeze: 1. In a cave, a part of the passage passable with effort because it is extremely small (Field 2002, McClurg 1996). *Cf. restriction*. 2. A pinching effect on the body caused by inadequate inflation of a *drysuit*. Increases with depth (Balcombe et al. 1990). 3. Damage and pain resulting from pressure imbalances between air spaces or cavities in the body and the ambient environment, caused by failure to *equalize* (Bozanic 2002: 524). *Syn. barotrauma*. *Cf. reverse block*.

SRPP: *Abb*. Strategic Regional Policy Plans.

SRS: *Abb*. Southern Research Station.

SRT: *Abb*. *single rope technique*.

SRWMD: *Abb*. *Suwannee River Water Management District*.

SSS: *Abb*. *scanning spectrofluorophotometer*.

stability index: See *Langelier index*.

stack: *Syn*. *canister*.

stage: The height of a water surface above an arbitrarily established datum plane (Jackson 1997: 618).

stage bottle: In diving, a *bottle* configured for *decompression*, stage diving, or as a safety bottle. Stage bottles are usually made of aluminum because of its buoyancy characteristics (Prosser and Grey 1992).

stage diving: A diver's means of providing an extended supply of gas for breathing. Involves wearing *stage bottles* in addition to the back-mounted or side-mounted tanks, allowing for further penetration or extended periods of time on a dive. *Double staging* refers to the wearing of two stage bottles. *Triple staging* refers to the wearing of three stage bottles. *Multiple stage diving* refers to the wearing of two or more stage bottles or the placement of bottles in a system in anticipation of use during a dive of extended duration or distance (Prosser and Grey 1992).

stair step: Cave feature resembling stair steps; occurring in repetitive horizontal flat areas divided by short vertical drops (FCTCKS 2004).

stake: A PVC stick used to secure the *line* in caves with sensitive features or no features (such as across large *chambers* or along passages with smooth walls). The stake is stuck into the silt or sand on the passage floor as far as will hold and the line then wrapped or otherwise secured to the top of the stake (FCTCKS 2005).

stakeholders: The various people who are affected by or have an interest in the establishment of a protected area or any other issue. Stakeholders in a spring may include nearby residents and farmers, developers, water bottling company representatives, and local politicians, among others (AMNH 2002).

stalactite: From Greek *stalaktos* (dripping; fall in drops). A cylindrical or conical *speleothem* hanging or growing downward from a roof or wall, originally with a hollow center, and formed by dripping *percolation* water that seeps from a cave ceiling and becomes saturated with *calcite* as a result of loss of carbon dioxide into the cave air. "Stalactites stick tight to the ceiling" (Field 2002). *Cf. soda straw*, *stalagmite*, *straw*.

stalagmite: From Greek *stalagma* (that which drops). A *speleothem* normally of *calcite*, formed by upward growth from a cave or cavern floor, often found directly under a stalactite. Formed when saturated drip water falls from a cave or cavern roof, losing carbon dioxide to the air as or when it lands, leaving a *precipitate* of calcite (Field 2002). "Stalagmites might reach the ceiling." *Cf. stalactite*.

standard: A criterion for evaluating performance results. It may be a quantity of quality of output to be produced, a rule of conduct to be observed, a model of operation to be adhered to, or a degree of progress toward a goal (US EPA 2004b).

standard deviation: The dispersion of values or a set of data from the *mean* of a particular variable (FCTCKS 2005).

standing line: In climbing, the part of the rope that is climbed or rappelled, not the part of the rope involved with the rigging or knots at either end (Smith and Padgett 1996).

State Section 305(b) reports: Water quality reports submitted every 2 years by each state to the U.S. Environmental Protection Agency (US EPA) that indicate the status of water quality within the state; US EPA submits a report to Congress based on these state reports (Wear and Greis 2002).

static rope: Ropes with low stretch while under *load* and commonly used in *SRT* and *caving* (FCTCKS 2005). See *dynamic rope*.

station: A discrete, arbitrarily selected point established by the surveying team for survey purposes (Dasher 1994: 186). *Syn*. survey station, point, survey point.

station marker: A device or mark used to identify a survey *station* (Dasher 1994: 186).

steephead: A deeply cut valley, generally short, terminating at its upslope end in an amphitheater, at the foot of which a stream may emerge (Field 2002: 180).

stegmatite: *Syn*. *shield*.

stewardship: The concept of responsible caretaking of the environment, based on the premise that we do not own the resources but are managers of the resources and responsible for their condition for future generations (London 2004).

stick map: Simple, Grade 1 sketch of a cave system, often produced while exploring a new system and under time constraints (FCTCKS 2004). See *grade*.

St. Johns River Water Management District (SJRWMD): Located in northeast Florida, one of the state's five water management districts and responsible for, but not restricted to: ensuring adequate water supply, protecting natural systems, minimizing the harm due to flooding, and improving and maintaining water quality (FCTCKS 2004).

Stoke's Law: An equation for calculating the rate of fall of particles through a fluid, based on gravity, fluid viscosity, and particle size (Lenntech 2005).

stooping: In caving, descriptive of a passage with not quite enough headroom to walk. However, it is larger than a *crawlway* (Meth 2002).

stop: In climbing, a type of auto-stop *bobbin* rappel device that incorporates a parking brake (Padgett and Smith 1992).

stormwater: Rainwater that flows overland after falling. In developed areas, stormwater typically becomes polluted by materials it picks up from roofs, streets, parking lots, and other impermeable surfaces, and may deliver pollutants to surface and groundwater (FDEP and FDCA 2002: 114).

stormwater management plan: That part of a Site Development Plan that shows existing and proposed low water and high water elevations, together with adequate justification that the proposed low water elevations will be attained, locations of proposed channels and ponds, and delineation of offsite areas draining to the proposed development along with the drainage calculations and other information (Hillsborough County 2004).

stormwater management system: A system designed and constructed or implemented to control discharges necessitated by rainfall events, incorporating methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, overdrainage, environmental degradation, and water pollution or otherwise affect the quantity and quality of discharge from the system (373.403 Florida Statutes).

stormwater treatment train (STT): A series of *swales* designed to capture and treat runoff (FCTCKS 2005).

straddling: Moving across a narrow canyon or pit with arms and legs on opposite walls (McClurg 1996).

strata: Plural of *stratum*. Layers of sediment.

strategic lawsuits against public participation (**SLAPP**): Countersuits filed by industries, developers, or other defendants against environmental activist groups or concerned citizens groups in response to the activists' or citizens' suing to stop land development, curb pollution, or conserve natural resources. The SLAPPs accuse the plaintiffs of libel, slander, or defamation, inter alia. Although a SLAPP may have a poor chance of proving the allegations, the burden of defending the SLAPP may cause a citizen group to abandon the original claim (Wyman and Stevenson 2001).

stratigraphic column: A graphic representation of the sequence of rock units in an area or at a specific locality (Bates and Jackson 1984).

stratigraphic sequence: A chronologic succession of sedimentary rocks from older below to younger above, essentially without interruption (Bates and Jackson 1984).

stratigraphy: The study of layers of sediment (*strata*) or cultural remains as deposited over time (FCTCKS 2005).

stratum: A tabular or sheetlike body or layer of sedimentary rock, visually separable from other layers above and below (a stratigraphic *bed*). It may be composed of a number of beds, as a layer greater than one cm in thickness, and constituting part of a bed (Jackson 1997).

straw: See *soda straw*.

stream: Any body of running water that moves under gravity to progressively lower levels, in a relatively narrow but clearly defined channel on the surface of the ground, in a subterranean cave, or beneath or in a glacier (Jackson 1997: 628).

stream capture: See *capture* (*stream*).

Stream Condition Index (**SCI**): A composite *macroinvertebrate* metric for use in flowing streams. Sampling consists of 20 sweeps of the most productive habitats found in a 100–meter stretch of stream using a dip net. Organisms collected are brought back to the laboratory for identification. The SCI assigns points to seven biological metrics to rate a site as excellent, good, poor, or severely degraded. The scoring system is calibrated to be regionally specific for three bioregions in Florida: the Panhandle, the Peninsula, and Northeast (FDEP 2004e).

stream flow: 1. Flow within a defined stream or conduit (FCTCKS 2006) *Cf. sheet flow*. 2. The rate of flow of surface water in a steam at a given moment, expressed as volume per unit of time (Jackson 1997). *Syn*. *discharge*, *flow*.

streamline flow: *Syn*. *laminar flow*, viscous flow.

stream reach: A segment of a stream (Wear and Greis 2002).

streamsink: The point at which a surface stream submerges and disappears underground (FCTCKS 2005). *Cf*. *influent stream*, *lost river*, *sinkhole*.

stressor: Pressure or change brought upon an ecosystem by pollution sources such as contaminants and toxins (Wear and Greis 2002).

strike: The direction taken by a structural surface, e.g., a bedding or fault plane, as it intersects the horizontal (Bates and Jackson 1984: 497).

stromatolite: A calcareous deposit that is the result of growth and secretions of mainly *cyanobacteria* ("blue-green algae") in colonies varying in size from fractions of a micron to dozens of meters, with a similar wide variation in shape, mostly of laminated domes and columns. They reached their acme during the late Precambrian, after which they went into a slow decline, possibly because of evolution and diversification of higher animal phyla, particularly bottom-feeders. Among the most important examples are the marine stromatolites in Shark Bay, Western Australia (Grimes 1999, Arduini and Teruzzi 1986).

