UC
CE

Outdoor Adventure

This We Believe:

- The boy and girl are more important than the projects.
- The member should be their own best product.
- No award is worth sacrificing the reputation of a member or leader.
- Competition is a natural human trait and should be recognized as such. It should be given no more emphasis than other fundamentals.
- Learning how to do the project is more important than the project itself.
- Many things are caught rather than taught.
- A blue ribbon member with a red ribbon project is more desirable than a red ribbon member with a blue ribbon project.
- To learn by doing is fundamental in any sound educational program.
- Generally speaking, there is more than one good way of doing most things.
- Every member needs to be noticed, to feel important, to win, and to be praised.
- Our job is to teach members *how* to think, not what to think.

CLOVER SAFE

AGRICULTURE AND NATURAL RESOURCES
ENVIRONMENTAL HEALTH AND SAFETY

#19

HEAT ILLNESS AWARENESS

Clover Safe notes are intended primarily for 4-H volunteers and members nine years and older.

According to the National Weather Service, an average of 235 heat-related fatalities occurred annually between 1975 and 2004. Moreover, about 25,000 heat-related illnesses or injuries occurred from 1991-2000. Children are at greater risk for heat stress because their bodies have a larger surface area per pound of weight. Youth that are vigorously exerting themselves in summer heat are at higher risk for contracting heat illness. By taking several simple precautions, people can control and/or reduce exposure to conditions that may cause heat illness.

Heat Illness Disorders and Symptoms

1. Heat Stroke - sweating stops and the body fails to regulate its temperature. Victims may die if they don't receive immediate medical treatment. Characterized by: mental confusion, fainting, or seizures; hot dry skin usually reddish in color; and high body temperature.
2. Heat Exhaustion - profuse sweating results in dehydration. Characterized by: fatigue, dizziness, and nausea; pale and moist skin; and possibly slightly elevated temperature.
3. Heat Cramps - cramping thought to be due to loss of salt through sweating. Characterized by muscle spasms in arms, legs, and abdomen during or following physical activities.
4. Heat Syncope - dehydration while standing still causes blood pooling in lower portions of the body. Characterized by fainting while standing still.
5. Heat Rash - occurs under hot and humid conditions where sweat does not evaporate readily. Characterized by irritated/itchy skin with prickly feeling and small red bumps on skin.

Treatments for Heat Illness Disorders

1. Heat Stroke - call 911 immediately, soak victim's clothing with cool water, move victim to shaded and cool area, fan victim to increase cooling of their body.
2. Heat Exhaustion - have victim rest in shaded and cool place and drink fluids. Do not serve caffeinated fluids such as soft drinks, iced tea, or coffee.
3. Heat Cramps - have victim rest and drink non-caffeinated fluids.
4. Heat Syncope - have victim rest in a shaded and cool place, and drink non-caffeinated fluids.
5. Heat Rash - wash and dry skin. Wear loose clothing and keep skin dry.

Precautions to Prevent Heat Illness Disorders

1. Volunteers and 4-H members should acclimatize themselves to the prevailing weather conditions.
2. Always drink plenty of fluids such as water and sports drinks. During warm weather, plan to have at least one quart of water available per person per hour of the outdoor activity. Avoid caffeinated drinks.
3. Wear a summer hat with a brim and loose-fitting, light-colored, and lightweight clothing like cotton.
4. Schedule vigorous activities during coolest portions of the day and take frequent breaks on hot days.
5. If someone is feeling symptoms of heat illness, they should take a rest period in a shaded area. Volunteers or 4-H members should help find access to shade – this may be any area where the affected person is protected from direct sunlight, such as under an umbrella, a portable structure, or inside a ventilated building or vehicle.

If a treated victim does not recover from heat illness in a reasonable amount of time, promptly seek medical attention. Plan ahead to know how to summon medical assistance and direct emergency responders to your location or how to transport the heat illness victim to a medical service provider.

Any incidents of heat illness shall be promptly reported to the 4-H member's parent or guardian and 4-H staff. See Clover Safe #13 for incident reporting procedures.

4-H
Camping and Outdoor Adventure Proficiency Program
A Member's Guide

OVERVIEW

The **4-H Camping and Outdoor Adventure Proficiency Program** helps you learn what you need to know about your 4-H camping and outdoor adventure project. Camping and Outdoor Adventure is an interesting 4-H project. You acquire skills in outdoor living and develop confidence in the ability to live safely and healthfully outdoors. Through this project, you will better understand the environment, the inter-relationships within the ecosystems and appreciate all aspects of nature. You will have fun living cooperatively in a group, and learn how to use leisure time constructively.

There are many resources to help you learn more about your project:

- The ***4-H Publications Catalog*** lists a variety of project materials and resources recommended for use in your project.
- The ***4-H Educational Resources Lending Library*** at your county 4-H office includes other books, videos and reference materials that can be checked out by members and leaders.
- Stores that sell backpacking and camping supplies may offer classes and other educational activities as well as equipment. Many communities have local sports enthusiast groups that can be a great resource to you.

There are five levels in the Project Proficiency Program. You may choose how many levels you wish to complete:

- **Level I – "Explorer"**, you begin to learn about many different aspects of your camping and outdoor adventure project.
- **Level II – "Producer"**, you practice and refine the many skills involved in your project.
- **Level III – "Consumer"**, you become an experienced producer in your project.
- **Level IV – "Leader"**, allows you to show your own leadership potential.
- **Level V – "Researcher"**, you carry out a demonstration or experiment on some aspect of your camping and outdoor adventure, and prepare a paper or portfolio.

As you work through the proficiency program, your leader will date each skill item as you complete it. When all items in a proficiency level are completed, your leader will sign the Certificate of Achievement and notify your 4-H office.

Approved by Lake County 4-H Council, 1999

Camping and Outdoor Adventure Proficiency
Level I - Explorer

Date Completed		
_____	1.	Explain these terms: erosion, ecosystem, conservation, vegetation, predator, food chain, habitat and biodegradable.
_____	2.	Demonstrate how to find the four basic directions (N, S, E, W) using the sun or the moon and a campus
_____	3.	List the appropriate foods to take on a day trip.
_____	4.	Name at least ten basic items you would take on a day hike or field trip.
_____	5.	Prepare a basic first aid kit.
_____	6.	List ten common courtesies or outdoor manners expected during outdoor adventure activities.
_____	7.	Demonstrate how to build a safe fire.
_____	8.	Demonstrate safe use of at least three outdoor equipment items such as a hatchet, knife, matches, stove, lantern, etc.
_____	9.	Make a craft item out of things collected from nature during one of your project outings.
_____	10.	Make a collection of ten different shapes, forms or patterns from nature (like rocks, leaves, shells, bark rubbings, feathers, etc.). Label the items and share the collection with your project group.
_____	11.	Keep a field notebook of sketches and notes of your observations and details from at least three outings. Include animals, plants, weather and terrain, etc.
_____	12.	Participate in a lost hiker exercise. Explain what steps to take when someone is lost.
_____	13.	Describe three different ways to get yourself in shape for a specific outdoor activity. Demonstrate these to your leader and explain your fitness plan. Keep a record of your progress for one month.
_____	14.	Take a short hike and identify at least ten different items that are polluting the environment. Take along appropriate equipment to help reduce the pollution.

Member's Name:_____ Date: _____

Project Leader's Signature:_____ Date: _____

KEEP IN YOUR RECORD BOOK WITH YOUR PROJECT RECRDS.

Approved by Lake County 4-H Council, 1999

Camping and Outdoor Adventure Proficiency
Level II - Producer

Date Completed

_____ 1. Explain how to test water for potability. Describe two methods for making water potable.

_____ 2. Draw a simple map that could be used by another person for directions on an outing.

_____ 3. Demonstrate how to use a compass and a map to find your way from one point to another.

_____ 4. Make at least one piece of practical equipment that can be used on an outing (example: solar oven, lean-to, outdoor shower, etc.).

_____ 5. Plan a menu for a three day overnight outing.

_____ 6. Participate in one field visit to an outdoor equipment manufacturer or provider.

_____ 7. Try one of the following with adult supervision and permission:
Fishing Canoeing Kayaking Mountain Climbing
Rafting Mountain Biking Backpacking Skiing
Wind Surfing Snorkeling Boating Caving
Ropes Course Rock Climbing Snowboarding Other

_____ 8. Demonstrate how to tie five different knots and tell how each should be used.

_____ 9. Explain how and when measurements (weight, distance, etc.) are used in outdoor adventure experiences.

_____10. Participate in an overnight outing and plan at least one part of it, such as the clothes you need to bring, a skit/song for the campfire, a meal for the group, etc.

_____11. Make a plaster cast of at least two animal tracks and display them at a project meeting.

_____12. Help someone else by sharing your knowledge or by participating in an activity that has to do with preserving the outdoors in a pristine state, or restoration of a wildlife area.

_____13. Demonstrate an ecosystem by building a terrarium.

_____14. Identify at least five potential emergency situations that could occur in an outdoor adventure. Describe how to prevent the situation and how to deal with the emergency if it occurs.

_____15. Keep records in at least two of the following categories: wildlife, plant/foliage, soil, rocks/minerals, fish, birds, etc. Describe what you saw, when seen, what it was like, where found, how many, etc.

Member's Name: _____ Date: _____

Project Leader's Signature: _____ Date: _____

KEEP IN YOUR RECORD BOOK WITH YOUR PROJECT RECRDS.

Approved by Lake County 4-H Council, 1999

Camping and Outdoor Adventure Proficiency
Level III - Consumer

Date Completed

_____ 1. Alone or with your group, plan and complete a community service activity related to your project.

_____ 2. Invite a guest speaker to one of your meetings and introduce them to the group.

_____ 3. Keep a personal reference library of literature that will be helpful in your project.

_____ 4. Take part in a project related demonstration or judging contest.

_____ 5. Report the history of one aspect (origin, equipment, material, technique, etc.) of outdoor adventure.

_____ 6. Contact a local, state, or national association related to your project. Explain to your project group what this association has to offer to its members and other interested individuals.

_____ 7. Make a chart that compares three commercial food items for cost, weight, size of container, taste, satiety, backpack ability, appearance, time for preparation, ease of preparation, clean-up and environmental consciousness.

_____ 8. Visit an expert in the field of an area of outdoor adventure and report what you learned at a project meeting.

_____ 9. Describe four ways to save money and be economical in obtaining materials for use in your project.

_____10. Design an item or piece of equipment that could be used in an outdoor adventure activity. Come up with a product name and convince your project group of the usefulness of this product.

_____11. Compare and contrast two different outdoor adventures using the following factors:
budget transportation time weather terrain
attitude scenery available water need for maps and compass

_____12. Create a list of ten or more practical rules for survival related to outdoor adventure activities and find a way to share them with others

_____13. Participate in at least three different outdoor adventure activities with your family or project group.

Member's Name:_____ Date: _____

Project Leader's Signature:_____ Date: _____

KEEP IN YOUR RECORD BOOK WITH YOUR PROJECT RECRDS.

Approved by Lake County 4-H Council, 1999

Camping and Outdoor Adventure Proficiency
Level IV - Leader

Date
Completed

_____ 1. Serve as Junior or Teen leader in this project for one year.

_____ 2. Assist younger members in designing and constructing needed equipment.

_____ 3. Prepare teaching materials for use at project meetings.

_____ 4. Develop and put on a demonstration or judging event or train a junior team for an event.

_____ 5. Speak on a project-based subject before an organization other than your 4-H group.

_____ 6. Assist younger members in actually learning a specific topic in the project.

_____ 7. Develop your own special project related activity. Chart your own progress, plan the activities, analyze successes and problems, and report on findings.

_____ 8. Assist a leader/adult in an outdoor adventure activity, organizing the group so that the chores/tasks are evenly distributed among the members.

_____ 9. Take a first aid class and assist younger members in making a first aid kit. Teach them how and when to use it.

_____10. Alone or with your group, select an outdoor adventure topic you would like to topic, and share information with others in two of the following ways: bulletin board display, written pamphlet, news article, club/group discussion, judging kit, poster, radio spot.

Member's Name:_____ Date: _____

Project Leader's Signature:_____ Date: _____

KEEP IN YOUR RECORD BOOK WITH YOUR PROJECT RECRDS.

Approved by Lake County 4-H Council, 1999

Camping and Outdoor Adventure Proficiency
Level V - Researcher

Date
Completed

_____ 1. Report on the results of a demonstration comparing measurable differences in some aspect of your project. (experiment)

_____ 2. Prepare a paper of 300 words or more on one of the following topics:

Evolution of techniques used in an outdoor adventure area

History of a specific topic related to your project area

Markets and methods of marketing outdoor adventure products

Resource utilization and/or conservation

Development of equipment used in project area

Cultural influences in a specific topic related to your outdoor adventure activity

Ecology of a specific geographic area, terrain, local, etc.

Other

_____ 3. Prepare a speech or illustrated talk to orally summarize your findings and present at a club or project meeting or other educational event.

Member's Name:_____ Date:_____

Project Leader's Signature:_____ Date:_____

KEEP IN YOUR RECORD BOOK WITH YOUR PROJECT RECRDS.

Approved by Lake County 4-H Council, 1999

Certificate of Achievement

This certifies that

_____

has completed the _____ ***Proficiency***

in _____ ***County.***

Explorer	*Producer*	*Consumer*	*Leader*	*Researcher*
_____	_____	_____	_____	_____
Date	*Date*	*Date*	*Date*	*Date*
_____	_____	_____	_____	_____
Leader's Signature	*Leader's Signature*	*Leader's Signature*	*Leader's Signature*	*Leader's*

Signature

NOTES

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North Region 6/97 **Publication No. NR-PP-003**

CLOVER SAFE

AGRICULTURE AND NATURAL RESOURCES
ENVIRONMENTAL HEALTH AND SAFETY

#21

HIKING SAFETY

Clover Safe notes are intended primarily for 4-H volunteers and members nine years and older.

Photograph Courtesy of Siskiyou County 4-H Program

4-H members participate on hikes that take place in terrain ranging from relatively flat land to steep, rugged topography and from wetland to desert conditions. Precautions to prevent injuries vary somewhat depending on the type of terrain and habitat encompassed by the path of the hike.Common injuries that are related to hiking include strains, sprains, cuts, bruises, insect bites, and sunburn. By taking several simple precautions and becoming familiar with the area and path to be hiked, 4-H members can control and/or reduce exposure to conditions that may cause injuries.

The following precautions should be followed to reduce the potential for incurring hiking-related injuries:

- Good safety practices are to (1) tell someone (that is not participating) the hiking route and when the hikers should return or complete the hike, (2) hike with a group or partner in remote areas, (3) bring adequate water for the weather conditions, and (4) carry a first aid kit and cell phone or other communication device while hiking.
- When possible, know the route(s) you will be taking during your hike. Carry a reference hike-route or -location map, if necessary.
- In case of an emergency, know how to direct emergency responders to your location or transport an injured person to the closest medical facility.
- Do not wander from your hiking group or partner.
- If you notice that a member of your hiking group is missing, immediately notify your project leader, parent, or guardian.
- Always treat hilly and mountainous topography with caution. Carefully pick the spots where you intend to step. Be careful of dislodging rocks onto other hikers below or following you.
- Walk carefully in uneven terrain, especially when the ground surface may be obscured by vegetation or during twilight or at night.
- Dress appropriately for the weather conditions and hiking path terrain: as necessary wear a hat, long pants, boots or sturdy shoes, jacket, and skin and eye protection (i.e., sunscreen and sunglasses).
- Use insect repellants containing compounds such as DEET (repels insects) on exposed skin and permethrin (kills many insects on contact) on clothing only.
- Rock climbing without proper experience or equipment is dangerous and ill advised.
- Always be aware of potential temperature extremes associated with the hiking path and area. Dress appropriately for extreme temperatures that may cause heat or cold stress.
- Be particularly alert for falling rocks, rock slides, or rock falls when hiking in proximity to cliff faces or steep rock outcrops. Wear a safety hat when hiking in areas where falling rocks are common.
- When hiking in wet areas or in proximity to water, beware of stepping onto slippery rocks, slopes, or ground.
- When hiking in wetland areas, be cautious of stepping onto unsupported vegetation, soft mud, or quicksand. Use a pole or branch to probe the path surface ahead of you when crossing wetland areas.
- Be conscious of tidal cycles when hiking in coastal and estuarine wetland areas. Consult tide tables or similar reference materials and plan your hike accordingly.
- Whenever a lightning threat becomes apparent, move to a low spot and seek shelter immediately.
- If you encounter a snake, remain calm and back away slowly. Always give snakes plenty of room to escape from you. Never approach, tease, corner, or poke at any snake.
- Closely look for snakes or insects before placing your hands on objects such as rock outcrops or trees or picking up objects from the ground (i.e. rocks, plants, leaves, etc.)
- Thoroughly inspect the area where you intend to sit, particularly around stumps, logs, boulders, or rock outcrops.
- If you experience an insect bite or sting, wash the wound with soap and water, apply an antiseptic, and cover the wound with a band aid or clean dressing. Carefully remove stingers from skin by using tweezers and then clean and dress sting wounds. Never scratch an insect bite or sting.
- Promptly seek professional medical attention if you suspect you are experiencing severe venom allergic reaction symptoms.
- If a snakebite occurs: calm the victim, wash the area of the bite with soap and water, apply a cold dressing over the bite area, and immediately transport the victim to the closest medical facility for professional treatment. Also, remove jewelry, watches, and tight clothing in preparation for tissue swelling.

CLOVER SAFE

AGRICULTURE AND NATURAL RESOURCES
ENVIRONMENTAL HEALTH AND SAFETY

#25
BITING AND STINGING INSECTS

Clover Safe notes are intended primarily for 4-H volunteers and members nine years and older.

Information available from the National Institutes of Allergy and Infectious Diseases indicates more than 40 fatalities annually can be attributed to severe venom allergic reactions (called anaphylaxis) from insect bites or stings. Common California biting and stinging insects include ticks and chiggers, centipedes, mosquitoes, black, deer, and horse flies, spiders including black widow and brown species, fire ants, midges, scorpions, bees including Africanized honey bees, wasps, and hornets.

Aside from allergic reactions, biting and stinging insects cause nuisance bites and stings that can result in tissue swelling, infections of bite and sting sites, skin lesions, itching, dermatitis, and pain or burning sensations.

Symptoms of a severe venom allergic reaction include large areas of itching and hives, difficulty breathing, dizziness, excess sweating, nausea, swelling of the tongue or throat, and possibly a rapid decrease in blood pressure resulting in loss of consciousness.

The following precautions should be taken for preventing insect bites and stings:

- The best defense against biting and stinging insects is to not be bitten by one. Therefore, avoid conducting working or playing outside during peak biting or stinging insect activity times (usually early morning and evening hours) and in favorable biting or stinging insect habitat such as wetlands, along streams, lakes, or oceans, and moist shaded portions of wooded, brush-covered, or grassy areas. Also, avoid contact with insect nests, swarming insects, and ant mounds.
- Wear a long-sleeved shirt and long pants with boots when in wild land, overgrown, rural, or wilderness areas. Tucking your pants into your boots or socks helps prevent biting and stinging insects access to your skin.
- Use insect repellants containing compounds such as DEET (repels insects) on exposed skin and permethrin (kills many insects on contact) on clothing only.
- Closely look for insects or insect activity before placing your hands on objects such as rock outcrops or trees or picking up objects from the ground (i.e., rocks, plants, leaves, etc.)
- Thoroughly inspect the area where you intend to sit, particularly around stumps, logs, boulders, or rock outcrops.
- If you experience an insect bite or sting, wash the wound with soap and water, apply an antiseptic, and cover the wound with a band aid or clean dressing. Have your project leader or other adult remove the stinger from your skin by using tweezers and then clean and dress the sting wound.
- Never scratch an insect bite or sting.
- Immediately tell your project leader if you suspect you are experiencing severe venom allergic reaction symptoms. Promptly seek medical attention if a severe venom allergic reaction is suspected or occurring.
- Let your project leader know in advance if you are allergic to insect bites or stings so they can respond appropriately if you are bitten or stung. Notify your project leader if (and where) you carry an epinephrine or EpiPen® auto-injector to treat severe allergic reactions.

CLOVER SAFE

AGRICULTURE AND NATURAL RESOURCES
ENVIRONMENTAL HEALTH AND SAFETY

#26

TOXIC PLANTS

Clover Safe notes are intended primarily for 4-H volunteers and members nine years and older.

Western Poison Oak
Photograph Courtesy California Poison Control System

Toxic plants can cause mild to severe dermatitis or other reactions when plant sap, fluids, or thorns come into contact with exposed skin or other tissues. California toxic plants include weeping fig, poison oak, chrysanthemum, geranium, ivy, century plant, crown of thorns, primrose, and firethorn.

Symptoms of dermatitis typically develop within 24 to 48 hours after exposure and include redness, blistering, swelling, and aggravated itching of skin exposed to toxic plants.

Reactions to toxic plant secretions or thorns depend on the individual's sensitivity, degree of exposure, and where on the body the toxic exposure occurs. For example, toxic plant exposures to sensitive eye tissue usually cause relatively more severe reactions than exposures to other body areas.

The following precautions should be taken to prevent contracting or treat dermatitis from toxic plants:

- The best defense against acquiring dermatitis or other reactions from toxic plants is not to come into contact with them. Accordingly, it is prudent practice to be able to readily recognize and thereby avoid, toxic plants that may occur in outdoor areas.
- Learn to recognize toxic plants in outdoor areas by studying a plant field guide or other similar plant identification materials.
- Wear a long-sleeved shirt and long pants with boots when in wild land, overgrown, rural, or wilderness areas. Tucking your pants into your boots or socks helps prevent toxic plant contact with your skin.
- Closely look for toxic plants before touching objects such as rock outcrops or trees or picking up objects from the ground (i.e. rocks, plants, leaves, etc.).
- Thoroughly inspect the area where you intend to sit.
- If you develop dermatitis from a toxic plant, treat the affected area by: washing with soap and water; rinsing with large amounts of water; and drying with a clean cloth.
- Promptly change clothing that has been exposed to toxic plants. Handle contaminated clothing carefully. Wash contaminated clothing several times in unmixed laundry loads.
- Never scratch an area of skin affected by dermatitis.
- Tell your project leader, parent, or guardian if you suspect or you have been exposed to a toxic plant.
- Seek professional medical help if dermatitis induced by contact with a toxic plant does not improve or worsens.

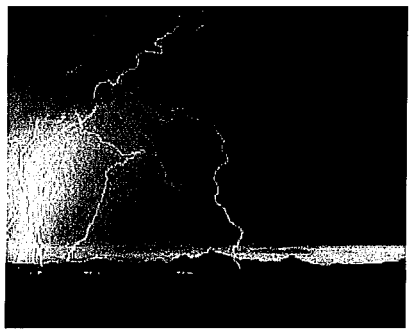
CLOVER SAFE

AGRICULTURE AND NATURAL RESOURCES
ENVIRONMENTAL HEALTH AND SAFETY

UNIVERSITY OF CALIFORNIA 4-H Youth DEVELOPMENT PROGRAM
CITIZENSHIP LEADERSHIP LIFE SKILLS

#35
THUNDERSTORM SAFETY

Clover Safe notes are intended primarily for 4-H volunteers and members nine years and older.



According to information available from the National Weather Service, approximately 1,000 people are struck by lightning in the United States each year. In addition, lightning caused 490 fatalities nationwide from 1995 through 2004. Of this total, approximately 50 percent of the lightning deaths occurred outside in open areas and about 16 percent of the fatalities happened when people stood under trees that were hit by lightning. Lightning from thunderstorms is a dangerous threat to people outdoors if they are in proximity to the storm.

The following precautions and actions should be taken to reduce the potential for being struck or seriously injured by lightning:

- Be aware that if you are within hearing distance of thunder, you are also within striking distance of lightning.
- If you see lightning and hear the resultant thunder in less than 30 seconds, the thunderstorm is within six miles of you and should be considered dangerous.
- Whenever a lightning threat becomes significant, seek shelter immediately.
- Sheltering from lightning includes returning to a vehicle, vacating ridge or hill tops and open water bodies, and occupying buildings or facilities.
- If you are able to shelter indoors, unplug and keep your distance from appliances, computers, radios, and television sets.
- Never stand under an isolated tree in an open area to shelter from a thunderstorm.
- During a thunderstorm, avoid contact with metal objects such as fences, poles, electrical wires including overhead utility lines, machinery, and power tools.
- It is not a safe practice to take refuge from lightning beneath canopies or small picnic or rain shelters.
- If you are caught in the open during a thunderstorm, crouch down and protect your hearing by covering your ears. If possible, crouch down in a nearby topographic depression or low spot.
- If someone is struck by lightning, immediately contact 911. Know how to direct emergency responders to the injured person's location.
- If the victim of a lightning strike is unconscious, check their airway. As necessary, start CPR and apply other first aid measures.
- Wait at least 30 minutes after a thunderstorm has passed before resuming outdoor activities.

I'm a 4-H Project Leader: Now What Do I Do?

How do I know who is in my project?

- Your club organizational leader will provide you with the names, addresses and phone numbers of the members enrolled in the project for which you are the leader.
- If you are working on the county level, contact the UCCE for the list of project members.
- The organizational leader may indicate to you if any of the youth have special needs. At your first project meeting, note any other youth that may have special needs.
- You may wish to consult with the parent or your 4-H Youth Development Agent as to how to work with a special needs child.

How often should I hold project meetings?

It is recommended you hold 4-6 meetings that each last 1½ to 2 hours in length. Some projects require more meetings or a longer meeting time to accomplish your goals. Some projects, such as leathercraft, may lend themselves to individual project work as members progress on their projects. In this case, you should hold several introductory meetings for all members and then set up a schedule of time for them to sign up for individual help.

When do I start?

Get started as soon as possible! Members' interest in a project is most keen when they are signing up for a project and when they get their project books.

How do I cover the cost of project meetings?

- There is a wide variety of means for covering the cost of project meetings. Some methods used include:
- Each member pays for their share of the expenses or provides a portion of the supplies.
- The club agrees to cover expenses using funds from their treasury. Approval in advance is needed for this.
- Members and leaders can solicit donations/supplies from area businesses.
- Sometimes funds from sources outside your club may be available to cover your project meeting costs.

How do I establish a project meeting schedule?

First, determine when you are available to work with project members. Then determine an initial project meeting date by consulting with your project members.

Thanks to 4-H Youth Development Programs, UW-Extension, Cooperative Extension for use of these materials.

Publicize the date using one of the following means:

- County and/or club newsletter
- Club meeting or leader association meetings
- Postcards or phone calls to project members

You may not be able to schedule an initial meeting that everyone can attend. Establish a time to meet with those unable to attend before you hold your second project meeting.

Where do I hold project meetings?

Typically project meetings are held at project leader homes, schools, or community buildings. For more information on facility adaptability and liability concerns contact your 4-H Youth Development Agent.

What safety precautions do we need to consider?

Consider the type of safety issues your particular project involves. Request and secure necessary safety items such as ear protection, eye protection and head protection.

How do I let others in my club or other clubs know I am a project leader?

Prior to enrollment ask for time on your club's meeting agenda to let families in your club know you're a project leader and to share some things the kids could do in the project if they enrolled in it. When the project materials are handed out, take the opportunity to inform or remind members that you are their project leader and set an initial meeting date with the group. If no one in your club is in your project, you may wish to offer your services to a neighboring club. Talk to your club organizational leader or county 4-H Youth Development agent about this opportunity.

How do I prepare for the first meeting?

You may want to establish a 4-H resource box where you keep your project materials and any additional resources you will be using. Take time to become familiar with your project literature and talk to others who were project leaders for this project to find out what activities the members enjoyed.

What should I do at the initial project meeting?

- At the initial project meeting, here are some ideas of what you might want to cover:
- Find out what the members want to learn and accomplish in the project. The project literature is an excellent source of ideas.
- Review the safety practices that members will need to follow.

Thanks to 4-H Youth Development Programs, UW-Extension, Cooperative Extension for use of these materials.

- Do an introductory activity related to the project so the members get to know one another
- Have a small project the members can complete and take home
- Talk about how the project meeting supplies will be paid for. Experienced leaders have found it easiest to charge a small fee to cover the cost of the expenses.
- Assess when members are available for additional meetings. You may wish to ask the parents or members to bring along their calendars of family activities.
- Encourage parents to participate in project meetings, especially the initial meeting.

What does a typical project meeting look like after the initial orientation?

Use the experiential learning model (found in the introductory pages of your Helper's Guide) to plan your project meeting. The project helper's guide will provide suggestions for designing a project meeting. Here are some suggestions for each section of the model:

Do

- Plan an activity to focus the project members on what they'll be doing today. Work on the project for that meeting.

Reflect

- Review the process completed
- Discuss what worked and didn't work.
- Talk about how any problems that arose were solved.
- Assist members in documenting their project work for inclusion in their record books/portfolios.

Apply

- Ask the project member the following questions:
- What else have you seen that is similar to this?
- How can you apply what you learned today to other situations?

What resources are available to help me?

- 4-H Project Literature – You will receive project literature through your 4-H club or the UW-Extension office. Typically there is a helper's guide and member literature for three to four levels.
- Other People in my Club & County – There are a number of people in your county who would be willing to share project ideas and tips with you.

Thanks to 4-H Youth Development Programs, UW-Extension, Cooperative Extension for use of these materials.

These include:

- Project leaders in other clubs
- County Staff
- Older youth who have been involved in the project

- Media Collection & Public Libraries – Additional resources can be obtained from the Cooperative Extension Media Collection. They have videos, skillathons, displays and resource packages available to support a variety of projects. There is a user fee per item you or your club will be responsible for. You can view their catalog at their website http://www.uwex.edu/ces/media/. Check with your local public library to find out what resources they may have or that you can obtain through inter-library loan.
- 4-H Website – Wisconsin 4-H is continually adding more information and activities to their website. Visit this site at www.uwex.edu/ces/4h/onlinepro/. You may wish to check out websites from other state 4-H programs also.
- Volunteer Leaders Conferences – Review each issue of your county's newsletter to learn about training sessions for project leaders offered by your county, district or at statewide events. Sessions focusing on new project literature are typically offered at the State 4-H Volunteer Leader Conference held every other year. Periodically statewide conferences focusing on specific project areas are offered in addition to sessions at the volunteer conferences. You can also exchange ideas with other leaders at statewide Field Day.
- Field Trips – Youth always enjoy the opportunity to see firsthand how things are done and how they work. Consider taking your project group on a field trip or tour of a local business or company to enhance their project experience. An example would be taking your dairy members to a cheese factory or your foods group to a local bakery.
- Local Experts – Bring in a local "expert" to share their ideas and experiences with your group. One example would be asking a Master Gardener to share information on choosing perennial or trimming shrubs at one of your project meetings.
- Magazines – Many leaders have found creative ideas to supplement those in the project literature in magazines they have or those at the public library.

Thanks to 4-H Youth Development Programs, UW-Extension, Cooperative Extension for use of these materials.

How can I incorporate activities not included in the project guide?

We encourage you to use the ideas in the project literature as they have been successfully used with youth. If you have some additional activities you would like to incorporate, consider the following criteria:

- Of interest to kids
- Developmentally appropriate
- Incorporate the experiential learning model
- Youth and adults are involved in determining what will be done
- Enhances the development of member life and project skills
- Research based source of content utilized

What is the relationship between project work and the county fair?

The County Fair is an opportunity for an independent evaluation of life and project skills a member learned through completing a project. County fair entries typically match the activities included in the project literature and may include other activities that are being emphasized in your county. One of your roles is to help maintain the focus of members and parents on the goal of 4-H, which is to develop blue ribbon kids. Talk with members about what they learned about each of their fair entries from the judging process. Help members celebrate their accomplishments regardless of the color of ribbon each project member received at the fair. This may be done through individual encouragement or at a meeting following the fair. While entering and displaying a project at the County Fair is the traditional method of public affirmation, there may be other means of exhibition such as a club tour, open house, community celebrations or others.

