DiSCOVER

4-H WONDERS OF WATER CLUB

EXTENSION
UtahStateUniversity

DiSCOVER

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Description

The Discover 4-H Clubs series guides new 4-H volunteer leaders through the process of starting a 4-H club or provides a guideline for seasoned volunteer leaders to try a new project area. Each guide outlines everything needed to organize a club and hold the first six club meetings related to a specific project area.

Purpose

The purpose is to create an environment for families to come together and participate in learning activities while spending time together as a multi-family club. Members will experiment with new 4-H project areas.

What is 4-H?

4-H is one of the largest youth development organizations in the United States. 4-H is found in almost every county across the nation and enjoys a partnership between the U. S. Department of Agriculture (USDA), the state land-grant universities (e.g., Utah State University), and local county governments.

4-H is about youth and adults working together as partners in designing and implementing club and individual plans for activities and events. Positive youth development is the primary goal of 4-H. The project area serves as the vehicle for members to learn and master project-specific skills while developing basic life skills. All projects support the ultimate goal for the 4-H member to develop positive personal assets needed to live successfully in a diverse and changing world.

Participation in 4-H has shown many positive outcomes for youth. Specifically, 4-H participants have higher participation in civic contribution, higher grades, increased healthy habits, and higher participation in science than other youth (Lerner et al., 2005).

Updated September 2017

Utah 4-H

4-H is the youth development program of Utah State University Extension and has more than 90,000 youth participants and 8,600 adult volunteers. Each county (Daggett is covered by Uintah County) has a Utah State University Extension office that administers the 4-H program.

The 4-H Motto

"To Make the Best Better!"

The 4-H Pledge

I pledge: My HEAD to clearer thinking, my HEART to greater loyalty, my HANDS to larger service and my HEALTH to better living, for my club, my community, my country, and my world.

4-H Clubs

What is a 4-H Club? The club is the basic unit and foundation of 4-H. An organized club meets regularly (once a month, twice a month, weekly, etc.) under the guidance of one or more volunteer leaders, elects its own officers, plans its own program, and participates in a variety of activities. Clubs may choose to meet during the school year, only for the summer, or both.

Club Enrollment

Enroll your club with your local Extension office. Each member will need to complete a Club Member Enrollment form, Medical History form, and a Code of Conduct/Photo Release form (print these from the www.utah4h.org website or get them from the county Extension office).

Elect Club Officers

Elect club officers during one of your first club meetings. Depending on how many youth are in your club, you can decide how many officers you would like. This will typically include a president, vice president, pledge leader, and secretary. Other possible officers or committees are: song leader, activity facilitator, clean-up supervisor, recreation chair, scrapbook coordinator, contact committee (email, phone, etc.), field trip committee, club photographer, etc. Pairing older members with younger members as Sr. and Jr. officers may be an effective strategy to involve a greater number of youth in leadership roles and reinforce the leadership experience for both ages. Your club may decide the duration of officers (6 months, 1 year, etc.).

A Typical Club Meeting

Follow this outline for each club meeting:

- ☐ Call to order–president
- ☐ Pledge of Allegiance and 4-H Pledge–pledge leader (arranges for club members to give pledges)
- ☐ Song–song leader (leads or arranges for club member to lead)
- ☐ Roll call–secretary (may use an icebreaker or get acquainted type of roll call to get the meeting started)
- ☐ Minutes of the last meeting–secretary
- ☐ Business/Announcements–vice president
- ☐ Club Activity–arranged by activity facilitator and includes project, lesson, service, etc. These are outlined by project area in the following pages.
- ☐ Refreshments–arranged by refreshment coordinator
- ☐ Clean Up–led by clean-up supervisor

Essential Elements of 4-H Youth Development

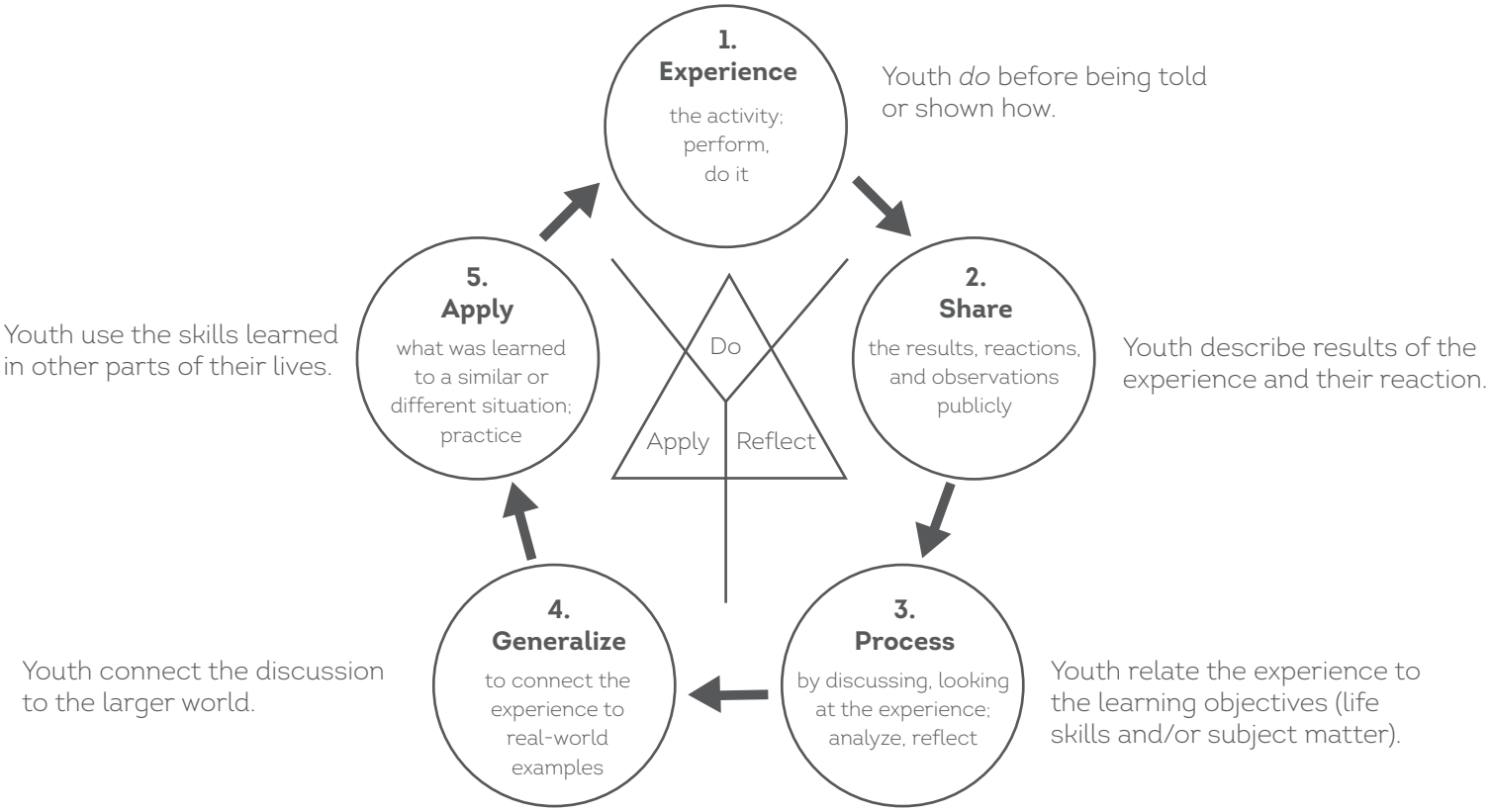
The essential elements are about healthy environments. Regardless of the project area, youth need to be in environments where the following elements are present in order to foster youth development.

1. **Belonging**: a positive relationship with a caring adult; an inclusive and safe environment.
2. **Mastery:** engagement in learning, opportunity for mastery.
3. **Independence:** opportunity to see oneself as an active participant in the future, opportunity to make choices.
4. **Generosity:** opportunity to value and practice service to others.

(Information retrieved from: http://www.4-h.org/resource-library/professional-development-learning/4-h-youth-development/youth-development/essential-elements/)

4-H "Learning by Doing" Learning Approach

The Do, Reflect, Apply learning approach allows youth to experience the learning process with minimal guidance from adults. This allows for discovery by youth that may not take place with exact instructions.



4-H Mission Mandates

The mission of 4-H is to provide meaningful opportunities for youth and adults to work together to create sustainable community change. This is accomplished within three primary content areas, or mission mandates - citizenship, healthy living, and science. These mandates reiterate the founding purposes of Extension (e.g., community leadership, quality of life, and technology transfer) in the context of 21st century challenges and opportunities. (Information retrieved from: http://www.csrees.usda.gov/nea/family/res/pdfs/Mission_Mandates.pdf)

1. **Citizenship:** connecting youth to their community, community leaders, and their role in civic affairs. This may include: civic engagement, service, civic education, and leadership.
2. **Healthy Living:** promoting healthy living to youth and their families. This includes: nutrition, fitness, social-emotional health, injury prevention, and prevention of tobacco, alcohol, and other drug use.
3. **Science:** preparing youth for science, engineering, and technology education. The core areas include: animal science and agriculture, applied mathematics, consumer science, engineering, environmental science and natural resources, life science, and technology.

Getting Started

1. Recruit one to three other families to form a club with you.
    a. Send 4-H registration form and medical/photo release form to each family (available at utah4h.org).
    b. Distribute the Discover 4-H Clubs curriculum to each family.
    c. Decide on a club name.
    d. Choose how often your club will meet (e.g., monthly, bi-monthly, etc.).
2. Enroll as a 4-H volunteer at the local county Extension office (invite other parents to do the same).
3. Enroll your club at the local county Extension office.
    a. Sign up to receive the county 4-H newsletter from your county Extension office to stay informed about 4-H related opportunities.
4. Identify which family/adult leader will be in charge of the first club meeting.
    a. Set a date for your first club meeting and invite the other participants.
5. Hold the first club meeting (if this is a newly formed club).
    a. See *A Typical Club Meeting* section above for a general outline.
        i. Your activity for this first club meeting will be to elect club officers and to schedule the six project area club meetings outlined in the remainder of this guide. You may also complete a-d under #1 above.
    b. At the end of the first club meeting, make a calendar outlining the adult leader in charge (in partnership with the club president) of each club meeting along with the dates, locations, and times of the remaining club meetings.
6. Hold the six project-specific club meetings outlined in this guide.
7. Continue with the same project area with the 4-H curriculum of your choice (can be obtained from the county Extension office) OR try another Discover 4-H Club project area.