STT: *Abb*. *stormwater treatment train*.

stygobiont: Aquatic *cavernicoles*, animals that live in karstic or alluvial groundwater. They include *stygobites*, *stygophiles*, and *stygoxenes* (Meth 2002). *Syn*. *stygofauna*, *troglobitic*.

stygobite: An aquatic *troglobite*. An obligate aquatic species of *hypogean* waters having *troglomorphic adaptions*, including the fauna of deep groundwater substrata of *alluvial aquifers* (Meth 2002). *Cf*. *troglobite*.

stygofauna: Aquatic groundwater fauna (Meth 2002). *Syn*. *stygobiont*.

stygophile: A facultative *stygobiont*, usually lacking *troglomorphies*, and considered the aquatic equivalent of a terrestrial *troglophile* (Meth 2002).

stygoxene: A habitual *stygobiont* that spends only part of its life cycle in cave waters, returning periodically to the *epigean* domain, e.g., for food (Meth 2002). *Cf*. *trogloxene*.

stylolite: A surface or contact, usually occurring in homogeneous *carbonate* rocks and more rarely in sandstones and quartzites, marked by an irregular and interlocking penetration of the two sides; the columns, pits, and teethlike pro-

jections on one side fit into their counterparts on the other. In cross section, it resembles a suture or the tracing of a stylus (Bates and Jackson 1987).

subaquatic archaeology: See *underwater archaeology*.

subaqueous: Said of conditions and processes, or of features and deposits, that exist or are situated in or under water, especially freshwater, as in a lake or stream. Generally used to specify a process that occurs either on land or under water (Jackson 1997: 633). *Syn*. subaquatic, *submerged*, underwater.

subaqueous spring: A spring that discharges below the surface of a water body (e.g., ocean, lake, river, or stream). The term implies a preexisting receiving surface-water body and is synonymous with *submerged* (Copeland 2003, Field 2002).

subconduit: Any void, whether of *tectonic* or *dissolution* origin, that is smaller than the accepted defined size of a *conduit*. Subconduits originate during the early stages of conduit formation, but many fail to achieve larger dimensions when drainage later becomes concentrated along preferred routes. In most cases, however, they will continue to function as part of the microfissure, or percolation, system with the rock mass. Subconduits are an essential part of a continuum of void sizes that extends between microscopic discontinuities and the largest tube passages (Field 1999).

subcutaneous emphysema: A lung overexpansion injury characterized by air around the base of the neck (Heine 1995: 281). *Cf. mediastinal emphysema*.

sub-Floridan confining unit: Strata of low permeability that limit the depth of active groundwater circulation on mainland Florida (SEGS 1986).

subjacent karst: Karst that forms at depth below a resistant nonsoluble rock. *Syn*. interstratal karst (Bates and Jackson 1987).

sublimation: The conversion of a substance in the solid phase directly to the gas phase without an intervening liquid phase (Wyman and Stevenson 2001: 374). *Cf. evaporation*.

submarine cave: Caves opening under sea level and entirely filled with sea water. Formed in limestone and sometimes lava. Sometimes form circular openings that when viewed from above appear as distinctive *blue holes* (Field 2002, Stock et al. 1986). *Cf. anchialine cave*, *littoral cave*, *marine cave*, *offshore spring*.

submarine spring: See *offshore spring*.

submerged: See *subaqueous*.

submerged spring: See *subaqueous spring*.

submersible pressure gauge (**SPG**): Used to monitor the diver's breathing gas during the dive (FCTCKS 2004).

subsidence: Sinking or downward settling of the earth's surface, not restricted in rate, magnitude, or area involved. It may be caused by natural geological processes, such as solution, or compaction; or it may be caused by man's activity, such as subsurface mining or the pumping of oil or groundwater (Bates and Jackson 1984).

subsurface drainage: The removal of surplus water from within the soil by natural or artificial means (Bates and Jackson 1987).

subsurface flow: Flow of subsurface water. It represents the flow of all water beneath the land surface and beneath bodies of surface water (Bates and Jackson 1984).

subsurface water: All water beneath the land surface and beneath bodies of surface water (Bates and Jackson 1984).

subterranean: Pertaining to underground environments, often in reference to caves (Meth 2002).

succession: A series of ecosystem changes where plants compete, succeeding and displacing each other as they respond to, and so modify, their environment (Waterwise 2003: 70).

suck hole: A colloquial term for a small *swallow hole* in the bed of a stream that diverts water from the stream (Rea 1992).

suicide clips: Colloquialism; type of brass clips prone to snagging the main line while cave diving (FCTCKS 2005).

sulfate (**SO_4**): A form of sulfur; one of seven major *ions* in most natural waters (USGS 2004a).

sulfate-reducing bacteria: See *sulfur bacteria*.

sulfur bacteria: *Anaerobic* bacteria that obtain the oxygen needed in metabolism by reducing sulfate ions to hydrogen sulfide or elemental sulfur. Some of these microbes found in Florida's sediments can transform inorganic mercury into organic methylmercury as a byproduct of their metabolism (Bates and Jackson 1987, SFWMD 2002).

sumidero: (Spanish) 1. A *swallow hole*. 2. In Latin America, any closed depression caused by solution (Field 2002: 186).

sump: A section of flooded passage. A place in the passage where the ceiling drops to and below the water level in a cave. Some sumps lead to extensive submerged passages, others are extremely short, allowing cavers to pass without the use of breathing apparatus (Field 2002).

supersaturated: Referring to water that has more *calcium carbonate* or other karst rock minerals in solution than the maximum normal conditions (Field 2002).

Surber Stream Bottom Sampler: An instrument used to collect *macroinvertebrates* within a framed area of shallow streams down to 18 inches (45.7 cm) deep (ANS 2005).

surface air consumption rate (**SAC rate**, **SCR**): A diver's measured breathing rate at rest on the surface, used in gas management and dive planning (FCTCKS 2004).

surface decompression: Time spent in the water at the surface immediately following a dive (FCTCKS 2004).

surface drainage: The removal of unwanted water from the surface of the ground, or the prevention of its entry into the soil, by natural or artificial means (Bates and Jackson 1987).

surface equivalent: The effect that the partial pressure of a gas has on the body at depth in relation to an equivalent amount of gas at sea level, e.g., breathing 1% carbon monoxide at 4 atm is the surface equivalent of breathing 4% carbon monoxide (Heine 1995: 281).

surface interval (**SI**): Time spent out of the water or resting at the surface between dives (FCTCKS 2004).

surface tension: The contractive forces at the surface of a liquid (Heine 1995: 281).

surface water: All waters on the surface of the Earth, including fresh and salt water, ice, and snow (Jackson 1997: 641). Water from natural springs shall be classified as surface water when it exits from the spring onto the Earth's surface (373.019 Florida Statutes).

surface water basin: See *drainage basin*.

surface water divide: The line of separation or the narrow tract of high ground marking the boundary between two adjacent drainage basins, dividing the surface waters that flow in one direction from those that flow in the opposite direction (Jackson 1997: 186).

surface water management: The development and implementation of a combination of structural and nonstructural measures intended to reconcile the water conveyance and storage function of depressions, lakes, swales, channels, floodplains, and coastal waters with the space and related needs of a designated area (FDOS 2001).

surficial aquifer: A hydrologic unit comprising all hydraulically connected saturated sediments from the water table down to the relatively impermeable sediments of the underlying confining unit. It is an unconfined aquifer system, recharged by rainfall and by leakage from surface water bodies (FDOS 2001). *Cf. nonartesian aquifer*.

surficial aquifer system: The uppermost permeable hydrogeologic unit contiguous with land surface, composed principally of unconsolidated to poorly indurated clastic deposits belonging to all or part of the upper Miocene to Holocene Series in Florida. The lower limit coincides with the top of laterally extensive and vertically persistent beds of much lower permeability. Aquifers within this aquifer system are under nonartesian conditions (SEGS 1986).

survey: 1. In *caving*, the measurement of directions and distances between survey points and of cave details from them, and the plotting of cave plans and sections from these measurements either graphically or after computation, used to create a map (Field 2002). 2. In *underwater archaeology*, a method of studying the stratification and context of remains at a site (FCTCKS 2005).

survey exploration line: Using knotted exploration line for a rudimentary survey sketch as opposed to using a tape measure for distances (FCTCKS 2004). *Cf. knotted line*.

survey line: *Syn. traverse*.

survey line to wall: Method of measuring passage proportions (FCTCKS 2004). See *traverse*.

survey point: See *station*.

survey station: See *station*.

suspended sediment: Small particles of insoluble, undissolved organic or inorganic matter suspended in water; and kept from settling out by the motion or velocity of the water (Meth 2002, UI 2005).

suspended solids (**SS**): In waste management, small particles of solid pollutants that resist separation by conventional methods. The presence of suspended solids (along with *biochemical oxygen demand*) is one of many measurement of water quality and an indicator of treatment plant efficiency (IFAS 2005). See *total suspended solids*.

sustainability: The use of ecosystems and their resources in a manner that satisfies current needs while allowing them to persist in the long run (AMNH 2002).

sustainable agriculture: Practices employed in the production of products that take a long-term view of the requirements for conservation and stewardship of the land. Included are the production of food and fiber in sufficient quantity and quality to provide for the needs of the public and for the financial stability of the farmer (Wyman and Stevenson 2001: 379).

sustainable community: A community that uses its resources to meet current needs while ensuring adequate resources are available for future generations. Such a community seeks improved public health and better quality of life for all its residents by limiting waste, preventing pollution, maximizing conservation and promoting efficiency, and developing local resources to enhance the local economy (FDOS 2001).

sustainable development: Describes efforts to guide economic growth, especially in less developed countries, in an environmentally sound manner, with emphasis on natural resource conservation. Also described as development that proceeds in a way that extends the lifetime of natural resources as long as possible (Wyman and Stevenson 2001: 379). See also *planned development*.

Suwannee River Water Management District (**SRWMD**): Located in north central Florida, one of the state's five water management districts and responsible for, but not restricted to: ensuring adequate water supply, protecting natural systems, minimizing the harm due to flooding, and improving and maintaining water quality (FCTCKS 2004).

swale: 1. Linear hollows or depressions found between dunes or beach ridges. They are typically marshy or swampy, or may contain small lakes (Grimes 1995). 2. A slight depression, sometimes swampy, in the midst of generally level land (Bates and Jackson 1984: 509).

swallet: See *swallow hole*.

swallow hole: (British) A place where water disappears underground in a limestone region. A swallow hole generally implies water loss in a closed depression of a blind valley, whereas a swallet may refer to water loss into alluvium at a streambed, even though there is not a depression (Field 2002: 189). *Syn*. lost river, *ponors*, sinking stream, sumidero, swallet.

SWFWMD: *Abb. Southwest Florida Water Management District*.

swimmer's ear: Otitis externa, a painful infection of the outer ear canal caused when water trapped in the canal causes bacteria and other *microorganisms* to multiply (FCTCKS 2005).

swimmer's itch: Cercarial dermatitis, an irritating burning rash caused by contact with *microorganisms* in warm freshwater and seawater (FCTCKS 2005). See *cyanobacteria*.

syncline: A geologic fold of which the core contains the stratigraphically younger rocks: it is generally concave upward (Bates and Jackson 1987).

syngenetic: 1. Said of mineral deposits formed at the same time, and by the same processes, as the enclosing rocks. 2. Said of a primary structure, such as *ripple marks*, formed contemporaneously with the deposition of the sediment in which it occurs (Bates and Jackson 1984: 511).

synoptic survey: A simultaneous collection of data or samples at specific locations across a given area in a specific period of time (FCTCKS 2005).

syphon: See *siphon*.

system: See *cave system*.

systematic sample: A set of samples selected by a repeating method, after randomly selecting the first sample (US EPA 2004b). *Cf. scientific sample*.