Who can I go to if I need someone to help me during the project meetings?

If you are leading beginning level project meetings, ask older members in the project to help you. This is a great leadership experience for them! Parents are another excellent source of help. Don't hesitate to ask them to stay for the meeting and be actively involved in their child's project work.

Thanks to 4-H Youth Development Programs, UW-Extension, Cooperative Extension for use of these materials.

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North Dakota 4-H

Nature Trails

Unit 1

Member's Manual

Revised April, 2004

Joe Courneya
4-H Youth Development Specialist

Welcome to the Nature Trails Outdoor Study Program. This program is designed for boys and girls who live in towns or on farms. This is the first in a series of programs which will help you experience your environment.

Mankind is learning that in order to survive we have to live in harmony with nature. We are a part of the environment and whatever affects the environment will also affect us. In order to understand and appreciate the environment we must study it.

This program will be your opportunity. There are a wide range of activities from which to choose. Select those that fit your interests and resources.

NDSU EXTENSION SERVICE
North Dakota State University, Fargo ND 58105

Original Manual Credits
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Extension Wildlife Specialist
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4-H Youth Development

Contents

Getting started

PLANNING YOUR PROJECT

1. Page through this booklet briefly and review its contents.
2. Decide what you would like to study and learn about during this next year. 3. 3. Use the North Dakota 4-H Record Form to list your goals.

WHO MIGHT HELP

You may need help with this project if your are taking it as an individual study. There are many people who can help you. Think about those who are interested in the outdoors and might help. They might be:

- Parents
- Brothers, sisters, grandparents, aunts, uncles
- Sports persons, professional wildlife personnel, conservation personnel
- Old adults in your community

Find a person who will be willing to help. Your 4-H leader may assist you in finding someone. Ask them to help you with this project. Show them a copy of this booklet. Give them a copy of the Guide for a 4-H Helper. A leader's guide may also be available for this project.

My 4-H Helper will be _____

Suggested project requirements

1. Study at least eight lessons and complete at least one exercise in each.
2. Select at least one major activity to complete during the year. This may be constructing a feeder, establishing an area for wildlife habitat, studying wildlife and recording your observations or other study.
3. Give a demonstration or talk for your 4-H club or other community organization.
4. Share what you have learned with others by preparing displays, teaching at workshops, writing at workshops, writing news releases or doing radio program.

Guide for 4-H Helpers

A 4-H member is asking you to be their helper. Listen to the request. Find out what the 4-Her is asking you to do. You can make a real contribution to the 4-H member's growth and development. You can share your skills to help them learn to do new things and learn more about themselves. You may have a feeling of sharing, caring and accomplishment. Try it. It could be for you.

- You will want to review their project book and become familiar with the requirements of the project. If you wish to have a copy of the project book, contact the young person's 4-H leader or your Extension county office.
- Help them decide which lessons to study.
- Help them select things that are easy and can be done quickly. Then challenge them to try new techniques and learn additional skills as they make progress in the project.
- Help complete the member-helper-leader agreement.
- Consult with their 4-H leader if you have questions.
- Help the 4-Her learn the skills in this project or activity.
- Help the 4-Her when needed, but don't do the project for them.
- Help the 4-Her evaluate the quality of their work.
- Be patient and support the young person in their learning efforts.

North Dakota 4-H

Nature Trails

Autumn Changes

Objectives

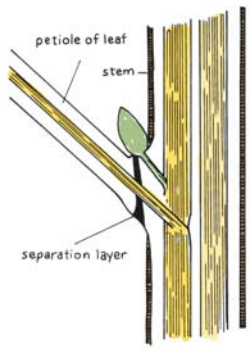
You will become aware of the reasons for

- leaf color
- animal color
- dietary changes and other changes associated with autumn.

Changes in Plant Color

In autumn the leaves of many plants, shrubs and trees change color. The causes for this are not fully known. Two things probably are involved; the loss of leaf vigor or healthiness, and decay of the leaf.

The Loss of Leaf Vigor



The decline of the leaf's healthy condition begins with the formation of a layer of cells to separate the leaf from the branch. This layer forms long before the leaf actually falls. This layer (called the *abscission* layer) is a band of tissue which goes almost through the base of the leaf stalk (the *petiole*). It does not penetrate the tissue that carries food and water.

As the season continues, the separation layer becomes soft. The stalk (*petiole*) of the leaf weakens. The vessels that carry food (*phloem*) and water (*xylem*) may become clogged. The clogged vessels reduce the amount of food for the leaf. This hinders the making of the green-colored material in leaves, a material called *chlorophyll*. Chlorophyll is constantly being destroyed by sunlight. When chlorophyll production is slowed or stopped, the leaves lose their green color.

As the green color fades in a leaf, new colors appear such as bright yellow, yellow-orange, red and brown. These colors are always present in the leaf, but are masked by the green chlorophyll and can be seen only after the green has faded. Red is produced in the leaf with the right conditions. Certain trees are known for their fall colors. Maples are often bright red, ash are yellow and oaks are most often brown.

- Leaf color is affected by the amount of light. The leaves of maples and some oaks are red in bright light but yellow in shaded areas.
- Brightest colors are formed during bright sunny days rather than dull cloudy days.
- Trees with the richest reds are those like the maple, which have the largest sugar resources

- Cut veins often affect leaf color. Cut or injured veins in leaves often turn portions of the leaf red. This is due to the sugar still in the leaf. This sugar doesn't leave, and helps the red color production.
- The richest colors occur when there is a quick change in temperature from high summer to lower autumn temperatures.
- Frost may play a role in color changes. Many leaves do not turn red and yellow before the first frost. An early frost *decreases* color changes in leaves, especially red, because it causes early death of the leaf. The leaf then goes from green to brown.

Decay of the Leaf

Decay of the leaf causes it to turn brown. Dark tannins and resins enter the leaf and turn it brown as the leaf dies. These color changes show that the plant is getting ready for winter.

Summary

Leaf color change is due to:

1. Loss of chlorophyll so that the leaf is no longer green, but yellow and orange.
2. As chlorophyll breaks up, the brightest yellows are formed.
3. The reds form because of bright sunlight and the presence of stored sugar in the leaf.
4. Decay products in the leaf mask other colors and the leaf turns brown.

Exercise

1. Look at trees in the fall. What color are most of the leaves? _____

2. What is the major reason for different leaf colors? _____

_____

3. If you want a variety of fall colors, what trees and shrubs should you plant? _____

_____

Exercise

List 5 common trees in your area and record the leaf color for each.

TREE	DATE	COLOR
1.		
2.		
3.		
4.		
5.		

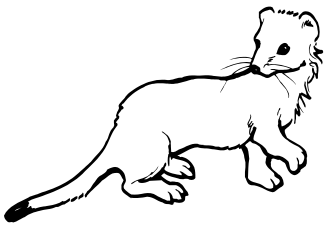
Exercise

Take fall color pictures of several species of trees or plants. Place on a photo page and identify the types of trees.

Change in Animal Color

Some animals also change color. The reasons for this color change are not exactly known. Weasels change color from a dark brown to white. The cold temperatures and snow cover have nothing to do with this color change. It results totally from the change in the amount of available light. As the number of hours of daylight shortens in the fall, the weasel's eye receives light for shorter and shorter periods. This reduction in light entering the eye prompts a gland at the base of the brain to shut off the production of color pigment for the new winter coat. Brown fur is not really replaced. Instead, the fur simply continues growing, but in white.

The process of replacing the fur on mammals and feathers on birds is called *molting*. Animals begin their molt in late August. It takes several weeks for the molt to be completed. The animal must start this molting process early so the full winter coat is in place with the start of winter.



Some fish also change color with autumn. Examples are the rainbow trout and the king salmon. Salmon from Lake Sakakawea turn from a silver gray to black.

The following are some common animals and birds that change as winter approaches.

Short-tailed Weasel
The short-tailed weasel is found throughout our state but especially in woody areas along lakes and streams, and in the prairie pothole region. Short-tailed weasels are also referred to as ermine. Weasels are primarily active during the night. Summer color is dark brown with white under parts. Winter color is white with a black tip on the tail.

Long-tailed Weasel
The long-tailed weasel is found in all parts of the state especially near lakes and streams. Summer color is dark brown with yellowish white under parts. Winter color is white with a black tip on the tail.

Least Weasel
The least weasel is the smallest weasel. It is found in meadows and woods near streams. It likes open prairie and farmlands. Summer color is brownish gray. Winter color is white.

White-tailed Jack Rabbit
The white-tailed jack rabbit is found statewide in prairie areas. It likes the open prairie and farmlands. Summer color is a brownish gray. The winter color is white.

Snowshoe Hare
The snowshoe hare is smaller than the jack rabbit. Its feet are large and long-furred to make travel on snowdrifts easier. Summer color is dark brown with the tail dark on top and lighter below. The winter color is white on the tips of the fur, but dark next to the skin. Ear tips are dark.

White-tailed Deer
White-tailed deer are found in most counties but are more common in the central and eastern portions of the state. They get their name from the white undersurface of the tail which is flashed and carried erect like a flag when the animal is disturbed. Summer color is reddish-brown. In winter the color changes to gray.

Exercise

1. What animals have you seen that change color during winter?

_____

2. What are the advantages of this color change?

_____

3. Can you think of any other animals or birds that have seasonal color changes?

_____

Changes in Diet and Other Changes in Autumn

The availability of food changes with the seasons so animals need to find different foods and often make several changes in their diet.

Moose have a summer diet of aquatic plants, grasses and forbs. They may also eat some agricultural crops. In winter, moose move into woodland habitats where they eat mainly browse (twigs). Elk graze the high mountain grasses in the summer. In winter, elk move to valleys where they feed on sagebrush, pine, aspen, willow and nearly anything that is edible.

Bighorn sheep graze on grasses in the summer. They browse on shrubs and trees in the winter. Pronghorn antelope graze on grasses and sagebrush.

Mule deer browse and graze rangelands in the summer. In winter they live mainly on shrubs, grasses and forbs which are not covered by snow. They may also paw through the snow to reach food. White-tailed deer graze and eat agricultural crops such as sunflowers and corn in summer. They browse more in woodlands during the winter.

The gray fox eats more insects and fruits in the summer. They switch to a primarily animal diet in the winter, mainly rodents and rabbits.

Squirrels do not change diet with the coming of autumn and winter, but they do change their behavior by beginning to bury the nuts they collect. This is called *caching*.

Birds also change their diet in the autumn. Sage grouse eat seeds, legumes, sage, weeds and grasses in the summer, but change to sagebrush leaves in the winter. Sharp-tailed grouse eat berries, seeds and small grains in summer, but during winter months eat whatever can be found in their brushy habitat.

Lesser snow geese will eat grasses and sprouting grains in the summer. They often glean the stubble fields and eat underground aquatic plants in the summer. In winter, their diet is grasses and sedges.

Many birds and animals change their location (migrate) so that they can still find the food they need for survival.

Exercise

1. Name a species of mammal and note their dietary changes.

_____

2. Why would animals change their diets?

_____

3. Why do birds diets change?

_____

4. Name several species of North Dakota birds that migrate.

_____

North Dakota 4-H

Nature Trails

Waterfowl Identification

Objectives

You will learn to distinguish between swans, geese, puddle ducks, diving ducks and mergansers.

Introduction

Our enjoyment and appreciation of North Dakota's natural environment can be greatly enhanced if we know how to identify the many species of waterfowl that are found in the state. It is recommended that beginners first learn to recognize waterfowl in spring plumages since in spring the males are usually more highly colored than in the fall.

There are many publications that are helpful for learning to identify waterfowl. You may get a copy of the booklet "Waterfowl Identification in the Central Flyway" free from the North Dakota Game and Fish Department.

For purposes of identification, waterfowl are divided into two groups: 1) **swans and geese**, and 2) **ducks**. Ducks can be divided into three further groups: 1) **dabbling ducks** (puddle ducks), 2) **diving ducks**, and 3) **mergansers**.

Swans and Geese

The adult tundra swan is a large snow-white bird with an exceptionally long neck. The young can be distinguished from the adults during the fall by their more dusky plumage. Often during migration a pair of adults and their young-of-the-year travel as a family group. The voice of the tundra swan is quite distinctive and once it is known one can recognize these birds at a great distance. It is varied, sometimes quite loud and striking, and at other times it is a soft trumpeting.

The only white birds in our state for which it is likely to be mistaken is the lesser snow goose, or white pelican. The snow goose is smaller (4 – 6½ pounds) and has black wing tips. Tundra swans often weigh from 11 to 20 pounds. The tundra swan is among the first waterfowl to arrive in the spring and the last to leave in the fall. It nests far north and passes through the state in spring and fall. A flock of large white birds with long necks and all-white wings is very likely to be tundra swans.

The geese most frequently seen in North Dakota are **Canada geese, snow geese** and **blue geese**. The voice of the snow and blue goose is harsh, high pitched and quite distinctive. These two geese are of the same species but have different colors. The adult snow goose is white with black wing tips, while the young-of-the-year is dusky white. The adult blue goose has a white head and neck with a darker blue-gray body. The young blue goose may be dusky throughout.

Blue and snow geese generally fly together in mixed flocks. If a flock of geese contains both white and dark birds and the call is high pitched, it is most certainly this species.

Canada geese of all kinds have a black head and neck and white patches on the cheeks. Several subspecies ranging in size from 2 ½ to more than 15 pounds pass through North Dakota in the spring and fall. The giant Canada goose is the largest of these and is the only one that nests in the state.

The white-fronted goose is rather uncommon but some pass through the central part of the state in spring and fall. They are small gray geese, usually weighing 4½ to 7 pounds. They have some white feathers on the face near the base of the bill and the breast is often flecked with dark feathers. The call note is quite distinctive being generally of two syllables and quite melodious.

Exercise

On the line below each sketch write in the correct identification. Choices are:
BLUE GOOSE, TUNDRA SWAN, CANADA GOOSE, SNOW GOOSE, WHITE-FRONTED GOOSE and **AMERICAN WHITE PELICAN.**

_____

_____

_____

_____

_____

_____

Ducks

The first step in duck identification is learning how to distinguish between dabblers, divers and mergansers. It is helpful to have some knowledge of the structure of the bird. Become familiar with the terms used to denote the different parts of a duck's plumage and body. Make special note of the part of the wing plumage known as the *speculum*. It is one of the most distinguishing marks.

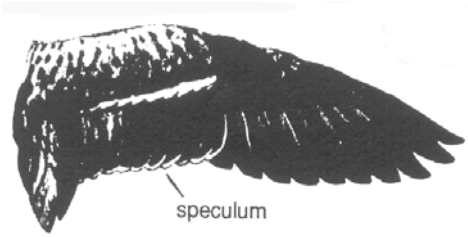
Geese and swans are generally much larger than ducks and both sexes are marked alike. In spring, the plumage of male ducks is much more colorful than the rather drab plumage of the females.

Drakes (males) of nearly all species of ducks lose their colorful spring plumage after the mating season is under way. For about a month during the summer they are in the "eclipse" plumage. The eclipse plumage is rather drab and resembles that of the female and young-of-the-year birds. The colorful breeding plumage is acquired over an extended period in the fall. It is well into the fall season before most adult and young males have this distinguishing attire. Males which hatch early may develop colorful plumage sooner than those which hatch later in the season.

The dabbling ducks (puddle ducks) include the mallard, black duck, gadwall, American widgeon, pintail, green-winged teal, shoveler and wood duck.

The diving ducks include the redhead, ring-necked duck, canvasback, lesser scaup, greater scaup, common goldeneye, bufflehead, white-winged scoter and ruddy duck.

The body feathers are shed twice each year to produce seasonal differences in plumage. The wing feathers are molted only once. The wing patterns, therefore, retain their identifying features and provide the best clue to a duck's identity. The speculum on most species contains distinguishing colors and feather markings. Wing patterns vary somewhat between young and old, males and females, but the basic markings are present.



Comparison of identifying characteristics of dabbling and diving ducks

	Dabbling Ducks	Diving Ducks
Species	Mallard, Black Duck, Gadwall, American Widgeon, Pintail, Green-winged Teal, Blue-winged Teal, Shoveler, Wood Duck	Redhead, Ring-necked Duck, Canvasback, Greater Scaup, Lesser Scaup, Common Goldeneye, White-winged Scoter, Ruddy Duck.
Feeding habits	Feed in shallow water by tipping or dabbling	Dive for food in deeper water
Posture on the water	Tail carried high giving the body the appearance of being tipped forward	Tail held low in the water so back is more sloping than in dabblers
Rising from the water	Jump upward and are quickly in flight	Patter along the surface of the water for some distance before becoming completely air born.

Flight	Wings beat slower than in divers. Neck may be inclined upward	Wings beat rapidly. Neck held straight out
Placement of legs	Near center of body. Facilitates walking.	Toward rear of body. Facilitates swimming and diving but walking often appears difficult
Speculum	Generally colored and iridescent	Generally gray, white or black and lacks iridescence
Hind toe	Without lobe	Lobed
Foot	Small	Large

Exercise

Distinguish dabbling ducks (puddle ducks) from diving ducks. On the line below each sketch write in the word “diving” or “dabbling” to indicate which group the drawing portrays.

_____

_____

_____

_____

_____

_____

_____

_____

Some Common Species

Following are descriptions of some of the more common species of dabbling (puddle) ducks, diving ducks and mergansers. For further reference, consult the booklet “Waterfowl Identification in the Central Flyway.”

Dabbling (Puddle) Ducks

The **mallard** has a purplish-blue iridescent speculum bordered before and behind with white bars. The male in breeding plumage has a glossy green head, a white collar ring and a chestnut breast. The female is a buff-brown color with similar distinguishing wing markings. Early in the hunting season drakes and hens may resemble each other.

The **pintail** is a fairly large, elongate duck with a long slender neck and fairly long and pointed tail. The adult male has a speculum of violet, bronze and green bordered in front by a cinnamon-buff bar and behind by a white bar which forms a trailing edge of the wing. Females and young-of-the-year may have duller speculum but they all have a white trailing edge on the wing. The male has a brown head, white breast and belly. Females are a drab grayish brown. Pintails are recognized in flight by their slender profile, pointed tail and white trailing edges of the wings.

Blue-winged teals are recognized by their small size. There is a large chalky-blue patch on the forepart of the wing and the speculum is green. The drakes have a white bar between the speculum and the blue patch on the part of the wing plumage known as greater *coverts*. On the female these feathers are dark but are tipped with white, giving a mottled appearance. The adult male blue-wing in spring has a distinct white crescent on the forepart of its otherwise purplish head.

The male **wood duck** is one of the state’s most brilliantly colored ducks. The females are rather plainly marked but have a conspicuous white eye-ring. Probably the best marking for identification of any wood duck is the silvery gray or whitish outer tips of the *primaries*, or main flight feathers. In flight it appears as a dark bird with a pale underside and a rather long squarish tail. It holds its head above the level of its body and often gives a “whistling-mewing” call.

Diving Ducks

The **canvasback** is a large duck. The adult male has a whitish back and reddish head but females and young are rather plainly marked and brownish birds. The speculum area is a plain solid gray and has no distinctive markings. The best identifying feature is the shape of the head which is elongate with a long sloping profile and rather long bill. As the name “canvasback” implies, the males in full plumage have a whitish back.

The **redhead** is a medium-sized duck. The adult male has a reddish head but the females and young are rather plainly marked. Color of speculum area is plain solid gray and there are no distinctive markings. The best identifying feature is the shape of the head and bill. The head is rather round with a rather high and abrupt forehead. The bill is shorter and broader than in the canvasback. Bills of adults, both male and female, have a whitish ring bordering the black tip.

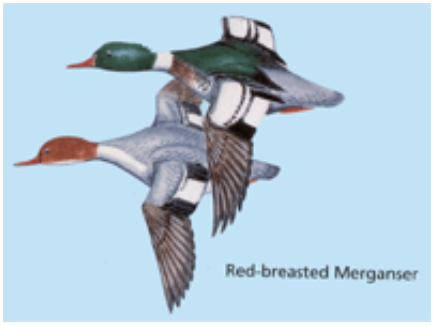
The **lesser scaup** or bluebill is a medium-sized duck. The male in spring has a purple-black head and neck, black breast and tail area and a light colored back and sides. The female has dark brown plumage. It is easily distinguished by its white speculum. This white speculum is sometimes less distinct for young birds but it is always a good identification mark. The white speculum is found on the *secondaries*, which are the flight feathers nearest to the body. This marking is easily recognized in flight.

The **ruddy duck** is small and easily distinguished by its tail feathers. The fanlike tail is often held stiffly erect when the bird is on the water. In spring plumage the male is a striking bird with chestnut back, sides and neck, a white cheek patch and a bright, light blue bill. The female is brownish gray and has a dark line across the cheek.

Other species often seen in the state are the **gadwall, American widgeon, green-wing teal, ring-necked duck, bufflehead, Barrow’s goldeneye** and **common goldeneye**.

Green-winged teal | Gadwall | Bufflehead | Ring-necked duck | Common goldeneye

Mergansers



The **mergansers** are easily recognized by their long, narrow and nearly cylindrical bills which are unlike those of other ducks. Plumages are bright for adult males but vary with the sex and age. There is always some white on the wings. The hooded merganser is the smallest of the three species found in North Dakota, being about the size of a wood duck. The largest is the **common merganser** which sometimes weights as much as four pounds. The **red-breasted merganser** is intermediate in size between the other two species. In its fall plumage it is often very difficult to distinguish it from the common merganser.

Common mergansers and red-breasted mergansers have a substantial amount of white on the top of the wing which is quite conspicuous in flight. The **hooded merganser** also has some white on the wings and it can be further distinguished by its long tail and pale underside.

The hooded merganser is the only one of the three species that nests in our state. They normally nest in tree cavities but will use nest boxes provided for them or for wood ducks.

Exercise

Plan a field trip to observe and identify wild waterfowl. For the beginner a good time to observe waterfowl in the field is April or May when the spring migration is in progress. You may go in the field individually or as a part of a group. You may want to set up an observation route that leads to several ponds.

Materials needed include binoculars, waterfowl identification booklet, notebook and pencil and means of transportation. Waterfowl encountered should be examined carefully to determine species, sex and behavior. Record all observations in a field notebook and include:

1. Date_____
2. Place _____
3. Species _____
4. Number(s) seen and sex_____
   _____
5. Behavior (i.e., feeding, courtship, flying) _____
   _____
   _____
6. Notes about the habitat (small pond, large marsh, field, etc.) _____
   _____
   _____
   _____

North Dakota 4-H

Nature Trails

Firearm Safety

Objectives

You will learn about 1) the safe methods needed when handling firearms and 2) the proper care and storage of firearms.

Introduction

Many Americans own firearms. It is very necessary that they be handled properly to avoid accidents. Become familiar with the requirements for safe handling and storage of firearms. All firearms should be treated as if they are loaded. **NEVER POINT A GUN AT ANY PERSON**.

Ten Commandments of Firearm Safety

The following is a list of basic rules to follow when handling firearms.

1. **Always POINT the muzzle in a safe direction. Be able to CONTROL the direction of the muzzle even if you should stumble.**
2. **Treat every firearm as though it were LOADED.**
3. **UNLOAD firearms when they are not in use. Keep the action open when the firearm is stored and carry it in a case to the shooting area.**
4. **Be sure the barrel and action are CLEAR of obstruction and that you have the PROPER ammunition for the firearms you are carrying.**
5. **Be sure of your TARGET before you pull the trigger.**
6. **Never POINT a firearm at anything you do not want to shoot. Avoid all horseplay with a firearm.**
7. **Never CLIMB a fence, tree, or JUMP a ditch with a loaded firearm. Never PULL a firearm toward you by the muzzle.**
8. **Never SHOOT a bullet at a flat, hard surface or at water.**
9. **Store firearms and ammunition SEPARATELY.**
10. **AVOID alcohol and other drugs before or during shooting.**

1. Think about each rule for firearm safety. Give one reason for each rule. What can go wrong if you ignore these rules?

REASON	WHAT COULD GO WRONG?
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Primary Rules

All firearm accidents could be avoided by knowing and observing the simple safety principles of holding appointing a firearm. You need to learn and **practice** these commandments.

1. Always point the muzzle in a safe direction. A "safe direction" means in a direction that, if the firearm discharges, it will not cause injury or damage. Anticipate the worst. Assume your gun may go off. Take precautions so that no one would get hurt if it goes off. Inside a building a firearm should **NOT** be pointed where the bullet might penetrate and hurt someone on the other side. Instead, firearms should be pointed at exterior walls. Safety-conscientious firearm handlers will never point the muzzle of a firearm at another person. They will not allow a gun to be pointed at them. Students of firearm safety should know and recognize when a firearm is not being handled safely. It is their responsibility to inform others.

2. Make sure the firearm is unloaded before handling it. Safe firearm handlers check every firearm by opening the action. Look and feel inside the breech or chamber to make certain the firearm is not loaded. **NEVER take another person's word for safety**. Safe firearm handlers assume the responsibility themselves. "I didn't know the gun was loaded" is never an acceptable excuse.

3. Always treat the firearm as though it were loaded. This is a good basic rule of thumb to avoid the accidents that may happen because of mechanical or human error. Always follow this rule to be prepared for any situation.

Safety at Home

Home is where youth will probably come across a firearm. It is estimated that three out of every four households nationwide possess one or more firearms. How firearms are stored, cleaned and handled in the home needs to be studied by every family.

Safety in the home should begin by locking up all firearms. Store ammunition in a **separate, locked** location. Drawers, closets, under beds or in corners are not safe places to leave guns. Ammunition should not be left within reach.

Firearms kept as collector's items should always be stored unloaded. Treasured relics and war-time souvenirs should be displayed out of reach or kept locked with other firearms.

Safety in the Field

There are times when you need to be on guard against possible accidents. These times include:

- When you've had just enough experience to think you know all the answers. Accidents in the field can happen if you don't follow all the rules.
- When carrying a gun. Be very careful handling guns around the home, camp or near the car. Be alert for rocks, holes and other hazards when in the field.
- When plinking. Plinking is shooting at informal targets. Beware of the temptation to "horse around." Never allow yourself or your friends to cause a tragedy.
- When you are tired. At the end of a long day's hunt, reflexes may become dulled. Gun carrying is relaxed. Watch for carelessness and try to avoid it.
- When you first spot game. The excitement sometimes causes you to rush into a careless shot. This eagerness cannot be felt in a class or on the training range. It comes naturally when spotting game. When you first see game, double your caution. Be sure to carefully identify your target.
- When a hunting buddy forgets or ignores the safety rules. Tell him immediately. He may be a close friend, but anyone careless with a gun is careless with your life. If he can't improve, be his friend someplace other than around firearms.

You need to learn how to carry firearms when you go out in the field. The safest way to carry is probably the two-hand carry which gives the best control of the gun and the muzzle. With this carry, the small of the stock is gripped with the trigger hand. The fore end is held with the other hand. The gun is carried diagonally across the body with the muzzle pointed up and away. Other carries are the cradle carry, the side carry, the trail carry and the sling carry.

In all carries the following rules apply:

1. **Keep the muzzle under control** and pointed away from all people, animals and your self.
2. **Keep the safety on** until ready to fire. BE CAREFUL! Most safeties block the trigger and nothing else. A hard blow in the right place can still fire the gun. A safety can wear out or it may not work. Handle every gun as if it were loaded and the safety off.
3. **Keep the fingers outside the trigger guard** and not on the trigger. Fingers should only touch the trigger when firing. Covering the trigger guard with the hand will help prevent other objects from hitting the trigger.
4. When target practicing, **all firearms should be left unloaded until shooters are ready to fire** at the targets. Placement of targets is also important. Make sure that nothing behind the targets can be injured or damaged or cause bullets to ricochet.

Watch Where You Shoot

If you are hunting with other people, everybody should agree BEFORE the hunt on the area each shooter will cover. Don't move to any other position. This is very important. Care must be taken so that others are not mistaken for game.

This illustration shows the common shooting zones used with two or more hunters.

Never shoot at a bird that flies back across the line of hunters. If a bird flies low between two hunters, forget the shot. Never let any gun point at another hunter. If you are following game with your gun, shoot only in your zone. Never swing your gun out of your zone. Keep your muzzle under control. Don't shoot if you can't see the target clearly.

Obstacles in the field can cause safety problems. Weather can produce hazards to the shooter. Wet, slippery ground is a danger. Mud, snow and ice can make walking difficult. Formations and obstructions such as steep banks, downed timber or ditches all need to be handled carefully. Crossing a fence, entering a boat or climbing a tree are particularly dangerous when carrying a gun.

Unload your gun when traveling on slippery ground, steep hillsides, uneven or unstable ground. If you should fall, hold the gun securely. DON'T throw the gun away from you. Afterwards, check the action and barrel for damage, dirt and obstructions.

When hunting with another shooter, unload your gun and open it before handing it to your companion. Take both unloaded guns while your partner crosses a fence. Never point the gun at another person.

When entering and leaving a boat, handle your gun by the muzzle. In the boat, guns should be held carefully. Always point them in a safe direction.

Exercise

1. Why would the shoulder carry be dangerous if you were in front of someone?

_____

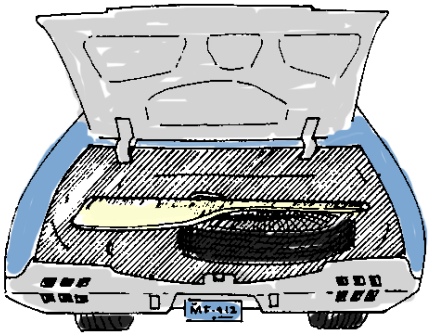
2. Why would the side carry be dangerous if you were behind someone?

_____

3. Why is the two-handed carry also called the "ready" carry?

_____

Transporting Firearms



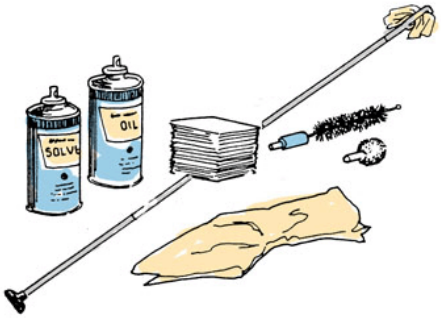
Transport firearms in a case in the trunk.

You are responsible for your firearm at all times. A firearm should be unleaded before it is put into a vehicle. The best way to transport a firearm in a vehicle is unloaded, inside a case, in the trunk. This keeps it safe and out of sight.

Firearms should not be leaned against automobiles, trees, fences or other insecure rests. Firearms that are taken care of properly are not only safer, but also last longer and need fewer repairs.

Gun Cleaning and Storage

A gun should be cleaned inside and out if it has been exposed to mud, sand, rain or snow. If moisture has formed on the metal parts (sweating occurs when a cold firearm is brought into a warm home) or if the gun has been stored uncovered and exposed to the air for a long time it should be cleaned before it is used.



Cleaning equipment should include a cleaning rod, flannel patches, powder solvent and light gun oil. A cleaning cloth treated with silicone is also advisable. Always check to be sure that the gun is EMPTY. Make sure that no ammunition is nearby.

Clean the firearm from the breech end (rear of the firearm). Too much oil or grease can be dangerous – just a few drops will do for most jobs. Too much oil on the safety can stop its action.

Fingerprints left on a firearm work as an acid and can corrode the metal.

Clean barrel and metal parts with good commercial solvent.

Clean bore until dry patch comes through as clean as possible

Run oily patch through barrel

Bore should be cleaned through breech end where possible

All metal parts should get a light coat of oil

Store guns in a horizontal position

After storage run clean patch through bore before firing

Remove all excess grease and oil

When storing firearms, make sure they are UNLOADED. Store firearms in a locked cabinet. Be sure to store ammunition separately in a locked compartment. When different types of ammunition are store together, each kind should be kept separate. Each kind should be in its own container to avoid mixing.