Other Resources

Utah 4-H website: www.Utah4-h.org

National 4-H website: www.4-h.org

4-H volunteer training:

To set up login:

http://utah4h.org/volunteers/training/

To start modules: (password = volunteer)

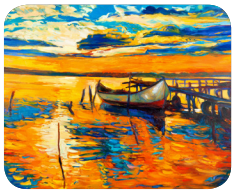
References

Information was taken from the Utah 4-H website (utah4h.org), the National 4-H website (4h.org), the Utah Volunteer Handbook, or as otherwise noted.

Lerner, R., M. et al. (2005). Positive youth development, participation in community youth development programs, and community contributions of fifth grade adolescents: Findings from the first wave of the 4-H Study of Positive Youth Development. Journal of Early Adolescence, 25(1), 17-71.

We would love feedback or suggestions on this guide; please go to the following link to take a short survey:
Go to https://goo.gl/iTfiJV or Click here to give your feedback

4-H WONDERS OF WATER CLUB *Meetings*



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DISCOVER
4-H Wonders of Water Club

Activity 1 Supplies

- 1 gallon of distilled water
- 5-10 clean pennies
- 5 eye droppers / small pipettes

Activity 2 Supplies

- Glass cup
- 6 or more paper clips
- Small slips of paper, toothpicks or other small objects
- Liquid dish soap
- Paper cups

GENERAL OVERVIEW OF THIS CLUB

This club provides ways to explore the wonders of water through science, art and service.

INTRODUCTION

The shape of the water molecule gives it many different properties than other similar sized molecules, including water's relatively high boiling and freezing temperatures and water's remarkable ability to dissolve many other substances. The two activities during this club meeting explore pure water's remarkable "cohesion" or how tightly the water molecules cling to each other.

SET UP

- Conduct this activity on paper towels, small trays, outdoors, or anywhere that spilled water won't matter.

Activity #1
Penny Drops

PENNY DROPS

TIME: 15 MINUTES

1. Discuss the activity. Explain that the club members can have a competition to see who can "balance" the most drops of water on a penny. Ask club members to make predictions of how many drops of distilled water they can balance. Ask whether adding soap to the water would change results. Ask them to explain their predictions.

2. Divide the club into groups of three or four. Give each group a couple of pennies, several droppers, a glass of water, and paper towels to clean up spilled water.

3. Taking turns, each member should slowly place drops of pure water (distilled) on the surface of a penny.

4. Count each drop and continue until the water drop "breaks" and runs off the penny.

5. Write down the total number of drops before it spilled over.

6. Repeat the experiment with soapy water and write down results.

7. Compare and contrast the results from each group.

Activity #2

Paper Clip Magic

PAPER CLIP MAGIC

TIME: 15 MINUTES

As the next activity demonstrates, water's cohesion makes it fairly easy for small insects to walk on its surface.

1. Fill a glass cup with water and very gently place a paper clip upon the water surface. (It will sink.)
2. Take another paper clip and bend it so that it forms a 90-degree angle (see Image 1).
3. Take a third paper clip and lay it across the bent paper clip (see Image 2).
4. Slowly lower the paper clip down onto the water's surface then carefully remove the bent one. (It will float.)
5. Try this with other small flat objects (slips of paper, toothpicks, small coin).
6. Repeat the experiment with soap or other liquids added to the water in the cup.

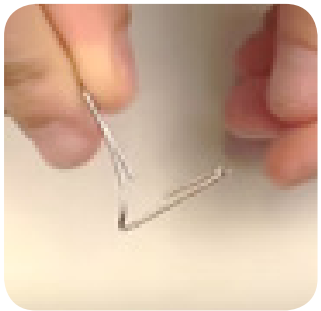


Image 1

Image 2

Reflect

- What happened? (*This activity demonstrates a water property called "cohesion", which is the tendency of water to form drops that cling to each other, creating "surface tension." Water also clings to other types of substances, such as glass and metal.*)

- Why doesn't the water "cling," or "support" as well when soap is added? (*Soap interferes with water's surface tension by breaking some of the polar bonds on the surface.*)

- Did you always get the same results with each penny? (*No –you will get some variability due to droplet size, surface of pennies, the force applied to the eye dropper, etc.*)

- Why was it important to lay the paperclip on the water? (*By doing this you distributed the total weight of the paperclip over the entire length of wire floating on the water.*)

- How could you make heavier objects float? *(Increase the area or total length of the object that is in contact with the surface.)*

Apply

- How does surface tension affect the world around us? *Water molecules cling to each other to make raindrops. Water can form a mound over the edges of a full glass. Surface tension, sometimes described as is if a skin has formed over the surface of water, acts as a barrier to objects moving from air to water or vice versa. Insects such as "water striders" can walk on the surface of water, and the larvae of other insects such as mosquitoes can hang down from water's surface.*

- What other special properties does water have? *Because of water's "polar bonds", ice forms open structured crystals that float. Because of this, oceans and lakes stay liquid beneath frozen ice rather than filling in with ice. Water boils, evaporates and freezes at very high temperatures compared to other molecules its size. Because of this, Earth naturally has all three forms of water – ice, liquid and vapor.*

Keep Exploring!

- Capillary Climbing Activity:
  http://www.sciencekids.co.nz/experiments/escapingwater.html

- Amoeba Sisters video about water properties:
  https://www.youtube.com/watch?v=3jwAGWky98c

References and Other Resources

https://www.sciencebuddies.org/science-fair-projects/project-ideas/Chem_p021/chemistry/measuring-surface-tension-of-water-with-a-penny

https://sciencebob.com/make-a-paperclip-float/

https://science.wonderhowto.com/how-to/make-paperclip-float-water-0145901/

Water Across the World

Activity Supplies

- 8 (6" X 6" X 6") cardboard boxes, cubes of Styrofoam or other light material to be used as dice
- Printed die labels (see Club Meeting 2 Appendix 1)
- Printed station labels (see Club Meeting 2 Appendix 2)
- Tape
- A bell or whistle
- Beads of 8 different colors that represent the different stations (e.g., blue for ocean, white for clouds, etc.). You need about 15 beads for each participant
- String for the beads
- Bracelet clasps or key chain attachments for the finished strings of beads

INTRODUCTION

Water on earth is found in different forms and areas such as the oceans, the atmosphere, groundwater, etc. We often call these "reservoirs", not to be confused with water held behind a dam. The water cycle is sometimes portrayed as a simple circle as water moves in a simple fashion from one "reservoir" to another. In fact, the water cycle is a complicated set of intertwined pathways. Water may stay in one reservoir for centuries, such as occurs with groundwater or glaciers, or may move quickly from one reservoir to another, as happens when water evaporates into the atmosphere and then condenses into rain.

This activity emphasizes both the variable routes a water molecule might take, but also the time that water may stay in each reservoir. Everyone becomes a water molecule and goes through different stages of the water cycle to learn how water moves - or in some cases, doesn't move, at least not for a very long time!

Although club members can track their water journey by recording each step on a list, we recommend making a keychain or bracelet with beads representing each stop along the way. This is a fun and highly visible way to see and compare the different pathways that a water molecule might take through the water cycle.

PRIOR TO THE MEETING

- Print out station signs and the dice coverings for each station.
- Attach the die labels to cubes, making sure that each finished die will roll easily and randomly land with any side up. You may want to cover each die and label completely with clear packing tape.
- Cut string or twine into 1 foot lengths, and attach bracelet clasp or key chain to each string.
- Thread a single bead to each string. The color of the bead is the starting point for each journey, so distribute these as evenly as possible.
- Place the remaining beads in separate containers.

- Place the station labels around the room in different locations. Station labels should be clearly visible to all participants (e.g. taped to a wall).
- Place a die at each station.
- Place a container of beads corresponding to each station near the station labels. Make sure that each station has enough room for club members to roll a die and to add a new bead to their string.

Activity #1

The Incredible Journey

THE INCREDIBLE JOURNEY

TIME: 30 MINUTES

1. Tell the club members that they are going to become water molecules moving through the water cycle. Ask them to describe the water cycle. (Typically this will be the simple cycle taught in grade school – a simple set of steps in which each water molecule moves from a cloud to a puddle, running off to a lake or ocean, evaporating back to a cloud and repeating. This activity will allow the students to better understand that this is a very simplified notion!)
2. Show the club members the different stations (reservoirs) and ask them to think about the different paths a water molecule might take from that reservoir. (For example, water in a lake might evaporate, might be consumed by an animal, or might stay in the lake.)
3. Give each club member a length of string with a colored bead tied to one end.
4. Have club members go to the station represented by their colored bead.
5. In this game, a roll of the die determines where water will go. Club members line up behind the die at their station. The club members roll the die and go to the location indicated by the label facing up. If they roll "stay," they move to the back of the line at their current station.
6. Every time a club member rolls the die at any of the stations, they add a bead to their keychain/bracelet for the stations they roll.
7. This will help club members see their path as a water molecule through the water cycle. Remind the members to take only one bead per roll.
8. Begin the activity with a bell or whistle and allow it to continue for approximately 10 minutes. Use the bell or whistle to stop the activity.
9. At the end of the activity, ask the members where they spent most of their time? Why do they think they stayed in one area for most of the time? Read the residence time of water molecules from the table below to the group. Explain that water doesn't move into and out of the different reservoirs at the same rate and that it may stay in some reservoirs for a long period of time, as they experienced during the activity.