Système International d'Unités (**SI units**): The system of units of measurement used internationally in commerce and scientific work, comprising seven basic units: ampere (A, electric current); candela (cd, luminous intensity); kelvin (K, thermodynamic temperature); kilogram (kg, mass); meter (m, length); mole (mol, amount of substance); and second (s, time). And includes, among other measurements: hertz (Hz, frequency); joule (J, energy); lux (lx, illuminance); ohm (Ω, electric resistance); volt (V, electric potential); watt (W, power) (FCTCKS 2005).

T

T (**on the line**): A junction in cave lines in the shape of a letter T. In cave diving, an intersection where a second *guideline* is tied to the line being followed. Line arrows and line markers assist the diver in following the correct course in and back out of the system. To prevent confusion in network caves, *gaps* are sometimes used instead of T's (FCTCKS 2004).

tables: See *decompression tables*.

tackle: The rope part of a block and tackle (FCTCKS 2004).

tandem climbing: Two people climbing rope together, one above the other (Smith and Padgett 1996: 368).

tank bands: 1. The metal bands that hold the *backmounts* to the diver's harness (Balcombe et al. 1990). 2. Bands that hold together the two tanks used in backmount configuration (FCTCKS 2004). *Syn*. cylinder bands.

tank, **tanks**: In cave diving, SCUBA tanks. Usually two steel tanks banded together and connected via a manifold allowing each tank to be isolated, but may also be used as single tanks. These tanks come in sizes from steel 85s to 120s. *Stage bottles* are usually made of aluminum because of buoyancy characteristics (FCTCKS 2004). *Syn*. bottles, *cylinders*, SCUBA tanks, SCUBA cylinders.

tanks-off restriction: A *restriction* that is so small the diver must remove one or both tanks to pass through (FCTCKS 2004). *Cf. no-mount*, *squeeze*.

tannic: A natural condition in which decaying vegetative matter dyes the water dark reddish brown. Many tannic systems also contain *hydrogen sulfide* (FCTCKS 2004). *Cf. tannic water*.

tannic water: Highly acidic dark-colored water typical in some areas of Florida, sometimes called *black water*. Because it is so acidic, tannic water can dissolve *limestone* at a fast rate. It also requires extra consideration from cave divers because of low *visibility* and lower temperature (Prosser and Grey 1992).

tape: 1. A flexible band graduated in units of length; used for accurately measuring distances (Dasher 1994: 186). 2. British term for nylon *webbing* (McClurg 1996: 243).

tape person: The person on a survey crew who carries the forward end of the tape measure and usually reads the distance (Dasher 1994: 186). *Cf. dumb end*.

taphonomy: The branch of paleoecology dealing with all processes occurring from the moment of an organism's death through the time its remains become encased in sediment up to its discovery (Jackson 1997, Arduini and Teruzzi 1986).

task loading: When a diver undertakes more or increasingly complex tasks, producing increased energy expenditure (either physical or mental) and in turn a greater predisposition to stress (Farr 2003: 126).

taxon (pl. **taxa**): From Greek *tasso* (arrange). In biology, the name or rank in a system of *taxonomy*. From the highest to lowest the ranks are: *kingdom*, *phylum* or *division*, *class*, *order*, *family*, *genus*, *species* (Meth 2002).

taxonomy: From Greek *tasso* (arrange) + *nomos* (law). The scientific naming and classification of organisms by presumed natural relationships.

TDRs: See *transfer of development rights*.

TDS: *Abb. total dissolved solids*.

tectonic: Pertaining to large-scale features resulting from the movements of the Earth's crust (Field 2002).

temperate karst: A descriptive term for karst found outside the tropics, especially in mid-latitude areas that generally receive less precipitation than Caribbean and tropical karst regions (e.g., Kentucky's Mammoth Caves). These areas may have similar topographic features as the other karst types, but often have underground features (esp. elaborate networks of large and accessible caverns) that are more accentuated than their aboveground features (UWSP 2005). *Cf. Caribbean karst*, *tropical karst*.

tensile strength: Breaking strength determined when the direction of the force is in line with the orientation of the device being tested. Compare with *sheer strength*, where the force is at right angles (Smith and Padgett 1996: 368).

"**tension**": Call used when climber wants the *belay* rope tighter (McClurg 1996: 243). *Cf.* "*slack*."

terminal breakdown: See *breakdown*, *terminal*.

terrain: 1. An area with some specific characteristics. In regard to *karst* studies, surficial features solely (Field 1999: 172). 2. A tract or region of the Earth's surface considered as a physical feature, an ecologic environment, or a site of some planned activity of man (Jackson 1997). *Cf. terrane*.

terrane: 1. An area with some specific characteristics. In regard to *karst*, both surficial and subsurface features jointly (Field 2002). 2. A fault-bounded body of

rock of regional extent, characterized by a geologic history different from that of contiguous terranes (Bates and Jackson 1987).

terra rosa: A reddish-brown residual soil found as a mantle over limestone bedrock (Jackson 1997). *Syn*. terra rossa (Europe and Canada).

terra rossa: See *terra rosa*.

terrestrial: Living on dry land surfaces, either *epigean*, *endogean*, or *hypogean* (Meth 2002).

terrigenous: Shallow marine sediments consisting of material derived from the land surface (Grimes 1995).

territorial waters: Inland or coastal waters under the jurisdiction of a state or nation. With regard to Florida, the waters extend outward from the coast approximately three miles in the Atlantic Ocean and outward approximately nine miles (three leagues) in the Gulf of Mexico (Florida Constitution). *Cf. waters.*

Tertiary: The geological time between the end of the Mesozoic Era (end of the Cretaceous Period) and the Quarternary Period; from about 65 to 1.6 million years ago. It occupies the bulk of the Cenozoic Era. From the oldest to the youngest, the subdivisions are the *Paleocene*, *Eocene*, *Oligocene*, *Miocene*, and the *Pliocene* (Grimes 1995).

tertiary treatment: See *wastewater treatment*.

test well: A well hole drilled for experimental or exploratory purposes (MSU 2000: 293).

tether: A length of nylon *webbing* used to suspend a duffel bag from a caver's seat harness. Usually about as long as the caver is tall, the tether moves the pack's center off-gravity to where it is less likely to pull a caver backward while he or she is *rappelling* a freefall drop or working against a sloping wall (Stone and AmEnde 2002: 318).

texture: The general physical appearance or character of a rock, including the geometric aspects of, and the mutual relations among, its component particles or crystals; e.g., the size, shape, and arrangement of the constituent elements of a sedimentary rock (Jackson 1997).

TH: *Abb*. *total hardness*.

theodolite: Survey instrument that measures both horizontal and vertical angles, as well as horizontal distances using a telescope and a stadia. Similar to a *transit*, except that its graduated scales are observed through an optical system (Dasher 1994, Meth 2002).

thermocline: 1. A boundary between a top layer of warm water and a bottom layer of cold water. Cold water is denser than warm water, so cold water sinks and collects in low spots. Thermoclines usually develop in cave rooms with very slow or only seasonal groundwater circulation. They are not common in cave systems that convey abundant groundwater (Prosser and Grey 1992). 2. The interface between warm river water and cold spring water. Sometimes can be felt within submerged cave passages where colder spring water discharges into the warmer karst water stream (FCTCKS 2004).

thirds: See *Rule of Thirds*.

thirds rule: See *Rule of Thirds*.

Thornthwaite equation: An equation used to estimate the potential *evapotranspiration* rates for a given flora (Wanielista et al. 1997). *Cf. Blaney-Criddle equation*.

threatened species: A specific plant or animal species whose population level is very low and that is likely to become an *endangered species* without intervention (Wyman and Stevenson 2001: 388).

threatened waterbody: Listed according to section 303(d) of the Clean Water Act, any body of water of the United States that currently attains water quality standards, but for which existing and readily available data and information on adverse declining trends indicate that water quality standards will likely not be exceeded by the time the next list of impaired or threatened waterbodies is required to be submitted to the U.S. Environmental Protection Agency (US EPA).

Where a waterbody is potentially affected by a thermal discharge, *threatened* means that adverse declining trends indicate that a balanced indigenous population of shellfish, fish, and wildlife will not be maintained by the time the next list of impaired or threatened waterbodies is required to be submitted to the US EPA (US EPA 2005b). *Cf. impaired waterbody*, *total maximum daily load*.

threshold: Doorway or starting point. The part of a cave just within the entrance where surface conditions change to cave conditions (FCTCKS 2005).

through cave: A cave through which a stream runs; it may be followed from entrance to exit along a stream course or along a passage that formerly carried a stream (Field 2002, Meth 2002).

throughflow: Water moving through soil horizons (FCTCKS 2005). *Syn. interflow* and *subsurface flow*.

tidal spring: A *spring* whose discharge is controlled by tidal cycles. Near the coast, tidal springs may alternately discharge *saline water* and *freshwater*; however, inland, the pattern of fresh water discharge may simply reflect changes in the *potentiometric surface* (SDII Global Corp. 2002).

tie-off: 1. In cave diving, the act of affixing *line* to a projection, heavy object, or fixed stake from which to deploy line from a reel or secure the line. Creates a station point for mapping (FCTCKS 2004). See also *primary tie-off*, *secondary tie-off*. 2. In vertical caving, a place to *rig* (Smith and Padgett 1996).

Timucuan: A tribe of tall tattooed people living in the state of Florida prior to European settlement through the 1700s. Among the first native Americans to meet the Europeans (Milanich 1999).

tissue saturation: The term used to describe the time or amount of a particular gas required to reach the saturation point within human tissue (Balcombe et al. 1990: 264).

TKN: *Abb. total Kjeldahl nitrogen*.