Exercise

1. Circle the unsafe firearm practices in each of the following situations.

North Dakota 4-H

Nature Trails

Winter Changes

Objectives

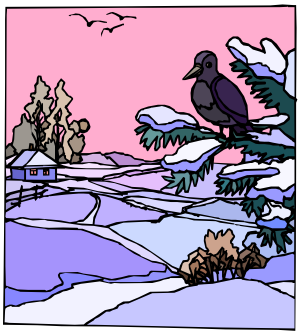
You will learn about 1) hibernation, and 2) survival of wildlife.

Introduction

Winter brings many changes. Some of these are hard on animals. The lower temperatures stress animals. They adapt in different ways to handle the cold.

Hibernation (seasonal torpor)

Torpor (pronounced tor-per) is a physical state during which metabolism (digestion), heart rate and breathing slows down. When the animal's body systems slow down it goes into a sleep-like state called torpor. Torpor in the summer is called *estivation*. Torpor in the winter is called *hibernation*.



Winter is often very hard on animals. They must find ways of surviving. Winter torpor also includes *hypothermia*, or the lowering of the body's temperature. Some animals use hypothermia daily and some seasonally. Hibernation is the seasonal use of hypothermia to reduce body temperature.

When an animal gets cold it usually shivers. Shivering is a mammal's way of warming its body quickly. When body temperature lowers during hibernation, shivering is stopped, since shivering takes energy. Mammals need this stored energy during hibernation.

Hibernation can be brought on by a shortage of food, and the onset of cooler temperatures. Body rhythms make some animals sensitive to falling temperatures. Hibernation does not always occur at a set time. Harsh conditions may hurry it and nice weather may delay it.

Hibernation is caused by several things. Sometimes a signal (*stimuli*) causes hibernation to start. Different animals react to different stimuli. The arctic ground squirrel, for instance, reacts to shorter days and cooler temperatures.

Woodchucks hibernate but not always deeply. Other members of this family also hibernate, including the thirteen-lined ground squirrel, Franklin's ground squirrel and Richardson's ground squirrel, as well as the least chipmunk, North Dakota's smallest chipmunk.

Some animals fall into a heavy sleep for several days in winter, and when the weather improves, wake and leave their den. This is not true hibernation. Badgers, for example, often sleep during harsh winters. Several badgers stayed underground for 70 days one winter. Raccoons also sleep during cold winter months. Before sleeping, they begin to store large amounts of fat. They are not considered true hibernators.

Hibernation is different in different mammals. All lower their body temperatures, but they don't all go down to the same temperature. Bats' body temperature gets very low. It is the lowest in deep hibernation. Bats would die in our area when the food supply decreases. Hibernation allows bats live here. By hibernating they can survive with a low food supply. Lower body temperature reduces the need for food.

Animal Winter Survival

There are several ways of dealing with winter. Hibernation and sleeping during the coldest part on the winter are two ways. Denning up is another way. The entrance to the animal's underground den is closed off and the air stays warmer inside the den. Usually the animal has stored up a supply of food. Sometimes the food is stored in a separate passage of the den. Examples of animals that den are:

- Ord's kangaroo rat
- Pocket gophers
- Prairie dogs
- some mice
- all tree squirrels

Mice avoid cold by sleeping through it. Some scientists think that mice hibernate. Others think that they den up.

Other animals handle winter differently. Pronghorns belong to the deer family. They are named for the distinctive prong of the male's horn. It is a true horn. The core is bone surrounded by a horny cover. Unlike cattle, the horny sheath is shed each year. As winter comes, pronghorn hair lengthens. The hair protects the animal. The coarse hair has a large central air cell. These cells provide a dead air space within each hair that is important for insulation. They keep the animal warmer. The pronghorn can also raise its hair. That also helps insulate it from the cold.

Striped skunks avoid harsh weather by sleeping in their dens. They can only do that for a few days at a time. Tree squirrels also avoid cold by sleeping in their dens.

There is much controversy about whether or not bears are true hibernators. Although their heart rate slows during hibernation, they only lower their body temperature by 9 degrees Fahrenheit. This is a small change. Other hibernators drop their temperature much lower. Bears also wake very rapidly. Other hibernators are very slow-moving when they first wake up.

Bears go into a feeding frenzy in the fall. They gain many inches of fat. The fat is important in hibernation since it can be broken down into energy, carbon dioxide and water. The bear gets all the water it needs by breaking down the fat.

Hibernating bears are studied as part of space research. While the bears are inactive, you would expect their bones to weaken. When we don't get enough exercise our bones lose calcium which gives bones strength. Studies have found that hibernating bears do not lose calcium. Scientists are hoping to find the compound that controls the bone calcium in bears since this might help astronauts survive long space voyages. Astronauts lose calcium from the loss of gravity.

All hibernating mammals have brown fat. Brown fat's job is to produce heat quickly. Some hibernators have brown fat in their neck or shoulders. Bats have brown fat between their shoulder blades. There are two ways mammals wake up during hibernation. One way is to burn the brown fat. This produces energy to wake up the animal. Another way is to start shivering. Shivering warms the body. Then the animal will wake up.

Exercise

Winter Word Find

1. Find and circle the following words:

BADGER	HIBERNATION	SIGNALS
BATS	HYPOTHERMIA	STIMULUS
BLACK BEARS	LESS FOOD	TORPOR
BROWN FAT	LIGHT	WAKE
DENNING	LOW TEMPERATURES	WINTER
GROUND SQUIRRELS	MICE	

C L A B X I O T W L H S T U N
H I B E R N A T I O N T V K L
A G L P A R T O N W A O W Y M
D H A P P T I N T T E P X G B
K T C C A R D A E E E C C O F
T A K E A P F A R M R A I Z I
D O B A N N I K T P N D H M J
N O E R W A K E T E A K A K S
T O A O N R X D O R N P N A O
V I R E T N A G E A K N V A P
G B S I G N A L S T E D W B S
M R T K O T R S T U T T Q R T
P O O D G G T R U R N B U H I
A K R U A E I O V E H O F G J
P P P K N B I N H S Y B K N N
O W O I N D T U A V P A P I O
K O R N L E S S F O O D W N Y
P N O K A N I Q E E T G Z N V
L E S V U V S T U A H E C E B
A N V A B A T S K I E R T D E
S I G M A M I N A M R E N O S
L I G N T S M O P S M R P Q R
S I N A L R U A N O I P E A B
P A R T S E L G A Q A U R L C
Q U I N T R U P L A Z K O N S
H A R D T O S T O P N O W X Z

2. Go to a wooded area or marsh. Look for animal tracks in the snow. A wildlife track guide book can help you find out what kind of animal made the tracks. Follow the tracks. Observe where the animal may live and what foods it may eat. Fill out the following chart.

DATE	LOCATION	ANIMAL	SHELTER TYPE	FOOD

Winter Survival for Birds

Some birds *migrate* out of the state to escape the cold winter. Migrate means to move from one area to another. Others move to more heavily wooded areas. Some waterfowl overwinter on the Missouri River. They will stay where is there is open water and enough food. The open water needs to be ice-free.

North Dakota is a good winter home for some other birds. These include English sparrows, blue jays, chickadees, finches and other song birds.

Sharptail grouse are birds native to our state. They are widespread over the state. Their name comes from their tail feathers. The tail has two long central feathers. The feathers are much longer than the other tail feathers. Sharptails have a white belly. The white tail and long central feather are important identification marks. Sharptails burrow into snow banks to avoid harsh weather. They also take shelter in woody areas.

A ring-necked pheasant relies on tall grasses or shrubs for winter protection. If such cover is not available, many of these birds will die during harsh winters.

Exercise

1. Observe birds in your backyard. Identify the birds using a bird key book. List those you have observed.

NAME	COLOR	NAME	COLOR

2. Can you tell what they eat? _____

_____

3. Do you feed them? _____

Internet Resources:

Birding on the Internet: Links to other websites
http://www.ndparks.com/Nature/Birding.htm

North Dakota Wintering Songbirds
http://www.npwrc.usgs.gov/resource/1998/backyard/winter.htm

Hawks, Eagles and Falcons of North Dakota
http://www.npwrc.usgs.gov/resource/othrdata/hawks/hawks.htm

Homemade Nest Boxes for Cavity Nesting Ducks
http://www.npwrc.usgs.gov/resource/tools/nestbox/nestbox.htm

North Dakota 4-H

Nature Trails

Feeding Wild Birds

To attract birds year-round one must provide for their basic needs of food, water and cover. Bird feeders, bird houses, a source of water and various plant materials can provide habitat needs for your backyard birds. This lesson provides information on common winter birds, bird feeders and feeding.

Common Winter Birds that Visit Feeders

A number of birds do not fly south for the winter, or in some cases fly only as far south as our state. Some of the more common birds that we can attract to backyard feeders are pine siskins, brown creepers, purple finches, nuthatches, chickadees, cardinals, blue jays, woodpeckers, red polls, juncos, goldfinches and red crossbills.

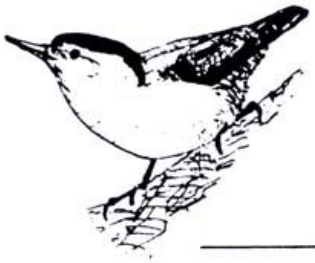
By offering food to these birds in winter we can help then survive the cold, while we take pleasure in having them around. Their songs, colors and lively actions add great deal of enjoyment to our winters.

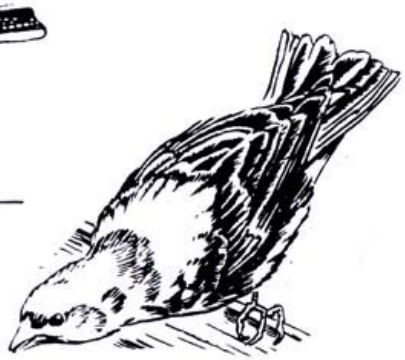
Birds' Favorite Foods

- Goldfinch – hulled sunflower seed, oil-type sunflower seed and thistle seed
- Chickadee – oil-type sunflower seed and beef suet
- Evening grosbeak – sunflower seeds of all types
- Blue jay – whole peanut kernels, sunflower seed and cracked corn
- Purple finch – oil-type sunflower seed
- Downy and hairy woodpeckers – beef suet
- White-breasted nuthatch – beef suet
- Red polls – oil-type sunflower seed, thistle seed, beef suet
- Juncos – red proso millet, oil-type sunflower seed
- Brown creeper – beef suet
- Red crossbills – oil-type sunflower seed

Exercise

On the next page are sketches of birds often seen at winter feeders. Try to identify each using a bird identification book or your library, if needed. Write the name under the picture.





Feeding Wild Birds

Most important of the three essentials for bird life is food. Water and shelter play a lesser role. Winter is the most important time for feeding. Begin in early fall to attract and hold birds that would otherwise migrate further south. Once lured from their natural wintering areas, birds concentrate around feeders in larger numbers than the area can naturally support. They are now your dependents. Feeding must continue until spring when natural foods are again abundant.

Selecting the Right Foods

Feeding birds is largely an art which must be learned through experience and observation. On the basis of diet, birds may be roughly separated into seed eaters and insect eaters. This division is not a clear one, for most birds fit into both categories at some time during their life. The use of several different feeders or combination feeders should satisfy the requirements of all.

Suet – Insect eaters like nuthatches and woodpeckers will consume large amounts of suet when insects and larva are not available. Suet is the fat from beef. Avoid stringy suet. It is hard for birds to eat. Suet may be made available plain or in any large mesh container. A better way is to grind it, melt it in a double boiler and pour it into molds to harden. It is more durable if melted before molding into cakes. Small frozen food dishes make good molds. Suet-seed cakes may be made by adding to the melted suet any of the seeds listed below. Melted suet or suet-seed mixtures should be placed in suet stick feeders while in a semi-liquid state. Stick feeders can be made by drilling holes in a small log or in 2” x 2” lumber.

Peanut Butter – May be used in place of suet in the manner described above. It is much more expensive, however. It should never be fed alone. Mix it with cornmeal or oatmeal.

Seeds – Even insect eaters consume some seeds, especially in winter. Seeds will attract many different kinds of birds. Grocery, pet and feed stores will carry the following material for seed feeding.

Sunflower	Grain sorghum
Wheat	Thistle seed
Millet	Commercial birdseed mixtures
Cracked corn	

Dog biscuits, rabbit food and other such items are also used in mixtures. A good homemade mixture is three parts sunflower seed, three parts millet and one part cracked corn. Experiment with several mixtures to find which one is preferred by the birds in your area.

Grit – Fine gravel or crushed charcoal should be added in small amounts to suet-seed cakes or seed mixtures to complete the diet. Birds have a gizzard and the gravel helps in the digestion of food.

Serving Bird Foods

Having attractive bird foods on hand is, of course, most important. Placement of those foods is important, too. Just as birds vary in size, shape, color, song and preferred food, so do birds differ in feeding behavior. Some feed almost exclusively in trees; others nearly always on the ground and others are opportunists, feeding wherever they can find acceptable food. You may wish to put up a variety of feeders.

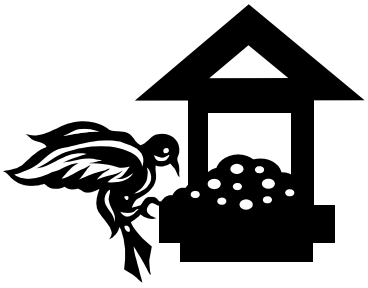
Most common birds will visit platform feeders. They are simple to build. You can buy hopper-style feeders that can be suspended by a wire or placed on a pole. Some birds, like juncos, prefer to feed on the ground on seed either kicked from platform feeders by other birds or placed on the ground for them.

Hanging tube-type feeders attract American goldfinches, chickadees and a variety of other species. Tube feeders permit goldfinches to avoid competition with blue jays and grackles which take over the platform feeders. Tube feeders will also attract pine siskins and red polls when they are in the area.

In general, birds which are ground feeders prefer white millet whereas birds attracted to tube feeders prefer oil-type sunflower seeds. Therefore, white millet and mixes rich in millet should not be used in tube feeders or other elevated feeders with small perching surfaces. Suet attached to tree trunks in wire baskets or in other feeders is attractive to woodpeckers and, unfortunately, starlings. In addition to food, birds readily use water placed near feeders.

Most people concentrate their feeding efforts during the winter months. Satisfaction comes not only from attracting good numbers of birds, but also because winter feeding helps birds survive the rigors of cold, icy and snowy weather. Actually, feeding birds year-round is enjoyable. Naturally produced seeds are not available in the spring and summer. Flocks of goldfinches and hose finches will visit tube feeders filled with oil-type sunflower seeds during spring and summer months. Cardinals and chickadees will visit daily. Young birds, often with clumps of down still attached, will come with their parents.

Selecting Your Bird Feeder



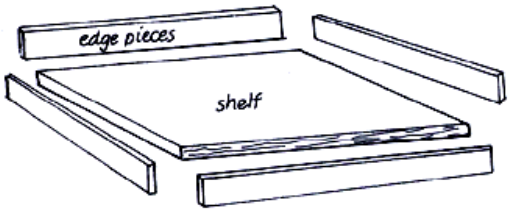
Many types of feeders are available commercially or can be made at home. Simple seed feeders can be made from an empty milk carton or other container. Others can be a piece of wood about 18” x 18” used as a platform. Many seed feeders protect the seeds from rain or snow and are easy to fill and clean. They provide a means to dispense feed gradually so spillage is reduced. Some spillage is OK because birds such as juncos prefer to feed on the ground. A feeder should also have a pleasing appearance.

Hopper-type seed feeders of various designs are the most common and versatile. Some of these limit feeding to certain birds. One type is surrounded by dowels or wire, spaced so that only small birds can enter. Another type has a counter-balanced perch that allows only lightweight birds to feed. Heavier birds trip the perch which closes the feeder door. Other specialty feeders include finch feeders that dispense very tiny seeds such as thistle or *niger* seeds, hummingbird feeders for sugar-water mixtures and suet feeders.

Building Feeders

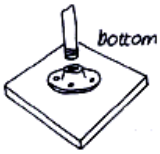
The next page contains a variety of plans for making a feeder. Construct one of more to place in your yard.

BUILDING FEEDERS



dowels, half-rounds, or quarter-rounds for edges

Support from ground with metal pipe and floor flange (from plumbing or hardware store)



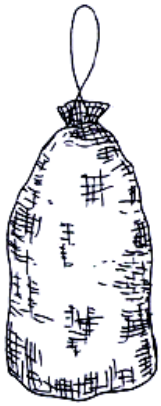
Materials

Base 1-18" x 18" x "

Edge 2-18" quarter round } APPROX.
2-17" quarter round } MEASUREMENTS

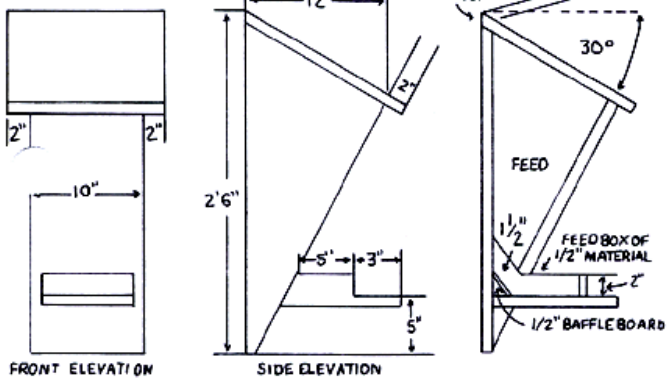
1 floor flange

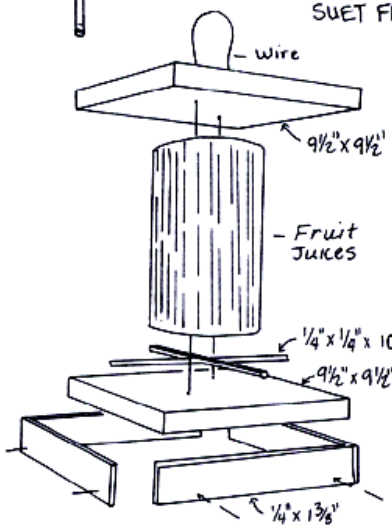
1 pipe



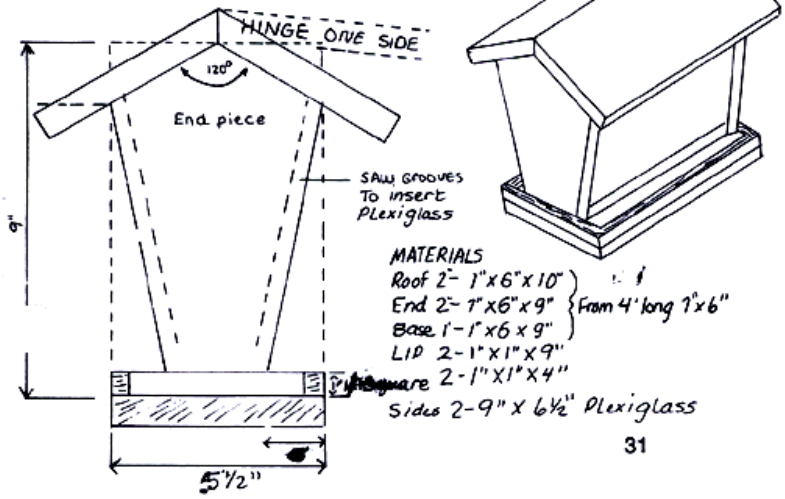
ORANGE or ONION BAG SUET FEEDER

OPEN FEEDER





WATER PROOF FEEDER



MATERIALS

Roof 2- 1"x6"x10" } From 4' long 1"x6"

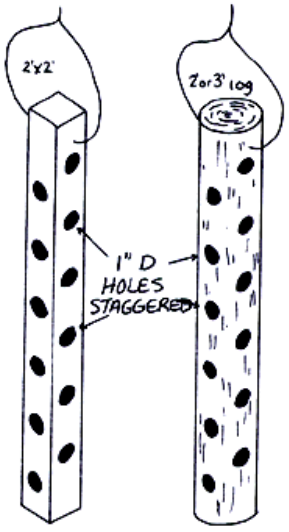
End 2- 7"x6"x9" }

Base 1-1"x6x9"

LID 2-1"x1"x9"

Square 2-1"x1"x4"

Sides 2-9" x 6½" Plexiglass



MIXED FEED or SUET FEEDER

Tips to Remember

1. Place the feeder where cats cannot hide and harm the birds when they come to feed. Try to situate it so the feeding birds are protected from strong winter winds. A good spot is in a somewhat open area with bushes or shrubs nearby for shelter and escape.
2. Begin feeding early – about October or November – and continue without interruption until spring. Birds develop feeding patterns and become dependent on feeders for their food. Interruptions in the food supply will cause them to abandon feeders.
3. Use a variety of feeders. Aggressive or "bully" birds may prevent other birds from feeding if only one feeder is used. And, as birds have different feeding behaviors, a variety of feeders will attract a more kinds of birds. Small feeders without perches are good places for small grasping birds to feed. Feeders placed low to the ground will attract ground-feeding birds such as juncos and native sparrows. Larger over ground feeders will draw in the cardinals, grosbeaks and other larger birds.

Exercise

Keep a record of birds that visit your feeding area(s). Use the following chart to record the date, time, type of feeder used, its location, amount and kind of food eaten and the numbers of different kids of birds seen. Keep a record of observations throughout the winter months.

Feeder Record

Date/Time	Type of feeder and location	Amount/kind of food eaten	Number and kind of birds observed

Questions

1. How many different species were observed? _____
2. Were different birds recorded at different times of the year? _____ Explain_____

   _____

   _____

North Dakota 4-H

Nature Trails

Managing Land for Wildlife

Objectives

You will learn 1) wildlife's requirements for food, water and shelter, and 2) how we can manage land to protect wildlife.

Introduction

Wildlife habitat is the place where an animal lives. Before we can begin to manage land for wildlife, we must understand their habitat needs. Wildlife habitat management is the science of making land suitable to meet the wildlife habitat needs. It is a science that, in order to be successful, must involve the landowner, sportsmen and professionally trained managers.

The total number of animals that are able to live in a habitat is called the **carrying capacity** of that habitat. Man is constantly changing the landscape and with it, wildlife habitat. These changes affect the habitat carrying capacity. Depending on the changes made, wildlife can be either benefited or harmed.

Kinds of Wildlife

Migratory – species that leave the area in which they were raised and travel to another area on an annual or seasonal basis. Most leave in late summer or fall and return to the area in early spring. Some species like waterfowl, shorebirds and songbirds travel great distances. Others, such as antelope or elk may only move a few miles between summer and winter ranges.

Resident – species that spend their entire lives within a few miles of the area in which they were raised. Examples are deer, sharp-tailed grouse, ring-necked pheasants, ground squirrels and fox.

Within each group of wildlife there are animals that are classified as being *game* or *non-game*.

Non-game – those wildlife species which are not hunted by man for meat, fun or enjoyment.

Game – those wildlife species that are hunted in specific seasons and according to bag limits set by the Game and Fish Department to regulate the harvest.

Wildlife Requirements

Food – Resident wildlife generally can find enough food. They eat green plants, weed seeds, wild fruits, waste grain or other animals. Usually when there is adequate cover there is adequate food supply. Food areas need to be located near cover that will furnish protection from enemies and weather. Food patches without enough protective cover sometimes end up being a trap for wildlife.

As winter progresses, food supplies become harder to find. During this time of year there are no insects and much or the plant life is gone. Occasionally we experience a severe winter storm that will reduce food supply area. Healthy game animals are well equipped to withstand winter. Most wildlife have the ability to endure many hardships.

Water – All wildlife have need for water. Most animals drink it, but some get the required moisture by eating water-filled plants or by licking dew off leaves. A stable water area, surrounded by a good growth of vegetation usually produces and supports a rich wildlife population. Wildlife needs good quality water which is free of pollutants.

Winter cover – Proper proportions of food and cover are all that is necessary to prevent excessive winter deaths. Idle fields with heavy weed growth, brushy woodlots, brush growing along roadside ditches and streams, wide shelter belts and shrubs growing along fence rows all provide cover against most winter storms.

Animals die in the winter mainly for these reasons:

- Starvation from lack of food
- Smothering by being covered with snow or ice
- Entrapment. They become covered by snow and can't escape
- Exposure. Low temperatures, no cover and a bitter storm can cause death

Spring cover – Spring can be an especially dangerous time for wildlife. Good wildlife cover is hard to find during early spring. Extreme weather conditions at this time can cause new hardships. Food is still scarce and snow has pushed down cover. New plant growth has just begun. Predators find this time of year to their advantage since there are few places available for game to hide. Many animals may have used up most of their body reserves during the long winter and may be very weak and thus are easy prey.

Nesting cover – Tall, dense undisturbed cover is needed to increase upland nesting bird numbers. Pheasants and other birds use early spring growth for nesting sites. Ducks use grasslands and haylands. Farming often destroys possible nesting sites and may kill the nesting hens and destroy the nest.

Safe nesting cover can be provided by leaving borders around fields, roadsides and waterways. Planting grass species which have a tendency to stand erect throughout the winter and into the nesting season will provide cover. Weeds and legumes will improve the quality of nesting sites. The use of no-till or conservation tillage has also provided many upland nesting wildlife with new nesting sites.

Escape cover – Escape cover protects wildlife by providing a place for them to hide from predators. This type of cover may be a den for a cottontail, a forest for a herd of elk or vegetation growing in a pond for fish. Cover includes an area of protection from predators and the elements of nature.

Travel lanes – Good travel lanes form an important part of the cover for game. Isolated sites offer excellent winter, refuge, nesting and food areas, but are often far apart. Fence rows often act as travel lanes. To be effective, a travel lane must be a route with enough cover for game to travel through with safety. Lanes left for game serve to connect smaller areas of suitable habitat.

Exercise

1. Keep a record of wildlife observations in the chart below.

Record of Wildlife Observations

Date	Time	Weather	Kind of wildlife	How many seen?	Where seen?	What was the animal doing?	Where did the animal hide?
Example: Aug. 7	7:00 am	Cloudy	Deer	1	Near forest	Eating	In forest
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							
17.							

Wildlife Management Practices and their Effect on Habitat

Now that you know some of the requirements of wildlife, how do you provide them? The following are some ways habitat can be improved.

Photo courtesy of J.S. Aber
http://academic.emporia.edu/aberjame/ice/lec18/lec18.htm

Controlled Burning (every 3 – 5 years) - Burning under cool, moist, low wind conditions. This should be done no later than February so ground nesting is not destroyed.

- Advantages of burning:
  a. Causes sprouting of some shrubs
  b. Releases nutrients into the soil
  c. Removes leaves and other organic matter so seeds can reach the soil
  d. Breaks down outside coating of some seeds so they can grow

- Effect on habitat:
  a. Helps keep plants grassy and weedy
  b. In pines, keeps the shrubs thinned out; provides grassy-weedy undergrowth
  c. Makes brushy growth more dense

Food Plot (1/8 to 1/4 acres) - Plot should be square or rectangular and should be located at the edge between two or more kinds of habitat. Best if located next to natural cover such as brush or honeysuckle. Plant corn, grain sorghum, millet, oats or rye.

- Effect on habitat:
  a. Useful in areas of natural plant succession where row-cropping is scarce
  b. Useful in areas with no brush

Nesting Boxes - Some species nest in cavities. If natural cavities are not available, artificial cavities can do the job. Different nest boxes are required for different wildlife.

- Effect on habitat:
  a. Good for birds in areas of new woods. Trees are not old enough to have cavities.
  b. Helps birds in areas with no trees.

Plant Shrubs - Shrubs benefit wildlife if properly located. All shrubs should be planted in the spring after danger of frost has passed (April – June).

- Effect on habitat:
  a. Useful next to fence rows and field edges.
  b. Deer, rabbits and grouse benefit from shrubs.

Plant Trees that Provide Food - Trees can provide food as well as shelter for wildlife. Consider planting fruit trees, buffalo berry, juniper and others.

Common Wildlife Foods

The following table lists some of the common wildlife species and the foods they prefer.

WILDLIFE																							FOODS
Geese	Frogs	Lizards	Salamander	Turtles	Bats	Moles	Woodpecker	Snake	Shrews	Owls	Beaver	Foxes	Hawks	Wood ducks	Bluegill	Bass	Bluebird	Dove	Pheasant	Grouse	Mallard	Deer	Muskrat	
	x	x	x	x		x	x		x								x		x	x	x			spiders
														x								x		acorns
																						x		mushrooms
x							x							x			x	x	x	x	x		x	weeds seed
x				x			x					x					x		x	x		x		fruit
x														x							x		x	tubers
x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x		x	x	x		x	insects
x	x	x	x	x					x					x							x		x	snails
x		x	x						x															centipedes & millepedes
											x									x		x	x	leaves, twigs (trees, shrubs)
																						x		lichens
		x					x	x	x	x			x											lizards
x														x						x	x	x	x	buds
x												x		x				x	x	x	x	x		grain
											x													bark
				x				x		x				x		x	x						x	fish
	x						x	x	x	x		x	x	x		x							x	frogs & salamanders
	x			x												x							x	turtles
	x	x		x				x	x	x		x	x			x							x	snakes
	x			x									x	x		x							x	crayfish
		x		x				x		x		x	x										x	birds
				x				x	x	x		x	x										x	small mammals
x				x							x			x								x	x	aquatic plants
				x						x		x	x										x	carrion
	x	x	x	x		x		x	x			x			x	x	x						x	earthworms
		x						x				x											x	eggs
x						x					x								x	x		x	x	grasses/forbs

Exercise

1. List the management practices would you use to make the picture area suitable for deer.

   _____

   _____

   _____

2. What practices could be used for pheasants? _____

   _____

   _____

   _____

Exercise

Name the regions shown in the photos and indicate one or more birds and/or animals that might live there.

A. 1. _____
2._____

B. 1. _____
2._____

C. 1. _____
2._____

D. 1. _____
2._____

E. 1. _____
2._____

Exercise

Examine the photos and list the animals that would do well in each environment.

Animals

Plants

Animals

Plants

North Dakota 4-H

Nature Trails

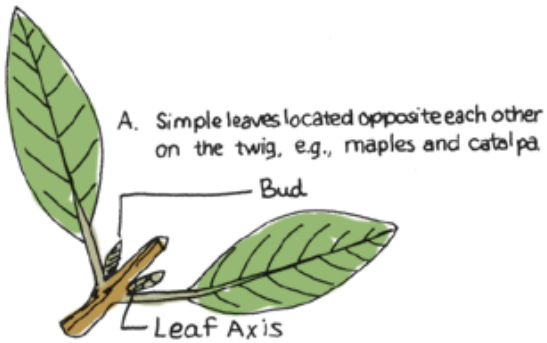
New Growth

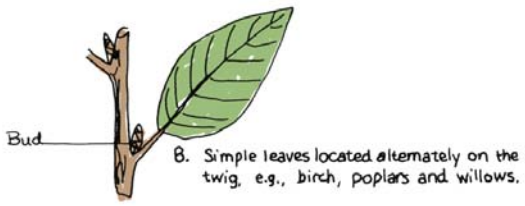
Objectives

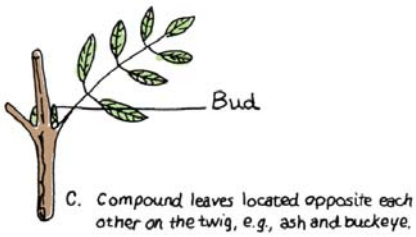
You will learn about 1) buds on twigs, 2) the structure of a bud, and 3) the parts of a flower.