*To illustrate the average time that water molecules remain in various reservoirs, the table below was taken from the following website: http://scied.ucar.edu/longcontent/water-cycle

Reservoir	Residence Time (Average)
Oceans	3,000 to 3,230 years
Glaciers	20 to 100 years
Seasonal snow cover	2 to 6 months
Groundwater: shallow	100 to 200 years
Groundwater: deep	10,000 years
Lakes	50 to 100 years
Rivers	2 to 6 months
Atmosphere	9 days

Reflect

- Based on what was experienced today, what are the different paths that water takes as it moves around the *planet? (Water molecules follow convoluted pathways between the different "reservoirs" of water on Earth.)*

- Where does the water that you use come from? *(The water on Earth is ancient. Much of this has been here since Earth was first formed. Some water was lost from Earth's early atmosphere but other water entered Earth's early atmosphere via icy comets.)*

- Can we make new water on Earth? *(Water changes form and water molecules are sometimes formed or broken apart in chemical reactions, but we can't actually make new water.)*

- What is the energy that drives the water cycle? (*the sun, which evaporates water*)

- What is the importance of conserving water? *(Because most of the water on Earth is not in a form that we can easily use, we must use the water we have carefully. We should also take care to keep this water from becoming polluted, because polluted water is not as useful to us.)*

- Where does the water in the streams and rivers that pass through your town come from? Where does it go? *(Water may fall as snow and drain from mountains as the weather warms. It may also fall as water, collecting in small streams that combine to form rivers. Water passing through your town may be used for irrigation by farms, for drinking water by cities, for industry, for recreation, and by wildlife. Some of these activities remove water from the stream. Some may add pollutants to the water heading downstream. Water "consumption" and water pollution mean that less downstream water is available.)*

- Why might we expect the planet to be wetter (more rain) as the earth experiences climate change? *(Heat from the sun causes more water to evaporate from the oceans, lakes and rivers. Also warmer air holds more evaporated water. For both these reasons, as the Earth heats up, we expect more rain and snow to fall.)*

- Why isn't precipitation spread evenly around the globe? *(Local rain patterns are modified by prevailing winds, ocean currents, elevation of the land, longitude and latitude.)*

Apply

Water conservation and keeping our water clean is important. Here are a few things we can all do to help. Ask your club members for other ideas.

- Don't leave the water running while brushing your teeth. Limit your showers to 10 minutes or less.
- Wash your car or dog on the lawn instead of the driveway. This keeps pollutants from the soap or car from getting to the storm drains and your lawn gets watered, too.
- Only wash full loads of dishes and laundry to help reduce pollution to our small and limited water available for human use.
- Don't use excessive amounts of fertilizers or pesticides around your house. They can wash into the storm drains and end up in a stream.
- Never put something down a storm drain that may hurt a fish.
- Walk only on existing trails when near the water to help reduce erosion

Keep Exploring!

- Think about ways to track water at a smaller scale. Club members can track:

  The water used in their homes, schools or churches.
  The water used for the landscaping at their own home or for an entire neighborhood or community.
  They may also want to think about the water pathways and uses in their local watershed.

- Members may want to have a water conservation competition.

References and Other Resources

https://www.watercalculator.org/water-use/indoor-water-use-at-home/

https://www.watercalculator.org/

https://www.epa.gov/watersense/watersense-calculator

https://conservewater.utah.gov/

Animal

After using you to process food, the animal pees and you end up on the ground.

Go to mountain.

After using you to process food, the animal pees and you end up on the ground.

Go to mountain.

You are exhaled from the animal's lungs into the air as vapor.

Go to cloud.

You are exhaled from the animal's lungs into the air as vapor.

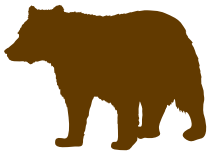
Go to cloud.

After using you to process food, the animal pees next to a stream.

Go to stream.

You get incorporated into an animal's body.

Stay in animal.



You fall as snow into the ocean.
Go to ocean.

You fall as rain into the ocean.
Go to ocean.

You fall as rain into the ocean.
Go to ocean.

You fall as rain onto a mountain.
Go to mountain.

You fall as snow onto a mountain.
Go to glacier.

You fall as rain onto a parking lot and make your way to a stream.
Go to stream.

You stay frozen.
Stay in glacier.

You stay frozen.
Stay in glacier.

You evaporate into the air.
Go to cloud.

Ice melts and you drain into ocean.
Go to ocean.

The ice melts and you run off into a river.
Go to stream.

Ice melts and you drain into ocean.
Go to ocean.

You move slowly down between soil and rock particles. Eventually you flow into the ocean.

Go to ocean.

You move slowly down between soil and rock particles. Eventually you flow into a stream or wetland.

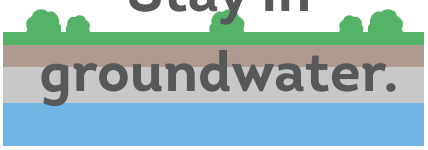
Go to stream.

You move slowly down between soil and rock particles. Eventually you flow into a stream or wetland.

Go to stream.

You continue to move slowly into deep groundwater.

Stay in groundwater.



You are pumped out of the ground for irrigation or drinking water, but evaporate instead.

Go to cloud.

You are pumped out of the ground from a well to irrigate crops. A plant takes you up through its roots.

Go to plant.

You soak into the ground and are absorbed by a plant's roots.

Go to plant.

You soak into the ground and become part of the groundwater.

Go to groundwater.

You soak into the ground and are absorbed by a plant's roots.

Go to plant.

You move downhill and become part of a stream.

Go to stream.

You move downhill and become part of a stream.

Go to stream.

You soak into the ground and become part of the groundwater.

Go to groundwater.

You are one of countless water molecules in the ocean and you stay there.

Stay in ocean.

You are incorporated into a jellyfish.

Go to animal.

You are one of countless water molecules in the ocean and you stay there.

Stay in ocean.

You evaporate into the air.

Go to cloud.

You are one of countless water molecules in the ocean and you stay there.

Stay in ocean.

You evaporate into the air.

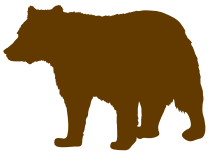
Go to cloud.

The plant is eaten by an animal.

Go to animal.

The plant is eaten by an animal.

Go to animal.



The plant transpires you through its leaves into the air as vapor.

Go to cloud.

The plant transpires you through its leaves into the air as vapor.

Go to cloud.

The plant dies and you decompose into the soil.

Go to mountain.

The plant incorporates you into its tissues.

Stay in plant.

You evaporate into the air.

Go to cloud.

An animal comes to the stream for a drink.

Go to animal.

You flow in the stream to a river and eventually reach the ocean.

Go to ocean.

You flow in the stream to a river and eventually reach the ocean.

Go to ocean.

You flow from a small stream to a larger river.

Stay in stream.

You soak into the ground and become part of the groundwater.

Go to groundwater.

Appendix 2: Station Signs


CLOUD

GLACIER


GROUND
WATER

MOUNTAIN SOILS


OCEAN

PLANT

STREAM

4-H Club Meeting 3
What's in the Water?

Activity 1 Supplies

- Plastic, disposable gloves (See resources)
- Household products with varying pH. (Suggestions: sodas, tap water, distilled water, cleaning supplies, vinegar, etc.)
- If possible, also collect water from other sources – rain water, snow melt, groundwater, etc.
- pH strips (See resources)
- Eye dropper (See resources)
- Small plastic cups and sharpie to label cups
- Results tables (Club Meeting #3 Appendix 1)

Activity 2 Supplies

- Tap water and ice cubes
- Small plastic cups.
- Sharpie to label cups
- Water thermometers (See resources)
- Dissolved oxygen kits (See resources)
- Results table (Club Meeting #3 Appendix 2)

INTRODUCTION

In this club meeting, we will explore the wonders of water through fun, hands-on activities that teach basic science principles. In Activity 1, we will be measuring water temperature and pH, and learning how these can affect aquatic organisms. In Activity 2, we will measure and explore the importance of dissolved oxygen in water. We'll learn how temperature affects how much oxygen can dissolve into water.

PRIOR TO THE MEETING

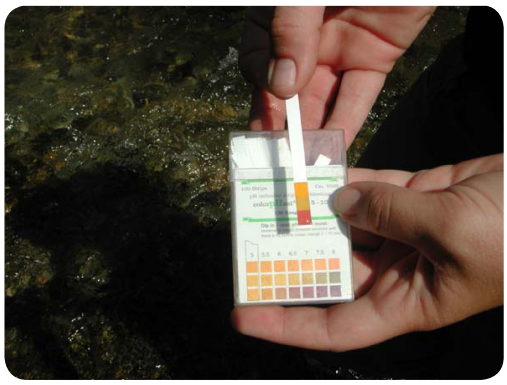
- Protect surfaces from spills during this activity by using paper towels, small trays, or conduct the activity outdoors or anywhere that spills won't matter.
- Label cups with the solution/liquid name and pour small volumes into the cups.
- Set up stations for different solutions.
- Place dry (new) pH strips at each station.

Activity #1
Measuring pH

MEASURING PH

Time: 15-20 MINUTES

1. Have everyone put on disposable plastic gloves.
2. Club members may work alone or in teams. Distribute datasheets to each team or club member and have them move to different stations.
3. At each station, members should carefully dip the pH strip into the first liquid and then let it sit for the amount of time directed on the pH package.



4. Fill in the table with the name of the liquid and results. Is the liquid you just tested an acid, a neutral liquid, or a base?

5. Repeat these experiments with all the liquids you selected, recording the pH of each.

6. To explore the impact of acids and bases on natural water, pour about ¼ cup of tap or stream water into a cup. Choose a very acidic (low pH) or very basic (high pH) solution to experiment with. Record water source and solution on the 2nd data sheet. Add 1 drop of solution to the cup and measure the pH. Record on the datasheet. Using a new pH strip each time, repeat up to 10 times or until the pH changes.