TMDL: *Abb. total maximum daily load*.

topographic map: A map that, in addition to other information, shows landforms

by the use of *contour lines* representing equal elevations of the Earth's surface (Rea 1992).

torch: (British) Flashlight.

tortuosity: In water flow through porous media, following a twisted or crooked path. Tortuosity is a leading factor in *mechanical dispersion* (FCTCKS 2005). *Cf. turbulent flow*.

total dissolved solids (**TDS**): In water quality sampling, a measure of the amount of material dissolved in water (mostly inorganic salts), consisting typically of aggregates of carbonates, bicarbonates, chlorides, sulfates, phosphates, and nitrates of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts. The *inorganic* salts are measured by filtering a water sample to remove any suspended particulate material, evaporating the water, and weighing the solids that remain. An important use of the measure involves the examination of the quality of drinking water. Water that has a high content of inorganic material frequently has taste problems and/or water *hardness* problems. High TDS solutions can change the chemical nature of water, exert varying degrees of osmotic pressures, and often become lethal to the biological inhabitants of an aquatic environment. The common and synonymously used term for TDS is "salt." Usually expressed in milligrams per liter (Horton 2000). *Cf. hard water*, *salinity*, *total suspended solids* (*TSS*).

total hardness (**TH**): The sum of calcium and magnesium hardness, expressed as a *calcium carbonate* equivalent (Lenntech 2005).

total Kjeldahl nitrogen (**TKN**): See *Kjeldahl nitrogen*.

total maximum daily load (**TMDL**): The maximum amount of a given pollutant that a waterbody can assimilate and meet all of its designated uses. Note, a waterbody that does not meet its designated uses is defined as being *impaired* (Paulic and Hand 1996).

total solids (**TS**): A measurement of the material dissolved or suspended in a water sample obtained by allowing a given volume to evaporate, then weighing the remaining residue. Total solids equals the sum of the *total dissolved solids* and *total suspended solids* (Wyman and Stevenson 2001).

total suspended solids (**TSS**): In water quality sampling, solids in wastewater or in a stream that can be removed by filtration. The origin of suspended matter may be manmade wastes or natural sources such as *silt* (Horton 2000). *Cf. total dissolved solids*.

touch contact: In cave diving, a method of negotiating underwater passages while exiting in the absence of visibility or light. One diver leads, maintaining contact with the line, while the second diver maintains contact with the lead diver (and the line), indicating by squeezes to proceed or stop while negotiating the passage (FCTCKS 2005).

tower karst: A karst landscape dominated by steep or vertical-sided limestone towers. The ultimate development of cockpit karst through *cone karst* to tower karst, in which the isolated residual hills have very steep to overhanging lower slopes. There may be alluvial plains between the towers and flat-floored depressions within them (Field 2002, Meth 2002). See *mogote*.

toxicology: The study of chemical agents causing diminished health and death in organisms. The discipline involves the study of chemical properties, recognition, identification, measurement, distribution, and metabolism of hazardous substances to which organisms are exposed and also the prediction of potential adverse effects on organisms, including humans, regarding different doses of chemicals (Wyman and Stevenson 2001).

trace: See *overflow stream*.

tracer: 1. A material introduced into surface or groundwater, or into the soil, where it disappears to be detected later. Tracers are used to determine drainage connections, water velocity, and travel times. 2. A material introduced into air in subterranean voids to determine cave interconnections (Meth 2002). *Cf. deliberate tracer*, *eosin*, *fluorescent dye*, *leucophor*, *natural tracer*, *Rhodamine WT*, *tracer-flow method*, *uranine*, *water tracing*.

tracer-flow method: A method of determining flow velocities and directions by introducing tracers (i.e., dyes) or indicators into groundwater (Field 2002: 194). *Cf. water tracing*. See *eosin*, *fluorescent dye*, *leucophor*, *Rhodamine WT*, *tracer*, *uranine*, *water tracing*.

transfer of development rights (**TDRs**): This land use management technique transfers the development potential from sensitive areas to less sensitive areas that have been identified as suitable and designated for growth. In a TDR program, two or more zones are established in a given geographic area, a "sending" (preservation) zone and a "receiving" zone. The most common TDR program allows the landowner to sell the development rights to a developer who then uses those development rights to increase the density of development on another piece of property at another location. A second method allows a local government to establish a TDR Bank to transfer development rights (FDEP and FDCA 2002: 114).

transgression: The spread of the sea over land areas, and the consequent evidence of such advance (such as strata deposited unconformably on older rocks, esp. where the new marine deposits are spread far and wide over the former land surface) (Jackson 1997).

transit: A telescoping surveying instrument capable of precise measurements of relative horizontal and vertical angles (Dasher 1994: 187).

transition zone: Initial region of the *dark zone* beyond the *twilight zone* where there is no visible light. Some external factors from the entrance environment may still be apparent; e.g., seasonally fluctuating air temperatures (Meth 2002).

transmissivity: The rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of an aquifer under a unit hydraulic gradient. Although spoken as if it were a property of the aquifer, it also embodies the saturated thickness and the properties of the contained liquid (Jackson 1997).

transpiration: The process by which water absorbed by plants, usually the roots, is evaporated into the atmosphere from the plant surface (Jackson 1997: 675).

trash: Colloquialism as in to "trash a cave" or "blitz a cave." Result of primarily

accidental disruption by bad diving technique of *silt* or debris in cave passage, causing a *total silt out* resulting in *zero visibility*. (FCTCKS 2004).

travel gas: The gas mix breathed to the point during the dive where the diver switches to a more optimal gas for depth considerations (FCTCKS 2004). *Syn*. travel mix.

traverse: 1. *n*. A route along ledges above the floor of a *cave*. 2. *v*. To travel in a cave along such a route. 3. The most common form of cave survey, in which direction, distance, and vertical angles between successive points are measured (Meth 2002). 4. In cave diving, a penetration with the point of exit different from the point of entry (FCTCKS 2004). *Syn*. *survey line*. *Cf*. *circuit*.

travertine: 1. A finely crystalline concretionary and compact *limestone*, of white, tan, or cream color, commonly having a fibrous or concentric structure and splintery fracture, formed by rapid precipitation of *calcium carbonate* ($CaCO_3$) from solution in *surface waters* and *groundwater*, as by agitation of stream water or by evaporation around the mouth or in the conduit of a spring. 2. Compact calcium carbonate rock formed by *precipitation* of soluble bicarbonates as a result of changes in temperature and chemical characteristics. Porous varieties are called calcareous *tufa*. (Field 2002). *Cf*. *stalactites*, *stalagmites*.

treatment train: A series of *best management practices* and/or natural features, each planned to treat a different aspect of potential *pollution*, that are implemented in a linear fashion to maximize pollutant removal (FDEP and FDCA 2002: 114).

trend: In statistical analysis, the change in data over time that remains after the *data* have been adjusted to remove seasonal and cyclical fluctuations (US EPA 2004b).

triangulation: 1. A method for calculating the distance to an inaccessible point, using sightings from two stations separated by a known distance (Dasher 1994: 187). 2. The combination of methodologies in the study of the same subject; establishing the accuracy of information by comparing three or more types of independent points of view on data sources bearing on the same findings (US EPA 2004b).

tributary: A stream feeding, joining, or flowing into a larger stream or into a lake (Bates and Jackson 1987: 700).

trim: Refers to a diver's balance or position in the water, variously described as head up, level, or head down. Good trim generally denotes a strong swimming position with minimum silt disturbance (Farr 2003: 126).

trimix: Breathing gas consisting of *nitrogen*, *helium*, and *oxygen*, used on deep dives to decrease the effects of *nitrogen narcosis* (Farr 2003: 125). *Cf*. *nitrox*, *normoxic*, *heliox*.

trim weight: *Weight* distributed on a diver to assist in maintaining *trim* during a dive (FCTCKS 2005).

triple staging: Refers to the wearing of three *stage bottles* for *decompression* or *stage diving* purposes (Prosser and Grey 1992).

tritium: Radioactive isotope of hydrogen (^3H) with a half-life of 12.3 years, often

produced by nuclear explosions and released into the atmosphere during the atmospheric nuclear testing program that largely began in the 1950s, peaked in the early 1960s (the bomb spike), and ceased in the 1970s. Tritium was one of the most widely used and useful groundwater tracers; however, radioactive decay has rendered the tritium values of bomb spike water similar to the current atmospheric levels. In many parts of the country, including Florida, tritium values are approaching undetectable levels (Clark and Fritz 1997).

troglobite: From Greek *troglo* (cave) + *bios* (life). An obligate cavernicole animal that lives permanently in a cave and is unable to live outside of it. Troglobites usually have *troglomorphic adaptations*. Aquatic dwelling troglobites are now referred to as *stygobites*, but may be referred to as aquatic troglobites (Field 2002, Meth 2002). *Syn*. *stygobiont*, troglobyte. *Cf*. *accidental*, *troglophile*, *trogloxene*.

troglobyte: *Syn*. *troglobite*.

***Troglocambarus* sp.**: See *crayfish*.

troglodyte: Living in caves (FCTCKS 2006).

troglomorphic adaptation: Adaptations to the cave environment. For example, loss of pigment, long antennae and legs, and partial or complete loss of eyes for species living in the *dark zone* (Meth 2002). *Cf*. *troglomorphy*.

troglomorphy: *Syn*. *troglomorphic adaptations*. However, troglomorphies do not necessarily equate to the level of adaptation to dark zone environments (Meth 2002).

troglophile: From Greek *troglo* (cave) and *phileo* (love). An animal that can complete its life cycle in caves, but is not confined to caves (Field 2002). *Cf*. *accidental*, *stygophile*, *trogloxene*, *troglobite*.

trogloxene: From the Greek *troglo* (cave) and *xenos* (guest). An animal that habitually enters or spends part of its life cycle in caves and returns periodically to the *epigean* domain for food. The aquatic trogloxene is referred to as a *stygoxene* (Field 2002, Meth 2002). *Cf*. *accidental*, *troglophile*, *troglobite*.

trophic level: Groups of organisms using or producing energy at a definable level in nature. Plants are at the lowest trophic level and are the primary producers of biological energy. Grazing and detritus feeding animals are intermediate, and predators, such as crayfish, catfish, and bass, are in the highest trophic level. Metals like mercury accumulate at higher trophic levels, while most energy in nature is stored in lower trophic levels (SFWMD 2002). *Cf*. *bioaccumulation*, *biomagnification*.

tropical karst: A descriptive term for karst that occurs in humid tropical regions (e.g., the Dominican Republic, Jamaica, and Puerto Rico) with much topographic relief distinctively characterized by steep, rounded hills known as haystacks or *mogotes* and areas of feral relief ("relief gone wild") with steep, nearly vertical rock formations (UWSP 2005). *Cf*. *Caribbean karst*, *temperate karst*.

true north: The direction from any point on the Earth's surface toward the geographic north pole; the northerly direction of any geographic meridian or of the meridian though the point of observation. It is the universal 0° (or 360°)

mapping reference. True north differs from magnetic north by the amount of magnetic declination at the given point (Bates and Jackson 1987: 704).

trunk: 1. A major conduit for existing or forming drainage. 2. A cave *passage* that has rather huge dimensions (Catherman 2005). *Syn*. trunk passage.

trust-me dive: Colloquialism. *Traverse* or circuit dive where a cave diver familiar with a particular system leads a less experienced cave diver beyond the traditional gas management rules knowing that ahead is another exit. Also referring to any cave dive where a more experienced diver leads a less experienced diver into a new environment that they may not be able to safely exit without the more experienced diver's guidance (FCTCKS 2004).