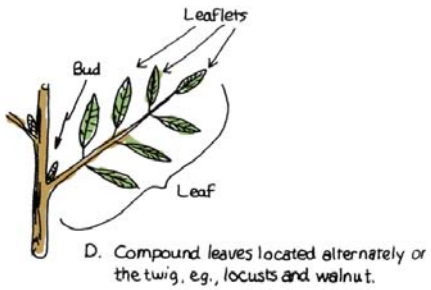
Introduction

One of the first signs of spring that you will probably notice is budding. The buds have actually been there all winter. In spring they are enlarging and beginning to mature.



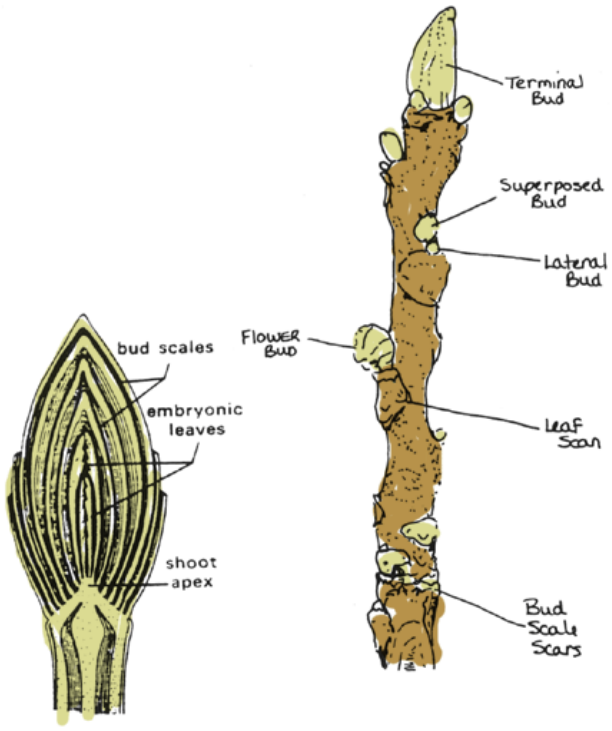






Buds are new (*embryonic*) shoots. Embryonic shoots are the first part of the leaf or flower to develop. First you see the shoot. Then the leaf or flower grows. Buds are found in the *axis* of the leaf (see drawing).

Twigs grow in length after the bud opens. The shoot tip has cells that rapidly multiply. Study the following illustrations and term definitions.



The Structure of a Bud **A Common Twig**

Definitions

Bud scales – The leaf-like covering over the bud. (Note: these scales are not always present. Buds without scales are called *naked*.)

Embryonic leaves – The beginnings of the new shoot.

Shoot Apex – The dome of plant tissue inside the bud. This is the area of growth in the new shoot.

Terminal Bud – A bud located at the end of the stem or twig.

Lateral Bud – A bud found at the side of the stem or twig.

Lateral Bud – A bud found at the side of the stem or twig.

Leaf Scar – The mark on the stem left after the leaf has fallen off.

Superimposed Bud – A bud located above another bud. These open only if the original bud or leaf is damaged.

Flower Bud – Contains the flower parts.

Exercise

1. Study several twigs from different trees. What types of buds did you find? _____

_____

_____

_____

_____

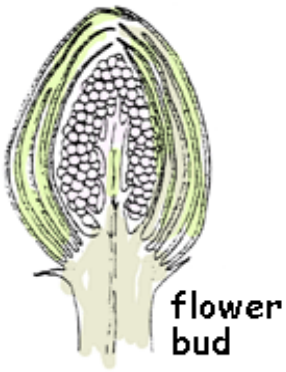
_____

_____

Types of Buds

There are three different types of buds.

Leaf buds develop into leaves. Under the bud scales, you can find tiny leaves that surround the tiny shoot.



Flower buds develop into flowers. Sometimes these buds look different from the leaf buds.

Mixed buds contain beginning leaves and flowers. Examples of plants with mixed buds are apple, grape and blackberry. The leafy shoot grows up and produces a flower cluster on its tip.

Exercise

1. Study the following illustrations. Under each indicate if it is flower or leaf bud.

_____ _____ _____ _____

What Kinds of Plants Have Buds?

Woody plants like trees have buds. They live more than one year. Their stems are hard.

Herbaceous plants (pronounced her-*bay*-shus) have naked buds. Naked buds have no scales. These plants have softer stems. The stem shoots up out of the ground and dies at the end of one growing season. These plants usually have many lateral buds.

Monocots are grasslike plants. In our area, monocots are very important. They include the cereal grains (wheat, oats, and so on). The cereal grains have an interesting growth pattern. It is called *tillering*. Tillering is the growth pattern in which the main shoot branches underground. Tillering is important because the plant can expand to fill all the available growing space. Each branch produces grain, which increases the yield.

Exercise

Use a hand lens or a magnifying glass to examine several buds from trees, shrubs, herbaceous and monocot plants. Carefully cut the bud in half and locate the following structures.

- Bud scales
- Embryonic leaves or flower parts
- Shoot apex

Draw a sketch of two different types of buds which you studied.

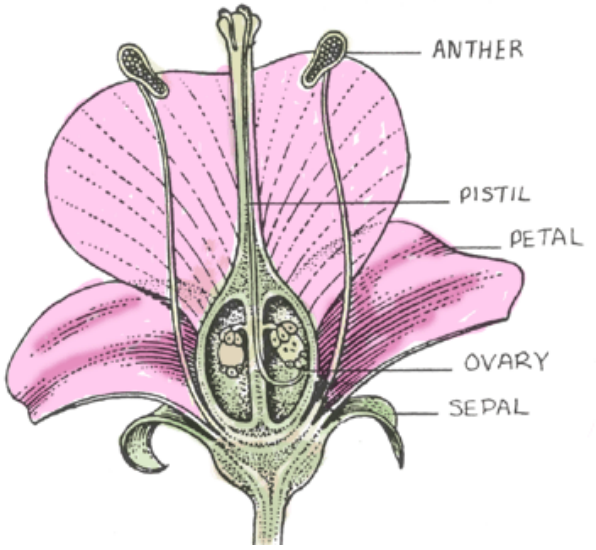
Plant Flowers

Plants reproduce by seeds. The seeds are found in the fruit of a plant. This fruit is produced from a mature flower. The flower is usually a branch stem which has leaves especially adapted to reproduce.

The Structure of a Flower

The lower leafy layer of the flower is called the *sepals*. These protect the flower. They are usually green, but sometimes they are the same color as the petals.

Above the sepals are the *petals*. Petals can be a variety of colors. Their function is to attract insects or other pollinators.



Pollen is produced by the *anthers*. Anthers are the male parts of the flower and are usually found at the end of long stalks under the flower. Some flowers have both male and female parts on the same flower. The pollen is transferred to the top of the *ovary* of the flower. The ovary looks like a small vase. Its top is sticky so that pollen will land and go down the tube. Inside the ovary, seeds are formed after the pollen has reached the inside of the ovary.

Exercise

1. Study some flowers. Can you find the same parts as on the diagram? Record your observations below.

Flower	Color of Sepal	Color of Petal	Ovary Present	Anther Present
1.				
2.				
3.				

2. What flowers are the first you see in the spring? _____

_____

_____

North Dakota 4-H

Nature Trails

Birds and Bird Nests

Objectives

You will learn about 1) where birds build nests, 2) the materials they use, 3) different nest characteristics and 4) how to observe nesting activity.

Introduction

Birds hatch their young in nests. Nests can vary from a smoothed place on the ground to the elaborately woven nests of the oriole. A nest is not a permanent “house” for a bird. Rather it is a nursery. Birds do not live in the nest once the young are grown and gone. Most birds use a nest only once, but a few keep adding to it from year to year.

This lesson provides information on some birds common to North Dakota and the types of nests they build or select to raise their young.

Where Do Birds Live?

Each species of bird has a very special place where it lives, finds its food and raises its young. This is called its *habitat*. A meadowlark lives in the open prairie, builds its cup-shaped nest on the ground and likes a fence post for its singing perch. You would not look for it in a wooded area. You would know that any nest found in a tree or under a bridge does not belong to this beautiful songbird.

A wren is a very adaptable bird. It might build its nest in a birdhouse, in hole in a tree or even in the pocket of a coat you hung up in a shed and forgot. You wouldn’t look for it in the middle of a pasture.

Some birds nest in brush or the lower parts of trees. Others prefer treetops. Some like the shady deep forest and others prefer a single tree or bush in a forest clearing. Many birds like the edge of a windbreak or wooded area, next to an open area. Once you know the habitat of a particular bird, you know where to look for it. If you change the habitat, you will change the kinds of birds in that area. This could happen when you plant a new windbreak that includes a lot of berried shrubs and evergreens. The opposite happens when an old grove or windbreak is bulldozed out. Habitat also changes when you drain a swamp or pothole. Birds will not stay where they can’t find the right foods, nesting places and shelter from their enemies.

Bird Nest Characteristics

Nests can vary greatly in construction. Some, such as a mourning dove next, are very simple structures made of sticks placed on a limb.

The bald eagle's nest is made of branches and twigs placed high in a tree. The eagle often uses the same nest for more than one year.

The robin's nest is more complicated. It is composed of grass, sticks and mud woven together. The nest of a rose-breasted grosbeak is saucer-shaped and is made of grass and twigs. It is found in bushes or trees.

Wood ducks usually lay their eggs in tree cavities. The female constructs the nest using pieces of wood bark or other material found in the tree cavity. It is then lined with down plucked from her breast.

The barn swallow builds a cuplike nest of mud mixed with grass. It is lined with grass and feathers. Nests are usually built under the roof of a building or on the rafters. The bank swallow builds its nest in a hole in a river bank. It usually nests in colonies with several nesting cavities found in the same area.

The killdeer does not build a nest. It usually lays its eggs on a sandy beach or shoreline.

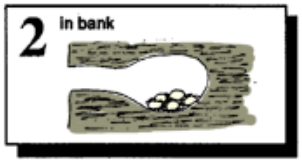
You can see from these examples that nests are constructed in many different forms and materials and can be build on the ground, in shrubs or trees, in cavities, steam banks, on buildings and almost anywhere. Each species has its own requirements.

Exercise

On the next page are pictures of 8 birds and 8 bird nests commonly found in our state. Place the letter of the bird that built the nest in each of the boxes.

_____

A. Barn Swallow

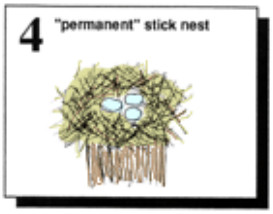


_____

B. Meadowlark

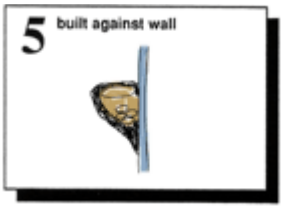
_____

C. Bank Swallow



_____

D. Rose-breasted grosbeak



_____

E. Killdeer

_____

F. Wood Duck

_____

G. Baltimore oriole

_____

H. Bald Eagle

Bird Nest Identification

It is not too difficult to identify nests if the birds are using them. If the birds have gone, look for the following characteristics. The size of the nest is an obvious clue to the size of the bird. The habitat in which the nest if found is another clue. Note the location of the nest which might be on the ground, in a shrub or a tree. The type of construction is also important. Observe the depth of the nest and the kinds of nesting materials used.

Study the nests of different birds. The best time to study nests is in the winter when the birds are not nesting. You will also want to observe the nest in summer, but do so with caution. Avoid scaring the bird by getting too close to the nest. Observing the nest from a distance with a pair of binoculars is best.

In locating nests, the singing stations of the male birds may give a clue. The killdeer may disclose the site of its nest by feigning injury when you are near it.

If you have robins or other birds that nest in your area, try to observe these birds building their nests. **THE NESTS SHOULD NOT BE COLLECTED.**

It is quite interesting that birds need not be taught how to build nests by their parents. Even a hand-raised bird will build a nest similar to others of its kind.

Cautions

1. It is against the law to collect bird nests.
2. Open birdhouses only when the parent birds are away from the nest.
3. Avoid disturbing nests and their surroundings any more than necessary.
4. If you scare the parent bird away from the nest, work carefully and quickly and leave so the parent can return.

Exercise

1. Find a place where birds may nest. Walk around a park, nature area or any suitable habitat. Look for nests or signs of them, such as wood peckers entering hollow trees.
2. Find one or more nests that you can observe. Sparrows or pigeons are good for this purpose.
3. Complete the Nesting Observation Sheet.
4. Compare your findings on this nest observation sheet with others you or your friends have made.

NESTING OBSERVATION SHEET

(Complete one for each nest)

Date observation began _____ Bird species _____

Nest Location_____

Latitude _____ Longitude _____ (optional)

1. *Describe the nest:*

Shape _____ Size _____

Materials _____

What is the nest attached to and where? _____

_____

Why is it built and located where it is? _____

_____

2. *Describe how the bird built the nest (*if you were able to observe the building process).

_____

_____

_____

3. *Describe the bird eggs:*

Number _____ Size _____ Shape _____ Color _____

Dates they were laid _____

Dates the hatched _____

Number of days to hatch _____

4. *Describe what the parent birds do.*

Who sits on the eggs? _____ How long? _____

Do they take turns? _____ Who brings food? _____

How much food? _____ How often? _____

What do they do when their nest is threatened? _____

_____

How do they feed their young? _____

_____

5. How many days after hatching do the young leave the nest (fledge)? _____

_____

Things to Remember

1. Reproduction is an important part of the bird's life cycle.
2. Nesting is the way birds raise their young.
3. Spring is the most frequent bird nesting period in North Dakota, but some birds nest at other times during the year.
4. Each species has its own nesting habits.
5. Some birds use nests for more than one year.

Common terms you may find useful:

CLUTCH – the eggs a bird lays in a single nesting effort

INCUBATION TIME – the number of days a bird sits on the eggs for hatching

NESTLING– a young bird in the nest

FLEDGLING – a young bird that flies from the nest

PRECOCIAL (*pre*-KO-*shul*) – birds ready to leave the nest and feed themselves immediately after hatching (ducks, partridge, killdeer)

Exercise

Complete the following questions.

1. Birds use nests to _____

_____

2. Why is winter the best time to study nests? _____

_____

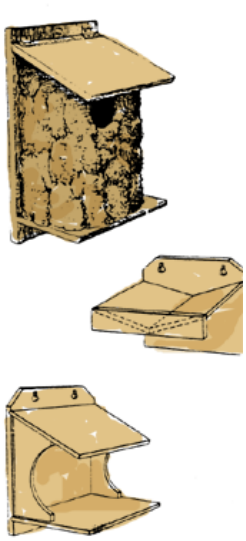
Challenge Activities

1. Research the following birds and describe their nests. Libraries are a good source of information.

BIRD	**NEST DESCRIPTION**
Yellow Warbler	_____
American Avocet	_____
Wild Turkey	_____
Screech Owl	_____
Ruby Throated Hummingbird	_____
Common Flicker	_____
Eastern Bluebird	_____
Ruddy Duck	_____

Build houses for birds and place them in yards, parks, along roadways or on public land.

Do this on your own, or as a club project for a community service. Get permission before placing bird houses. Use North Dakota Extension Service circular WL-964, “Homemade Nest Sites for North Dakota Songbirds, Vol. I.”



North Dakota 4-H

Nature Trails

Fish and Fishing

Objectives

You will learn about 1) some of the common species of fish in our state and 2) spin fishing techniques.

Introduction

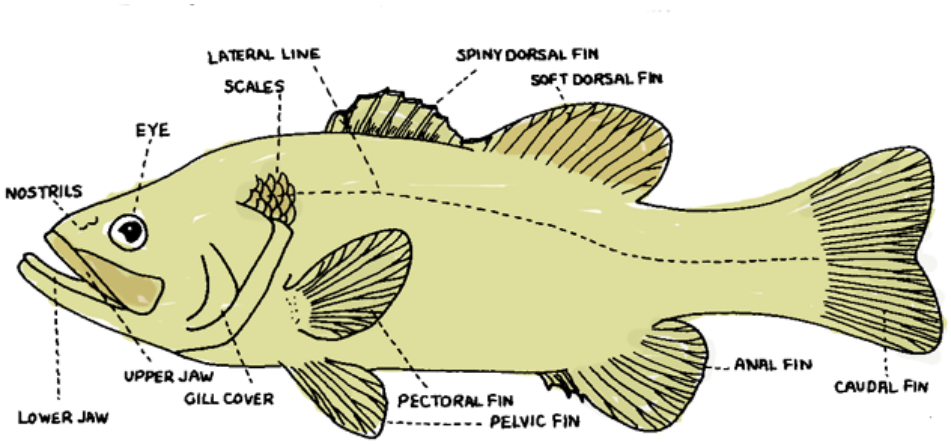
Fish are the lowest group in the family tree of vertebrates. They are cold-blooded. Most fish have a large part of their body covered with scales. In their water habitat, fish breathe by a system of paired *gills*. Their oxygen required to sustain life is obtained from the dissolved air in the water. Fish can actually smother and die in water which contains too little dissolved oxygen. This often happens where fish are too crowded. Bubbling, sprayed or fast moving water will pick up oxygen from the air. This makes if available to the fish as dissolved oxygen. Aquatic plant life also adds oxygen to the water through the process of *photosynthesis*. During photosynthesis plants take in carbon dioxide from the water and give off oxygen.

Here's the way a fish breathes. Water containing dissolved oxygen is passed over a series of filaments called gills. Gills are a network of many fine vessels with walls so thin that oxygen can pass from the water into the blood system of the fish and carbon dioxide can pass out.

One structure peculiar to fishes is the air bladder or swim bladder. The entire function of this organ is not known, but in some primitive fish it serves as a reservoir of oxygen.

Fish Identification

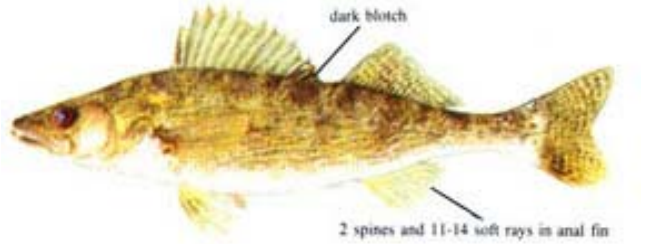
The illustration below shows the parts of a fish. Knowing the parts will help you identify the common species of fish found in North Dakota.



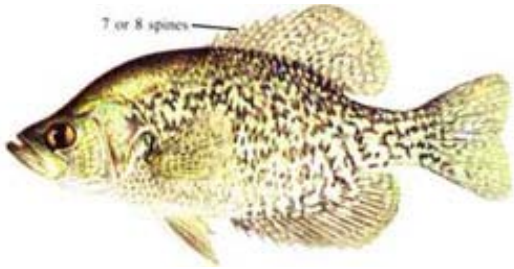
A wide variety of fish species is found in our state. A few of the more common ones will be discussed here.

Northern Pike – Pike are marked with horizontal body spots and never have more than five pores on each side of the lower jaw. Pike have scales covering their entire cheek. The northern pike was named our state fish by the 1969 legislative assembly. Other names are northern, pike, jack, snake, pickerel and hammerhandle.

Walleye – Walleye are dark olive in color with an overall golden-brown mottling and a white belly. A black blotch on the lower rear portion of the front dorsal fin helps identify the walleye. They prefer sand and gravel bottom areas, commonly found in our large reservoirs. They are also called wall-eyed pike.



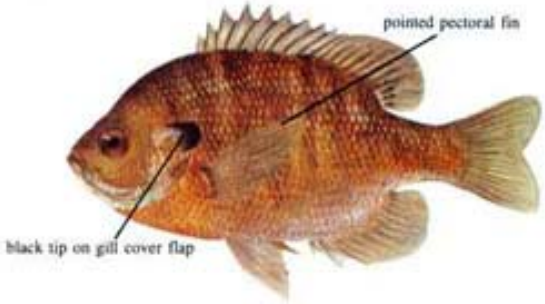
Black Crappie – Flat and silvery in appearance and marked with irregular dark spots, the crappie is a very attractive and desirable fish. The black crappie has seven or eight spines in the dorsal fin. It prefers clear water conditions.



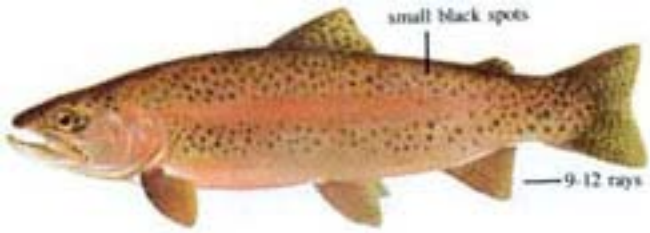
Yellow Perch – Yellow-green in color, perch have six to eight dark bars running up and down their sides. They have two spines and six to eight soft rays in the anal fin while walleye and sauger have two spines and 11 to 14 soft rays in the anal fin. Being easy to catch in both summer and winter and of good eating quality, the yellow perch is a popular fish. However, it is often stunted and needs heavy fishing pressure to keep its numbers in line with available food.

White Bass – This beautiful silver-gray fish has rows of dark narrow stripes running the length of its body. At times it reproduces abundantly and good catches are made – then the population seems to almost vanish until conditions favor it again. It has done well in our large lakes and reservoirs. It is also called silver bass.

Bluegill – This wonderful and scrappy little fish varies in coloration but usually is dark olive above with dark vertical bars on the upper sides and orange or yellow on the throat and belly. Its gill covers are blue with a black tip on the flap. It is probably the most popular member of the sunfish family, but at times it may be stunted due to overpopulation. It is also called bream, sunfish and sunny.



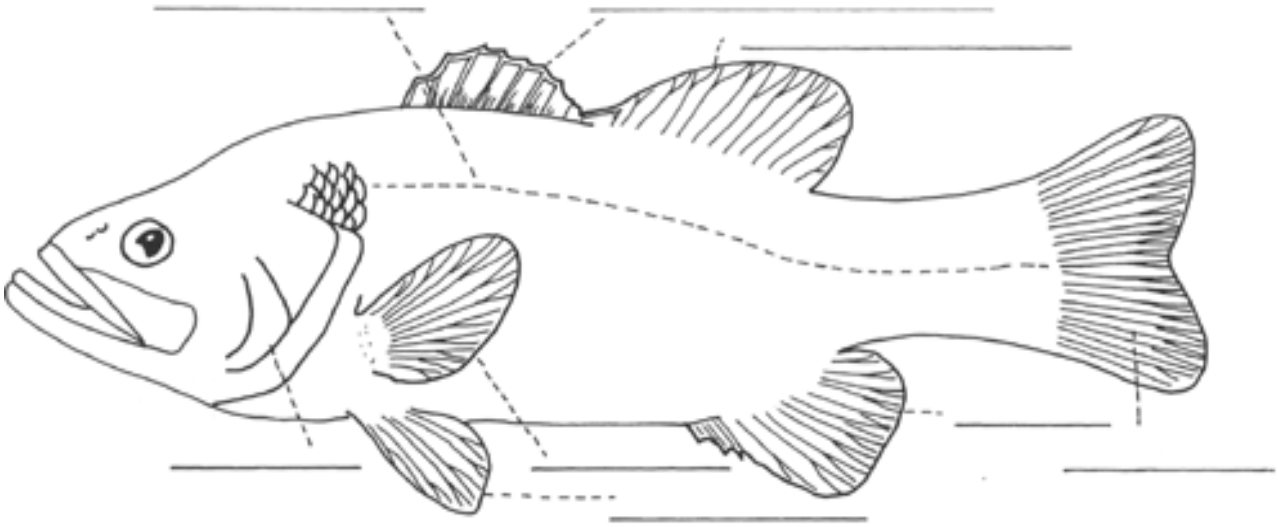
Rainbow Trout – The rainbow from the Pacific coast has been widely stocked in many states and has been most successful. It varies in coloring but usually has pinkish streaks on its sides and small black spots on its sides, fin and tail. The rainbow has 9 to 12 rays in its anal fin. Steelhead trout are a variety of rainbow that spend time living in the salt water of an ocean. Other rainbows are named according to where they originate, such as **Kamloops trout**, or by a descriptive term such as red band trout. **Cutthroat trout** are closely related to rainbows but can be recognized by a red cutthroat slash on each side of the lower jay. Rainbows are found in a variety of colorations, due to where they originate, where they are stocked, the time of the year and if they have crossed with other trout.



Black Bullhead – The black bullhead is our most common bullhead. Compared to a catfish, bullheads are stockier, darker in color, have a more rounded and slightly notched tail and are not as large. We also have yellow and brown bullheads. The black bullhead has 20 to 24 rays in the anal fin, while the yellow bullhead usually has 20 to 27 rays. There are also variations in color as the names suggest, but they are not as noticeable as might be expected. Most of us are satisfied to know them as just bullheads and don't worry if they are black, brown or yellow.

Exercise

1. Identify the parts of the fish. Write the correct terms on the blanks.



2. Pictured are some of the fish found in our state. Identify each fish and write its name on the blank.

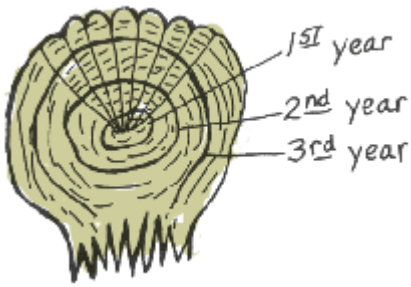
_____

_____

_____

_____

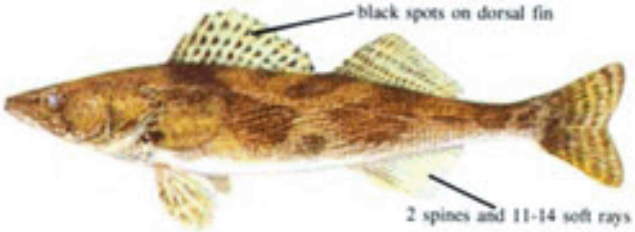
3. Fish scales can be studied to determine age (see illustration). Study the scales form fish that you catch or buy and record their ages below.

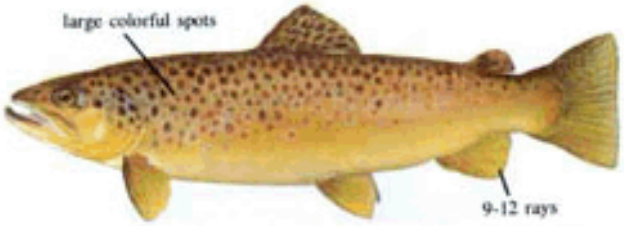


SPECIES		AGE	WHERE CAUGHT
1.			
2.			
3.			
4.			

Challenge Activity

The following fish are also found in our state. Using an identification manual or other library reference, try to identify each one.



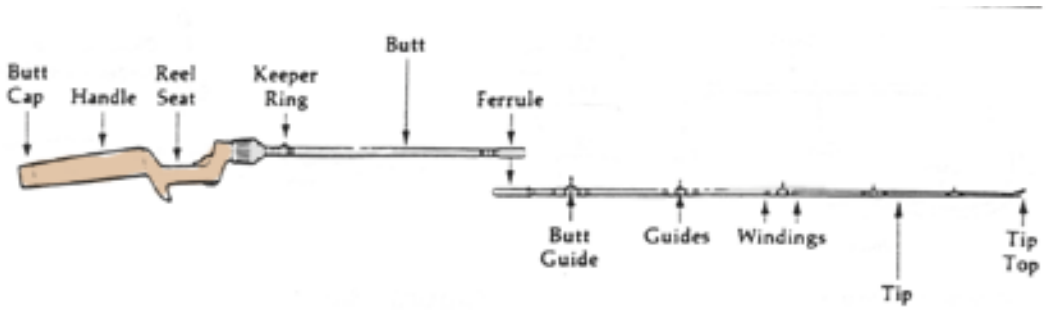


Spin Fishing

Fishing provides enjoyment to people. It can be relaxing, exciting or inspiring. It attracts people of all ages. Fishing is one of the most popular outdoor sports.

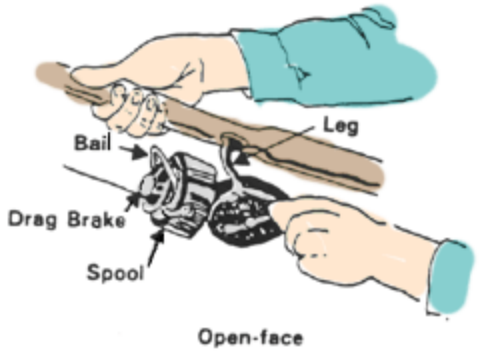
Fishing Equipment

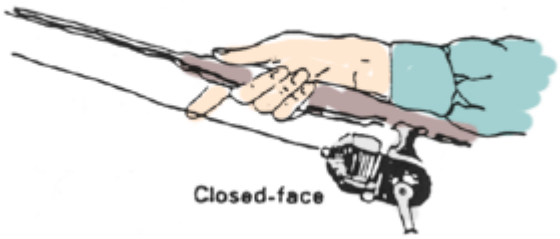
Rod – The rod is usually five to six feet long. The grip, or handle, is offset rather than straight. Most rods are made of fiberglass, but graphite fibers or metals can also be used to make rods.



Reels – Reels are designed to hold, release or retrieve line. The spin-cast reel is simple to operate. It has a stationary spool protected by a cover called a *housing*. It is usually mounted on top of the rod. A thumb button lets the line out of the spool. It can also stop the line while casting. To sop the release of the line, fully push the thumb button. Turning the reel handle starts a line pick-up device. Timing of these actions is important to good casting.

The reel's drag lessens the change of a fish breaking the line. Be sure to check your *drag* before fishing. One good method of adjustment is to have one person hold the rod in a normal position while another person pulls down on the line (no hook on the line). If the rod appears to be under too much stress and no line is being released by the reel, the drag screw should be loosened until line is released. If the line is released with too little effort, the drag should be tightened. It is better to have too little tension on the drag than too much.





Line – Line comes in several strengths. For freshwater fishing, 6, 8 and 10 pound test strengths are usually used. The greater the strength of the line, the thicker and heavier it is. This affects the casting quality. The weight of the bait or lures used, the size of fish, the action of the rod and other factors also enter into the selection of line.

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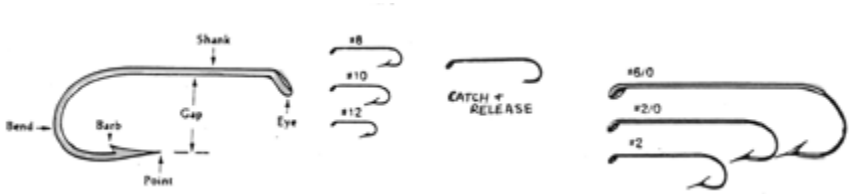
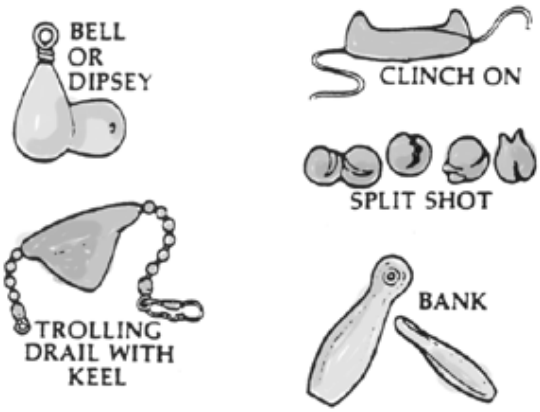
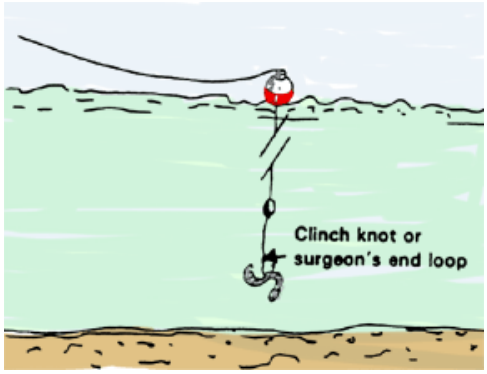
Hooks – Hooks come in many sizes and styles. Hooks must be sharp to be useful. Sharp hooks can be dangerous – handle them with care. A small file or whet stone helps keep hooks sharp. Catch and release hooks do not have a barb.