7. To explore the impact of acids and bases on distilled water, pour about ¼ cup of distilled water into a plastic cup. Add 1 drop of solution (from #6) to the cup, measure the pH using a new pH strip each time, and record on the datasheet. Repeat until the pH changes.

Activity *#2*

Measuring Temperature and Dissolved Oxygen

MEASURING TEMPERATURE AND DISSOLVED OXYGEN

Time: 20-30 MINUTES

1. Create three stations consisting of: room temperature water, hot water, and water with ice cubes added (stir vigorously to mix with air).

2. Let club members read and record temperature at each station. Be sure to record the proper units. (degrees C or degrees F)

3. If dissolved oxygen kits are available, have club members measure dissolved oxygen at each of the three stations. Follow the simple instructions in the kit or go to http://extension.usu.edu/utahwaterwatch/monitoring/field-instructions/dissolvedoxygen/ for more information.

Reflect

- Which liquids were the most acidic? Most basic? *(Lower pH=acidic, higher pH=basic)*

- Discuss the range that is acceptable for living organisms. *(In many states, including Utah, pH levels between 6.5 and 8.0 are considered acceptable for most living organisms. See Table in Club Meeting 3 Appendix for more information.)*

- Why are most Utah streams neutral pH? *(Utah's geology has a large amount of calcium carbonate in rocks and soils that helps buffer the water.)*

- Discuss the pH Scale (*See Table in Club Meeting 3 Appendix*). The scale ranges from 0-14 with anything below 7 representing an acid substance, and anything above 7 representing a basic substance. Note that an increase of one in the pH scale corresponds to a tenfold increase in hydrogen ion concentration. Log scales are a useful way of condensing large changes in magnitude to a more manageable scale such as the pH and Richter scale.

- What changes pH in natural waters? For more information about changes in pH in natural waters, go to https://extension.usu.edu/waterquality/learnaboutsurfacewater/propertiesofwater/ and click on pH

- Discuss the connection between water temperature and available oxygen in the water. *(Colder water can hold more dissolved oxygen.)*

- Why is it important to know the temperature of natural water bodies? *(Most organisms that live in water are "exothermic" – their bodies are the same temperature as the water. These organisms usually have a specific temperature range in which they can thrive.)* For a more detailed lesson plan about temperature effects, see http://streamsidescience.usu.edu/lessons/5-12/when-things-heat-up/index

- Why is it important to measure dissolved oxygen in water? *(All animals that live in water use oxygen, but most use oxygen that has dissolved in the water -NOT the bubbles in the water.)* For more information about the importance of dissolved oxygen, go to https://extension.usu.edu/waterquality/learnaboutsurfacewater/propertiesofwater/ and click on dissolved oxygen

Apply

- Scientists take many different types of water measurements for many reasons. For example, some scientists test tap water to make sure it is safe to drink. Other environmental scientists test lakes and streams to make sure the organisms that live in these waters will stay healthy.

- What are some of the measurements they might take? What would these measurements tell us? *(Water temperature, dissolved oxygen, dissolved salts or metals, and the presence of disease causing organisms.)*

- Why might we want to limit the amount of acidic substances that we consume or release to the environment? *(Acids that enter into natural waters may lower its pH. This may damage fish eggs and can damage organisms such as fish, macroinvertebrates, and many marine organisms, including corals.)*

Keep Exploring!

- Create a homemade water filtration device. Click on the link below to access USU Extension's water quality website and click on "Homemade Water Purifier:"
  http://extension.usu.edu/waterquality/educator-resources/lessonplans/index

- Have your club join Utah Water Watch to monitor a local waterbody:
  http://extension.usu.edu/utahwaterwatch

- Utah Water Watch Citizen Science Project:
  https://www.youtube.com/watch?v=J8i483gskME

- Check out the Stream Side Science website at: http://streamsidescience.usu.edu/

- The Utah Stream Team manual provides many simple monitoring techniques and helps users interpret their results. To see and/or download this document, go to: http://extension.usu.edu/waterquality/wq-publications/index. Under publications, click on "Resources for Educators" and select "Utah Stream Team" under "Program Manuals."

- Optional Activity: Water Pollution Graphing
  https://digitalcommons.usu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=2168&context=extension_curall

References and Other Resources

To borrow kits and supplies: Go to http://extension.usu.edu/waterquality/educator-resources/equip/index for a map of Extension office locations where equipment is available for loan.

To purchase kits and supplies: Go to https://usu.app.box.com/s/dmnh4jpmd6wrimq38pzskuodvnsi9i28 for a table of water quality supply sources and prices.

The "Utah Stream Team Manual" and the "Stream Side Science Manual" provide additional information about interpreting and measuring water quality parameters, including pH, temperature, and dissolved oxygen. To access or download these manuals, go to: http://extension.usu.edu/waterquality/wq-publications/index Under "Publications", click on "Resources for Educators." Both documents are available under "Program Manuals."

For additional documents about pH and dissolved oxygen go to the Fact Sheets link at http://extension.usu.edu/waterquality/wq-publications/index. You'll find fact sheets about pH and dissolved oxygen under the "Understanding Your Watershed" list of publications.

Club Meeting #3 Appendix 1: pH results tables

pH Results Table

Solution	pH	Is this Basic? Neutral? Acidic?

Effect of acid or base additions to tap, stream or distilled water

Water source (tap, stream, distilled)	Name of Acid or Base solution:	Number of drops added to water	pH

Club Meeting #3 Appendix 2. Temperature and Dissolved Oxygen table

Temperature and Dissolved Oxygen Results

Sample ID	Temperature (indicate units)	Dissolved oxygen (mg/liter)

The pH Scale

Common Substances		Biological Effects
Stomach acid	1	
Lemon juice		
	2	
ACIDIC		
Vinegar	3	All fish die
Soft drinks		Caddisflies and mayflies die
Tomatoes	4	
Carrots		
		Salmon eggs and alevins die
Normal rain	5	Bass and trout begin to die
		Snails and tadpoles begin to die
Milk	6	
NEUTRAL	7	
Human blood		Optimum for most fish
Egg whites	8	
Baking soda	9	
BASIC	10	All fish die
Ammonia		
	11	
Bleach		
	12	
Lye		
	13	
	14	

Activity 1 Supplies

- Pictures of aquatic macroinvertebrates (see Club Meeting
- 4 Appendix)
- Materials from "Items Representing Adaptations" in Table 1 of this activity (e.g., water noodle, feather boa, rope, sunglasses, googly eyes, etc.)

Activity 2 Supplies

- None needed other than a safe area to play the game.

INTRODUCTION

Many people only think of fish when asked about animals that live in our lakes and rivers. Other animals live under rocks, in the mud, or float in the water and are far more abundant than fish but because of their small size are often overlooked. The group of small animals that live in streams, rivers, and shallow waters are called aquatic "macroinvertebrates." As the name indicates, these macroinvertebrates, unlike fish, reptiles, and amphibians, don't have backbones.

"Macro" may suggest that they are large, but it really means that they are large enough to be seen without magnification (although a magnifying glass helps with the details). This group includes worms, mollusks, and crustaceans, but many are insects who spend the young stages of their lives in water before "emerging" into the air as adults. Most aquatic macroinvertebrates live under rocks and woody debris in the water or burrow into bottom sediments. Macroinvertebrates eat smaller organisms, plant materials, and detritus and are often an important source of food for fish and other large animals living in the water. Even smaller microscopic animals (zooplankton) live in most lakes and ponds. These animals may be visible as small dots in the water and can only be observed closely with a microscope.

Everything in nature has a niche or habitat–a place where conditions are best for it to live, reproduce and thrive. Some organisms can only live under very specific conditions. For example, some aquatic macroinvertebrates require cold and clear water with lots of dissolved oxygen that is free of toxic metals or other pollutants. Other organisms are far more tolerant of different conditions and may do fine in cloudy, warm and shallow waters. In Activity 1 of today's meeting, we'll learn about some of the adaptations that these small organisms need to survive in different habitats.

Sometimes organisms are introduced into new environments. Often these organisms do not survive because conditions are so different. On the other hand, some new organisms can do just fine in a new location and may even do better than the original inhabitants, especially if there are no natural predators in the new location. These organisms can become so abundant that they cause serious ecological consequences, such as outcompeting native organisms for food or preying on native organisms. We call these "invasive species". Activity 2 explores some of the impacts that aquatic invasive species can have on the ecosystems of lakes and rivers.

PRIOR TO THE MEETING

- Have printouts of aquatic insects readily available. Conceal items representing adaptations in a large but easy to access container (e.g., a plastic tub). Read over or print out Table 1: Adaptations for life underwater.

Activity #1
Build-A-Bug

BUILD-A-BUG

Time: 30 MINUTES

This activity uses pictures and other information about the different aquatic organisms and their special adaptations. The activity is adapted from an activity called Build-A-Bug and is available at:
http://extension.usu.edu/files/publications/publication/NR_WQ_2005-02.pdf

1. Help club members understand what is meant by aquatic macroinvertebrates, (See definition in Introduction above.) Ask them what is meant by aquatic (water-related), invertebrate (no backbone), and macro (visible with our eyes).

2. Tell club members that many of the macroinvertebrates are insects who hatch from eggs laid in the water and live in the water until they have developed into adults. Ask club members if they might need to change some things about themselves for living in the water? Ask them to suggest different adaptations an aquatic insect (or other aquatic macroinvertebrate) would need to live in an aquatic environment.

3. As members share ideas with you, show the pictures of aquatic insects that you've printed out. Identify some of these adaptations in the immature forms.

4. Choose a volunteer from the group and tell the group that they're going to help adapt them so they can live under water, like an aquatic insect.