TS: *Abb*. *Total Solids*.

TSS: *Abb*. *Total Suspended Solids*.

tube: A nearly horizontal cave passage of smooth surface, and elliptical or nearly circular in cross section. Formed by approximately equal dissolution all around when full of flowing water (Field 2002, Meth 2002).

tubular webbing: A flat woven tubular strap usually made of nylon and used for a variety of applications in harnesses and rigging (FCTCKS 2005). *Syn*. *flat webbing*.

tufa: Soft, porous concretions of *carbonate* re-precipitated from saturated karst water (Field 2002). *Cf*. *travertine*.

tunnel: 1. A nearly horizontal cave, open at both ends and fairly straight and uniform in cross section (Meth 2002). 2. In cave diving vernacular, synonymous with *passage* (FCTCKS 2004).

turbidity: In water quality sampling, the muddiness, cloudiness, or milkiness of water. The measure of *suspended sediment* in the water (SFWMD 2005b, Meth 2002). *Cf*. *visibility*.

turbulent flow: The flow condition in which inertial forces predominate over viscous forces and in which *head loss* is not linearly related to velocity. It is typical of flow in surface-water bodies and subsurface conduits in karst terranes, provided that the conduits have a minimum diameter of approximately 2–5 mm (0.08–0.20 in), although some research suggests that 5–15 mm (0.20–0.59 in) may be more appropriate (Field 2002). *Cf*. *laminar flow*.

turnaround: Cave diving. The point where the inward dive is terminated. This should be planned and normally depends on factors such as air consumption, time, depth, and distance (Farr 2003: 126).

turn the dive: See *turnaround*. Also a command signal given when the turnaround point is reached or continued further progress is not desirable (FCTCKS 2005).

twilight zone: The part of a cave in which some daylight penetrates (but not direct sunlight) and gradually diminishes to zero light (Meth 2002). *Cf*. *dark zone*, *transition zone*.

twin cylinders: See *independent doubles*.

twins: See *independent doubles*.

twisted rope: Generally, a rope made from three strands twisted together (FCTCKS 2004).

tying in surveys: *Syn. closed traverse.*

tyrolean: A rope stretched sideways and attached at two points whereby people or gear traverse back and forth. This includes horizontal and tilted traverses (Padgett and Smith 1992: 331).

U

UAA: *Abb. use attainability analysis.*

udometer: A rain gauge (Horton 2000).

UIAA: International Union of Alpinist Associations. An organization of national climbing associations that sets standards for equipment used by recreational climbers, establishes guidelines for access and fees for expeditions in other countries, and sets policies for safety, conservation, medical, and documentation practices (Smith and Padgett 1996: 370).

ultraviolet radiation (**UV**): 1. Light waves shorter than visible blue-violet waves of the spectrum; i.e., below 3900 Angstroms (å). UV can be used for the disinfection of water (Horton 2000).

unconfined: *Syn. nonartesian.*

unconfined aquifer: See *nonartesian aquifer*, *surficial aquifer*.

unconformity: A break or absence of a sequence in depositional sedimentation (Field 2002).

undergarments: The clothing worn by a cave diver under the drysuit. Chosen for thermal properties and low bulkiness. Woollies (insulated jumpsuit style garments) are popular as are similar materials. Layers work best but must be worn so as not to constrict the movement or reach of the diver and to avoid bulkiness. Includes woolly socks, also referred to as woollies (FCTCKS 2004).

underground source of drinking water (**USDW**): An *aquifer* that supplies or can potentially supply a *public water system* and is currently used for human consumption or has a *total dissolved* solids concentration of less than 10,000 mg/L and is not exempted. Underground injection rules protect underground sources of drinking water (Wyman and Stevenson 2001).

underwater archaeology: The study of the underwater remains of past cultures (FCTCKS 2005). *Syn.* subaquatic archaeology. See also *archaeology*.

uniform flow: *Flow* of water or other fluid through channels or conduits where characteristics such as depth and velocity do not change over distance (FCTKS 2005).

unsaturated zone: 1. A subsurface zone containing water under pressure less than that of the atmosphere, including water held by *capillary action*, and containing air or gases generally under atmospheric pressure. The zone is confined between the land surface above and the surface of the *zone of saturation* below (Wilson and Moore 1998). 2. In karst, the zone where voids in rock are partly filled with air and through which water descends under

gravity (Meth 2002). *Syn*. vadose zone. *Cf*. *groundwater*, *phreatic zone*, *zone of saturation*.

upconing: Upward migration of mineralized water as a result of pressure variation caused by withdrawals (SWFWMD 2000: 7–8).

upstream: Direction of water flow from an opening in a submerged passage. Refers to water flow toward an entrance. It is against the current. It may be relative to the entry point or direction of travel (FCTCKS 2004).

uranine: Also known as CI Acid Yellow 73. A type of fluorescent dye used in groundwater tracing that appears green at low concentrations (FCTCKS 2005). *Cf*. *eosin*, *fluorescent dye*, *phloxene*, *Rhodamine WT*.

urban development: The human landscape characterized by cities, towns, suburbs, and outlying areas that are typically commercial, residential, and industrial in nature. These areas are typically nonagricultural or nonrural in nature (FDOS 2001).

urban development boundary: A planning technique used to delineate the physical extent that urban development will be allowed in a particular jurisdiction (FDOS 2001).

US CB: *Abb*. U.S. Census Bureau.

US CFR: *Abb*. U.S. Code of Federal Regulations. *Syn*. CFR.

US COE: *Abb*. U.S. Army Corps of Engineers. *Syn*. COE.

USDA: *Abb*. U.S. Department of Agriculture.

USDW: *Abb*. underground source of drinking water.

use attainability analysis (**UAA**): A structured scientific assessment of the factors limiting designated uses of waterbodies (US EPA 2005a, 40 CFR 131.3g).

US EPA: *Abb*. U.S. Environmental Protection Agency. *Syn*. EPA.

USGS: *Abb*. U.S. Geological Survey.

UV: *Abb*. *ultraviolet radiation*.

uvala: Large, complex sinkholes with irregular bottoms, formed by the coalescence of several smaller closed depressions. The bottom of an uvala is characterized by multiple sinkholes and an irregular bottom (SDII Global Corp. 2002).

UV light: *Abb*. ultraviolet light. See *ultraviolet radiation*.

V

vadose cave: A cave believed to have undergone most of its development above the water table. Within the *vadose zone*, drainage flows freely under gravity, and cave passages have air above any water surface. The gravitational control of *vadose flow* means that all vadose cave passages drain downslope, they exist in the upper part of a karst aquifer, and they ultimately drain into the *phreatic zone* or out to the surface. Older higher cave passages are found in the vadose zone; usually vadose caves have been abandoned by groundwater except in times of extreme aquifer recharge. Passages usually appear as canyons and *keyholes* (Lowe and Waltham 1995).

vadose flow: Water flowing in free surface streams in caves (Field 2002: 203).

vadose seepage: Refers to water moving downward through the *vadose zone*, either in narrow *fissures*, or in the walls of air-filled caves (Meth 2002). *Syn*. *percolation*, percolation water, seepage water.

vadose water: Water above the *zone of saturation*; water in the *vadose zone* (Field 2002).

vadose zone: 1. The zone between the land surface and the water table. 2. The zone between land surface and the deepest water table, which includes the *capillary zone*. Generally, water in the vadose zone is under less than atmospheric pressure, and some of the voids may contain air or other gases at atmospheric pressure (Field 2002). *Syn*. *unsaturated zone*, *zone of aeration*. *Cf*. *phreatic zone*, *zone of saturation*.

validity: The extent to which a measurement instrument or test accurately measures what it is supposed to measure (US EPA 2004b).

Valsalva maneuver: A method of equalizing the pressure in the middle ear during descent. Typically, the diver exhales against a closed nose and mouth (FCTCKS 2005).

value-added: The monetary worth contributed by labor to raw materials through the production process. Any process that adds value to products and final goods (FDOS 2001).

Van Dorn sampler: An instrument used to collect water samples at different depths. Water collected at different depths differ in temperature and amount of dissolved oxygen, telling scientists how much aquatic life can survive depending on the amount of oxygen for them to breathe. The more oxygen there is, the more organisms there are that can thrive (ANS 2005).

vaporization: See *evaporation*.

variable: 1. Liable to or capable of change. 2. Marked by difference (e.g., varying angles). 3. A quantity that can assume any set of values. (Princeton University 2003).

variable friction: The ability of a device to deliver a full, uninterrupted range of retarding force upon rope. A device such as this usually has the ability to compensate for and maintain safe control on wet rope, dry rope, stiff rope, flexible rope, mushy rope, dirty rope, and rope of different sizes (Smith and Padgett 1996: 370).

variation: The local difference in degrees between true and magnetic north (Heine 1995: 281). *Cf*. *magnetic variation*.

vasoconstriction: A decrease in the diameter of blood vessels (London 2004).

Vauclusian spring: A *spring* rising up a deep, steeply inclined, water-filled passage from the deep *aquifer*, and under considerable pressure. The term derives from such a spring in France that rises about 250 meters (820 ft) and flows at about 25 cubic meters per second (883 cfs) (Meth 2002).

vellum: A strong membranous material used as a drafting medium, as opposed to paper (Burge 1988: 123). *Cf*. *Mylar*.

velocity: The rate of motion of an object in a given direction, measured in distance divided by time. Regarding water, velocity is the distance that water moves divided by time (Miller 1967).

vent: An opening that concentrates groundwater discharge at the Earth's surface, including the bottom of the ocean. The spring point of discharge is significantly larger than that of the average pore space in the surrounding rock and is often considered a cave or fissure. Flow from the opening is mostly turbulent (Copeland 2003: 16).

venturi: A channel that serves the measurement of water flows (Lenntech 2005).

Venturi effect: See *venturi*.

vermiculation: A pattern of thin, worm-shaped coatings of clay or silt on cave surfaces (Field 2002: 204)

vertical: Any *drop* that requires ropes or rock climbing skills to negotiate (Smith and Padgett 1996: 370).

vertical angle: The angle in a vertical plan between a line of sight and the horizontal and positive above, and the horizontal and negative below (Field 2002). *Cf. easting*, *northing*, *horizontal angle*.

vertical caver: One who is well versed in *single rope techniques* and explores caves using such skills (Smith and Padgett 1996: 370).

vertical caving: *Caving* with the understanding that there are often significant ascents and descents involving *rappelling* or *single rope technique* skills (FCTCKS 2005).

vertical gear: Equipment necessary to climb or descend a rope (FCTCKS 2004).

vestigial organs: Bodily organs that have lost their function over time through evolution or adaptation. Rudimentary eyes are found in some species of cave fish, although the fish cannot see because of the absence of light within the submerged cave systems (FCTCKS 2005).