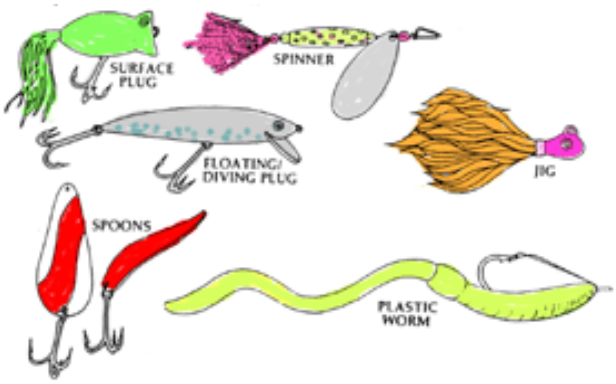
Sinkers – Sinkers and split shot are used to hold your line stationary on the stream, lake or pond bottom or to carry the bait into deep water. The split shot and the *dipsey* or bell sinker are probably the most often used.

Bobbers – The bobber is a floating object used either to keep live bait off the bottom or to signal when a fish has taken your bait. The hollow plastic sphere is most common.



Natural Baits – Natural bait is the most common bait. Earthworms, minnows, crayfish, frogs, grubs, insects and insect larvae are often used. The key is to secure the bait firmly to the hook.

Artificial Lures – There are many artificial lures on the market. Check with your hardware or sporting goods stores.



A variety of techniques may be used when fishing with artificial lures. These include moving the rod tip up and down, varying the reeling speed, and pausing as you reel. Make short casts and watch how the lure reacts. Select a method that makes it work most naturally. Sometimes a small variation in the way the lure moves makes a big difference in catching fish.

Spin Casting Methods

Grasp the rod handle firmly but don't try to strangle it. Place two fingers forward on the reel. Good casting, for distance and accuracy, is a matter of skill and timing.

Assume a natural, comfortable position with the rod tip at about 10 o'clock. Try shifting your body so all your weight is on the right leg (for right-hand casting) and the right shoulder is well forward toward the target. The casting arc is from 1 o'clock to 10 o'clock. When casting, remember to let the rod do the work. You control the power that has been built into the rod.

Bring the rod smartly from 10 o'clock. Do not let the rod come to rest at 1 o'clock. This means that the tip will still be going back from the momentum of the lure when you start the handle back toward 10 o'clock. When the lure starts forward, you will feel the rod working. If you allow the rod to rest at 1 o'clock, all the compression will have been lost and the cast will have no power. Don't let the rod and lure come to rest on the back cast. Keep them moving until the lure is in flight.

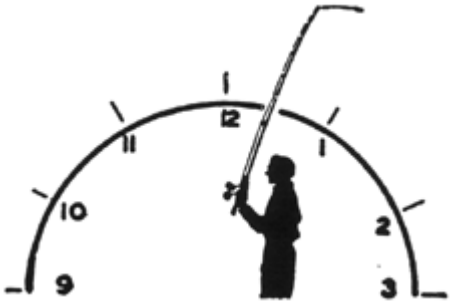
Practice this Pendulum Movement

Spin-casting techniques, in brief:

10 o'clock – Be comfortable and relaxed. Put the lure in position, move the pick-up bail out of the way and be ready to case. CONCENTRATE on the target.

Step 1 – Start the cast with the rod tip at 10 o'clock and with the lure drawn to within 6 inches or so of the tip.

1 o'clock – Note that while your hand has started the handle of the rod back toward 10 o'clock, the rod tip and lure are still going back. Don't rest at 1 o'clock.



Step 2 – Raise the rod swiftly and smoothly to the 1 o'clock position, then immediately. . .

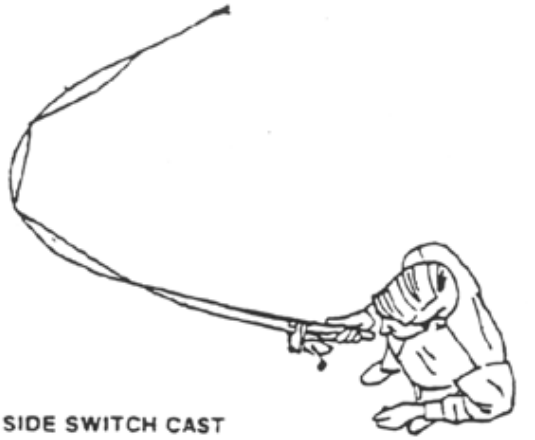
10 o'clock – Let go of the line. Your first cast may go almost straight up. You may be releasing the line too soon, a natural error.

Step 3 - …move the rod back down to the 10 o'clock position and release the index finger hold on the line. To stop the flight of the lure, touch the line against the spool lightly with your index finger.

Line control while the lure is in flight is simple. Just lay the tip of your right index finger on the line or on the edge of the spool. The amount of pressure used determines the braking effect. The lure may be stopped dead in flight this way, or by winding in on the handle. This will be useful when you fish in cramped areas or where vegetation and rocks are present.

Side Switch Cast

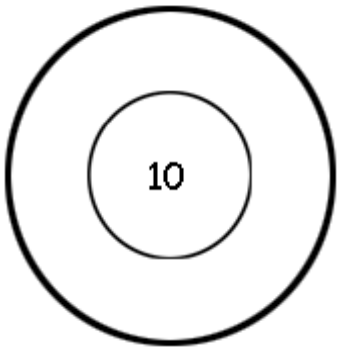
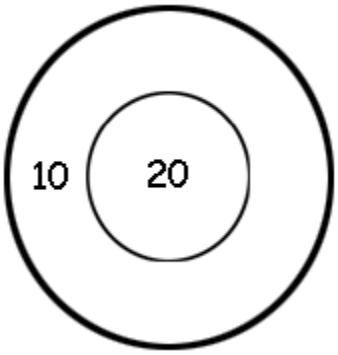
To cast a lure low over the water, simply switch the rod tip slightly downward and to the right, or lift it a few inches. Release the forefinger from the line as the rod begins to straighten. Don't swing your rod completely to the right or left because you may hook another fisherman.



SIDE SWITCH CAST

Exercise

1. Practice casting. Tie on a casting weight, one without hook and preferably weighing ¼ to 5/8 ounces. Grasp the rod handle firmly. Aim at the target which can be made from a tire, ropes or other object. Keep score on the Casting Score Sheet below.

TARGET WITHOUT BULLSEYE	TARGET WITH BULLSEYE
	
STATION 1	**STATION 2**
1st cast _____	1st cast _____
2nd cast _____	2nd cast _____
3rd cast _____	3rd cast _____
Subtotal _____	Subtotal _____

North Dakota 4-H

Nature Trails

Amphibians and Reptiles

Objectives

You will learn about the characteristics of amphibians and reptiles.

Introduction

North Dakota has several types of amphibians and reptiles. These animals are important parts of the food chain. For example, snapping turtles eat small birds and other animals. They help control animal populations. Reptiles and amphibians also serve as food for other animals.

Amphibians

Amphibians are found on every continent except Antarctica. They have soft bodies. Their skin is usually moist.

Amphibians undergo a change from egg to larva to adult. This change is called *metamorphosis*. Metamorphosis is the gradual change in body form. Each stage looks different from the other. Frogs and toads are amphibians. Their larvae are called *tadpoles*. Tadpoles have fishlike features. They have gills and a long finlike tail. Gradually the tail is absorbed. Legs develop and lungs enable the amphibian to live on land.

If they have feet, they are often webbed. The toes have no claws and are soft. Amphibians can breathe through the gills, lungs or through their skin. Some amphibians stay in the larval form throughout their lives. The mudpuppy is an example. It never develops the lungs of adult amphibians. Instead, it has three pairs of gills.

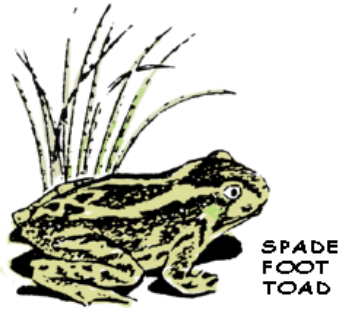
Amphibians lay eggs in water or in a damp place. Sometimes the eggs are in clumps or in long stings.

Amphibians with Tails

Salamanders
Salamanders have no vocal chords. Their legs can barely lift them off the ground. Salamanders have no claws. They have very little defense against predators. Some can change color. That helps them hide. Others are covered with a bad-tasting mucus.

These animals are often overlooked. They spend most of their lives underground. Spring mating brings them above ground. They live on insects, earthworms and other animals. Our state has three salamanders; the eastern tiger, the gray tiger and the blotched tiger salamander.

Amphibians Without Tails



Toads
Toads have short compact bodies. They have no tails. Their front legs are shorter than the back legs. The back legs are muscular. Toads move by leaping. The front legs cushion the animal as it leaps. Toads have a warty, rough skin. It is **not** true that you can get warts from handling toads.

Toads have a crest or ridge on their heads. Frogs don't have this crest. Usually toads' fingers are less webbed than frogs.

The **spadefoot toad** is found in southwestern North Dakota. It has a large black horny spur on its hind legs. This spur is used to dig through the dirt. Other toads have the spur but it is not as large.

Other toads found in North Dakota are the **Great Plains toad, Dakota toad** and the **Rocky Mountain toad.**

Frogs
Frogs live close to water. Tree frogs live in wooded areas with ponds. Chorus frogs are found throughout the state. They make a sound like running a finger over a comb. These two frogs have suction cups on the ends of their fingers and toes. Chorus frogs are tiny. They are slightly bigger than dime.

The most common frog in our state is the **leopard frog**. It is also the most common in the United States. It has distinctive dark spots on its body.

Both frogs and toads have no teeth. Instead, they have tiny bumps inside the mouth. These are not true teeth. Their job is to hold prey.

Exercise

Amphibians' breeding season starts in the spring. Once the temperature stays above 50 degrees, amphibians will come out of hibernation.

1. Find a pond or roadside ditch. Choose a less-traveled road. Catch amphibians with a dip net or your hands. Be very careful not to squeeze too hard. Study each one. Keep a record of the different amphibians you study. Use the chart below.

AMPHIBIAN	LOCATION	COLOR	SKIN	TEXTURE	LENGTH	WEIGHT

2 Listen for frog and toad sounds. Use a tape recorder to record the different sounds they make. Do this in the spring.

3 Collect frog eggs from a pond or stream. Keep the eggs in a large container of pond water. The temperature should be about 64 to 77 degrees Fahrenheit. Describe what happens.

Reptiles

Reptiles are covered with scales. Some have very rough scales, and others have very smooth scales, but no reptiles are slimy.

All reptiles are *exothermic*. This means their body temperature changes with the surrounding air temperature. They differ from mammals and birds, which are *endothermic* and can control their own body temperature. This is why reptiles become inactive in the winter when the temperature is cold.

Most reptiles lay eggs. Their eggs are different from a bird's egg in that the shell is soft and will not break if dropped. Most reptiles do not watch over their eggs or their young after they are hatched. The eggs are laid in moist soil or in rotting logs. In the case of turtles, the female will dig out a hole on the shoreline of a lake or river and deposit the eggs, cover them up and then leave them to be incubated by the sun.

Some reptiles, such as the garter snake, bear their young alive.

Reptiles are primarily predators, actively catching and killing their food. They will eat dead animals when they are available. Snakes feed on small mammals such as mice, gophers and rats (warm-blooded prey), or on frogs, fish and other snakes (cold-blooded prey). Water turtles feed on crayfish, fish and dead animals that are found in the water. Land turtles feed on insects, berries, mushrooms and even cow manure.

Snakes

Snakes are the most misunderstood and feared animals in the world and they do not deserve this reputation. Most snakes swallow their prey head first since in this position the legs of the prey lie closer to the body, making them easier to swallow. Snakes are useful to man because they often eat rodents and other pests. The snake's tongue is a kind of feeler. Snakes do not hear like most animals. Instead their entire body picks up vibrations from the ground.

Snakes must shed their skin as they grow. Scales cover their body. These scales are replaced by a new set. Scales cover the eyes of the snake. As it is shedding this eye scale their eyesight becomes murky. Snakes are very vulnerable at this time because they cannot see well. Even friendly snakes may strike at this time. Be very careful when you handle them. To get the old skin off, the snake will rub up against a hard object. The skin is then rubbed off the body. The skin is turned inside out as it is rubbed off.

Snakes do not have legs, of course. They move by using their body muscles. The roughness of the ground's surface provides something for them to push against. An undulating movement is used by most snakes to move forward.

Most snakes are nonpoisonous, but they will bite if cornered. You'll most likely find the **Plains garter snake**. It's got a surprise for you if you should catch one. They smear their enemies with a foul smelling liquid. The red-sided garter snake is also found in North Dakota.

Plains garter snake

The **hog-nosed snake** has a distinctive nose. This snake has the ability to scare you if cornered. It will puff up like a cobra and hiss at its enemy. It will also bite repeatedly. They can also pretend they are dead. That often helps them escape from an enemy.

Hog Nosed Snake

We have only one poisonous snake in our state. It is the **prairie rattlesnake**. The rattlesnake is a *pit viper*. That means it has a sensory pit on its head near its eye. The pit senses when warm-blooded prey (lunch) is near. Fangs inject poison which kills the prey. The poison actually starts to digest the prey.

If you are bitten by a poisonous snake, DO NOT PANIC. Few people die of snakebite. Don't panic and send the poison racing through your body. DON'T CUT THE WOUND. Get to a hospital quickly. Anti-venom will be given by a doctor.

Turtles

Turtles are the armored tank division of the animal army. These reptiles have a top and bottom shell. The two shells are connected by a bridge. For defense, the turtle pulls all its soft parts inside its shell.

Painted Turtle

Snapping turtles are found throughout the state. They will hiss and strike at enemies. Be careful if one is near you. If they get you in their jaws, you will have to cut their jaws to release their hold. You will find snapping turtles on land.

The **painted turtle** is more friendly. It gets its name because of its colorful shell.

Exercise

Amphibians and Reptile Word Find

Locate the following words in the puzzle below. Circle each.

AMPHIBIANS
FROGS
HOGNOSE
LIZARD
METAMORPHOSIS
PIT VIPER
POISON
REPTILES
SALAMANDER
SNAKES
SPADEFOOT
TOADS
TURTLES

A M P H I B I A N S K L M U M L C R A B
B Z I P C X H O G N O S E T T I S B C N
R N T O A D S Y I Z D S N O O Z T R A S
E O V F B T A R T B E N K A P A U C E T
P T I R Z W S A L A M A N D E R S L X N
T S P O I S O N T V Z K M S X D T M Q R
I P E G Q U R S U N D E P D E R I S V O
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E L S N O S P A D E F O O T E M Z J T D
S M E T A M O R P H O S I S V W M D U L

North Dakota 4-H

Nature Trails

Water Conservation

Objectives

You will learn about 1) the world water supply, 2) the water cycle, 3) rainfall and snow records and 4) water needs in your home.

Introduction

The earth has been called the *water planet*. Between two-thirds and three-fourths of the earth's surface is water. Water is found in several forms. The polar ice caps are a solid form of water. Polar ice is fresh water, but not very useable to man. Many lakes are not fresh water, but salty. We cannot use these as source of drinking water. We rely heavily on groundwater, which is held under the earth's surface.

World Water Supply

The following table shows the breakdown of the earth's water supply.

SOURCE	PERCENT
Oceans	97.61
Polar Ice	2.00
Groundwater	0.62
Freshwater Lakes	0.009
Saline Lakes	0.008
Soil and Subsoil Moisture	0.005
Atmosphere	0.001
Rivers	0.0001

Exercise

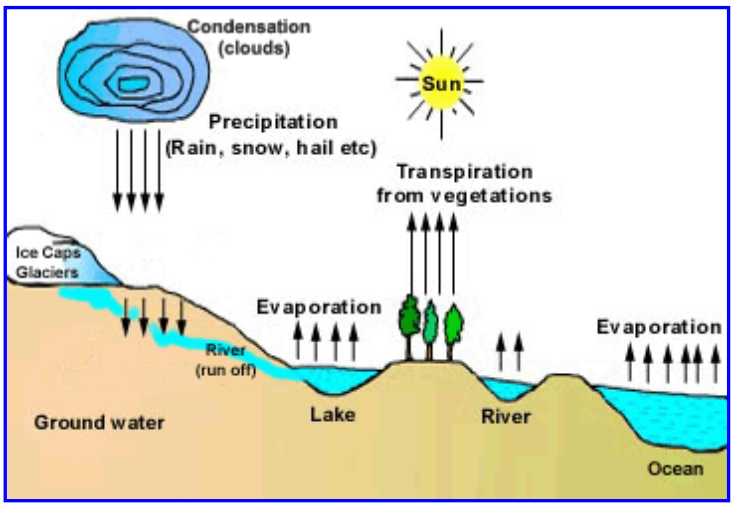
Calculate the percent of fresh water that is available to man:

	Percent
Groundwater	_____
Freshwater lakes	_____
Rivers	_____
Subtotal	_____
Ice caps	_____
TOTAL	_____

The Water Cycle

The water cycle is sometimes called the **Hydrologic Cycle**. The drawing shows the water cycle. The water cycle is continuous. The different forms that water can take are:

Solid – ice, snow, hail
Liquid – rain, lakes, rivers, etc.
Gas – water vapor



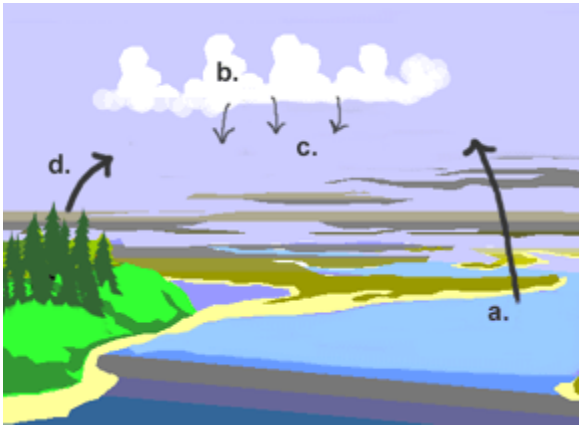
Ice caps and oceans are also part of the water cycle. The water cycle redistributes the earth's water. Water collects in lakes, rivers and oceans. The lakes and rivers are heated by sunshine. The water evaporates and is changed into the gas form, or water vapor. Water vapor is also given off by plants. The vapor forms clouds. As the vapor forms into droplets of 1/25 of an inch or larger, the earth's gravity pulls it back to earth. This is what we call rain. Sometimes crystals are formed which produces sleet, hail and snow.

Definitions

Condensation – process of a water vapor (steam) turning into a liquid.
Evaporation – process of a liquid turning into a vapor.
Evapotranspiration – the loss of water vapor from a plant.
Precipitation – rain, hail, snow, etc.
Run-off – the excess water from snow or rain that does not soak into the ground.
Transpiration – the loss of water vapor from a plant.
Water cycle – process that changes water from solid to liquid to gas involving evaporation, transpiration, condensation and precipitation.

Exercise

Label the following diagram using the words **evaporation, condensation, precipitation** and **transpiration**.



a. _____

b. _____

c. _____

d. _____

Exercise

Let's see if we can use water to make a cloud. You will need:

a kitchen stove
a saucepan
ice cubes
aluminum foil

Set the dial on the stove for high heat. Place ten or more ice cubes in a saucepan. Begin to heat the ice cubes. What change do you see? You should see the change from a solid (ice) to a liquid (water).

Complete the following questions. (Underline the correct answer.)

1. What causes the ice to change into water? (heating, cooling)
2. Keep heating the water until it boils. The water now changes into the third form of water, which is (solid, water vapor).
3. What is another name for water vapor made this way? (steam, condensing)

As the water boils make an aluminum foil tent about 20 inches above the pan of boiling water.

4. What do you see on the foil? (water drops, clouds)
5. Where is the water cooler? (in the pan, above the pan on the foil)
6. Warming water causes (evaporation, condensation).
7. Cooling water causes (evaporation, condensation).

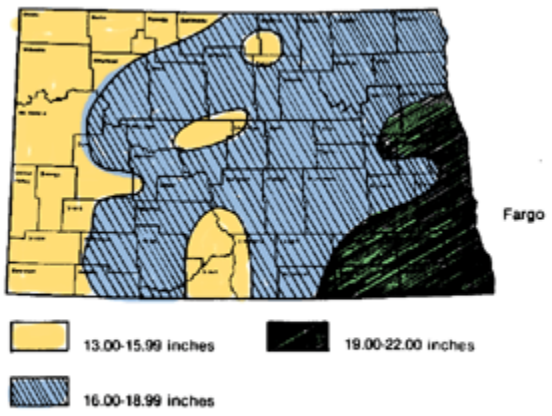
Summary

Plants give off water vapor as a waste product. This water vapor also becomes part of the water cycle. Water vapor rises in the air. The rising water vapor cools. This cooling is called condensation.

You can see the results of this cooling in the sky as clouds. Inside the clouds water drops form. The water may become heavy enough to fall to the ground. This is called precipitation. Precipitation can be rain, hail, snow or sleet. Water is constantly changing form.

Annual Rainfall Records

North Dakota has a semi-arid climate. Rainfall varies greatly. Averages are 13 to 20 inches per year from west to east. About 60 – 70 percent of this rain falls from April through September. Water losses due to evaporation and plant transpiration are usually higher than the annual rainfall. That leaves the land very dry. The average rainfall and snowfall for the state is 17 inches.



MAP OF THE ANNUAL PRECIPITATION FOR NORTH DAKOTA

Exercise

1. Which part of the state has the most annual rainfall? _____

2. Keep a record of the rainfall or snowfall in your area. Compare the amounts that you get with the amounts listed in the local paper. Keep your record for one month.

Rainfall Date	Your amount	Newspaper Amount

Water Usage in the Home

Modern living conditions in our homes have made water more available for our use. The following table shows some of the uses of water in our homes.

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AMOUNT	USE
3 – 5 gallons	flush toilet
3 gallons	shaving with water running
5 gallons/minute	shower
8 gallons	cooking 3 meals
8 gallons	cleaning the house
10 gallons	washing dishes for 3 meals
20 – 30 gallons	washing clothes
30 – 40 gallons	watering lawn
30 – 40 gallons	taking a bath
30 – 40 gallons	washing a car

Exercise

1. Keep a record of your family's water use for one day. Record your findings below.

USE	HOW MANY TIMES	ESTIMATED AMOUNT USED IN GALLONS
Flushing toilet		
Shaving		
Showering		
Taking a bath		
Cooking 3 meals		
Washing dishes for 3 meals		
Washing clothes		
Watering lawn		
Washing car		
Cleaning house		
Other:		

Exercise

Water is used to manufacture the products we use daily. Many products are from a water environment.

List 8 things you would expect to find in a grocery store that come form an aquatic (water) environment. (include ponds, swamps, oceans, etc.)

_____ _____

_____ _____

_____ _____

_____ _____

Go to a local grocery store. List 10 products that contain water.

_____ _____

_____ _____

_____ _____

_____ _____

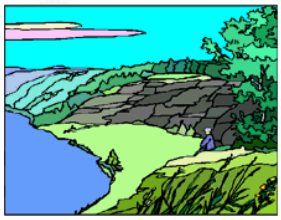
Challenge Activity

Trace the manufacturing of a product and find out how water is involved in the production of the product. Report your findings below.

North Dakota 4-H

Nature Trails

Geology of North Dakota



Objectives

You will learn about how the land of North Dakota was formed.

Introduction

North Dakota is a wonderful place to live. Have you ever though about how it was formed? To answer that question, you need to know something about *geology*. Geology is the study of the earth.

North Dakota Before the Glaciers

Scientists believe the earth is about four and one half billion years old.

The earth is covered by a thin rigid layer called the *crust*. Under the crust is the *mantle* which is more flexible. The mantle is *plastic*, somewhat like silly putty. You can slowly pull and stress it but if you pull it suddenly, it will snap. Pressure and heat keep the rock in the mantle plastic. Continents and oceans are part of what floats on the plastic mantle. Continents are less dense than the ocean floor. That is why continents rise above the oceans.

The rocks that make up the earth are of three types:

Igneous – rocks formed when hot molten material (magma) cools and hardens (crystallizes).

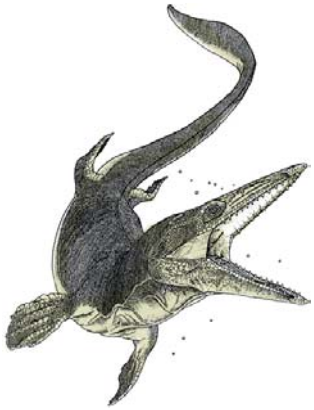
Sedimentary – rocks formed from the weathering and erosion of pre-existing rocks. The grains are transported by water, wind or ice and deposited to later be formed into new rock.

Metamorphic – rock formed when either igneous or sedimentary rocks are buried at great depths within the crust where the pressures and temperatures are very high. The heat and pressure changes the parent materials into new rock. This rock may have a different texture, composition and mineral content.

The seven continents used to be one *supercontinent*. Gradually, the continents separated and drifted apart. The ocean floors spread out taking the continents with them.

Seas of the North American continent during the Cretaceous period.

Most of the geologic history of North Dakota is buried deep below the surface of the land. The land surface of North Dakota is relatively young and has a history that only goes back to the **Cretaceous** period (about 100 million years ago).



Mosasaur

In the Cretaceous period plates of the crust to the west of North Dakota were forced against each other, much like closing a vice. The rocks between the plates (or in the vice) were squeezed, or faulted and folded. The Rocky Mountains were formed. This was also accompanied by volcanic activity. Ash from volcanoes can be found near Valley City. The ash settled in a sea. Where we are now was once the central part of a large shallow sea that connected the Arctic Ocean to the Gulf of Mexico. Large reptiles such as *mosasaurs* swam in this sea. Their bones are found near Valley City. Bones of large flying reptiles, the *pterosaurs*, have also been found near Pembina. On the western edge of this sea, near Bowman and Marrmath, bones of several types of dinosaurs have been found, especially *Triceratops* and duck-billed dinosaurs.

Following the formation of the Rockies, erosion began. Small particles eroded from the base rock to form soil. The soil was washed down the mountains. These particles are called *sediment*. They spread out at the bottom of the mountains. The Great Plains were created.

The Great Plains were formed from clay, sand and silt from the surrounding mountains. The North Dakota Badlands were formed from sediment eroded from the Rockies. The sediment was transported by large rivers to be deposited on the broad floodplains. At this time the climate of western North Dakota was subtropical and crocodiles were present in the lakes and rivers.

BEFORE

Drainage pattern in North Dakota before the state was glaciated. All major streams drained northward into Canada.

AFTER

Modern drainage pattern in North Dakota. The Missouri River valley developed when north and east flowing streams were diverted along the margin of the glacier.

At this time most of the water in North Dakota flowed north into the Hudson Bay. See the maps of river flow that show the drainage patterns before and after the glaciers.

Then the Glaciers Came

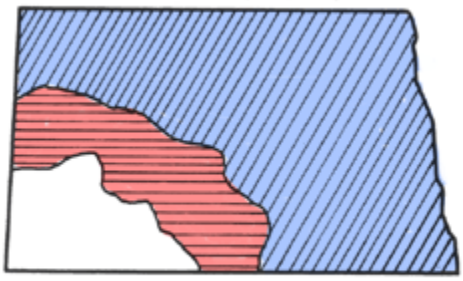
What do you think North Dakota looked like before the glaciers? Actually, it looked like the southwestern part of the state looks today. It had long steep slopes, low buttes and mesas.

Some land features still exist today that were present before the glaciers. They include:

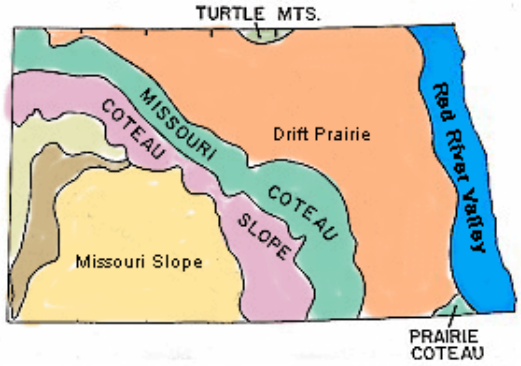
- The Turtle Mountains
- The Missouri Escarpment
- The Red River

When the glaciers advanced over the state, river drainage was blocked and changed. Some of the valleys were completely filled in with glacial sediment when the glaciers advanced over them. Others again became rivers and streams after the ice melted.

This map shows the part of North Dakota that was glaciated (shaded area). The diagonal pattern indicates the area that was glaciated during the most recent glacial period, the Wisconsin. The horizontal pattern indicates the area that has earlier glacial deposits at the surface.



GLACIER MAP



North Dakota Land Shape Today

North Dakota is located in the center of the North American continent. Rugby, located in the north-central part of the state, is the geographic center of North America.

The state is mostly flat or rolling land. Its elevation is highest in the western part of the state. From the west, it slopes downward gradually toward the Red River Valley in the east. Two factors shaped the state; glaciers northeast of the Missouri River, and wind and water erosion southwest of the Missouri River.

North Dakota is divided into two areas:

1. The Central Lowlands in the east
2. The Great Plains in the west

The Central Lowlands

The Central Lowlands refers to an area of North Dakota where the original plant life was a tall grass prairie before the land was opened for farming. This area is also called the *Drift Prairie*. The Central Lowlands also includes:

- The Red River Valley
- The Turtle Mountains
- The Prairie Coteau
- The Glaciated Plains
- The Missouri Coteau

The Red River Valley

The Red River Valley is 40 miles wide along the eastern border of the state. Rivers always flow from a point of high elevation to one of low elevation. The lowest point of the Red River is on the northern border of North Dakota where the river enters Canada.

This area is so flat because it used to be an old lake bottom. This old lake bottom is called Lake Agassiz. Lake Agassiz was formed as the glaciers melted. The water dammed up and formed the large lake. The lake covered parts of North Dakota and Minnesota and most of Manitoba.

Like many lakes, Lake Agassiz also had beaches. The beaches are sand and gravel. These beaches can still be found west of the Red River. The old beaches were laid down at different times as the lake raised and lowered.

The map shows the locations of the Lake Agassiz beaches (the lines), the areas of offshore lake sediment (green) and areas of delta deposits where rivers emptied into Lake Agassiz (gold).

Headwaters of the Red River of the North

The Red River Valley is very flat. It is some of the richest farm land in the country. The rich soil is from the river deposits of topsoil. Topsoil was eroded form other areas and washed down the river. The river deposited this soil along its course.

The river used to be several miles east into Minnesota. The river wore the land down until it reached very hard bedrock. Since it couldn't cut into the hard rock, it began to shift westward. The ground to the west was shale and sand, which are easier for water to cut through than hard bedrock.

The Pembina Escarpment
The western edge of the Red River is the Pembina Escarpment. An escarpment is the side of a cliff or ridge. This escarpment had springs in it. The springs wore down the walls of the escarpment. The walls got steeper and steeper. The river cut into it, moving it westward. The escarpment may have gotten sharper when the glaciers moved through the state.

The Pembina Escarpment

The Glaciated Plains
This area is made up of rolling hills except for the Turtle Mountains on the northern border and the Prairie Coteau region. A *coteau* is a flat-topped ridge. The plains were formed from the gradual melting of the glaciers. As glaciers moved over the land they scraped off the soil and rock and carried them along. Sometimes the glaciers took large chunks of bedrock. *Till* is the sediment that the glacier collects as it moves along.

When the glaciers melted, the dirt, rocks and sediment were left covering the land and the ice turned to water. At first the water was dammed up as Lake Agassiz. Then the water moved northward into the Hudson Bay. A **ground moraine** is the name for the gently rolling land that came from melting glaciers.