5. Ask the group what adaptations the volunteer needs in order to live in water. Try to get them to really think about how different the world is for an aquatic animal compared to a land animal.

6. As the group gives out ideas, dress the volunteer in the items from the table below that represent the adaptations.

7. Discuss the adaptations as you go along. Why would a macroinvertebrate need them? How do they help the macroinvertebrate survive? (For example, you could ask club members what the macroinvertebrates need to breathe underwater. This should get them thinking about the need for gills to breathe "dissolved oxygen" or perhaps having the ability to carry air underwater with them.)

8. Be sure to take a photo of your adapted club member at the end of the activity.

Table 1. Aquatic Insect Adaptations

Adaptation	**Use**	**Example (**See Aquatic Macroinvertebrate Information charts)	**Items to represent the adaptation***
Category: Adaptations for breathing while living underwater			
Gills	To breathe the dissolved oxygen in the water.	Mayfly larvae (gills are found on their abdomen).	Feather boa (gills are often "frilly" in order to expose a lot of gill surface to the water.)
Air bubble	Like a SCUBA tank, atmospheric oxygen can be taken underwater.	Some insects (eg water boatmen) trap air in small hairs on their body and carry this bubble underwater with them.	Inflated balloon.
Breathing tube	Like a snorkel, to breathe air while underwater.	Mosquito larvae	Straw
Category: Ways to sense the environment			
Compound eyes	To see. Most insects have eyes with many small lenses (unlike our eyes with one main lens). This doesn't create a really clear image, but works well to detect motion.	Immature stoneflies and mayflies have large eyes that they may use to detect food but also to see predators. Blackfly larvae have small eyes. These remain attached and hidden below rocks and do not eyes to filter particles from the water.	Large plastic sunglasses with "googly eyes" glued to them.
Small hairs on the head or body	To detect movement or chemical changes in the water.	Black fly larvae.	Wig or furry hat
Antennae	To use chemical cues in the water to detect food or predators.	Stoneflies	Store bought or make them with pipe cleaners attached to a hair band.

Category: Ways to catch or handle food			
Specialized mouth parts	For scraping, piercing, shredding food items. The specialized mouth part indicates the type of diet an animal eats.	Read about different feeding habits on macroinvertebrate information charts or online.	"Vampire" teeth or other goofy fake mouth parts.
Net for catching food	For filtering or catching food as it floats by. Nets may be grown or built.	Blackfly larvae have hairs on their heads that capture food. Caddisflies often "spin" a net out of mucus, then reel it in after its trapped material from the stream.	Small fishing or aquarium net.
Sharp claws	Can capture food. Also used to hold on to rocks or logs.	Stoneflies	Pirate or monster claw (can attach these to the water noodles that represent legs).
Category: Ways of moving or staying in place in the water.			
Legs	To walk on underwater surfaces, or to swim.	Insects have 6 legs (we just have 4 limbs) although not all immature insects have legs (see Craneflies or blackflies).	Water noodle with a strap or small rope in the middle to gently tie around your volunteers middle.
Tails	Swimming and maneuvering in the water	Stoneflies or mayflies	Garlands or ropes.

* Costume or toy stores are great places to look for many of these items.

ZOMBIE INVADERS

Time: 10-15 MINUTES

In many ways aquatic invaders are like zombies - once they arrive, they harm the local organisms and are hard to get rid of. This fun activity drives home some of these points. Zombie Invaders is a modified game of tag with two rounds that help club members learn about invasive species and the tools and methods we might use to control them. See http://streamsidescience.usu.edu/lessons/5-12/aquatic-invasion/index for more information.

Round 1

1. Assign one or two club members to be zombies.
2. Explain that everyone the zombies touches becomes infected and must remain still for 25 seconds–then they become a zombie whose new goal is to turn everyone else into a zombie!
3. Continue the game until everyone has been tagged and becomes a zombie.

   At this point ask them what things would have to change for the zombies not to win. Some suggestions might be giving humans special powers or tools. One easy way to play is to set aside a "medic" who is able to reverse the effects of the zombie attack and can cure anyone the zombies catch if they are able to get to them within 25 seconds of being tagged.

Round 2

1. Assign one or two members to be zombies.
2. Assign one or two members to be a "medic."
3. As the game begins anyone that is tagged by a zombie becomes infected and remains still for 25 seconds and then turns into a zombie. But, if the "medic" tags an infected human within those first 25 seconds, the member is cured and remains a human.
4. Continue the game until your allotted time for the game runs out.

   After the second round, help club members make the connection that zombies are like invasive species. In the "real world," if there is no management or treatment for these invasive species they may take over completely. But, if an area is well-managed, the native species can thrive in its environment. Preventing aquatic invasive species from getting established is the best way to fight against them.

Reflect

- What adaptations do we (as humans) have to survive in our environment?
- What do you think causes an animal to become "invasive"?
- Why might invasive species be a threat to native species in a given ecosystem?
- Why might we not want to release animals we buy from the pet store out in the wild?

Apply

- Richard brought his pet bullfrog to class. He and his classmates thought about releasing it to a nearby pond. Why is this a bad idea? *(Pet bullfrogs are probably not native where he lives. A released frog either would not survive or could become an invasive species. The outcome would be difficult to know.)*
- What are some examples of local and aquatic invasive species *(Quagga Mussels, Zebra Mussels, bullfrogs, Phragmites, Russian Olive, Tamarisk)*
- What is the Utah Division of Wildlife Resources doing and how can you help reduce invasive species? (see: https://wildlife.utah.gov/173-invasive-species.html)

Keep Exploring!

- You can see the aquatic macroinvertebrates in their natural environment by visiting a stream and turning over rocks (be careful that you stay in shallow water and never go into water that is too deep or too cold). Follow this link to find the lesson plan that accompanies this activity https://extension.usu.edu/files/publications/publication/NR_WQ_2005-05.pdf
- Club members can make "Unwanted Posters" about local aquatic invasive species. See http://seagrant.oregonstate.edu/sites/seagrant.oregonstate.edu/files/lp-t-most-unwanted-poster_1.pdf for some resources about local invasive species and some great ideas about designing these posters.

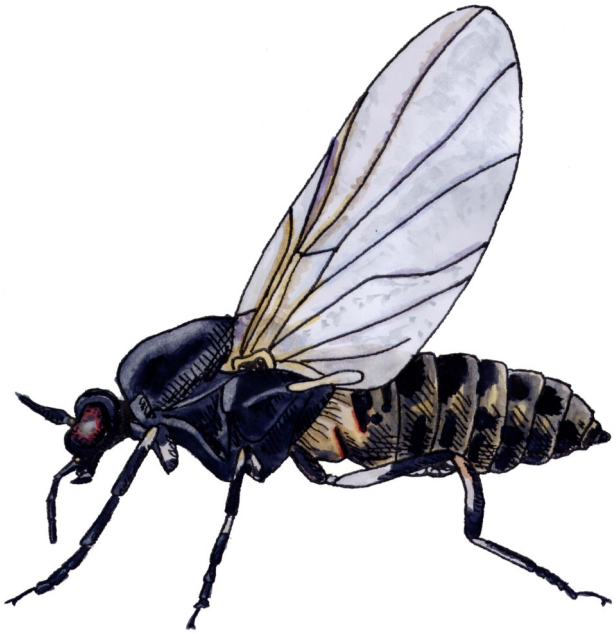
References and Other Resources

http://streamsidescience.usu.edu/lessons/5-12/aquatic-invasion/index

https://extension.usu.edu/waterquality/learnaboutsurfacewater/propertiesofwater/invasivespecies

http://seagrant.oregonstate.edu/sites/seagrant.oregonstate.edu/files/lp-t-most-unwanted-poster_1.pdf

BLACKFLY



1-12 mm

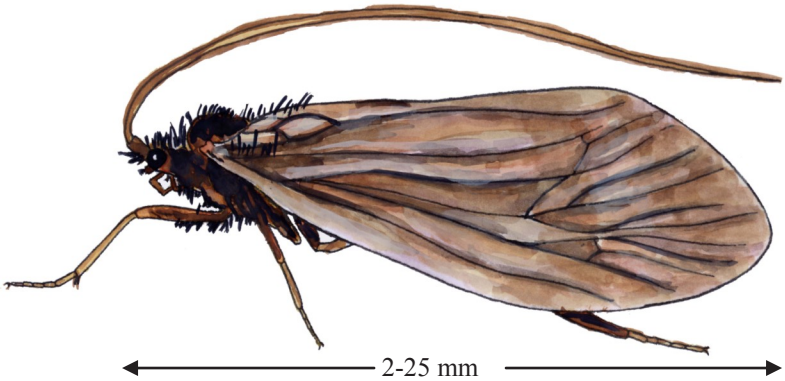
2-25 mm

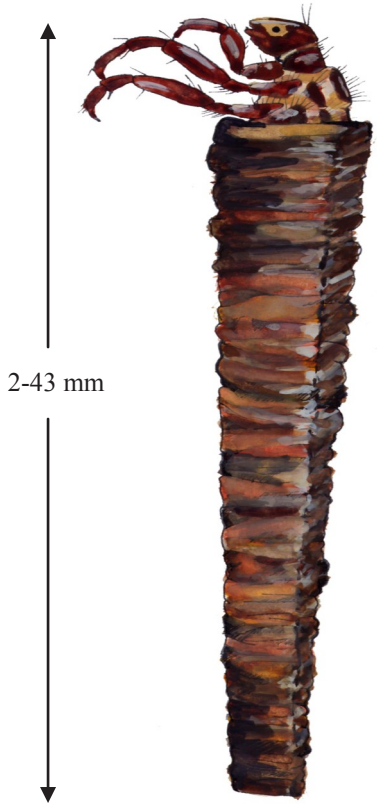
- Blackfly larvae are found on gravel, rocks, driftwood, and vegetation in medium to fast moving water.
- Sometimes rocks are covered so thick with Blackfly larvae they look slimy!
- The body of Blackfly larvae is often shaped just like a "bowling pin."
- As adults, these insects are the small, black, buzzing flies that get into your eyes, ears, mouth, and nose. They rarely bite humans, but they do bite horses, cattle, deer, and other wildlife.

