

## Utah Stream Team

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Thank you for being a volunteer with the Utah Stream Team Program! We appreciate your time and effort in helping make this experience a success. The following is an overview of our program to give you some background information before heading into the field.

The Utah Stream Team has provided a hands-on program for all ages. Due to the fact that all the measurements are done in the field, volunteers should exercise caution, and be aware of the always-changing environmental conditions. The participants will gain an appreciation for our natural resources through hands-on activities in natural settings.

The goal of the Utah Stream Team program is to promote water quality monitoring through physical, chemical and biological testing. The information obtained will help us to better understand how our activities effect water quality, determine the overall health of our water, and identify specific water quality problems.

### Physical Measurements

- a. Stream flow is the amount of water that flows past a specific point over a specific period of time. We measure stream flow by determining the average velocity (how fast an object moves in the stream) and multiplying that by a cross sectional area of the stream. Participant will wade into the stream to take several depth measurements.
- b. Stream shape refers to the physical structure of the stream. The stream channel may be meandering (making many tight “s-turns”), straight, or braided (continually splitting and rejoining). The stream may contain riffles (areas where the water is flowing over rocks and gravel), runs (long smooth areas), or pools (deep slow moving areas). We also measure substrate, which is the material that makes up the streams channel. Substrate is divided into six categories based on size. The participants will pick up, measure and record the size of the rocks on the stream bottom.

### Chemical Measurements

- a. pH is the measurement of how acidic or basic the water is. We measure pH on a scale from 1 to 14, with 1 being acidic, 7 being neutral, and 14 being basic. Water with extremely high or low pH is deadly to plants and animals. We sample pH using colored litmus strips which are dipped into the water. The color strips react with the water and are then compared with a chart to determine the pH. The allowable range of pH is 6.5 to 9.0 in the State of Utah.
- b. Dissolved oxygen is a measurement of the amount of oxygen molecules in the water (the oxygen is invisible to our eyes; bubbles contain oxygen that is not dissolved). To test for dissolved oxygen, stream water is mixed with chemicals in a small glass ampoule, which then change color depending on the amount of oxygen present in the water. The darker blue, the more oxygen

dissolved in the water. The minimum concentration for Utah is 6.5 mg/liter for coldwater fish, and 5.5 mg/liter for warmwater fish.

- c. Nitrogen (we measure nitrate and ammonia) is used in building proteins, and is therefore an essential nutrient for plant and animal growth. Too much nitrate in a stream however, may cause too many plants to grow, which may cause problems when they die and decay. Both nitrate and ammonia can also be poisonous. The nitrate and ammonia tests are color tests, where the amount of color change is proportional to the amount of pollutant being measured. The State of Utah considers nitrate concentrations of 4 ppm(mg/liter) to be an indicator of pollution problems. Ammonia is much more toxic in warm water or at higher pH levels.
- d. Phosphorus is another important plant nutrient. Phosphorus is often the nutrient that limits how much plant growth occurs in a stream, lake or reservoir. We also measure phosphorus with a color test. The State of Utah considers a total phosphorus concentration of 0.05 ppm(mg/liter) in a stream or river an indicator of possible pollution problems.
- e. Turbidity is a measurement of the amount of suspended solids present in a stream. This affects how deeply light can penetrate. We measure turbidity with a turbidity tube. Fill the tube with stream water, then release the water until you can see the black and white disk at the bottom. The depth in the tube to this point is then converted into turbidity units (NTU's). The higher the NTU's, the cloudier the appearance.
- f. The temperature of the water is influenced by seasons, the geographic area of the stream, the source of water and the channel shape or shading from plants on the bank. We sample temperature with a field thermometer. The maximum temperature allowed for warm water fish and aquatic wildlife is 27 degrees Celcius. The maximum temperature allowed for cold water fish and aquatic wildlife is 20 degrees Celcius.

#### Biological Measurements

- a. The tiny animals that live in the streams are called aquatic macroinvertebrates. The types and abundance of macroinvertebrates found in a stream are important for two reasons. One, they indicate water quality. Different macroinvertebrates tolerate different types of stream conditions. Two, they are important parts of the aquatic and terrestrial food chain. We sample macroinvertebrates directly from the stream by dislodging them from the rocks they cling to and collecting them in a net. They can be observed with a magnifying glass or counted for a water quality index.
- b. The riparian zone is the green ribbon of life alongside a stream. The riparian zone connects the uplands zone to the aquatic zone. Well-functioning riparian zones are critical to a healthy watershed. All riparian measurements are taken by walking a transect and recording the plants with each step. We measure the types of plants that grow at the waters edge (the green line) to tell if these are plants which can hold on to the banks. We sample the canopy cover to see how shady the riparian area is. We sample the plants from the streams edge upward to see how extensive the riparian area is.