The glaciers also changed the streams in this area. The sediment deposited by the glacier covered the old streams. Now this area is buried in sediment. Instead of streams, this part of the state has many small lakes called *prairie potholes*.

The Prairie Coteau and the Turtle Mountains
These two areas are higher than the rest of the glacial plains. They were formed by a **dead ice moraine**. The Turtle Mountains and the Prairie Coteau were present before the glaciers. As the glacier moved, it cut pieces of rock and sediment out of the highlands. This rock and sediment was moved to the top of the glacier forming a layer over the glacier. This layer insulated the glacier. The glacier in the plains melted faster because it was not insulated. It took several thousand years longer for this part of the glacier to melt. When the dead ice melted, the land looked bumpier than the smooth plains.

The Missouri Escarpment
This steep cliff divides the Missouri Coteau from the Central Lowlands or Drift Prairie. It is believed to be the result of a *fault*. A fault is a break in the earth's crust. The blocks of rock beside the break slid upward, forming the Missouri Escarpment.

The Missouri Coteau
This coteau (flat-topped ridge) is a strip of land 30 to 50 miles wide. The land is bumpy, being made up of irregular plains and rounded hills. This land was also formed by a dead-ice moraine. Dirt and rocks covered the top of the glacier. The Missouri is the farthest west that any glacier came in our state.

The Great Plains
The Great Plains look much different from the rest of the state. This is the part of the state south and west of the Missouri River. Streams are present here. The glaciers did not dump sediment here to cover them. This land was shaped by wind and water erosion.

When the last glacier stopped, the debris it was pushing at its front left a **terminal moraine**. The debris left by the glacier blocked the rivers in the western part of the state so they could no longer flow north into Hudson Bay. The rivers had to find new paths. They cut a steeper and shorter path. The Missouri River's new path cut through the Badlands.

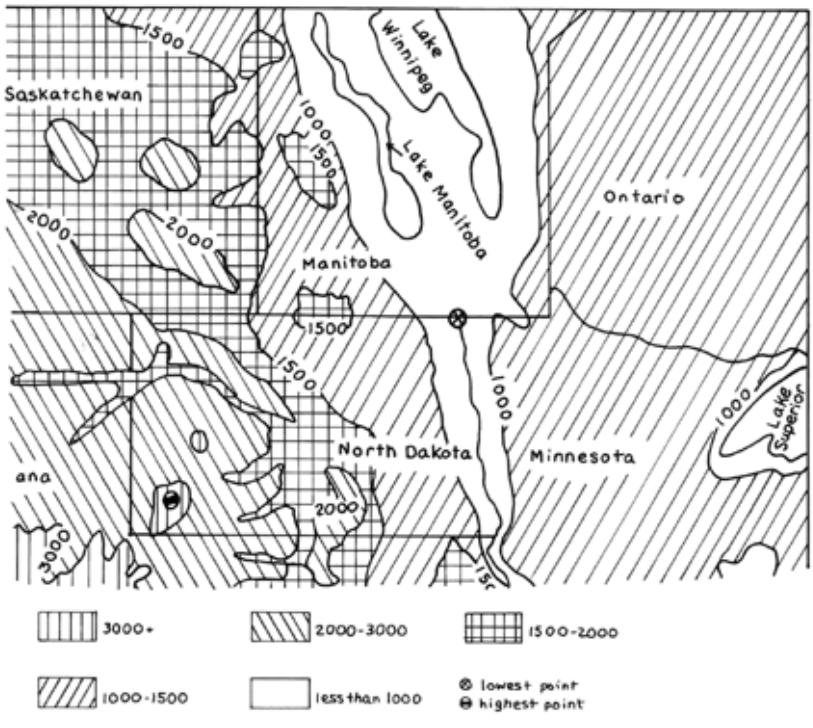
Coal and oil fields are found in this area. They were formed when plant and animal material broke down and was buried under a thick layer of sand.

Exercise

1. Match the following terms with their correct definition:

_____ Escarpment	A. Large, high flat-topped plateau with steep sides
_____ Butte	B. Smaller area than a mesa, but also has a flat top and steep sides
_____ Mesa	C. The side of a steep ridge or cliff

Map of the North Dakota elevations



The highest point in North Dakota is found in the Great Plains. It is White Butte. Can you find it on the map above? Mark it in color.

Challenge yourself to complete one or more of the following:

1. Make a topographic (landform) map of North Dakota. Include rivers and other features. You may draw a present day map or you may choose to show an earlier period.

2. Do a study of your area. What happened with glaciation and land form changes? If you live in an unglaciated area, document the effects of wind and water erosion.

3. Observe geological formations in your county. Write a report of your findings.

Thanks to Dr. Allan Ashworth, NDSU Geology Department, for his help with this lesson.

Oregon 4-H Outdoor Project Agent Resource Manual

4-H 301A
July 1988

OREGON STATE UNIVERSITY EXTENSION SERVICE

Oregon

4-H Outdoor Project

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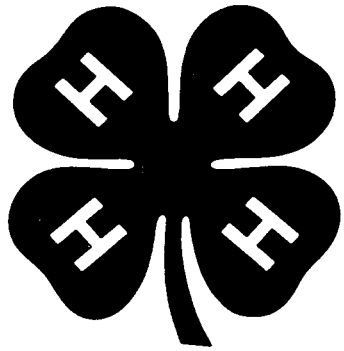
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OREGON 4-H OUTDOOR PROJECT

Dear 4-H Outdoor Leader,

Do these describe you: you're interested in working with a group of boys and girls; you'd like to learn more about the outdoors; you'd like to help children learn more about how to enjoy and take care of the outdoors?

If these describe you, this leader guide will help you understand how to provide fun and educational outdoor learning experiences for children; understand basic outdoor leadership skills; provide ideas for field trips, tours, and resources; and enjoy your role as a 4-H Outdoor Leader.

This leader guide will <u>not</u> give you an absolute blueprint for the project, nor will it be an exclusive source of ideas.

As an outdoor project leader, you'll need to find the tools that work best for you and your group. A 4-H Leader is a "people grower." You'll learn member interests, needs, and desires; you'll help members meet these in a positive, informal, learning environment. You'll also help the young people you work with develop four special skills: how to learn, how to get along with others, how to use new knowledge, and how to feel good about themselves.

The Pacific Northwest is well known for its natural beauty. Northwesterners are proud of their natural heritage. We wish to pass these natural resources and conservation ethics to our children so they may enjoy and take care of this legacy.

Your role as a 4-H Outdoor Project Leader working with children and their families will help to ensure that future.

Good luck!!

Learning in an Outdoor Environment

You may recall what it was like when you took natural science classes in school -- long lists of plants, trees, or animals you had to identify and memorize. However, natural science teaching has changed considerably. In some ways it is easier and more fun because information is applied to real-life situations.

Today, children are involved by having first-hand experience, the learning responsibility placed on the child, more emphasis on thinking and less on rote memory, and less telling the children the answers with more effort to have the children discover the relationships.

Your role is helping 4-H members experience the natural world, discovering what it is like, and thinking about its meaning. You'll take what kids like to do and tie it to an understanding of nature.

Most kids like to:

* collect objects from nature
* hike and backpack
* wade in streams and ponds
* fish and hunt
* observe wildlife
* camp out
* cook their own meals outside
* figure weights, measurements, and distances
* sing
* make crafts from nature
* dig in soil and sand
* watch the stars
* learn about the pioneers and Indians
* make up stories

You can explore with 4-H members in doing these things while learning about the natural environment. You can achieve this by providing the kind of experiences where members:

* observe details that can be directly detected (color, smell, taste, size, and surface characteristics)
* use numbers (count and determine percents)
* use measures (determine length, weight, or volume in a specific unit)
* assume (reach a logical conclusion based on observed evidence)

* classify (arrange things into groups according to similarities and differences)
* communicate (give complete and concise summaries describing what was observed)
* hypothesize (develop an educated guess to explain a variety of observations related to a phenomenon based on relevant data)
* experiment (test one or more variables in a controlled situation and record data for later interpretation)
* put together models (arrange or group information, data, or principles to describe a phenomenon, i.e. diagram one type of community showing a food chain)
* research (an orderly search for answers to a question by reading about it, talking to experts, and making observations of a particular phenomenon).

How to Use This Guide

The 4-H Outdoor Project is an introduction to learn about and live in the outdoors. As a leader, you choose the information to fit the interest, abilities, and experience levels of club members.

You may first wish to review this leader guide to see what and how the information is presented. This will give you a background to draw from when you plan your activities with your members.

Project Units

The 4-H Outdoor Project is divided into five units, each with separate activities, learning objectives, activity descriptions, necessary materials and resources, and procedures and considerations.

You can work from each unit all year, depending on age, interests, season, resources, and the number of meetings held, or you may want to concentrate entirely in one area. As learning progresses, you will be able to branch into more advanced opportunities; and with the wide range of activities and ideas suggested within, you will be able to use your Outdoor Project for many years to come.

You may find this guide to be a good first reference as you think about leading an Outdoor Project. This guide will help stimulate ideas for you to use with your club and also give you basic tools to consider. Much of this guide was written by experienced outdoor 4-H leaders who have developed successful programs.

What Makes 4-H Experiences Successful

* Establish yearly club and individual goals with members -- Use basic skills and understanding as starting points to build the project on your interests, members' interests, and available resources.

* Involve members in planning activities and meetings, and sharing accomplishments -- Members will be more interested if they help plan and share. Each section of this leader guide gives hints to involve members.

* Plan challenging and new things for 4-H'ers to stretch their skills and understanding of the outdoors -- This gives members self-confidence.

* Plan activities that allow members to talk with each other and with you.

* Keep indoor planning and organization meetings short -- You may discover that field trips, day hikes, and overnight trips will hold member interest for longer time periods. Be flexible; allow plans to be changed and modified. Plan alternative activities in case of bad weather.

* Help family members work with their children on the project and join with you in conducting activities -- Help members apply what they learn to daily living.

Learning Tools

Organizational meetings usually take about 90 minutes. Be sure to involve officers in conducting the club business and recording the minutes. Allow for reports on special projects and be sure to make plans for field trips, hikes, and overnight camp outs.

These meetings give members time to review the club's experiences, provide leader, member, or outside resource-led activities, and provide recreation and refreshments.

Field trips, day hikes, and overnight camp outs place members in an extended learning experience and provide for exploration and outdoor discovery. These trips utilize a specific outdoor natural resource as a learning laboratory (pond, stream, lake, forest, hiking trail, meadow, arboretum, weather station, natural history museum, fish hatchery, zoo, tree farm, geological area, marine tide pool, desert).

Members will have an opportunity to learn outdoor living skills (such as food planning, preparation, and outdoor cookery; proper hiking procedures; conservation practices, first aid and safety; wildlife observation; weather observation and astronomy; edible plants; knots; canoeing and rafting; mountain climbing; and cross country skiing).

Be sure to utilize outside resource people. They provide a learning opportunity for the members to learn from expert outdoor and natural resource professionals (foresters, naturalists, soil conservationists, botanists, fish and wildlife managers/biologists, geologists, hunters, fishermen, mountain climbers, outdoor equipment sellers, tree farm operators, taxidermists, outdoor recreation specialists, and science teachers) to name several.

Reports and presentations allow individual or team reports to other members on a specific area of interest. This can be part of a regular organizational meeting. Presentations are a formal method of presenting an idea, complete with illustrations. They can be an outgrowth of a members interest in a subject. Presentations also can be publicly presented at County Presentation Days or at the county fair.

County or multi-county special events are usually held with the county 4-H annual events calendar. These offer enrichment opportunities for natural science clubs and usually involve an educational tour, competitive events, or overnight campouts.

County and State Fair exhibits and contests give members opportunities to show what they have learned by making an educational exhibit or display, participating in contests, or exhibiting specimens collected. Check with your county Extension office if you are interested.

Club and individual member records tell you and the member the accomplishments of the year. These records also help set goals for the future. Record sheets are available through your county Extension office.

The 4-H Outdoor Project provides many opportunities for awards, recognition, and scholarships. Members may achieve personal satisfaction and achievement in the varied club activities of the year. You can also build "fun awards" into your club through imaginative planning.

There are county, state, and national awards, recognition and scholarships for outstanding member achievement and leadership. Awards and recognition vary. Check with your county Extension office for specific details.

The community service project is an important learning tool in the Outdoor Project. Each year members should plan and conduct a community service project to benefit public or private natural resource users.

Examples of projects include developing interpretive nature trails (including one for the handicapped); restoring streams for salmon and steelhead runs; planting trees and shrubs; cleaning parks, trails, and camping areas; planting food and cover for wildlife habitat; collecting data to help with wildlife or land use conservation; and helping with bird census.

4-H Outdoor Project Presentations

You may want your club to give presentations on how to do or make something related to the Outdoor Project. Presentations may be before the club, school class, family, friends, at the fair, or on 4-H Presentation Day. Presentations require knowledge of the subject, planning, and practice. A presentation usually shows how to do something. It can be an ongoing part of your club program.

How to give a good presentation:

* Select something that you like to do.
* Tell your audience who you are, what you are going to do, and why.
* Give your presentation by showing and telling what you are doing.
* Go slowly.
* Be sure that everyone can see and hear you.
* Do one step at a time; explain each step as you do it.
* Show what you have done or made and tell why it is important after you have finished.
* Review what you have done.
* Ask if there are any questions.

Suggested presentations:

Once members learn about presentations, they will have ideas for their own. Be sure to include ideas in a presentation planning session.

* How to tie one or more useful knots
* How to build and put out a campfire
* How to plant a tree
* How to read a map and use a compass
* How to pace distances
* How to sharpen a knife or an axe
* How to make a terrarium
* How to make a small animal trap
* How to identify three trees
* How to mount a pressed leaf specimen
* How to make plaster casts of animal tracks
* How to give first aid for injuries
* How to select a campsite
* How to backpack for an overnight hike
* How to practice no-trace camping
* How to select and care for suitable outdoor shoes and clothing
* How to build a bird feeder
* How to tell the age of a tree

Exhibits

Members can make educational exhibits to display at your county fair. (Check your local fair book rules for specific criteria.) The State 4-H Fair offers the following categories and guidelines for exhibits:

Outdoor

An educational exhibit relating to the out-of-doors. May not exceed 30 inches wide, 24 inches deep (front and back), and 30 inches high. This is available to junior, intermediate, and senior members.

Scoring

* Educational value	25
Quality of work, arrangement, neatness	50
Attractive, holds interest ...	25
Total	100

* Educational Value will include explanations of how to use exhibit, how it was made, where materials can be gathered, identify parts if appropriate. Example: a bird house exhibit could include plans for making it, where it would be used, for which birds, and a picture of where it will be used.

Conservation

An educational exhibit relating to conservation of soil, energy, water, forests, marine life, range, or wildlife. May not exceed 30 inches wide, 24 inches deep (front and back), and 30 inches high. This is available to junior, intermediate, and senior members.

Scoring

Educational value	25
Quality of work, arrangement, neatness ...	25
Attracts attention	25
Practical (teaches approved practices).....	25
Total	100

Fishing

(see project manual for guidelines)

General ideas:

Nests, insects, and birds. Label all specimens with common name, where found, date found, and name of collector. Add any other information you like. It is a good idea to spray nests to kill mites or lice.

Animal trap. An animal trap you made. Tell what you trapped, when, and where you trapped the animal.

First aid kit. An example of a camper's first aid kit. Tell how the items were selected and how to use it.

Dish garden of native plants and rocks. Label with common name, where found, date found, and name of collector.

Collection of rocks or remains of animals found in one place. Have labels or short story to explain your specimens.

Collection of "old skins." Examples are snake skin, May fly, dragon fly, caddis fly, or other insect pupa cases. Label with common name, where found, date found, and name of collector.

Notebook of mounted plant specimens native to Oregon. Mounting sheets are available from your county Extension office.

Seed collection telling how the seeds are spread and the kinds of seed. Be sure the speciments are fastened to a mounting material. A shallow box with clear plastic top will protect and keep the exhibit clean.

Project Goals

We strive for goals to create a better world for ourselves and other people. Youth need to feel good about who they are. You are in a position to help build a positive self image in all the children you work with. Use the out-of-doors and the interaction of your club to achieve this. This can be your most important, demanding, and rewarding goal in 4-H.

Goals that will help you get there:

Awareness and appreciation for the out-of-doors and the natural environment. Help individual 4-H'ers and the group acquire strong feelings of care, respect, and concern for the environment; develop motivation to actively participate in the protection and improvement of the environment.

Knowledge. Help 4-H'ers acquire a basic understanding of how things work in the natural environment.

Attitudes and values. Help 4-H'ers acquire social values and the ability to make sound choices while developing a sensitivity to the environment.

Skills. Help 4-H'ers acquire skills for solving environmental problems and properly use the outdoors for recreational pursuits.

Project Unit I: CONDUCTING HIKES AND FIELD TRIPS

ACTIVITY: Information about hikes and field trips

This activity's learning objectives are to provide fun and adventure, to practice group safety and cooperation, to teach responsibility to members, and to observe wildlife, trees, plants, and rocks.

Hiking with 4-H'ers can be challenging and rewarding. This section can help you think of the variables to consider for a safe, enjoyable experience.

Before You Leave:

1. Try to pre-hike the area to determine its features, whether the group can handle it, and what kinds of things to explore while on the hike.

2. Consider your budget, transportation, time, weather, terrain, altitude, scenery, available water, and need for map and/or compass.

3. Obtain information on the area from local park and recreation districts, National Wildlife Refuges, private landowners, national forests, state parks, or the Bureau of Land Management. Obtain U.S. Geological Survey maps from local outdoor equipment stores.

4. Select a hiking site based on your group. If the group is young, you should have something specific in mind. If you have an experienced group , you may wish to have alternatives. Let a committee make the decision. Make sure you have a planned destination. A previously-set goal is an important motivation and allows everyone to feel successful.

5. Notify parents of your destination. If the hike is in a National Forest Service District, notify the service personnel.

6. Obtain insurance by calling your county Extension Office.

Clothing

Dress for the season, changing weather conditions, and elevation. Urge the group to use the layering system, i.e., T-shirt, long-sleeved shirt, sweater, and windbreaker and hat. Use rain gear, if necessary. Remove and add layers according to need. Clothing should be loose and comfortable. In winter, wool is the best material for warmth even when wet.

Footwear

Feet are your transportation, so footwear is an important item. If the hike is no more than 8 miles and the terrain is smooth, sneakers in good condition are acceptable. If the hike is in rough terrain and the 4-H'ers will be wearing backpacks, they should wear hiking boots to support the ankles. These boots should be broken in before the hike. Be sure members wear tube-type socks with boots and sneakers.

Suggested Equipment

What equipment you carry depends on the terrain, length of hike, and weather conditions. It is best to be prepared for the unexpected.

- Maps
- Compass
- One canteen of water per person
- Food
- Knife
- Toilet paper & small plastic shovel
- Matches in a match safe
- Small flashlight
- First Aid Kit
- Safety pins
- Field notebook (or other nature book)
- Change for an emergency phone call
- Day pack (to store extra clothing, or lunch)
- Optional items

Hiking Foods

Food should be light, easy to carry, and not require cooking. It is best to eat a series of high-energy snacks and a light lunch.

Snacks include: dried fruit, Gorp (dried fruit, granola, candy, nuts), carrots, fruit, beef jerky, candy, and cookies.

Lunch suggestions include peanut butter and jelly or honey, cheese, sausage, and crackers. Hot soup, hot chocolate, hot tea, and honey are good if the weather is cold.

Remember that rigorous activities require more carbohydrates. Let a committee work on the menus while you assist them.

Be sure to carry out all trash.

Hiking procedures

Front and back leaders. Select a front and back leader. Vary these during the trip. The front leader is resposible for finding the way and observing dangers and changes in the trail, setting the pace, and finding rest areas. The front leader should set a pace that is appropriate to the pace of the slowest person in the group. The slowest person should be immediately behind the front leader. The back leader follows the ranks, makes sure the group stays together, and stops if there are problems.

Pacing. The pace should vary with the altitude, condition of the group, terrain, slope, and trail. Both leaders should watch for fatigue, hot spots leading to blisters on feet, and use of clothing required for body heat generated while hiking. (It is better to be cool on the trail than overdressed and perspiring.) Rest stops are important in the success of a hike. A good method is to set a steady pace for up to 50 minutes and with a 5-minute break. If the group is exploring along the way, shorten the hike so muscles do not tighten.

Stragglers. Children who have problems keeping up with the group are a special consideration. Place them in front and talk to them while hiking.

ACTIVITY: Outdoor Manners

Members are able to identify and practice appropriate manners while enjoying the outdoors. Think about how you can help members develop their own code of outdoor manners. Discuss the effects human actions can have on the outdoors by showing a film or reading a story about behavior in the forest or public parks. Make a chart and have members list their ideas on recommended practices. The club may want to adopt a code of outdoor manners. An example is below.

OUR CODE OF OUTDOOR MANNERS

_____ 4-H Club

1. Be careful not to litter. Pick up litter left by others.
2. Use trash cans.
3. Respect wildlife.
4. Be careful with fire.
5. Stay on trails.
6. Avoid cutting green trees.
7. Dispose of body wastes.

Think about how you can help members minimize their impact on the environment. When hiking, remind members to use no-trace campfires, use only seasoned wood, and to close all gates behind them. Be sure they do not harass animals, take short-cuts off trails, or throw rocks into streams.

ACTIVITY: Outdoor Safety

Safety is the most important concern. As a group leader you are responsible for the safety of everyone in your group.

What You Should Know

1. Know each member's capabilities, judgement, and ability to cooperate and follow directions.
2. Understand the basic principles of first aid and its application; carry a first aid kit with the group.
3. Know the hiking area.
4. Know approximate group pace, hiking distance, and time.
5. Know what to do in an emergency.
6. Understand basic principles for use of outdoor clothing in various weather conditions.
7. Recognize and safely avoid or negotiate physical/climatic hazards.
8. Know how to control and pace a group.
9. Know how to read a map, use a compass.
10. Know what to do if you have lost a member, or if the group gets lost.

What Will Help

1. Initiate games.
2. Take an American Red Cross first aid course and know the contents of the field first aid kit.
3. Scout the area ahead of time.
4. Start with short hikes until you know more about the interests and abilities of the group.
5. Discuss an emergency plan ahead of time with the group. Test by role playing an accident where group must use the emergency plan.
6. Visit an outdoor equipement store with the group. Examine appropriate clothing and discuss dressing for "climate control" while hiking. Discuss ways to dress for hiking without expensive clothing.
7. Check out local weather and snow conditions prior to outing. Read about procedures on taking groups across steep slopes. Have a plan for dealing with lightening storms.
8. Place slowest individual at front; develop a small group "buddy system."
9. Practice procedures before the hike with a game or pre-hike test.
10. Have group make up a lost hiker exercise, role-playing what could be done.

"POCKET GUIDE FOR 4-H HIKES" -- 4-H 3001

Ways to use the Hike Guide

This publication helps leaders to:

Stimulate interest in animals and plants and the Earth itself.

Develop observation skills to help youth see and understand the world around them.

Help youth learn the names of animals, plants, and geologic features and how to identify them.

Make hiking, camping, club meetings, and contests fun activities.

It can be used in many ways:

As a roll call topic at 4-H meetings. Members name a mammal, a bird, an insect, or a land feature, when answering their name. Classifications can be more specific as the members become more skilled (name a marine animal, a game bird, a mineral found in Oregon, etc.).

On hikes help members identify what they find, where it lives, and why. They may carry pocket guides with them, or check what they have seen when they get home.

At camps and in parks, self-instructing nature trails can be established with labeled specimens.

Self-testing nature trails with numbered specimens and with the correct names at a check station at the end of the trail can be used by members to check their own card.

"Open book" self testing is a good teaching method. Give the participant a Pocket Guide or list to use. It will help the member to identify the specimens and spell the names correctly.

As a contest at fairs. The contest may include 30 to 50 animal, plant, or mineral specimens from the "Pocket Guide to 4-H Hikes." Pictures, models, or actual specimens may be used. Score 5 points for each item correctly identified and spelled. Take off 1 point for each illegible or misspelled word. Allow 3 points if only part of the name is correct.

ACTIVITY: Keeping a Field Notebook

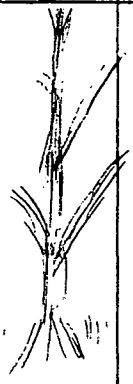
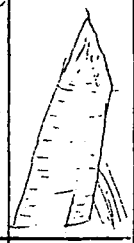
A 4-H Outdoor Project field notebook keeps records of observations, notes your feelings as you interact with groups and nature, and it itemizes what you have learned for use in talks, presentations, and exhibits during the year.

The outdoor investigation techniques of this leader guide lists numerous examples of collected and recorded data. You may want your members to include these in notebooks. Keep the notebooks simple, using materials that strike your interest during field trips. The book should be small enough to carry in a pocket and have a way to attach a pen or pencil.

How to take notes in the field

1. Take all notes on the spot. It is difficult to recall details later.
2. A picture or sketch is worth a thousand words.
3. Cultivate the practice of observation. Learn to see things not ordinarily noticed. Write about what you see, avoiding interpretations based on inadequate information.
4. Be sure all observations recorded are accurate. Identify all species carefully. If necessary, collect specimens for later indentification.
5. After you complete the field trip, review what you have recorded. You might wish to share this with the group.

EXAMPLE OF A FIELD NOTEBOOK ENTRY

Trip no 23	November 	Nov 4
    Deer tracks near river	his afternoon was warm, up in the 40's, and I headed for the Sibley Piner, The wind was rather chilly as I walked among the trees and down beside the river. I noticed the river was much higher at the bend than it had been when I was there in August. The sandbar was completely covered. I soon discovered the reason when I came to the first gnawed tree, and then I saw the beaver dam around the second bend. They had been busy	1 white breasted nuthatch 2 Downy woodpeckers 
Went alone to	in two months. I found two dams already built and a third begun. As I have	

ACTIVITY: Things to do on Hikes

Rain drops

Place everyone in a different spot and tell them they are raindrops. Have each person follow the course they think they would go. Talk about infiltration and run-off, how humans affect the process, steps to prevent damaging run-off. Do this in a variety of habitats: forest, field, meadow, hilltop.

Follow a sunbeam

If you are in a woods, follow a beam of light to where it hits the ground. What grows there? Talk about the effects of shading, competition, rainfall, coolness of the forest, soil moisture. Stand in the sunbeam and note the temperature difference there and other places. Is there a difference between the ground and five feet up? If possible, move into a meadow and notice the changes.

Seeing colors and framing a picture

Have the group count to themselves all the colors they see in one minute. What color is predominant? Why? Talk about colors and their causes. Have them frame a picture with their fingers as an artist might paint it or a photographer snap it.

Discover and describe

Give each member an egg carton to find one dozen discoveries. Explain the importance of living things and not to injure or kill anything. Tell them that what they discover is a secret and not to let the others see it. When they are done, pair them up and have partners sit back to back. One holds an object and with closed eyes describes to the other, without saying the name. Example: "It smells like ...", "It feels like ...", "It is eaten by ...", "It came from ...", "It is shaped like ...". When the game is over return the objects.

Space people

A variation of the "discover and describe" game offers a different perspective. Explain that the group is a team of scientists from another planet. They have just landed and are preparing to leave their ship. Have them explore the region for life and to determine whether or not they would like to set up residency on the planet Earth. If so, how would they manage for the future? What style of government would they have? How will they eat? What dangers to they need to consider? (Weather, temperatures, animals, people?)

Trust hike

Blindfold the entire club and have them hold on to one another. A leader will take them on a walk through various places (from sunshine to shade, under a fallen tree, across a shallow stream, in grass, on a path). It is best to have several leaders (not blindfolded) at different points along the walk to watch for any trouble. Instruct the group that they must all help one another.

For variation

Pretend you are all trappers as you follow the tracks.

Watch the sunrise

Get up before dawn and hike to a good place to see a sunrise. Be quiet and watch, listen, and smell. Walk quietly back to camp and try to observe wildlife. Celebrate the sunrise with a big breakfast!

Do the same for a sunset.

Insect search

The small plastic containers in which restaurants serve taco sauce or catsup are the best "bug boxes," if the top is still usable. Give each hiker a clear box of the same sort (a baby food jar will work just as well) and set them loose on the hike to search for bugs of all varieties. Observe them as a group in the boxes and them let them go free. Share information about where the bugs were found.

Singing hike

If the path is wide, everyone can walk in a group, gathered close for a silly song contest. One person begins by singing a song and ends anywhere. The next person begins a song using the last word from the first song. The second singer ends his song anywhere, and the next person uses the last word from the second song as a base for his/her song. Have everyone join in, the louder and noisier, the better!

That-a-way!

Allow each person in the group to be the leader for about 10 to 15 minutes. The leader gets to decide which direction to head. He/she yells, "That-a-way!" and treks off. After everyone has been a leader, get out the compass and find out how to get back.

Signs of animals

Have the group see how many signs of animals, birds, and insects they can find. Go slowly and be observant: tracks, scat, gnaw and claw marks on trees, brushpiles, alterations on leaves, possible homes, dead animals, or birds, broken branches.

Gone birdin'

Get out the binoculars and bird books and go on a bird hunt. Early morning is best, but any time of the day will do.

Exploration

Hike to an area and explore it.

Photography Hike

Work on photpgraphy skills and understanding as you hike a trail or journey cross-country.

Food hunt

If there is an expert in your county on wild edibles, you may want to have him or her talk to your group and take them out to identify edible mushrooms, berries, nuts and herbs. NOTE: This activity is not recommended unless the leader has previous experience in this area and can recruit an expert for additional experience.

Winter hike

Bundle up to explore a winter wonderland. Look for signs of animals or birds. Listen to winter sounds. Go while the snow is falling if you can! End with a snowball fight and hot chocolate.

Rain hike

Put on the ponchos and raincoats and become a part of the outdoors when it rains. You will be amazed at how enjoyable this is.

Moonlight hike

Turn out the flashlights and watch and listen for wildlife. How is the outdoors different at night? This activity can provide new perspectives and reduce fear of the dark. This is fun to do on a night of a full moon to celebrate the moon's glow.

Star hike

Walk to the top of an open hill, or on a clear evening, to study the stars and their legends. Take your sleeping bags along to spend the night. Take a book and small flashlight to help you identify new constellations.

Sealed orders search

The group must find their way from clues. A new clue is either found or given to them when they reach the previously-designated spot. Use riddles, poems, or codes to heighten the excitement. It is best to do this in small groups. Stagger teams or send search groups in different directions, for a large group. For the finale, all meet in the same place.

Anthropologists

Explain to the group that they are anthropologists from the year 2100 and they have come to learn what they can about the civilizations which inhabited the area in the year_____ (present year). Have them examine litter, markings on trees and rocks, etc. to learn about the environment and the people who lived there. This is a good adventure to do in public areas where people litter.

What Is It?

Rotate leaders and have them stop every time they see something pretty, interesting, or unusual. Talk about the object and learn about how it functions and why. Then give the object a name that seems appropriate. If it is edible, let everyone sample a bite. (NOTE: Be sure that plants are edible. Take along an edible plants book and have some experience in this area if you plan to do this.) This game can add diversity to a long hike.

Project Unit II: ADVANCED CAMPING SKILLS

OBJECTIVES: Members will be able to plan and carry out safe, enjoyable overnight camping experiences with a minimum of impact on the Oregon environment.

What Members Should Be Able to Learn And Do:

select trip locations
choose hiking routes
plan transportation arrangements
know how to care for and use proper camping equipment and clothing
how to select a campsite
fire building and use of cookstoves
sanitation and hygiene
food planning and outdoor cooking
proper shelter construction
no-trace camping procedures
use of knife, saw, axe
packing a backpack
trail leadership
use of map and compass
first aid and emergency procedures
surviving emergency situations

Hints

Your 4-H members will probably come with a variety of camping experiences which may include, none at all, camping in their backyard, car camping in a state or national forest campground, and backpacking to primitive campsites.