ORDER: DIPTERA

UtahStateUniversity WATER QUALITY EXTENSION

CADDISFLY



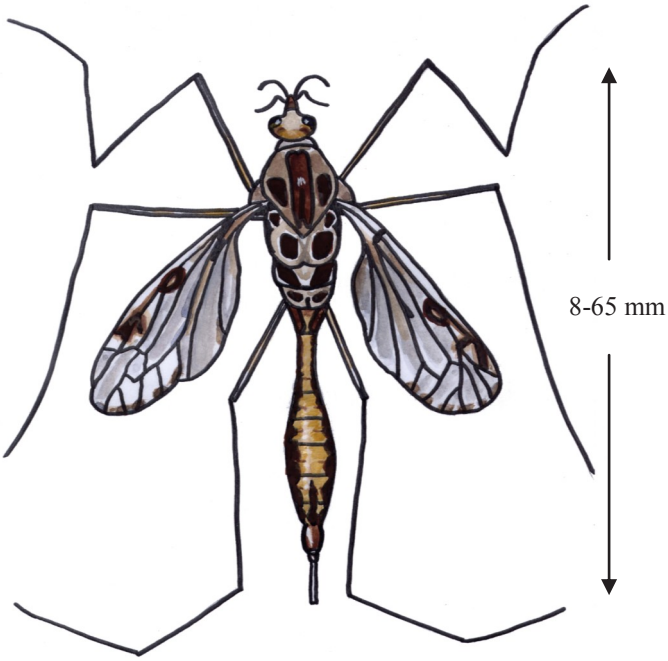


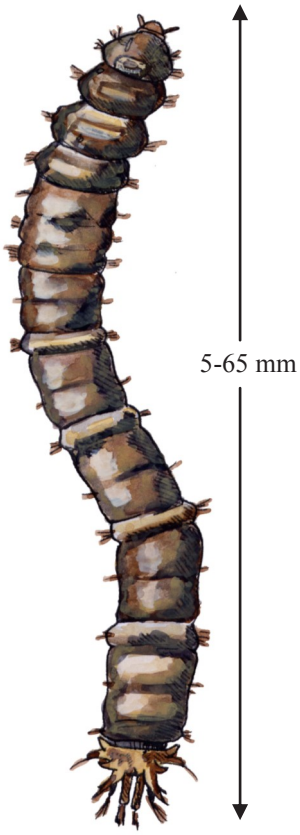
- Many Caddisfly larvae build cases to live in. The case protects them from predators as well as increases their weight allowing them to live in fast moving water without being washed down stream. The cases are made out of plants, sticks, and rocks found on the streambed.
- Some Caddisflies create nets of silk to catch food floating in the water.
- Others swim freely and eat other macroinvertebrates. They also scrape algae or eat leaf pieces from stream bottoms.

ORDER: TRICHOPTERA

UtahStateUniversity
WATER QUALITY EXTENSION

CRANEFLY



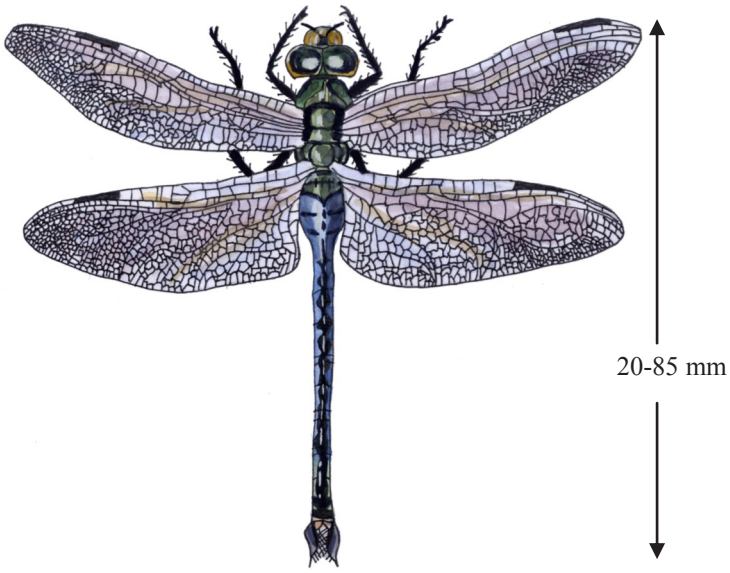


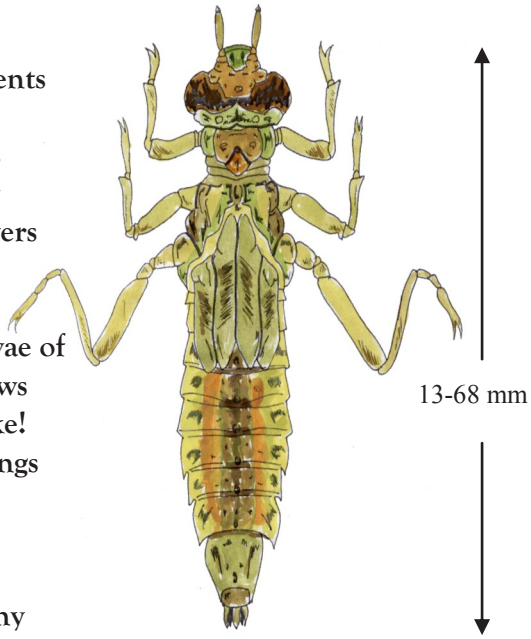
- Cranefly larvae survive under rocks and debris, or on muddy stream bottoms.
- The Cranefly larva head can be hard to see, because they can retract it back inside their body.
- Cranefly larvae can be up to 4 inches long.
- Cranefly adults are often called "mosquito hawks" or "mosquito eaters."

ORDER: DIPTERA

UtahStateUniversity
WATER QUALITY EXTENSION

DRAGONFLY



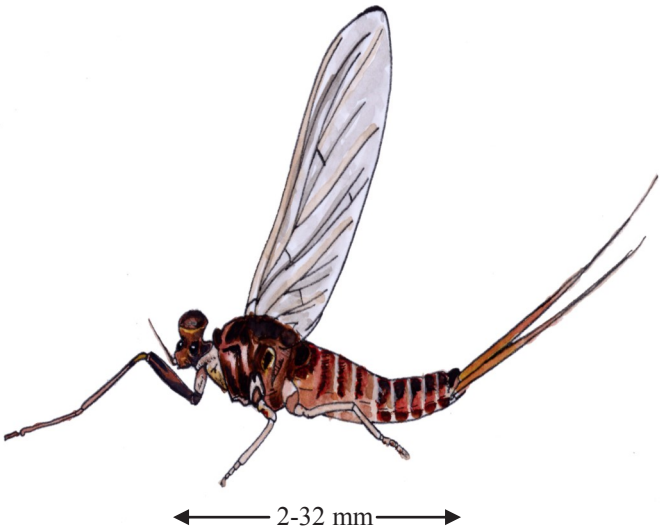


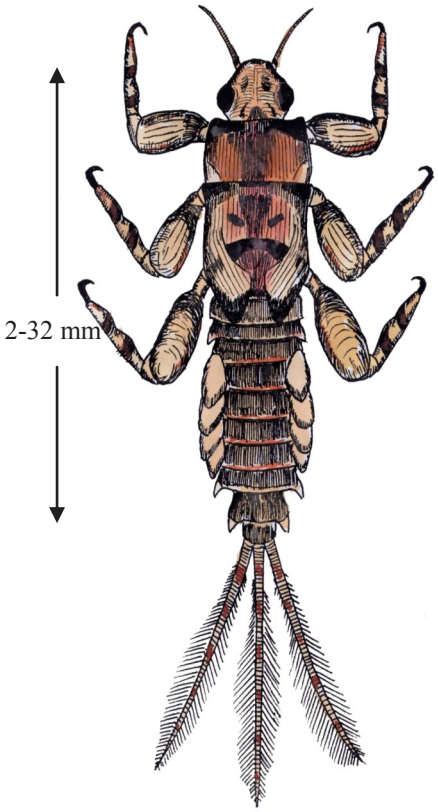
- Dragonflies are common residents of ponds, lakes, marshes, and at times rivers. Large numbers of Dragonflies can occasionally be seen flying together near rivers and lakes.
- You may not recognize the larvae of a Dragonfly, but everyone knows what adult Dragonflies look like! They are large with 4 broad wings and a long tail.
- Dragonfly larvae often stalk their prey which consist of many types of insects and fish!