VIP: *Abb. visual inspection*.

virgin cave: See *virgin passage*.

virgin lead: *Syn. lead*.

virgin passage: *n.* A cave passage (or entire cave) that has not previously been entered; a new discovery (Dasher 1994: 187).

vis: *Abb. visibility*.

viscous flow: *Syn. laminar flow*, streamline flow.

viscosity: The resistance of a fluid to flow (Field 2002: 205).

visibility: The distance a diver can see underwater expressed in feet (FCTCKS 2004). See *zero visibility*. *Cf. turbidity*.

visual gap: See *visual jump*.

visual inspection (**VIP**): Internal and external inspection performed on a SCUBA *cylinder* at least once per year (Heine 1995: 281).

visual jump: In cave diving, relying on a visual connection between two *lines* as opposed to a physical connection created by running a *gap reel* or *jump reel* (FCTCKS 2004). Used synonymously with visual gap.

VOC: *Abb. volatile organic compound*.

volatile organic compound (VOC): Organic chemicals that have a high vapor pressure relative to their water solubility. VOCs include components of gasoline, fuel oils, and lubricants, as well as organic solvents, fumigants, some

inert ingredients in pesticides, and some byproducts of chlorine disinfection (Hughes et al. 2000).

volatization: Loss of a substance through *evaporation* or *sublimation*, as when chemicals dissolved in *groundwater* transfer from a liquid state into a gas, which then percolates up through the *vadose zone*. When manure is spread on a field, ammonia-nitrogen in the manure may volatize quickly and be lost as fertilizer unless it is incorporated into the soil (US EPA 1998).

volcanic cave: See *lava tube*.

vug: A small cavity in a rock or a vein, often lined with crystals of different mineral composition from the enclosing rock (Jackson 1997).

W

walking passage: In a cave, a passage large enough for humans to walk through (FCTCKS 2004).

wall: Horizontal inside area of a cave passage stretching from the floor to the ceiling (FCTCKS 2004).

wall-out: Passage ends in blank wall or breakdown with no continuation (Balcombe et al. 1990).

wallow: Term used either as a derogatory description of a diver who is extremely negative in the water or to describe one form of exploration of very low passages. Usually involves the disturbance of massive amounts of mud or silt (FCTCKS 2004). *Cf. mud puppy*.

wall pocket: See *pocket*.

wastewater: Water discharged from homes, businesses, and industries that contains dissolved, suspended, and particulate inorganic and organic material (Wyman and Stevenson 2001: 420). *Syn*. sewage, domestic wastewater.

wastewater treatment: Any of the mechanical or chemical processes used to modify the quality of waste water to make it more compatible or acceptable to humans and the environment. It includes primary treatment (settling and chlorinating), secondary treatment (biologic processing using microbes), and tertiary treatment (oxidation and the spraying of *effluent* on croplands) (MSU 2000: 294). See *reclaimed water*.

water allocation: A hydrologic system in which there are multiple uses or demands for water; the process of measuring a specific amount of water devoted to a given purpose (MSU 2000: 294).

water budget: A hydrologic formula used by scientists and land managers to determine water surpluses and deficits in a given area (FDEP 2005).

water control structure: A barrier that acts to hold water at a planned level (FDOS 2001). *Cf. weirs*, dams.

water cycle: See *hydrologic cycle*.

water diversion: The transfer of water from a stream, lake, aquifer, or other source of water by canal, pipe, well, or other conduit to another watercourse or to application on the land (MSU 2000: 294).

water dowsing: The use of a *divining rod* (of wood or metal) for locating water (MSU 2000: 294).

water inventory: An accounting of water resources in a given area (i.e., groundwater inventory) or on the Earth in all forms (gas, liquid, solid) and related uses. Calculated as inflow equivalent to outflow plus change in storage (FCTCKS 2005).

water management district: Pursuant to Chapter 373 Florida Statutes, the districts are authorized to administer flood protection programs and to perform technical investigations into water resources. The districts are also authorized to develop water management plans for water shortages in times of *drought* and to acquire and manage lands for water management purposes. Regulatory programs delegated to the districts include programs to manage the *consumptive use* of water, aquifer *recharge*, well construction and surface water management. Florida Statutes give the Florida Department of Environmental Protection "general supervisory authority" over the districts and directs the Department to delegate water resources programs to them where possible (FDEP 2004c). Any flood control, resource management, or water management district operating under the authority of Chapter 373 (373.019 Florida Statutes).

water pollution: The presence in water of enough harmful or objectionable material to damage water quality (Lenntech 2005). *Cf. contaminant*, *pollutant*.

water quality criteria: The concentration limits for *pollutants* in water to be used for specific purposes. The criteria are for individual pollutants and are based on different water uses, such as *public water supply*, aquatic habitat, industrial supply, or recreational facilities (Wyman and Stevenson 2001). *Cf. water quality standard*.

water quality monitoring: The effort to obtain quantitative information on the physical, chemical, and biological characteristics of water through sampling (Sanders et al. 1994).

water quality standard: Regulations specifying the intended use of a body of water and establishing the criteria to be used to protect the *designated use*. The standards are prepared by each state and are subject to the approval of the U.S. Environmental Protection Agency (Wyman and Stevenson 2001: 421). See *biological criteria*, *narrative biological criteria*, *narrative standard*.

water resource caution area: Area identified by the *water management districts* where existing sources of water may not be adequate to supply water for future human needs while maintaining water resources and related natural systems (Waterwise 2003: 70). *Syn. critical water supply problem areas*.

water resource development: The formulation and implementation of regional water resource management strategies, including collection and evaluation of surface water and groundwater data; structural and nonstructural programs to protect and manage the water resource; development of regional water resource implementation programs; construction, operation, and maintenance of major public works facilities to provide for flood control, surface and undergroundwater storage, and groundwater recharge augmentation; and related

technical assistance to local governments and to government-owned and privately owned water utilities (373.019 Florida Statutes).

water resource implementation rule: The rule authorized by Chapter 373.036, Florida Statutes, which sets forth goals, objectives, and guidance for the development and review of programs, rules, and plans relating to water resources, based on statutory policies and directives. The waters of the state are among its most basic resources. Such waters should be managed to conserve and protect water resources and to realize the full beneficial use of these resources (373.019 Florida Statutes).

water resources: The amount of *groundwater* and *surface water* in a given area (Florida Council of 100 2003: 32).

water rights: A legal right to use a specific amount of water for beneficial purposes (MSU 2000: 294).

waters: With regard to Florida, include, but are not limited to, rivers, lakes, streams, springs, impoundments, wetlands, and all other waters or bodies of water, including fresh, brackish, saline, tidal, surface, or underground waters. Waters owned entirely by one person other than the state are included only in regard to possible discharge on other property or water. Underground waters include, but are not limited to, all underground waters passing through pores of rock or soils or flowing through in channels, whether manmade or natural. Solely for purposes of s. 403.0885, waters of the state also include navigable waters or waters of the contiguous zone as used in s. 502 of the Clean Water Act, as amended, 33 USC. ss. 1251 et seq., as in existence on January 1, 1993, except for those navigable waters seaward of the boundaries of the state set forth in s. 1, Art. II of the State Constitution. *Cf. territorial waters*.

watershed: The total land area that contributes *runoff* to a body of water (Florida Council of 100 2003: 32). *Syn. drainage basin*

watershed planning and management: Water resource management organized on the basis of the natural boundaries formed by surface water basins or groundwater divides, which often overlap the borders of governmental jurisdictions (FDEP and FDCA 2002: 114).

Water Shortage Declaration: Rule 40E-21.231, Florida Administrative Code: "If . . . there is a possibility that insufficient water will be available within a source class to meet the estimated present and anticipated user demands from that source, or to protect the water resources from serious harm, the Governing Board may declare a water shortage for the affected source class." Estimates of the percent reduction in demand required to match available supply is required and identifies which phase of drought restriction is implemented. A gradual progression in severity of restriction is implemented through increasing phases. Once declared, the water management district is required to notify permitted users by mail of the restrictions and to publish restrictions in area newspapers (SFWMD 2005b).

water supply: The total amount of water available for human and other uses (Florida Council of 100 2003: 32).

water supply development: The planning, design, construction, operation, and maintenance of public or private facilities for water collection, production, treatment, transmission, or distribution for sale, resale, or end use (Florida Council of 100 2003: 32).

water system: A river and all of its branches and contributing conduits. A network of interconnected facilities operated by a utility (FCTCKS 2005).

water table: 1. In the context of caving, the top or the highest level of groundwater in a given area. Below this level, cave passages may be flooded (Rea 1992). 2. The surface between phreatic water, which completely fills voids in the rock, and ground air, which partially fills higher voids (Meth 2002). *Cf. potentiometric surface*.

water table aquifer: See *nonartesian aquifer*, *unconfined aquifer*.

water table well: A well whose water is supplied by a *water table* or unconfined aquifer (US EPA 1998).

water tracing: A method of determining the subterranean connections between points of stream disappearance and known conduits, or of soil water seepage and points of reappearance on the surface or underground (Meth 2002). *Syn*. groundwater tracing. *Cf. deliberate tracer*, *natural tracer*, *qualitative tracing*, *quantitative tracing*, *tracer-flow method*. See *fluorometer*, *tracer*.

water use: 1. Water used for a specific purpose, such as for domestic use, irrigation, or industrial processing. *Syn*. *end use*. 2. The amount of water withdrawn from groundwater or surface sources (FCTCKS 2005).

water year: A twelve-month period used as the basis of annual data summaries by various governmental agencies. The commencement date of the twelve month period is not necessarily consistent from one agency to the next (FCTCKS 2004).

weathering: Natural breakup of materials by various methods (Zokaites and O'Malley 2000: 129).

webbing: Any woven, flat, or tubular nylon strap used to build harnesses for cave diving and vertical caving applications (FCTCKS 2004). *Syn*. tape. *Cf. flat webbing*, *tubular webbing*.

weight: Small molded lead bars or mesh plastic bags containing tiny lead balls in set size increments (2, 3, and 4 pounds each) used singly or in combination by divers to control their *trim* and *buoyancy* during a dive. Weights are worn in either *weight pockets* or a *weight belt*. (FCTCKS 2005).