Most of the above-listed skills can be taught and practiced within reason, at your regular club meetings. Goals and expectations that will provide opportunities to actually camp out overnight and practice these skills in a real life situation should be built into the club program. You may have to gear the level of your camping experiences to the availability of equipment within the group and the physical capabilities of members. An example of levels might be car camping at a roadside campground if your equipment is too heavy to carry as opposed to backpacking into a primitive campsite. You may wish to explore these possibilities with your group and design a series of experiences of increasing difficulty.

SELECTING TRIP LOCATIONS AND CHOOSING HIKING ROUTES

Think about how you can help members answer the following questions:

1. Is the location within reasonable driving distance?
2. Do all members have the skill and ability to undertake a trip at this particular location?
3. Are the expected weather conditions at the location suitable for the purpose of the trip and the limitations of the group?
4. Does the location offer the natural features necessary to successfully satisfy the purpose of the trip?
5. What are the rules and regulations of the particular area?
6. What are the trail conditions?
7. What is the availability of campsites?
8. What are the sources of water along the trail?
9. What method will the group use to retrieve the parked cars?
10. What are the hiking miles and elevation changes to be considered in estimating distances of travel by the group?

TRANSPORTATION

Think about how you can help members answer the following questions:

1. What is the transportation cost to participants?
2. What is the minimal number of vehicles required?
3. Do the number and types of vehicles chosen for the trip provide adequate comfort for the passengers?
4. Do the vehicles have adequate storage space for equipment?
5. Is there adequate insurance coverage for all vehicles, drivers, and participants?

TRANSPORTATION (continued)

6. How and where will the group all meet to get started and how will they proceed to their destination?

7. Based upon an estimated travel time, have considerations been made in case of necessary food, fuel, bathroom, car campsites, and shuttles to various parking locations?

8. Where and when will all participants meet for the return trip?

EQUIPMENT AND CLOTHING

Ask the group to list all the equipment they think they will need. (This may vary depending on the nature of the camping location and the seasonal requirements of the area.) Have the group bring the equipment they have at home or will be able to borrow to a meeting. Have the group sort through the equipment into lightweight, backpacking gear and equipment that could only be used in a car camping situation.

The following is a basic lightweight camping and equipment list. Use this list as a reference once you have let the members discuss and develop reasons for using certain types of equipment. Once they discuss this list, have them prepare a revised list which they can keep as a permanent reference.

Personal Clothing

Boots. Medium weight to heavy, preferrably with vibram soles. Sneakers can be worn on dayhikes but can cause blisters with backpack loads. Sneakers do not offer the support necessary for climbing or moving downhill on rocky terrain. Lava rock in the Cascades will chew up a pair of sneakers very rapidly.

Heavy wool socks. At least one pair, plus two pairs of lightweight cotton socks.

Pants. Wool is best; blue jeans are okay if they don't get wet.

Long Sleeve Wool Shirt.

Wool Sweater. Down sweater is okay if worn over a heavy wool shirt.

Wool Mittens & Wool Hat.

Thermal Underwear. Can be used as pajamas if sleeping bag is not sufficiently warm in cold temperatures.

Personal Clothing (continued)

Parka. Windproof, water-resistant parka with hood is best for keeping dry.

Poncho. Necessary for rainy conditions.

Personal Equipment

Sleeping bag. lightweight, downfilled or dacron fiberfill (fiberfill retains warmth even when wet)

Sunglasses.

Stick matches. in a waterproof container

Pocket knife.

Whistle.

Foam sleeping pad.

Polyvinyl ground sheet.

Plastic cup.

Fork and spoon mess kit.

Biodegradable soap.

Toothpaste, toothbrush.

Toilet paper.

Frame backpack.

Umbrella. (optional, but often handy)

Group Equipment

Lightweight water-resistant tent with rainfly. 2 man or more

U.S. Geological Survey Map and Compass.

Flashlight. spare bulb and batteries

Group Equipment (continued)

First Aid kit.

Cooking Pot. can be made from #6, #8, or #10 tin cans and baling wire

Plastic shovel.

Extra cord.

Plastic garbage bags.

Backpacking:

Stove, stove fuel, funnel.

Hatchet, saw.

Basic Clothing and Equipment Considerations

1. Wool insulates even when wet.
2. Multiple layers of clothing permit easy adjustment of insulation.
3. Wool hat prevents loss of heat.
4. Boots should be roomy enough for at least one pair of heavy (wool) socks and one pair of lightweight (cotton) socks.
5. Boots should be broken in before they are used on the trail.

SELECTING A CAMPSITE

Think about how you can help members consider the following questions:

1. Is the campsite free from natural hazards?
2. Is the site far enough from other campers to minimize noise and disturbance?
3. Is the site free from insects and dampness?
4. Is the area flat enough for sleeping?
5. Is the site protected from winds and storm conditions?

SELECTING A CAMPSITE (continued)

6. Is safe drinking water close by? Sleeping too close to water sites should be discouraged to minimize human impact on the environment.

7. Is firewood readily available? Stoves are recommended to minimize impact on environment.

FIRE BUILDING AND COOKSTOVES

Use firewood if it is readily available and there are no restrictions on its use.

Have members consider the following questions:

1. Is the fire area away from tent sites and other areas of traffic?

2. Is all combustible ground cover cleared away to a distance of five feet in diameter from the location of the stove or fire?

3. Is the site clear of overhanging tree branches?

4. What is the fire going to be used for? Warmth? Cooking? Campfire? What size fire is best for each purpose?

5. What size and type of wood is necessary to start and keep a fire going? What is available -- kindling, pitch, tinder?

6. What are the primary and lighting requirements for the particular stove you are using?

SANITATION AND HYGIENE

Have members consider the following:

1. Is the washing and bathing being done well away from the water source?

2. Is the washing being done with biodegradable soap?

3. Is all human waste and uneaten food buried at least 30 yards from the nearest trail, campsite, or water source?

4. Is the waste buried in the organic layer of soil where it can decompose?

SANITATION AND HYGIENE (continued)

5. Is all non-burnable and non-biodegradable refuse bagged to be carried out?

6. Are socks and underwear washed regularly?

SHELTER CONSTRUCTION

1. Is the location flat with deep, dry ground cover?

2. Are the twigs, cones, etc. removed before the tent is set up?

3. Is the location away from fragile plant life and other delicate flora and fauna?

4. Is the tent site upwind from all fires?

5. Is the tent erected so that the rear of the tent is facing the wind and the front (entrance) is away from the wind?

6. Is the tent flap open to allow ventilation and prevent interior condensation?

FOOD PLANNING

The group must deal with three aspects of food planning: purchasing, packaging, and preparation. They can work individually, in small groups of 3 or 4, or do it as an entire club.

Food for backpackers must be lightweight, easy to prepare, and not spoil easily.

Calorie requirements vary from individual to individual. A rough estimate is around 3,700 calories per day in summer and 4,500 calories per day in winter. This averages to 2½ pounds per person per day in summer and 3 pounds in winter.

Nutrition: Foods should be a balanced diet of protein, fat and carbohydrates. When planning your menu consider the following:

Proteins: meat, fish, cheeses, eggs, nuts, milk, and beans
Fat: margarine, bacon, nuts, cheese, eggs
Carbohydrates: sugar, jam, candy, cereal, bread, rice, macaroni, dried fruit, vegetables

Cost: Most lightweight foods can be found in supermarkets, more specialized freeze-dried foods can be purchased at a higher cost in sporting goods stores.

Packing Food: (This will depend upon individual or group procedures.)

* Divide food into plastic bags for individual meals and label breakfast, lunch, and supper.
* A separate bag should contain staples and condiments.
* Extended trips should be packed according to a daily menu.
* Discard all unnecessary packing to eliminate bulk.

Eating Hints:

* Eat two hot meals per day.
* Eat lightly but frequently by nibbling between meals on gorp, dried fruit, granola, or jerky.
* Light a fire and get water boiling immediately upon arriving in camp.
* Start out with hot drink - lemonade, jello, tea
* Cook one-pot or foil meals for efficiency (stews, casseroles, etc.)
* Check water sources for possible pollution. Use water purification tablets or boil ten minutes if water is questionable.

NO TRACE CAMPING PROCEDURES -- A MUST!

Leave only footprints: This means removing all sign of your having been there.

1. Live trees and plants are to be left to live.
2. Fires are to be completely put out with water, soil, etc. Charred sticks and logs scoured and scattered and the dead coals buried. The rocks, if used, are removed and scattered. The fire area is completely covered with the pre-existing duff and returned to a natural condition.
3. The sleeping beds are restored to their natural condition.
4. Paper, baggie ties, and other litter is removed and carried out.

The group should feel great satsifaction in having enjoyed a wilderness campsite they have returned to its natural state for someone else to enjoy. If others have abused this priviledge, it's an opportunity to bring the site back to the way it was before it was abused.

USING AND ORGANIZING A BACKPACK

A frame backpack with adjustable padded shoulder straps and a padded waist belt is the easiest for carrying backpacking loads.

Packing for a smooth trail: keep heavy items high.

Packing for rough terrain: pack heavy items near the center of the pack and close to your back.

Adjust the shoulder straps so they are snug on the shoulders (not too tight which could cause discomfort).

Adjust the waistband so that the pack rests on the hips to take the weight off the back and shoulders.

Your sleeping bag is generally stored in a waterproof stuff sack and strapped against the frame underneath the pack.

Consider the equipment to be used enroute during the day and pack them for easy access. This might include first aid kit, rain gear, hat, parka, map and compass, trail snacks, lunch, cup, water bottle, matches, and toilet paper.

Use stuff sacks to order the reamining equipment. Separate sacks might include toilet articles, clothing, cooking utensils, food, etc.

Putting on a backpack

Lift the pack up on to your extended right knee, place the right arm through the appropriate shoulder strap, and swing the pack around the right shoulder. The left arm is inserted in its strap after the pack is in place on your back.

USE OF CAMP TOOLS

In most cases, hatchet, bows, saws and knives, see only occasional use, depending on firewood requirements, cutting and repairs needed in the group. It is important that members handle these tools safely.

Are the blades kept clean, dry, sharpened, and protected when not in use?

Are they passed from one person to another safely?

When using a knife, is it cutting "away" from your body?

When swinging an axe, are onlookers at least two arm lengths away?

Is a stump being used as a chopping block?

KNOTS

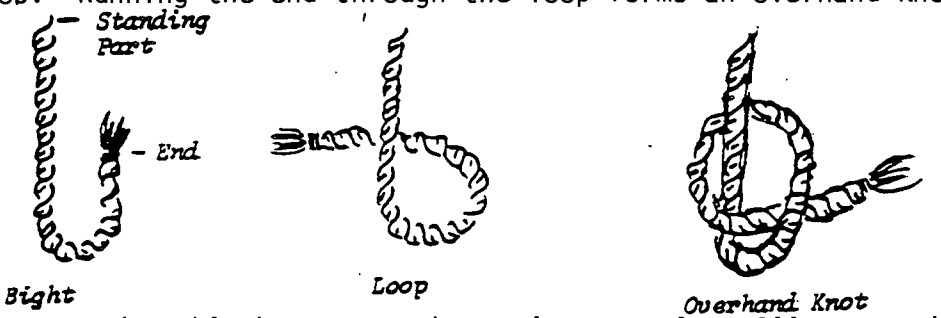
Anyone who has seen a "knotboard" display is aware of the great variety of knots, ranging from the simple to the complex. Except for decorative ropework and some special knots, most knots can be grouped by purpose into three categories:

knots for joining
knots for loops
knots for attaching

While any knot may be used for more than one purpose, each has a purpose which it serves best.

knots for joining	knots for loops	knots for attaching
square knots	bowline	clove hitch
sheet bend	tautline hitch	half hitch
carrick bend	slip knot	timber hitch
fisherman's knot	overhand loop	

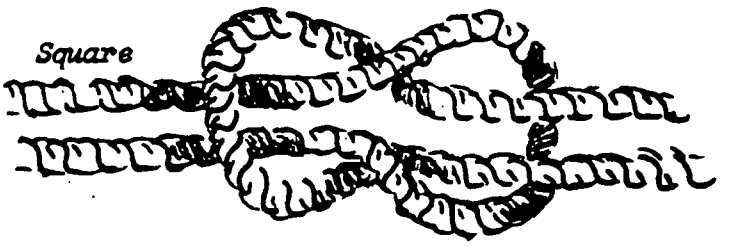
A few common ropework terms are used in describing how a knot is tied. The standing part of a rope is generally the longer portion or the part that is attached to something else. The end refers to the end being used to tie the knot. A bight is the figure formed by doubling the rope back onto itself in a U-shape. When the rope crosses itself to form a circle it is called a loop. Running the end through the loop forms an overhand knot.



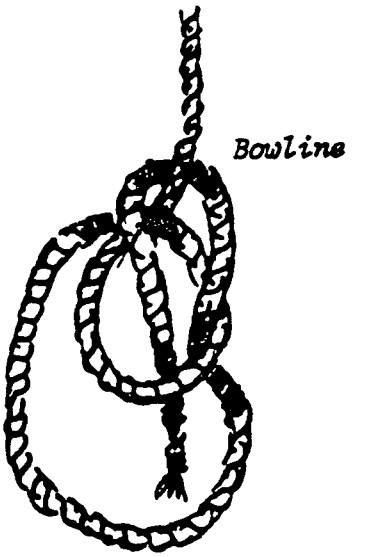
The more common and usable knots are the easiest to tie. All are combinations of bights, loops, and overhand knots. The square knot interweaves two bights while the carrick bend interweaves two loops and the fisherman's knot consists of two overhand knots. The sheet bend and bowline are both composed of a bight and a loop. A bight and an overhand knot are combined in a slip knot. The clove hitch is a combination of two loops and the half hitch and timber hitch are variations of the overhand knot.

Care must be used in tying any knot to get each part in its proper relation to the other parts. If rope parts cross incorrectly, you will end up with the wrong knot or no knot. Tighten a knot by pulling gently while maintaining the proper relation of all parts.

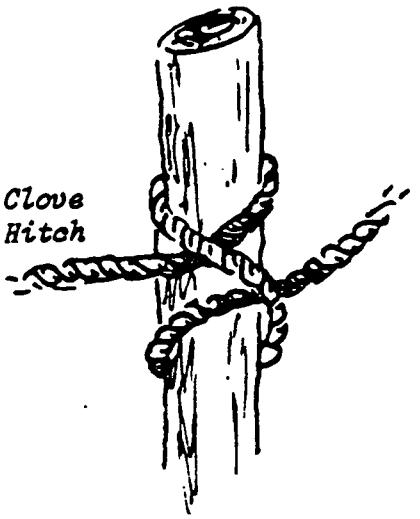
KNOTS TO TIE



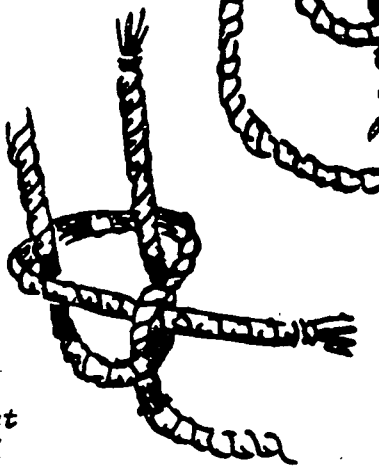
Square



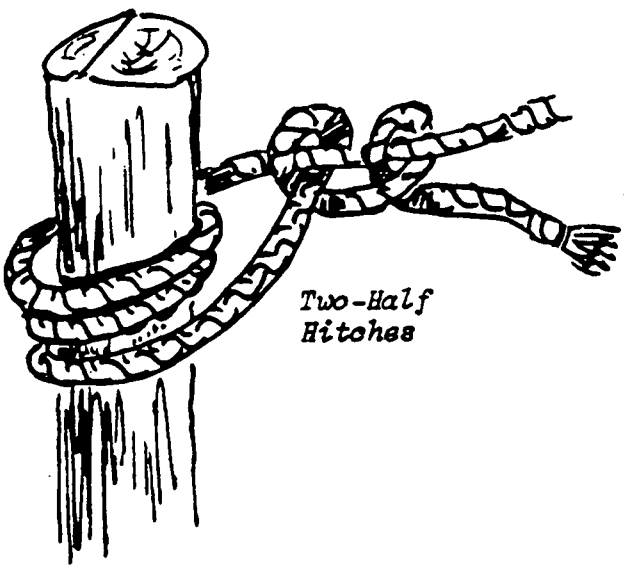
Bowline



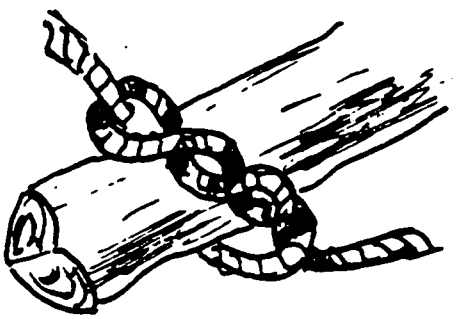
Clove Hitch



Sheet Bend



Two-Half Hitches



Timber Hitch

TRAIL LEADERSHIP

Many hints are given in the section on day hikes. However, there are special considerations for backpackers.

1. Is your group traveling as a unit? On easy trails, particularly if group is heading home, you could send members out in threesomes or foursomes.

2. An interval of six feet between hikers is standard.

3. Blister checks should be noted and the group stopped. Moleskin on irritated areas is a good preventative measure.

4. Conservation of energy is aided by rhythmic breathing and an even pace. If anyone needs to stop and rest, the group's pace is too fast. Stops should be brief. It takes more energy to get going once the body has cooled down.

5. Make sure proper clothing adjustments are made to avoid rapid cooling once stopped or to avoid overheating while moving.

6. The slowest member of the group should be given special consideration and placed toward the front of the group where the pace can be monitored.

7. If an impending storm, physical hazards, or group fatigue cause you to feel that the group should stop before reaching your pre-determined destination, then definitely stop for the day. The group will be in much better shape to enjoy the following day, rested, warm and well fed.

MAPS AND COMPASS

Members should be able to answer the following questions when they are hiking or backpacking:

1. Do they know where they are at all times?

2. Do they know how to plan a route from one place to another by the fastest, safest route?

3. Do they know how long a route will take?

4. Do they know how to get to a destination and return safely without getting lost?

Reading map symbols

1. Margin references (name, date, scale, latitude and longitude, names of adjacent quadrangles, contour interval, magnetic declination).
2. Constructed features (buildings, roads, mines, power lines).
3. Water symbols (streams, lakes, springs).
4. Vegetation features (forests, brush).
5. Elevation features (contour lines depicting the shape of topographic features).

Understanding contour lines

If you walked a distance of a mile up a steep hillside you would gain more elevation than if you walked a mile up a gentle hillside. Thus, you would cross more contour lines on a steeper slope. They would appear closer together on a map on the steep slope.

Contour lines always close around mountain peaks. Contour lines make a "V" pointing upstream where they cross valleys; on ridges they make a "V" that points outward and is usually irregular.

Have members take a felt pen and sketch contour lines of a large boulder or other large geographic feature of your area to illustrate the use of contour lines.

Orienting a map

A map is oriented in the direction of true North, the earth axis of rotation. The compass points toward the magnetic pole northwest of Hudson Bay. In Oregon, the direction of the magnetic pole is around 20^{o} east of true North. Thus, a correction of 20^{o} must be made when transferring directions from the compass to the map.

You can do this by placing the margin of the base plate of the compass beside the magnetic declination arrow at the lower margin of the map and rotate the map on a flat surface until the compass needle points in the direction of the declination arrow.

Using a compass (this applies to a magnetic compass)

1. Point out the important parts of the compass, i.e., magnetic needle, direction of travel arrow, base plate with scales and rotating compass housing scribed in degrees numbered clockwise.

2. Explain the correspondence between direction and bearing (East is 90°; West is 270°; North can be taken as "0" or 360°, etc.

3. Show how to take a magnetic bearing of an object by pointing the direction of travel arrow at the object, turning the housing and reading the bearing on the housing at the direction of travel arrow.

4. Show how to walk following a given bearing by setting the bearing on the compass. Keep the compass needle aligned with the housing, and following the direction of travel arrow. Show how to follow a bearing through a forest by sighting on trees, and how to walk around an obstacle on a bearing by making four 90° turns and counting paces.

5. Explain and practice how to determine map location by taking bearings on two prominent landmarks in the field, transferring the bearings to a map, and location of the interaction of the two bearing lines.

Estimating time and distances on a map

At the bottom of the map is a scale in inches of miles or kilometers. Take a blade of dry grass and clip it off to represent the scale. Place it on the existing map location and measure the route you are taking.

Since you will be traveling in varied terrain, use this formula: 2 mph on the flat plus one hour for every 1,000 feet climbed. On descent, figure half that time.

Learning how to read topographic maps and use a compass to determine direction of travel are essential to this process.

FIRST AID AND EMERGENCY PROCEDURES

As a 4-H Outdoor Leader, you should be competent in giving first aid and carry a current American Red Cross First Aid Card.

What you may encounter in leading 4-H members outdoors

Minor problems including burns, scratches, cuts, diarrhea, punctures, blisters, sprains, sunburn, frost nip, heat exhaustion, and snow blindness.

Major problems including hypothermia, heat stroke, frost bite, dislocations, breaks, head and back injuries, and lacerations.

You should be aware of evacuation routes along your selected hiking trail. You should be able to exercise judgement on whether to assist the victim out of the situation or send for help. Knowledge of the nearest phone emergency services and hospital is essential.

Contents of your group first aid kit

Adhesive tape ½", 1" or 2"
Elastic bandage, 1", 2", or 3"
Adhesive strips, assorted sizes
Butterfly bandages
Cotton
Gauze pads, 1x1, 2x2, 4x4
Gauze roll, 1" or 3"
Moleskin
Salt tablets
Aspirin
Ammonia inhalant
Triangle bandage
Single edge razor blade
Safety pins, assorted sizes
Inflatable splint
Scissors
Snake bite kit
Thermometer (oral)
Tweezers
Sewing needle
Clear topical antiseptic
Liquid germicidal soap
Vitamin E ointment

Surviving emergency situations

Every member should be aware and have understanding of the following:

How to develop the proper attitude in a survival situation.
Your body may be stressed from thirst, hunger, or injury.
You may suffer from fear, loneliness, or imagination.
You may be subjected to cold, heat, or wind.

Stay calm!

1. Think through what may happen and take necessary steps.
2. Never travel alone.
3. Leave a travel plan at home and stick to it.
4. Dress for expected climatic conditions.
5. Carry a knife, matches, compass, flashlight, and whistle.
6. Know your physical limitations.
7. Travel during the day or stay put.

Five essentials to survival:

1. Conserve energy.
2. Build a fire.
3. Construct or find shelter.
4. Find a reliable water source.
5. Use the universal distress signal -- 3 whistle blasts, smoky fire.

CAMPFIRE ACTIVITIES

Perhaps the most important period of the day on an overnight field trip is the evening campfire celebration. It is a chance for reflection, sharing of thoughts, planning for the coming day, playing quiet games, singing and in general, preparing for the night.

Campfires develop a spirit of unity in reviewing the day. It is wise to have some type of "before bed" ceremony -- even if the campfire is missing! No matter how exhausted and out-of-sorts the leader and group may feel, frustrations minimize with the entire group talking and participating in a light-hearted activity.

Sometimes it is enjoyable to establish a loose pattern for each group campfire. For example: Beginning cheerful songs, games, discussion of the day (good and bad times, and what everyone learned), planning for the next day, slower songs, and off to bed (walking to bed in silence can help quiet the group). The basic routine can provide security to a group of younger children who are probably worried about the dark.

What follows is a list of suggestions for night-time celebration circles. You will no doubt come up with many more ideas and can add them at the end of this section.

Stimulating conversation

Discussion ideas: The oder the age group, the more probable the success for some in-depth discussion. Younger ages need more entertaining, but they, too, can be easily pulled into conversing and sharing their thoughts.

Facilitate a discussion about: parents, school, camping, joys, frustrations, what is a friend, how do you become friends with others, what is beautiful, what is ugly, the importance of grades, family life, ... any issue where everyone can take part. As people begin to talk about themselves and their feelings, they can obtain a clearer self-image, as well as understand that the entire group has many things in common.

Such talks can be started by asking an open-ended question: this is a question which requires more than a simple "yes" or "no".

"What did you like best?" A pleasant way to look back at all that happened during the day is to ask everyone in the group, one at a time, to say at least one thing they liked during the day. After everyone has had a turn, talk about the events.

Fears: Have each 4-H'er write his or her biggest fear(s) on a small piece of paper. Only they will see what they write. Next, instruct them to throw the paper in the fire. Talk about fears.

Good Point: If the group is relatively small, have one person begin and then go around the circle. Allow each person a chance to say one thing they like best about each individual in the group. Encourage different ideas. Talk about how each person affects the entire group and talents of each which make the group a unit. Go into how the group can create their own atmosphere: trust, encouragement, smiles, bickering, put downs, blame shifting, etc. Talk about this in the group in a positive manner. This is aimed at cooperation in the group and better understanding of a person's own attributes, as well as those of others.

This exercise might precede or follow a group cooperative activity.

Poetry writing: Around supper time, ask each person to take out a piece of paper or their field notebook. Ask them to write a poem about how they feel. Have no rules about how to construct the poem and give them several hours (off and on) to ponder the task. Have each poem read at the evening campfire.

Lighthearted activities:

Storytelling: Everyone enjoys listening to stories, especially younger-aged children. Telling a story can give the leader an opportunity to shine. Look through the library or your favorite books and come up with a story to tell. It is usually more entertaining to relate a story rather than read it. Still, with enthusiasm and voice changes, the reading of a tale can be just as entertaining.

Stay away from ghost stories -- they can cause a lot of apprehension!

Who Am I: Place a sign on the back of each 4-H'er and on it write the name of a plant, animal, or natural object. Each person tries to determine the name on his or her back by asking questions that can be answered with a "yes" or "no". Play until everyone has guessed their name.

Earth, air, fire, and water

Divide the group into two sides or teams. Have a caller in the middle. The caller points to someone on one team and states either, "earth", "air", "water", or "fire". If it is one of the first 3, the player names something which lives in the environment (i.e. bird for air, fish for water, and an animal for earth.) If "fire" is announced, the player is silent. Go back and forth from team to team. Each correct answer scores one point. Play to any number.

Machines: This is a good confidence building exercise to begin a session of drama activities or is an entertaining game in itself.

One person begins by standing in front of the group and performing an action which can be repeated, and repeated, in a pattern. (For example, doing knee bends - up and down, up and down --- to a smooth beat). People join in as they perceive ways to become part of the machine. Keep the same rhythm and be creative. What you build isn't important, just that everyone joins in to form a working machine. The machine stops only when everyone has joined in. Sounds are okay, too! Repeat as many machines as the group wants.

Pantomime: Have each person do a very short pantomime (actions but no sound) on some object the leader decides. Here are a few ideas:

Squirrel cracking a nut and eating the meat inside
A feather falling
A bird hatching from its egg shell
A leaf being swept down a babbling stream

Inanimate objects are also fun to pantomime:

Toaster
Vacuum cleaner
Electric blender
Guitar being plucked

Expand the above into a more elaborate pantomime: A squirrel hunts beneath a tree for just the right nut. When it is found, he carries it home and buries it in a very special place in his store room.

Expand it even further. Involve several people in a scene: Have someone be a nut; add a mama squirrel waiting back at the tree, etc.

Carry on from the above point and add words to a new theme from a previously performed pantomime.

Each of these suggestions is aimed at confidence building and a taste for for dramatic activity. Confidence can be built at each stage. A youngster or teen may be hesitant at being in a skit. The above sequence can help alleviate fears.

These activities can be done in one evening or spread to cover several evening campfires.

At this point, continue creativity by having 4-H'ers write their own script and perform a short play or melodrama. It may be helpful to suggest several ideas. Here are a few to get you thinking:

- The group cooking a "typical" meal over the fire
- A tribute to flowers
- A forest at morning (or evening or night)
- Life in an ant colony
- The flights and adventures of a flock of geese flying south
- What was it like when the pioneers first discovered the land you are exploring
- Indian life long ago at your camping grounds

Encourage the use of costumes, props, an appropriate stage and whatever else the group might be able to pull together.

OTHER IDEAS

Singing:

Singing can be one of the most enjoyable aspects of a campfire, especially if someone has a musical instrument. Choose songs that everyone knows or teach easy tunes that have a repeating chorus. Loud and lively songs add a cheery beginning to a campfire ceremony. As bed time approaches, change the songs to slower and quieter ones. In this manner, the youth will be able to wind down from the day and are more likely to go to sleep.

It is often nice to end with the same song, if you are out camping for several days. "Taps" is good for this. The group can stand and cross their arms right over left and hold on to their neighbors' hands. Once the song is over, everyone can stand in silence for a moment and then walk quietly to bed.

Star watch:

Once the evening ceremony is over, everyone can sleep close together in an open area. Look at the stars and talk about constellations, etc., before falling off to dreamland. The group might prefer making up their own constellations and stories -- just as was done a thousand years ago.

Night hike:

Begin the evening festivities with a long walk in the dark. Have the group be quiet and listen for animals and other sounds. Discuss how many animals sleep during the day and hunt at night. Why? Are their eyes different than ours? In what manner? You may want to cover a flashlight with red plastic or fabric and sit quietly beside an area (a stream) where you expect some nocturnal animal activity. The red light will not bother the animals and they can be observed at their tasks.

When the exploring is over, return to the campfire for some songs and a snack.

Types of wood:

Before dark, have the campers gather different kinds of wood: hard wood, soft, deciduous, conifer, rotten, damp ... Get a big blaze going and then look at the selected samples. Pass them around and discuss each, and put them into the fire and observe how they burn. For younger ages, especially, this can teach about various points to consider when gathering wood. What should be used first to get the flame going? What would burn for a long time? What would make the best coals? And so on.

Field handbooks:

Set aside some time at the campfire circle to allow everyone to write (or draw) about the day in their field notebooks. Reflect on the day's activities and lessons.

Night scavenger hunt:

Why not? This can be a tool to encourage young people to explore the outdoors at night and become more attuned to its secrets. Here are some suggested items:

A group of stars that looks like a bear
Something that glows in the dark
A sound heard only at night
Something that predicts tomorrow's weather
The North Star
A short poem about night
A smell not present during the day
A bird conversation
A nocturnal insect -- where is it seen?
The snack planned for an after-the-game reward

The idea is not to go and find something and bring it back, but rather to point, to observe, use imagination, and show the results to the group and the leader. A snack for everyone can be a reward for "work" well done.

Project Unit III: OUTDOOR DISCOVERY SKILLS

ACTIVITY: Using Your Senses

OBJECTIVES: To introduce opportunities where children can gain a greater awareness, appreciation, and collect information about the out-of-doors by using their five senses. This can be accomplished in club meetings or outdoors in combination with other activities.

The ideas presented here will lead you to a variety of ways you may wish to develop discovery skills while being with boys and girls in the out-of-doors.

Touch and texture

1. How many living things have you touched today?

2. Collect different varieties of soil. Try these activities and answer the questions:

   - Can any be rolled into a coil?
   - Can any be piled into a tall hill?
   - Which would make a print from your hand?
   - Which feels the roughest? Warmest?
   - How much pressure does it take to break up the soil? What external forces (elements, animals, objects) could give that pressure?
   - What is the smallest particle found in each soil sample?
   - Drop some water on each soil sample. Where does it go?
   - Can you dig a hole in it to plant a seed?
   - How easily could roots begin to grow? Dig your fingers into the soil noting the pressure it takes to go downward and find room.
   - Would you find this soil on top of the earth or in layers below it?