ORDER: ODONATA

UtahStateUniversity
WATER QUALITY EXTENSION

MAYFLY



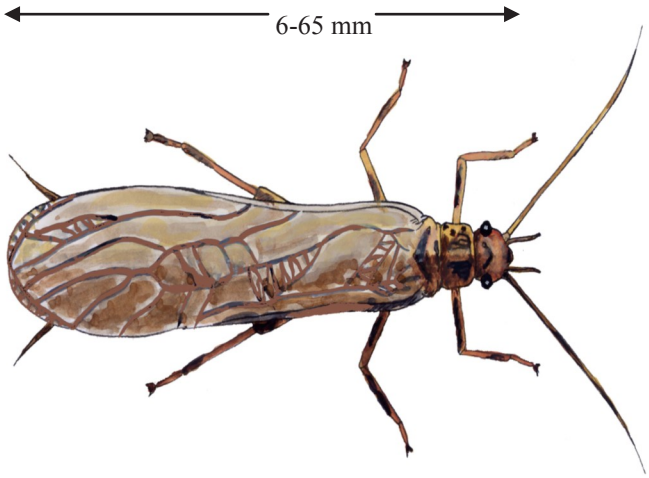


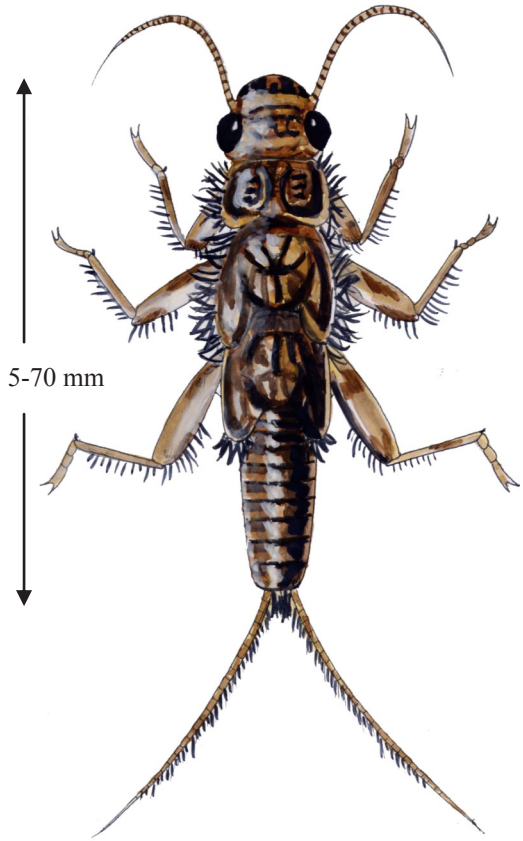
- Some Mayflies live in water for 2 -3 years as larvae. When they hatch they can have as little as 24 hours to find a partner, mate and lay eggs before they die. Usually they don't even have time to eat.
- Most Mayfly larvae feed on microscopic algae and small bits of organic matter, making them herbivores.
- Mayfly larvae have gills down the sides of their abdomen, large eyes, 1 claw at the end of each leg and 2-3 tails.

ORDER: EPHEMEROPTERA

UtahStateUniversity
WATER QUALITY EXTENSION

STONEFLY



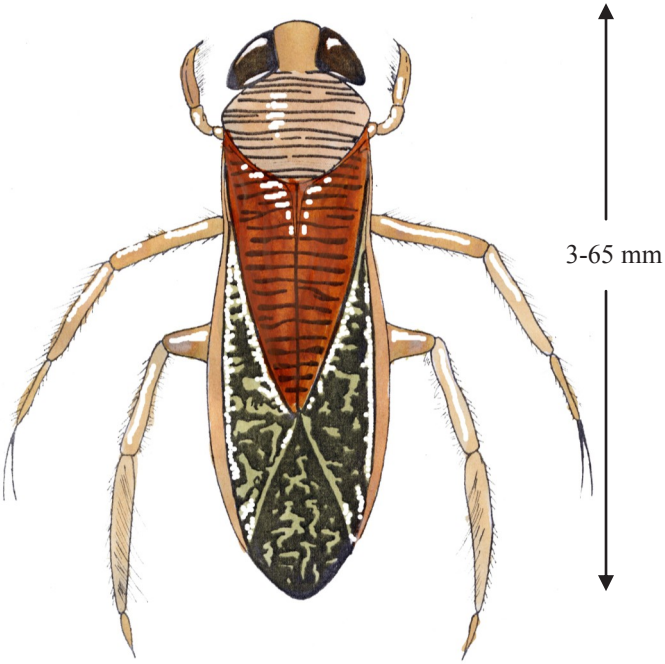


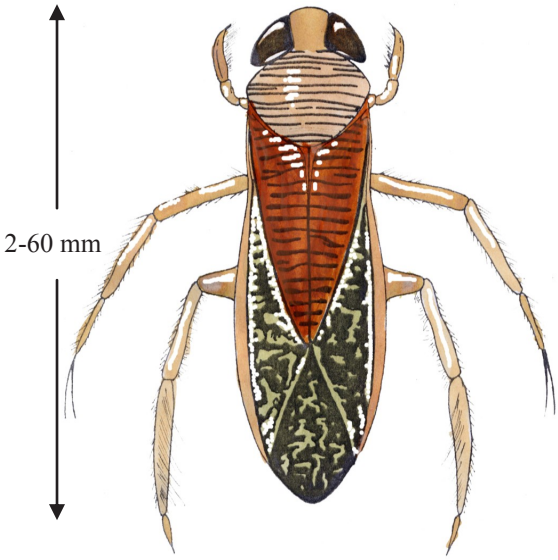
- Stoneflies are very sensitive to pollution and only live in the very cleanest of streams
- Stonefly larvae have 2 tails & 2 claws on the end of their legs.
- Some Stoneflies live in the water for 3 years before becoming adults.
- Stoneflies can be either herbivores or predators.
- Stoneflies have hairy looking gills under their arms and on their thorax. When there isn't adequate oxygen in the water, they will do "push-ups" to move the water past their gills.

ORDER: PLECOPTERA

UtahStateUniversity
WATER QUALITY EXTENSION

WATER BOATMAN





- Water Boatmen's back legs have long hairs which make them look like oars and help the Water Boatmen swim.
- Water Boatmen breathe air from the surface of the water by trapping it in hairs on their abdomen.
- Water Boatmen are very common and can live in almost every type of water

ORDER: HEMIPTERA

UtahStateUniversity
WATER QUALITY EXTENSION

Activity 1 Supplies

Choice of assorted art supplies, such as:

- Paper
- Pencils
- Colored pencils or markers
- Clay
- Playdough
- Pipe cleaners
- Paint (optional)
- Pipe cleaners or "bendaroos"Colored feathers, puff balls, "googly eyes" or other beads and items from craft stores.

*See table in Activity 1 for additional materials

INTRODUCTION

Monet was inspired to paint by his backyard pond in the French countryside, while Thoreau's Walden was inspired by the tranquil waters of Walden Pond. What's your story? In Activity 1 of this meeting, members can build their own aquatic insect, using ideas and lessons they learned about adaptations in Club Meeting 4. Activity 2 encourages club members to explore their own special connections to water.

Activity #1
Make a Macroinvertebrate

MAKE A MACROINVERTEBRATE

Time: 15-25 MINUTES

In Club Meeting 4, participants learned about basic aquatic animal adaptations. In this activity, club members will get a chance to put their artistic skills to work and make an aquatic macroinvertebrate with some of the adaptations we talked about!

1. Tell the club members they will be making an aquatic macroinvertebrate of their own. (They can make it out of clay, draw it, or paint it.)

2. Show members the materials listed in the adaptations table included below (or substitute other materials to represent adaptations as you see fit).

3. Ask them to recall adaptations they saw during the previous lesson and show them what materials might represent that adaptation (a feather might represent gills, bendaroos might represent legs or tails, etc.).

4. Have club members use the materials to create their own macroinvertebrate.

5. Have each club member share his or her macroinvertebrate with the class and explain the adaptations that make their bug special.

Table 2. Suggested materials for making a macroinvertebrate.

Adaptations	Use	Items Representing Adaptations for Making a Microinvertebrate
Legs, claws, hooked feet, suction cups, hair on legs	Holding onto rocks and hard substrate, scraping algae off rocks, attacking prey	Bendaroos, pipe cleaners
Tails	Swimming and maneuvering	Bendaroos, pipe cleaners
Compound eyes	Help insect detect motion	Googly eyes (various sizes)
Hairs on head or body	Help detect movement or chemical changes in water	Puff balls, feathers
Antennae	Sensing food, water, surroundings	Bendaroos, pipe cleaners
Gills	Breathing dissolved oxygen in the water	Bendaroos, feathers
Air bubble	Breathing oxygen from the surface air	Plastic necklace, pop-beads, bouncy ball, beads
Breathing tube	Breathing oxygen from the surface air	Straw
Specialized mouth parts	For scraping, piercing, shredding, etc. The mouth parts reflect food choices of the insect	Toothpicks
Device for catching food, i.e. net (made by the insect or part of their body structure) or special hairs	Catching food in the current	Fabric netting and toothpicks, feathers

Activity *#2*
Water Values

WATER VALUES

Time: 20-25 MINUTES

Club members will expand their thoughts and impressions on water by expressing themselves through art and sharing with others.

1. Ask club members to describe their favorite body of water. Ask them why they like it. Help give examples of ideas about water before you begin.

- Favorite vacations
- Favorite family spots (houseboat on Lake Powell, Cancun, Bear Lake, skiing).
- How is water important (Recreation, peace and quiet, adventure)?

- Which body of water is involved?
- Is this water body threatened in any way (too little water, too much water, pollution)?
- How can we help to keep it special?

2. Choose one or more creative way of expressing each club member's thoughts about a water body.

- Draw a picture of your favorite body of water or of something you like to do there.
- Go online to find photographs you feel capture the things you love most about this water body. Print them off to bring to the meeting and share with others.
- Find your favorite body of water on a map of your watershed. Describe the journey that the water takes from its origins to its final destination.
- Share your thoughts about water with others.
- Have a poetry reading in the club or go to an assisted living home (or any other similar place) and share your work with the residents.

Reflect

- Why do so many people like the color blue? (Some scientists believe that we evolved to like blue BECAUSE it is the color of water, which is so essential for survival.)
- Why is water so often used to express states of being? (e.g., "calm as a lake on a clear night", "you're in hot water")

Apply

- How can learning about science spark creativity?
- How can creativity help us discover new things in science?
- Help other people learn to love water and share the stories or the art work each member created. (e.g., go visit an assisted care facility and share a story with the residents about your favorite place with water or ask them to tell you a story about water.

Keep Exploring!

- Keep a journal and write about experiences you have on and around lakes and streams.
- Visit a natural history museum or display. Look for beautiful organisms that could be works of art.
- Visit an art museum. Look for different types of art that include representations of water (sculptures, paintings, etc.).