weight belt: A nylon belt with pockets for adding or subtracting *weights* used during a dive. The belt is worn around the diver's waist and attaches with a plastic clip (FCTCKS 2005).

weight pocket: Usually integrated in buoyancy compensation vests but can also be independent pockets slipped onto a harness-style *buoyancy compensator* designed to hold *weights* used by divers during a dive (FCTCKS 2005).

weir: An underwater dam or barrier in a channel or ditch placed to limit or control water flow; water flows over the top of the weir (Wyman and Stevenson 2001: 423).

well: 1. A deep, round hole in a cave floor or on the surface in karst (Meth 2002). 2. A bored, drilled, or driven shaft or a dug hole, with a depth greater than the largest surface dimension, for the purpose of obtaining water, oil, gas, or minerals (Monroe 1970, USGS 2005).

wellhead protection area: A designated surface and subsurface area surrounding a well or well field that supplies a public water supply and through which contaminants or pollutants are likely to pass and eventually reach the aquifer that supplies the well or well field. The purpose of designating the area is to provide protection from the potential of contamination of the water supply. Established under the Safe Drinking Water Act, these areas are designated in accordance with state laws, regulations, and plans that protect public drinking water supplies (Brown and Black 2005).

wet cave: In caving, a term for any cave containing water (FCTCKS 2004).

wetlands: Land areas saturated or regularly flooded due to proximity to bodies of surface or groundwater and supporting vegetation adapted for life in saturated soil conditions. Wetlands include bogs, marshes, and swamps (FCTCKS 2006).

wetsuit: A tight-fitting garment of foam *neoprene* that insulates a diver from the cold by allowing a thin film of water to penetrate between the suit and the body (Field 2002). A wetsuit does not provide the same level of warmth retention as a *drysuit*. Wetsuits work on the assumption that the water held near the skin maintains a level of warmth during the dive (FCTCKS 2004).

whaletail: An aluminum rappel device similar to a *rack*, but made of one solid piece, with slots and spacers for the rope to slide through. This device became popular in the early 1970s (Padgett and Smith 1992, Smith and Padgett 1996).

whole water: Pertains to the constituents in solution after an unfiltered representative sample of water with suspended sediments is digested (usually using a dilute acid solution). Complete *dissolution* of particulate matter often is not achieved by the digestion treatment; thus the determination represents something less than the "total" amount (that is, less than 95%) of the constituent present in the dissolved and suspended phases of the sample. For inorganic determinations, digestions are performed in the original sample container to ensure digestion of material absorbed on the container walls. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results (USGS 2004a).

wild cave: An undeveloped cave in its natural state, in contrast to a show cave or commercial cave where lighting and paths have been added (McClurg 1996: 244).

wilderness: Land that has not been cultivated or otherwise affected or modified by human activity (FCTCKS 2005).

wildlife: Wild animals; animals that have not been domesticated by humans (FCTCKS 2005).

window: In speleology, a natural opening above the floor of a passage or a room, giving access to an adjoining cavity or to the surface. An irregular opening

through a thin rock wall in a cave. (Field 2002, Meth 2002). *Cf. karst window*, *porthole*.

wing: Equipment worn on a diver's back that assists in controlling buoyancy. Consists of an inflatable bladder covered by protective material that fits between the diver's tanks and the backplate of the harness. The wing acts as the cave diver's *buoyancy compensator* (FCTCKS 2004).

wire ladder: See *cable ladder*.

withdrawal: See *groundwater withdrawal*.

woollies: Wool socks. See *undergarments*.

work-of-breathing: The measure of the volume-averaged pressure occurring at the mouth of a diver during a complete breathing cycle; also referred to as resistive effort (Nuckols et al. 1996), used to compare the ease, or lack of ease, of breathing from a particular scuba regulator (FCTCKS 2005).

wrap: *Line placement* in which the *line* is secured to a rock, *stake*, or other outcropping or feature often by wrapping the line around the feature several times and passing the *reel* under its own line to create tension, which will hold the line in place (FCTCKS 2005).

X

X, Y, Z-coordinate system: An informal name for the rectangular or *Cartesian Coordinate System* (Dasher 1994: 187).

X-coordinate: The east-west distance of a given survey station from the *zero datum*. East is positive, west is negative (Dasher 1994: 187).

xenobiotic: A general term for chemicals foreign to their surroundings, for example, chemicals present in organisms or the environment that are not naturally found there. The presence of xenobiotics almost always is an indicator of human activity. Examples include most pesticides, synthetic organic chemicals, and most food additives. Xenobiotic DEET is being used as an indicator in springs monitoring (Wyman and Stevenson 2001).

xeric: Characterized by a lack of moisture; dry (FCTCKS 2005). *Cf. hydric*, *mesic*.

xeriscape: A landscaping method that maximizes the conservation of water by the use of site-appropriate plants and an efficient watering system (FDEP and FDCA 2002: 114).

Y

Y-coordinate: The north-south distance of a given survey station from the *zero datum*. North is positive, south is negative (Dasher 1994: 187).

YBP: *Abb*. years before present.

yoke: A *first stage* SCUBA tank tap used primarily by open water and recreational divers (FCTCKS 2004). *Cf. DIN*.

Y valve: A single *cylinder* valve that allows two separate *regulators* to be fitted to one cylinder (Balcombe et al. 1990: 264).

Z

Z-coordinate: The vertical distance of a given survey station from the *zero datum*. Up is positive, down is negative (Dasher 1994: 187).

zero datum: The reference point from which all distances and angles are measured. *Syn*. datum (Dasher 1994: 187).

zero discharge: 1. The goal, stated in the preamble to the Clean Water Act, of zero pollutants in water discharges. 2. Describing a facility that does not release any wastewater to the environment but recycles and reuses it internally. Also called zero wastewater discharge systems or closed-circuit systems. 3. Describing a regulatory requirement that certain (but not all) pollutants be undetectable ("virtually eliminated") in a waste stream. (Wyman and Stevenson 2001).

zero vis: See *zero visibility*.

zero visibility: Informally referred to as "zero vis," a natural or manmade condition in which there is no *visibility* within the submerged cave. Also often used to describe relatively low visibility conditions encountered on exit, rather than true zero visibility conditions. In this condition, a light is useless and a diver cannot read gauges or computers, nor estimate position within the water. It is often used to describe relative low visibility conditions encountered on exit rather than true zero visibility conditions (FCTCKS 2004). *Cf. blown out*, *total silt out*, *trash*.

zipline, **zip line**: Any angled rope that stretches from the top of a drop to the bottom and is used to slide equipment either up or down. The greater the angle away from the perpendicular, the safer and more controlled the transfer will be (Padgett and Smith 1992: 260).

zip tie: A nylon tie wrap that makes a distinctive zip sound when tightened. Divers use zip ties to attach bolts to gear and other items (FCTCKS 2005).

zonation: The condition of being arranged or formed in zones; e.g., the distribution of distinctive fossils, more or less parallel to the bedding, in biostratigraphic zones (Jackson 1997: 735).

zone: In geology and *stratigraphy*, a geographic area with distinct boundaries. In archaeology, distinct excavation layers by *strata* (FCTCKS 2005). *Cf. index fossil*.

zone of aeration: A subsurface zone containing water under pressure less than that of the atmosphere, including water held by capillary action. This zone is limited above by the land surface and below by the surface of the *zone of saturation*, i.e., the water table (Bates and Jackson 1984).

zone of saturation: A subsurface zone in which all the interstices are filled with water under pressure greater than that of the atmosphere. This zone is separated from the overlying *zone of aeration* by the water table (Bates and Jackson 1984). *Syn*. *groundwater*, phreas, phreatic, *phreatic zone*, *water table*. *Cf. unsaturated zone*, *vadose zone*.

zooplankton: See *plankton*.

Appendix A

Equipment for Caving

NOTE: The following list is not intended to be complete nor to be used as a checklist for caving. The list is intended for information purposes only. Caving can be extremely dangerous. Please contact the National Speleological Society or your local grotto for further information.

National Speleological Society, www.caves.org
National Cave Rescue Commission, www.caves.org/io/ncrc/
Anthros Costa Rica Grotto, http://www.anthros.org/
Central Florida Cavers, cfc.batcave.net/
Flint River Grotto, tfn.net/~frgrotto
Florida Speleological Society, www.caves.com/fss/
Tampa Bay Area Grotto (TBAG), www.tampabayareagrotto.org/

Helmet
Lights (minimum of 3)
Batteries
Pack
Boots
Gloves
Knee pads and elbow pads (as necessary)
Candle (may count as one light source)
Butane cigarette lighter
Garbage or trash bag
Foil blanket: The candle, cigarette lighter, garbage bag, and foil blanket perform multiple functions. In case of hypothermia, the candle and garbage bag act as an emergency warming room. The cigarette lighter also can be used to determine bad air.
Clinometer
Compass and Map
Appropriate clothing: Clothing should be carefully selected for the type of caving being done. Clothing should be made of material that keeps water away from the skin, especially if the cave is wet or cold, or if extensive time will be spend sitting or waiting such as at a long drop or on a mapping trip. A spare shirt kept in a waterproof bag will be useful if the cave is wet.
Coveralls, Pants: Should be full length and durable.