References and Other Resources

For more information about making your own macroinvertebrate, visit:
https://streamsidescience.usu.edu/ou-files/pdfs/make-macroinvertebrae.pdf

4-H Club Meeting 6

Service and Recreation

Activity Supplies

- Variable (depends upon location) but may include trash bags, gloves, and boots if a service project is involved.
- Make sure club members bring sun screen, insect repellent, water, hats and appropriate footwear.
- First aid kit.
- Camera to record the activity!

INTRODUCTION

Sometimes it is hard to appreciate things until we experience them. For the last activity, take a field trip (adventure) to a local spot appropriate for the ages (and total number) of youth in your club. Shared stewardship is the notion that each of us have a shared responsibility to take care of certain public resources, such as water, the forest, and the air. As responsible citizens each of us must take care not to pollute our waters. Contaminated waters are unsuitable for drinking, recreation, or even for watering our crops. Take note of how you feel when you see polluted waters and how you feel when you help to clean them up.

Activity 1 is a service activity. Activity 2 is a recreational activity. You may wish to do these activities on two different dates but will need to check with club members to make sure this fits their schedules.

LEARNING GOALS

Club members will develop a greater sense of community through service and learning how they can protect the water resources near their community.

Activity #1

Service Activity

SERVICE ACTIVITY

TIME: VARIABLE

1. Decide with club members on what type of service project they would like to conduct. These may range from trash pick up and recycling to helping plant trees at a local stream restoration project. Your club may also decide to join Utah Water Watch or help with an outreach activity.

2. Pick a site to carry out your service project. You can find service projects on your own or you may contact the local watershed coordinator, soil and water conservation district, or county Extension office. The Utah Clean Water Partnership website (https://www.utahcleanwater.org) has a calendar of upcoming activities and also a list of contacts for watersheds around the state.

3. Meet with other adult leaders to evaluate additional risks that members might face during the activity. Make sure you've reviewed, "Water Safety Tips" in Club Meeting 6 Appendix.

4. Some acitvities may require special permission (especially if you are going onto private land). Make sure you have obtained it in every situation.

5. Let parents/guardians know about this activity ahead of time. Ask about any problems with allergies, bee stings, and other concerns.

Activity #2

Outdoor Adventure

OUTDOOR ADVENTURE

TIME: VARIABLE

1. Pick a water-related recreational activity for your last club meeting. This could be a trip to a local water park or swimming pool, renting canoes or even participating in a raft trip.

2. Make sure you've reviewed "Water Safety Tips" in Club Meeting 6 Appendix. Meet with other adult leaders to evaluate additional risks that club members might face during the activity.

3. Some activities may require special permission (especially if you are going onto private land). Make sure you have obtained it in every situation.

4. Let parents/guardians know about this activity ahead of time. Ask about any problems with allergies, bee stings, and other concerns about individual club members.

5. Make sure any site you visit has access for club members with any physical impairments.

6. Go and enjoy the wonders of water!

Reflect

- Why is it important to keep our waters clean? Think about environmentally friendly habits that will help protect our waters? *(Human populations now inhabit all corners of Earth, and are rapidly using more than our share of water and other natural resources. Forming environmentally friendly habits, ranging from household water conservation to simple pollution control, helps remind us and others that we must share these resources to protect a better world for all of us!)*

- Why is it important to keep trash and pollutants out of our rivers and lakes? *(As you learned in Club Meeting 1, we cannot make new water on Earth and usable water is a rare resource. It is far cheaper and easier to keep water clean than to let it get polluted and have to pay to clean it up. Remember: we all live downstream!)*

Apply

- You learned about the shared stewardship we all have with the environment, how can that same concept apply to doing chores in your house or serving your community?

- There are a lot of "common resources" that we all share and it is our responsibility to help preserve these resources so that everyone can utilize them, even those in future generations. What are some of these common resources that we share with everyone? (*Think about how we share the air we breathe, how we all need foods grown in healthy soils, how we need abundant and clean water for all aspects of life.)*

Keep Exploring!

- There's a lot of service that needs to be done in the world and a lot of things to be taught and learned. If you're feeling ambitious, you might want to think about carrying out a project to stencil storm drains or clean up a larger area of your community. Make a poster for a fair about keeping our water clean. Visit the website: https://extension.usu.edu/waterquality to learn more about issues that could be relevant to you or contact your local Extension agent for ideas of service projects you could carry out in your community: https://extension.usu.edu/locations

- Join Utah Water Watch (https://extension.usu.edu/waterquality) to monitor a local lake or stream. Learn about lakes and streams while you are helping to keep your own lake or stream clean and healthy.

- How big is your water footprint? We all love water but sometimes we don't realize how much we use ourselves and how much is used to provide our favorite foods and activities. If you've got the curiosity bug, you'll want to check out National Geographic's Water Footprint Calculator to see where you stand! http://www.nationalgeographic.com/environment/freshwater/water-conservation-tips/

Appendix: Water Safety

Kids and water are a natural combination. To ensure the two mix well, consider the following guidelines before going to your recreation and service site.

How do I manage my group in the field?

- Have at least one adult supervisor for every six students.
- Keep a good line of communication between groups at all times (e.g., stay within hearing distance).
- Be aware of medical considerations.
- Make sure each group has ready access to first aid.
- Know which members of your group are allergic to bee stings, and know how to handle a reaction.
- Know the causes and early warning signs of hypothermia and heat exhaustion.

What are potentially hazardous conditions?

- Be aware of steep, slippery banks. In addition, hazards like holes and vertical banks can be especially difficult to see when the banks are very heavily vegetated.
- Scout the area for dangerous trash such as broken glass, rusted wire, or metal scraps. Flag areas to avoid if necessary.
- Scout the area for poison ivy, poison oak, and stinging nettles. Make sure everyone in the group can identify these plants.

When is it unsafe to enter the water?

- Moving water is deceptively dangerous. Don't let club members enter water over their knees (sometimes 1 foot deep) or water that is moving very fast (more than 1 foot per second).
- If you suspect your stream is seriously polluted, contact your local County Health Department or local Division of Water Quality office.
- Never hold activities during a lightning storm, and beware of sudden storms higher in the watershed which could produce flash floods.
- Club members should not enter the water without proper clothing (bathing suits, water shoes, waders or good wading shoes, and a change of clothing).
- Never let your group enter the water if not enough adult supervisors are present

Service Project Safety

- Wear gloves to prevent injury and to protect your skin and body from potentially harmful substances.
- Make sure members know how to operate any tools or equipment being used.
- Pair members of your group together, or stay together as a big group.

Recreation Safety

- If entering the water on a vessel (boat, raft, canoe, etc.), make sure that every member of the group has and properly wears a lifejacket.
- Have at least one designated lifeguard if your group decides to go swimming at an unsupervised body of water.
- Make sure to wear appropriate amounts of sunscreen and appropriate clothing for the activities.
- Bring and drink plenty of liquids. It's easy to become dehydrated while participating in an outdoor activity.

Continue Discovering

More to Discover

Congratulations on completing your Discover 4-H club meetings! Continue with additional curriculum in your current project area, or discover other 4-H project areas. Check out the following links for additional 4-H curriculum.

1. www.discover4h.org
2. http://www.4-h.org/resource-library/curriculum/
3. http://utah4h.org/curriculum/

Become a 4-H Member or Volunteer

To **register** your Utah club or individuals in your club, visit and contact your county Extension office.

http://utah4h.org/about/

http://utah4h.org/join/index

For help registering in 4-H online visit:

http://utah4h.org/staffresources/4honlinehelp

Non-Utah residents, please contact your local 4-H office:

http://www.4-h.org/get-involved/find-4-h-clubs-camps-programs/

Stay Connected

Visit Your County Extension Office

Stay connected with 4-H activities and news through your county Extension office. Ask about volunteer opportunities, and don't forget to register for your county newsletter. Find contact information for counties in Utah here:

https://extension.usu.edu/locations

Enjoy the Fair!

Enter your project or create a new project for the county fair. Learn about your county fair and fair judging here:

http://utah4h.org/events/index

Participate in Local or State 4-H Activities, Programs, Contests, or Camps

For Utah state events and programs visit:

http://utah4h.org/events/index

http://utah4h.org/projects/

For local Utah 4-H events and programs, visit your county Extension office:

https://extension.usu.edu/locations

Non-Utah residents, please contact your local 4-H office:

http://www.4-h.org/get-involved/find-4-h-clubs-camps-programs/

Discover *Service*

Become a 4-H Volunteer!

http://www.youtube.com/watch?v=UBemO5VSyK0

http://www.youtube.com/watch?v=U8n4o9gHvAA

To become a 4-H volunteer in Utah, visit us at:

http://utah4h.org/join/becomevolunteer

Serve Together as a 4-H Club or as an Individual 4-H Member

Use your skills, passions, and 4-H to better your community and world. You are needed! Look for opportunities to help in your area or participate in service programs that reach places throughout the world (religious groups, Red Cross, etc.).

Hold a Club Service Project

USU Collegiate 4-H Club hosted "The Gift of Giving" as a club activity. Club members assembled Christmas stockings filled with needed items for CAPSA (Community Abuse Prevention Services Agency).

http://tinyurl.com/lu5n2nc

Donate 4-H Projects

Look for hospitals, nursing homes, or other nonprofit organizations that will benefit from 4-H projects. Such projects include making quilts for CAPSA or Primary Children's Hospital, or making beanies for newborns. During Utah 4-H State Contests, 40 "smile bags" were sewn and donated to Operation Smile.

Partner with Local Businesses

92,000 pounds of processed lamb, beef, and pork were donated to the Utah Food Bank in 2013 by multiple companies.

http://tinyurl.com/pu7lxyw

Donate Money

Clubs or individuals can donate money gained from a 4-H project to a worthy cause. A nine-year-old 4-H member from Davis County donated her project money to help a three-year-old battle cancer.

http://tinyurl.com/mqtfwxo

Give Us Your *Feedback*

Help us improve Discover 4-H curriculum. We would love feedback or suggestions on this guide.
Please go to the following link to take a short survey: Click here to give your feedback
or go to: https://goo.gl/iTfiJV