Wetsuit: If the cave involves swimming for an extended period of time, a wetsuit is recommended to prevent hypothermia.
Flagging tape
Water and emergency food: Every caver should have some water and food along in case the trip turns longer than expected.
Basic first-aid gear
Rope or hand line (optional)
Vertical gear (optional)

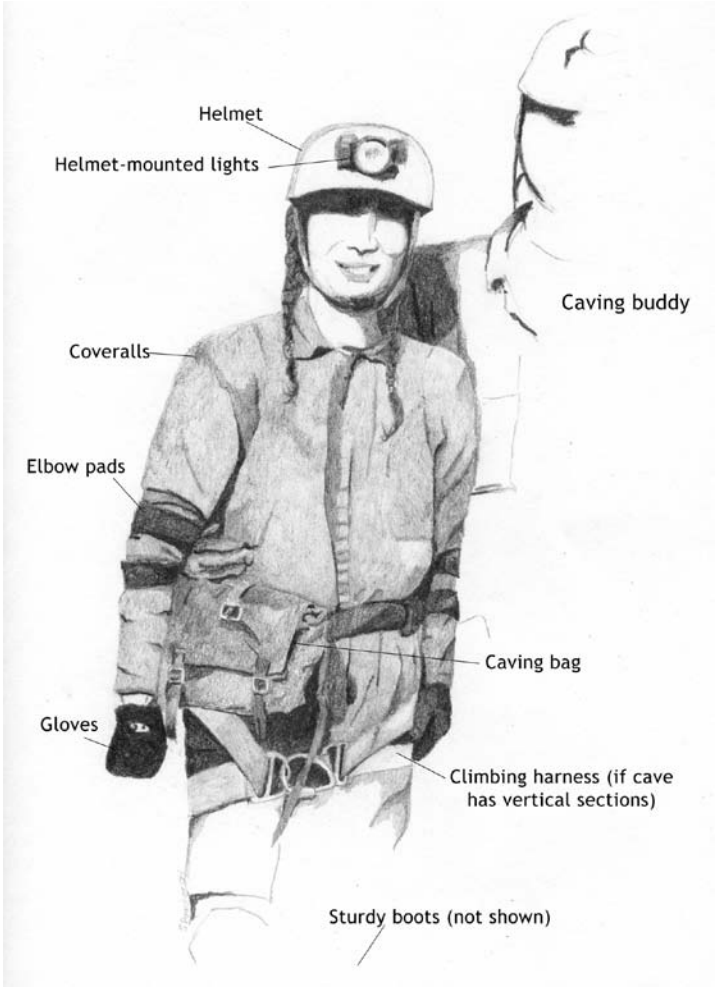

Figure 1. Caving Equipment. Drawing by Sandra Poucher.

Appendix B

Equipment for Cave Diving

NOTE: The following list is not intended to be complete nor to be used as a checklist for cave diving. The list is for information purposes only. Some items require additional training above full cave. Cave diving is extremely dangerous. Please contact the appropriate agency and obtain the proper training before attempting to cave dive.

National Speleological Society Cave Diving Section (NSS-CDS), www.nsscds.org
National Association for Cave Diving (NACD), www.safecavediving.org
International Association of Nitrox and Technical Divers (IANTD), www.iantd.com
International Underwater Cave Rescue and Recovery (IUCRR), www.iucrr.org/p_whoweare.htm
Quintana Roo Speleological Society (QRSS), www.caves.org/projects/qrss/

Tanks, tank bands, lanyards, clips, etc.
Harness and Wings / Buoyancy compensation device
Two breathing regulators, one equipped with a long hose
Pressure gauge
Reels: Primary reel, Safety reel, and Gap/Jump reel
Slate and pencil
Undergarments
Wetsuit or Drysuit
Hood
Gloves
Booties
Primary light and 2 backup lights
Mask, spare mask, full face mask
Fins
Depth gauge
Dive computer, or a depth timer and decompression tables
Compass
Cutting device
Scooter/DPV
Helmet
Rebreather

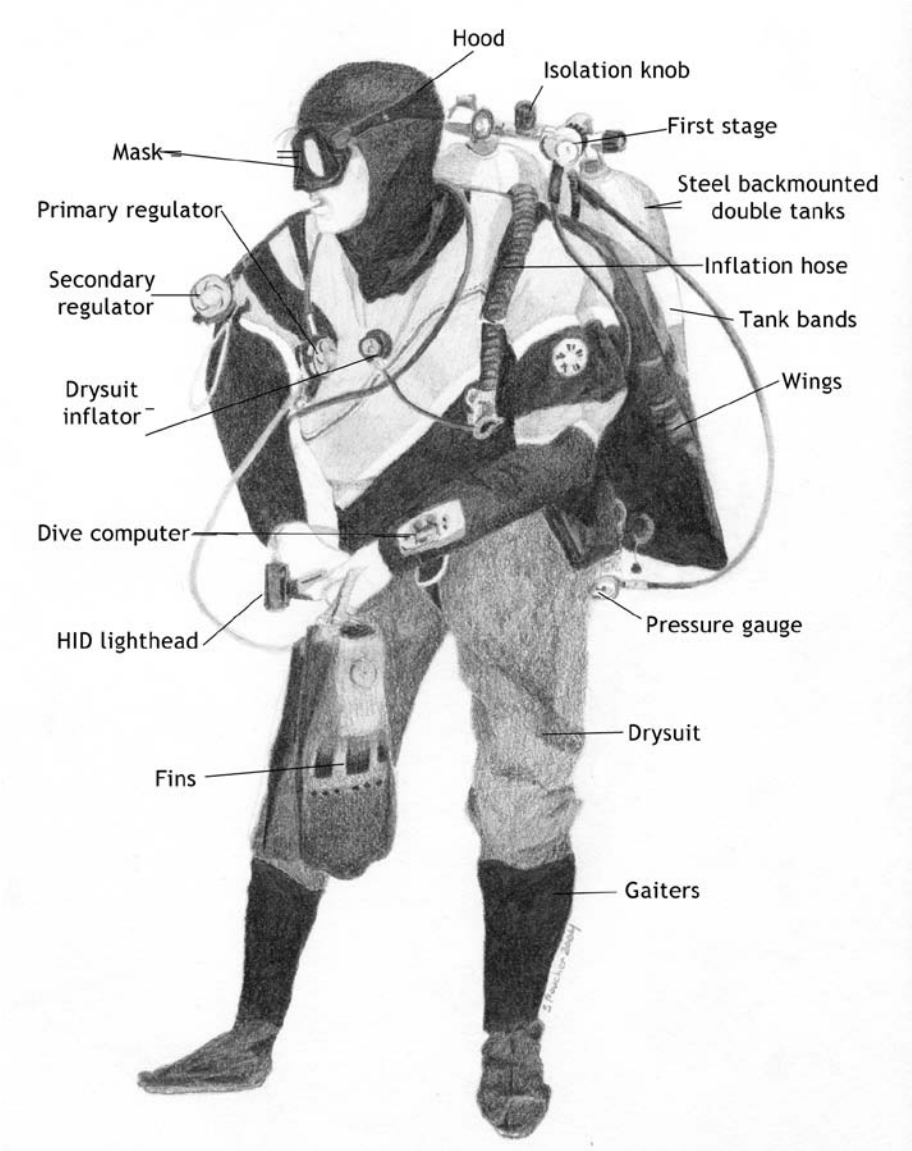

Figure 2. Cave Diving Equipment. Drawing by Sandra Poucher.

Appendix C

Equipment for Rappelling (SRT, single rope techniques)

NOTE: The following list is not intended to be complete, nor to be used as a checklist for rappelling. Rappelling, or abseiling as it is called in Europe, is the descending of walls, pits, and other vertical surfaces by the use of a mechanical friction device on a rope. Various rappelling gear (i.e., rappel racks, figure-8) and climbing systems (i.e., ropewalker, frog) are used worldwide. Again, because of the great variety of gear and techniques and very small margin for error, please obtain the proper training before attempting rappelling. Vertical caving involves heights, darkness, and self-sufficiency. Contact the National Speleological Society's Vertical Section or your local grotto (see appendix A for a list of Florida grottos) for vertical training.

National Speleological Society Vertical Caving Section, www.caves.org/section/vertical/
International Union of Alpinist Associations (UIAA)

Helmet: Always wear a helmet when rappelling. The danger of falling rocks, gear, and debris is always present.
Helmet-mounted lights: Primarily if descending into a pit or cave.
Static rope
Rope pad
Rappelling rack or figure 8: Depending on familiarity and comfort, either may be used safely.
Seat harness
Chest harness
Ascending system
Safety ascender
Gloves: An absolute necessity
Long pants or jeans
Knee pads
Boots
Gear bag
Extra locking carabiners
Cable ladder

Anchors: With training and familiarity only. Anchors can cause damage to cave walls.

NOTE: If rappelling into a deep pit, cavern, or cave, consult the caving equipment list (appendix A).

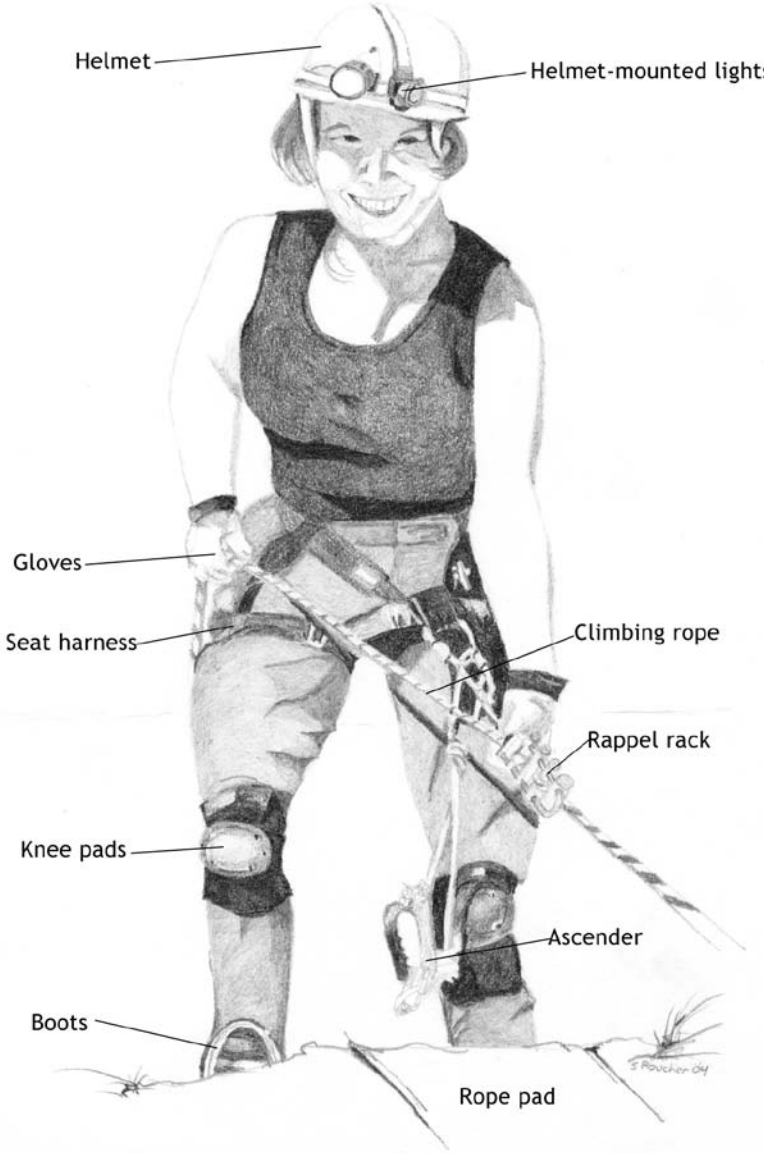

Figure 3. Rappelling Equipment. Drawing by Sandra Poucher.

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