3. Outside activity: Blindfold individuals and have them guide themselves by touch accompanied by a person who is not blindfolded for safety. In this way the member explores nature by touch, smell and sound only. It is interesting to have them later relate their experiences to the group.

4. Scavenger hunt for seeds. Place in categories of elements (air, water, animals) the element which would best carry it for seed dispersal.

5. When touching objects in a room, rub them in one direction and then try two different directions, not necessarily only moving from front to back. Try rubbing it sideways.

6. Stone identification. Ask each person to find a stone. Sitting cross-legged in a circle, tell each person to feel their stone carefully without looking at it. Give them a minute or two to do this. Then ask everyone to pass the stones to you. After scrambling them up, cover each stone with your hand and pass it to your right. Tell everyone to feel each stone as it is passed and to identify his/her stone by feel. When each person has found their own stone, they are to let it drop to the ground and continue passing the remainder of the stones until everyone has found their stone.

7. Blindfold walk. By using your voice in different locations, can you tell if you are in a forest clearing, near a body of water, in the forest itself, by a building, or on a high elevation? The sounds you make are in addition to the sounds you would already be hearing. Test it out in a room; explain the auditory differences between being in a building and being outdoors.

Color

1. Make a color wheel collage from objects that you find:

   - Arrange similar objects with colors going from lightest to darkest.
   - Arrange similar objects with colors going from yellow to brown.
   - Try the above with different objects.
   - Find different objects with the same colors; do they always blend together when placed on top of each other?
   - Do manufactured objects have more variety of color than nature?
   - How does color on an object change with age? Consider the changes that occur in natural and manufactured objects.

2. Continue the idea of different objects with similar colors:

   - Why would an opposum want to blend in with the surrounding wood?
   - Why are aquatic animals lighter on the bottom?
   - Are animals the same colors all over?

3. Obtain color samples from nature. When gathering natural materials, where would you search for red? brown? blue? etc...

   When picking up different objects, rub them, scratch them, split them, get them to release a juice or powder.

   Add a little oil and water to your colorant, dab it with your finger and paint with it on paper.

4. How do certain colors change when mixed? What mixes together to make certain colors? Hold up gels and look at different colored objects. Try one color at a time, then overlap them. Take two different colors and hold one color over each eye, look at different objects.

   - Are shadows really black?
   - How many different kinds of green can you find?
   - Look at the same object at different times during the day; does the position of the sun change the coloring of the object?
   - Try putting minute dots of different colors together on paper. Look at it from a distance. Do they blend together? Try to "mix" a color on a leaf or rock or plant stem. How close do you come when you try to smudge the colors together? How close do you come when you don't blend the colors by smudging but first do dots, then stand at a distance?
   - Are objects the same color up close as they are from a distance?

Sound

1. Do you hear more human-made sounds than sounds of animals or natural elements? Make a list of the first ten sounds you hear right now, or when you walk outdoors.

2. Collect materials that when rubbed, tapped, cracked, whipped, thrown, dropped, knocked and blown make sounds. Have each person practice with their "instrument". Select a conductor to direct a song, lullaby, jazz or marching piece. Can you imitate these sounds with your own voice?

3. Read a story that needs sounds filled in. Give groups of people their own subject to make up a sound for, encouraging them to each do their own sound, within each group. Someone reads the story, pausing after each subject to hear the group response.

4. Follow these directions: wait five minutes, then write the first ten sounds you hear when you go outside and sit at the base of a tree, lie down on the ground or pavement, stand at the end of a dock, watch the sun come up or go down, or go outside at night.

5. Make a tape recording of sounds in early morning, during midday, and at nighttime in different seasons and different places.

Shapes

1. Look for basic shapes in the environment. Are any of the objects shaped like a triangle, square, rectangle, or circle? Make a list of the examples you find. Can objects have more than one shape or half of a shape? Look at objects made by people, too. Does nature or human-kind have more triangles, squares, or circles where you are?

2. Shape and function:

   - Put your hands up to your ears as if you were a rabbit. Does it improve your hearing? Flip your hands to the front of your ears, cupping them backwards. What happens?

   - If you had to cross a snow-covered field, would you wear your snowshoes or spikes? Would a deer or a rabbit find it easier to cross the field?

   - If you were a fish, would you want to grow two hands? How would you use them? How would they get in the way?

3. With your whole body, act out a vine growing across different surfaces: brick, tree, cement, branches, etc.

4. With your body, stand in the general shape of a distinct tree, such as a fir, alder, oak, maple. Pay attention to trunk, bark, branches, and leaves. To know how these trees look, give to each person a part of one tree's bark and a leaf. With these clues, search for a real tree of the same kind.

5. Find rocks that vary in shape. Stack them or arrange them so as to contrast their shapes or form a new group shape. How are the rocks naturally resting around you in your environment? Does your arrangement resemble their natural one, or stand out as a contrast? Try this with different found objects, even manufactured throw-aways, such as crushed cans.

6. Pick up a rock and rub, feel, and touch it to your cheek. Discover all the cracks, pores, edges, smooth, and rough surfaces. Does it feel like anything else? Now look at it. Does it resemble any animal or plant? Using its surface, draw on it the object that it resembles, trying to make the rock and the object one.

7. Sketching shapes in nature with charcoal, or black crayons. Sketch large shapes as well as detail within large shapes. Examples: trees, flowers, rocks, clouds, hill outlines, bird nests, honeycombs, anthills.

Smell

All members should choose a partner. One of the partners is blindfolded and the other opens up a box of objects. One at a time, they hold the objects near their partner's nose.

- Can they smell it from a short distance? A long distance?
- Ask them to describe the type of smell; write their description down.
- Can they identify the object by its smell? Again, write their guesses down.
- Some containers have a description of their contents on the label. Read the label to the blindfolded person and ask them to describe the smell when you open the container. Can they guess what it is? Write down their first reactions.
- Heat some of the objects and see if they change their smell. Untie the blindfold so that both of you may work together. Try heating the soil samples used before. Do any smell good enough to eat?
- Try distinguishing different smells in your outdoor environment. Trace the smells to the source. How would you describe the odor?
- Draw a picture and write a description for an animal that:

  -uses its nose for tracking food buried underground
  -can run and hunt a scent over a long distance
  -seeks food by smell in deep passageways
  -smells other animals to know if they are friend or foe
  -uses smell as a protection from danger
  -leaves a scent to mark a trail or his territory

Given a specific situation (cave, wooded grove, river) where an animal is trapped and hungry and needs food, what kinds of nose would be best to have in that particular environment? Consider the kind of animal that lives there now. Draw the environment you choose and the animal searching in it.

Give each person a card with an animal's name on it. With hands, quickly shape the nose of the animal upon your face or act out a function of it. Can anyone guess which animal you are?

Combining senses

We want to share these ideas with you, hoping they will stimulate related experiences for you to share with your group. Most of them combine the senses. Think about the processes involved and why they are being used. What do you wish to develop? What would be an interesting way for you to explore it? How can you transfer that feeling of discovery to your program?

1. Just using certain adjectives, describe a certain object. Consider different senses: how would you describe the way it stimulates your hand? Your eyes? Your ears? Your balance?

2. Use "living labels" to mark a trail, point out interesting areas, possible homes of animals, etc. Labels can be a descriptive word other than a name; try a color, footprint, leaf, or an indication to look in a different direction.

3. Keep a diary of different sensory experiences. When enough of one object or event has been collected, compose them into a poem, word picture of the subject, or a story to share.

4. Adopt a tree, patch of ground, or an animal. Visit it daily and keep a log on changes occurring there.

5. Gather natural and manufactured objects for printing. Try making different lines and shapes with each object. Can both kinds of objects print similar lines?

6. Find all the objects outside that are smaller than you, same height as you, and taller than you.

7. Observe and/or draw the environments around you from different angles. Lie down and part the grass as if you were an ant. Climb a tree. Place your eyes level with the water.

8. How do things change while drying? Draw, photograph or record two objects daily; one in its enviroment and one out of it.

9. What reflects the most light: snow, water, or eyes?

10. Ask questions that cover several answers. Examples: Rain collects in _____. Trees are homes for _____. If you remove something from its environment, how will that space be filled?

11. What would an ant say if it could speak?

12. Give your body characteristics of natural or manufactured objects. How do you change between day and night? How do you change in different weather conditions?

13. Name different natural things that connect natural objects: spider webs, soil.

14. Design a home for yourself from available materials. How long could you live in it?

15. You can store energy in different parts of your body. How does the earth store energy? How is that energy released?

16. Is the outside of a rock any clue as to what is inside?

17. How many different lines are you wearing? How many examples can you find outside? Do they differ in length, shape, or feel? Do animal tracks make a line?

18. Identify symmetrical objects versus asymmetrical objects.

19. What's happening underground? Choose several objects and draw them completely, including those parts which are underground. Dig out around them to observe them and when you are finished, carefully replace the soil.

20. Gather daylight bugs and nighttime bugs. How do they differ?

21. If litter blossomed, what would its roots, flowers, and stalks be like?

22. Find the hairiest leaf, the smoothest, warmest and wettest.

23. Find all sticky objects.

24. We pack soil down; what loosens it up?

25. What type of wood can you push your fingernail through?

26. What if rained every day; how would a particular area change?

PROJECT UNIT IV: OUTDOOR INVESTIGATION SKILLS

INVESTIGATING ANIMALS

OBJECTIVE: These activites will provide more advanced ways for children to investigate the outdoor environment. These activities will help children understand interrelationships between living things, their behavior, and adaptations. The "whys" and "hows" become important instead of just the "whats".

Children can move through the investigative steps:

"Hey, look at that!" (observing)

"I wonder if ..." (hypothesizing)

"How can we find out?" (testing)

"I bet if we do this ... " (predicting)

"How many are there?" (counting)

"How long is it?" (measuring)

"This one has the same number of legs as those, but that one has more." (classifying)

"When I tried it, I found that ..." (communicating)

"If that's so, then I'll bet ... " (inferring, predicting, hypothesizing)

"We can't do it that way because ... " (defining specifically)

The order in which this happens can be spontaneous. This can be used in club meetings or on field trips.

Each section represents an area where investigative skills can be used. The few ideas in the specific sections can help build additional interest and investigations. As a club leader you will serve as a guide or facilitator. You should look over the area you are planning to investigate ahead of time and read through the steps in the investigation process to make sure you understand what you will be asking the members to do.

Much of the information will be gathered and analyzed by the members themselves so you don't have to offer information to them. Most of the investigations have the following components:

Setting the stage.

Individual and group tasks and activities.

Charts and tables to be used in data interpretation. (You may wish to make copies of these where indicated so members can keep their own records.)

Some have suggested questions and discussion points and learning objectives.

Reasons for the investigation approach

1. It is a way for club members to pool their skills and knowledge in collecting and interpreting their own information.

2. It allows everyone an opportunity to participate at their own level of interest and motivation.

3. It allows the group to work together in a problem-solving situation.

4. It allows the group an opportunity to summarize their own findings, values, and feelings.

Investigating animals

All animals have the same priorities:

To stay alive:

- obtain food, water, and shelter.
- avoid being eaten

To reproduce:

- find a mate
- provide food, water, and shelter for young
- protect young from predation

In a few cases, the latter priorities are replaced by an enormous over-production of young, allowing for great predation and low survival rate.

When animals move around, it is usually for one of the following reasons:

search for food or water	seek shelter
escape from enemies	protect territory
seek mates	explore surroundings

Some animals are extremely curious, others have no curiosity at all. When looking for animals, consider first what THIS animal would likely be doing at THIS time of day, in THIS weather, and secondly, where the animal would likely be doing the activity. Most mammals remain out of sight for the greater part of the day, seeking food at night as much as possible. Many do not come out at all on the first day of a storm but by the second or third day, must to obtain food. Animals are harder to find during the full moon and this has nothing to do with superstition; it is simply a matter of light. If they can see to find their food at night, they can stay in their shelter during the day.

ACTIVITY: Finding Out About Animals

Concept: Animals require certain conditions in their habitat in order to live. It is important for us to get acquainted with what an animal habitat is and the relationships that exist between animals and their environment.

Content:

Idea 1 Observing and measuring animal sightings and evidence

Idea 2 The survivors

Idea 3 Animal communities - making vivariums

Idea 4 Food chains

Other ideas that you may wish to try:

- directions for making a live animal trap
- making plaster casts of animal tracks
- learning about an animal's habits
- following an animal in its environment

Idea 1: Observing and Measuring Animal Sightings and Evidence

1. Take your group into an outdoor area where you know animal signs can be observed.

2. Begin by asking questions about this area:

   a. What animals would we expect to find living in this area?
   b. What are the needs of these animals?
   c. What are the names and places where animals live?
   d. Where would you look for animals around here?
   e. What habitat conditions would be most important to the animals? (vegetation, soils, moisture relationships, temperature)
   f. What evidence might we find that animals have been here? (sign things, sounds, smells, tracks, droppings, nests, burrows, partially eaten food)

3. Have the group go in teams of two and explore a defined area. Take along Activity A (below) and have them fill it out.

ACTIVITY A
Record any animals or evidence of animals you see and the number of each. Observe and list different habitats for animals in the area.

4. Bring the group together and discuss what was observed.

Have the teams work from recordings in Activity A. Select three different habitats in this area and record the data in the chart. Give each habitat a name based on the data you recorded.

ACTIVITY B			
HABITAT	I	II	III
Characteristics			
Name of Habitat			
Name & number of animals, other evidence			
What would account for the similarities and differences between habitats?			

Bring the group back together and divide them by teams into three groups. Have each group put their display up and report on it (characteristics of animals there, evidences of animals, etc.)

QUESTIONS:

What could account for the similiarities and differences of the habitats?

What are some of the animals that might live in the habitats?

Source: Investigating Your Environment Series, U.S. Forest Service, Portland, OR.

IDEA 2: The Survivors

The problem: What changes cause a species to become extinct?

ACTIVITIES

1. Clues for you: Look up the word extinct. List several animals that have become extinct. List reasons for their disappearance.

2. Many living things are in danger of becoming extinct. We say they are endangered. Research at least one plant or animal that is endangered. Write a short report telling why this animal or plant is endangered. In your report, include information on what, if anything, is being done to prevent this animal from becoming extinct.

3. Find a picture of this animal. Decoupage the picture of the animal on one side of a piece of wood. On the other side, add a short report about the animal.

4. Other ways to look at it: Study one animal from Oregon that is endangered. List the reasons why the animal is extinct. Is anyone doing anything to prevent this animal's disappearance?

5. Why should you be concerned about the disappearance of that animal?

6. Collect pictures of endangered animals. Make a book about them. Be sure to include information about where they are found, their habits, and why they are becoming scarce.

7. The Department of the Interior publishes a list of endangered species. Write for it.

8. Research one extinct animal. Find out why it disappeared.

9. Discuss. Can humans and animals share the same living space? What animals are most susceptible to the crush of civilization?

10. What did you discover? Present to the class your report on one endangered animal. Be sure to give information about the animal's habitat, habits, and reasons for being endangered.

Source: Broad Spectrum Environment Education Task Cards - Florida

IDEA 3: Animal Communities

Concept: Environment determines the kind of animals which live in the community.

Objectives: To learn that animals found in one animal community differ from those in another community because of the effect of the environment.

Materials:
2 terraria
1 aquarium
Animal cage
Minnow, tadpole, or frog
Land animal
Jars for animals from the pond
Small net to catch minnows
Insect net and cage

Introducing the concept: Plants live in communities and one community differs from another because of the effects of the environment. It is suggested that a bowl of tadpoles, minnows, a turtle, or frog be placed in the meeting room with the question in large print above it, WOULD THIS ANIMAL LIVE IN A DESERT ENVIRONMENT? (Desert aquarium). A live rabbit or squirrel in an animal cage would also be helpful with the question: WOULD THIS ANIMAL LIVE IN A WATER ENVIRONMENT? (Aquarium).

Developing the concept: As a result of the questions and comments stimulated by the bowl of minnows or tadpoles or the animal in the cage, the group would be taken on a field trip to observe animal life in different communities. Most animals observed in the woods can be identified (squirrel, rabbit, birds, lizards, beetles, insects, spiders). Make a list of animals observed on the field trip.

- Allow children to collect insects, minnows, frogs, turtles, or other animals found in or near water that can be observed for a time in the meeting room or their homes.

- Some water birds should be observed.

- List animals seen on, in, or near water which have not been seen in the woods. Any insects, frogs, snakes, etc. captured on the field trip should be properly cared for on the return to the meeting room.

Extending the concept:

Place the lizard, toad, or other small land animal in the terrarium.

Place the minnows, snail, tadpoles, and other water animals in the aquarium.

Point out that the kinds of animals noted in different locations were determined, to a large extent, by the environment.

Horned toads can be obtained from pet shops for a nominal price and do well in a desert terrarium.

Fixing the concept:

Ask:

How do animals found in one location differ from those found in another?

If a habitat is changed or destroyed by man, what will the effect be on the animals?

MAKING VIVARIUMS

You can study the ecology of various environments by making vivariums (a glass container with living plants and small animals). Here are the instructions for building three kinds of environments: desert, bog, and woodland. However, be sure to choose plants and animals that will be able to live and grow in the size container that you have chosen.

Remember that with all animals, you must provide them with food and water. Keep an eye on your animals for signs of ill health. In most cases, the eyes indicate any trouble. A glassy or dull look signifies a possibly ailing animal.

Desert Vivarium

- Obtain a large, commercial-sized mayonnaise jar, fish bowl, or brandy snifter.
- Clean the container with soap and water and rinse it well.
- If you are using a large jar, place it on its side.
- Spread two cups of sand onto the bottom of the container.

- Add a layer of sandy soil on top of the sand.

- Choose an assortment of cacti and succulents and arrange them.

- Use tongs to plant prickly varieties of cacti.

- Nestle a jar lid in the sand and fill it with water.

- Choose a horned toad or lizard, gopher tortoise, and/or Mediterranean gecko. These animals do well in desert surroundings.

- Cover the container with wire or plastic mesh secured with tape or wire.

- Place the container in a bright area and water the plants evenly once every two weeks in summer and only lightly once a month in winter.

- Feed the animals live mealworms. These can be obtained from a pet shop.

- Remember to keep the jar lid filled with water for the animals.

Bog Vivarium

- Clean a large, commercial-sized mayonnaise jar with soap and water and rinse it well.

- Place the jar on its side.

- Spread gravel out on the bottom of the jar so it will be concentrated towards the back of the jar.

- Add rich soil which is capable of holding many times its weight in water.

- Place ferns, mosses, lichens, and liverworts in the soil.

- Add water. (Do not put so much that it covers the back mounded portion of the arrangement.)

- Place a dried twig or piece of driftwood in the vivarium.

- Tree frogs, salamanders, newts, and mud turtles do well in a bog vivarium. Add one or two.

- Cover the jar with a screw-type lid to provide an air-tight cover.

- Place the vivarium in an area where light is weak and water when needed.

- Check often to see that animals have substantial drinking water and feed them with live mealworms from a pet shop.

Woodland Vivarium

- Obtain a large, commercial sized mayonnaise jar.

- Clean the jar thoroughly with soap and water and rinse well. Wash and rinse the lid as well.

- Dry the jar and lid and screw the lid on.

- With the jar on the floor, pound holes into the lid using a hammer and large nail.

- Find an outdoor area that has many trees.

  Look on the forest floor for small plants that do not need much light. Plants such as mosses, baby ferns, or wintergreens are good choices.

  Select a few healthy plants of a variety of types. Dig them up with plenty of soil and keep them moist.

  As you are digging, look for small insects and other tiny creatures that live on the woodland floor. Capture these insects carefully and save them for your vivarium.

  Dig some extra soil and leaf mold to use when you put your vivarium together. Try to get the dark, moist soil on the surface of the forest floor.

  Collect some small stones and sand to use later as the soil base.

- Now you are ready to build the vivarium.

  Lay the jar on its side and spread the stones on the inside of the jar. Add the sand.

  Moisten the dark soil and humus you have collected, mix in chipped charcoal, and spread it over the sand and gravel.

Arrange the plants in the vivarium and when you are satisfied with the arrangement, make small holes and bury the root systems.

To make a miniature lake for your vivarium, you can cut a small paper cup in half or use a plastic can lid filled with water, and then bury it to its rim.

Place the insects or small critters in the vivarium.

Cover the jar with the punctured lid.

Water plants when needed, check often to see that the "lake" is full, and feed small animals with mealworms from a pet shop.

IDEA 4: Food Chains

The building and observations of vivariums lead nicely into the study of a food chain. The session on vivariums should have created a spark of interest as well as some curiosity.

Introduction

This section discusses nature's food chains -- the natural cycles that plants and animals depend on to sustain life. The section also shows what can happen when the chain is broken or the natural cycle is disrupted by the breaking of a link.

A food chain is a graphic representation of one of the most complex relationships found in nature. Simply stated, it shows the relationships between plant and animal organisms that depend on one another.

If students understand the relationships in a simple food chain, they will better understand the basic issue that underlies countless environmental debates. This basic issue is whether human disruption of the balance of nature will have serious environmental consequences. By understanding the concept of natural cycles -- exemplified by the food chain -- students will see that a change at one point in any natural cycle will almost always result in changes at other points.

The simplified food chain which is studied in this section is a teaching device from which much detail has been eliminated for the sake of clarity. A totally complete chain would have so many variations that arrows would go in countless directions, crossing and re-crossing so that a properly drawn food chain would look more like a puzzling maze than a picture explaining plant-animal relationships.

The very nature of this complexity helps insure survival in nature. If one organism in a chain becomes scarce, another can often assume its role. Such variables provide for checks and balances, and help insure the balance of nature.

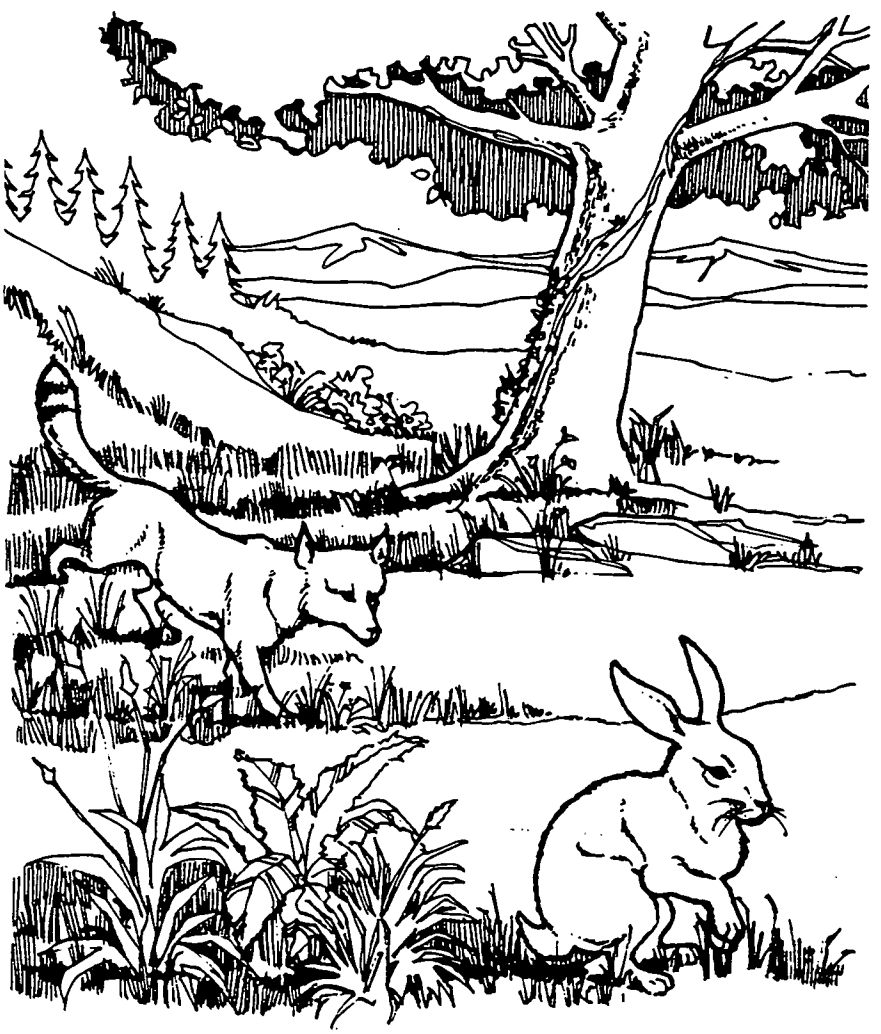
This balance can be destroyed by people and sometimes by nature itself. The fact that human actions can destroy the balance of nature is fundamental to any understanding of why pollution must be avoided.

Many environmental issues are a question of values, rather than questions of science alone. For example, the debate over the Alaskan pipeline was not just a scientific issue. Few people question whether the pipeline will disrupt the ecology of the area along its trans-Alaskan route. The major issue was whether or not the inevitable disruptions and damage would be outweighed by the benefits which would result from this new source of petroleum.

This section does not attempt to deal with such value issues, but hopefully it will establish the basis for better understanding of such issues. The point that should be made to members is that when it is necessary to disrupt the balance of nature, we must have the foresight and concern to mimimize that disturbance. Members should come to recognize that humans are part of nature -- not its conqueror -- and that we must learn to live in harmony with nature's laws.

TEACHING PROCEDURES

Using the illustration, you will note that it shows three of the four members of the food chain: green plants, a plant-eater (rabbit), and a meat-eater (fox). The fourth type of members, decomposers, are not shown in the picture. Their role is discussed in the questions below. By reading these questions, you will be able to acquaint yourself with the role of each member in the chain. Since the role of decomposers will probably be the least familiar, you may want to give special attention to it by drawing a picture of a decomposer on the illustration as you discuss it. These decomposers could be represented by small insects or worms. By drawing these, you should be able to give emphasis to the role of decomposers.



QUESTIONS:	ANSWERS:
1. What living things do you see in the picture?	Rabbit, fox, grass, tree
2. Are there things that you can't see that are probably living in the trees or ground?	Birds, insects, worms, micro-organisms
3. What would happen if you took the rabbit away from the field and put it in a cage?	
What would the rabbit need to stay alive?	Food, clean air, water
4. What does the rabbit need to stay alive in nature?	Food, clean air, water, and shelter
5. What does the rabbit eat?	Green plants
6. Why does the rabbit need food?	For energy and growth
7. Why does a plant need food?	To keep alive and grow
8. How does a plant get its food? Does anyone know?	With the help of sunlight, it makes its own food from air, water, and chemicals in the soil.
9. Does the rabbit in the picture have an enemy?	The fox. Note that some animals, like the fox and the hawk, are called predators -- meat-eaters that catch other animals alive and feed on them.
10. What's important about insects and worms? What do insects and worms eat?	Explain that certain insects and worms are called decomposers. They feed on wastes of plants and animals and on dead plants and animals. They also break down wastes through their digestive systems into simple chemicals that plants use to make food.
11. As you study plants and animals in the picture, can you see a food cycle that exists when there is a balance in nature?	From the green plant to the plant-eater (rabbit), to the meat-eater (fox), to the decomposer, and back to the green plants.

QUESTIONS:	ANSWERS:
12. A major change in one part of the food cycle endangers all parts of the cycle. For example, if a hunter kills all foxes in a wood, would this be good for rabbits?	No, because it would cause an over-population of rabbits. Eventually the rabbits would eat all the plants in the area. With the food supply exhausted, the rabbits would then starve.
13. Can you see the value of predators?	They keep down the populations of animals and help maintain a balance in nature.
14. Could there be a food chain without decomposers?	No.
15. Could there be a food chain without green plants?	No.
16. Could there be a food chain without plant-eaters or meat-eaters?	Yes. Animals are not essential to a food chain, but plants and decomposers are.
17. How does air and water pollution affect the cycle?	To grow and thrive, plants and animals need clean air and water.
18. How does a forest fire affect the cycle?	By destroying trees and ground cover, a forest fire destroys food and shelter for animals.
19. Name ways that people can help to maintain nature's balance.	(There should be many suggestions)

If time permits, the members may want to have a general discussion of the material covered in this section.

Additional of Follow-Up Activities

1. Take a walk to observe food chains.

2. Have members make a list of meat-eaters, plant-eaters, green plants, and decomposers.

3. Take a walk and list all the predators that you observe -- for example, cats, birds, spiders, etc.

4. Select a predator that is most interesting to you and study it.

5. Make a detailed list of everything you ate the day before. Then think about where they come from and how the various facets of the environment affected them.

6. Take several boxes of food, read on the label what ingredients the packages contain. Then list the things that come from plants, from animals, and those that are manufactured (these would include chemicals).

MAKING A LIVE ANIMAL TRAP

Materials:

* empty coffee can
* small screws and bolts - two per trap
* metal or wire cutter
* mouse traps
* hardware cloth (1/8 inch mesh works very well)
* very fine wire

Procedure:

Cut two slits one inch long and one half inch apart in the open end of an empty coffee can. Drill two holes in it the size of the two screws on opposite sides of the pad of the mouse trap. Bend the cut piece of the coffee can back into the coffee can, and slide the pad of the trap into the opening formed. Drill two holes in the coffee can to match the ones cut in the trap.

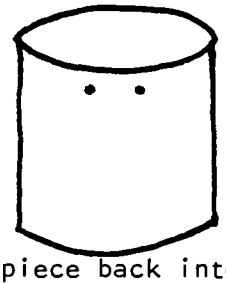
Cut the hardware cloth so that there will be about one-half inch overlap around the can. Cut off half an inch on one side of the wire circle. Attach the hardware cloth to the wire of the trap using the fine wire. Attach it in eight places at least. Make sure to attach the hardware cloth so that it is on top of the wire trap when the trap is set. This is done so that when the trap is sprung, the hardware cloth will fit flat against the can opening. Using the screws and bolts, secure the trap to the can. The wood base of the trap should be outside of the can.

Set the trap in the usual manner poking the trap wire through one of the holes in the hardware cloth.

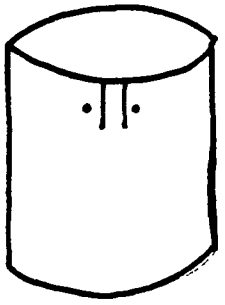
See the following page for illustrations and directions.

DIRECTIONS FOR MAKING A LIVE ANIMAL TRAP

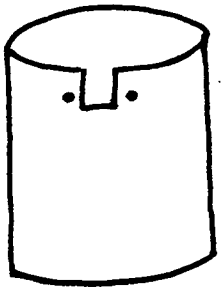
1. Use a coffee can or juice can, depending on what size trap you want. Drill two, 1/8" holes 3/4" down from the can lip, one inch apart.



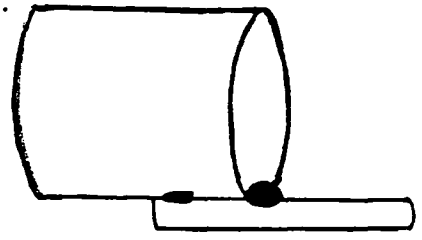
2. Cut two slits one inch long and one-half inch apart between the holes.



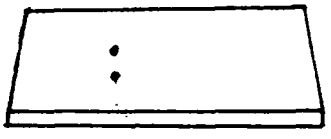
3. Bend the cut piece back into the can.



4. Place the can on the mouse trap and slide the slit back over the trap trigger until the lip of the can fits snugly against the trap spring. Then mark the wood platform of the trap with a pencil through the holes drilled in the trap.

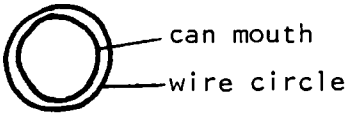


5. Drill holes in the trap platform the same size as those in the can at the pencil marks.



6. Cut hardware cloth so that there will be a one-half inch overlap around the can lip to cover the can opening. Cut off one-half inch from one side of the wire circle.

A.

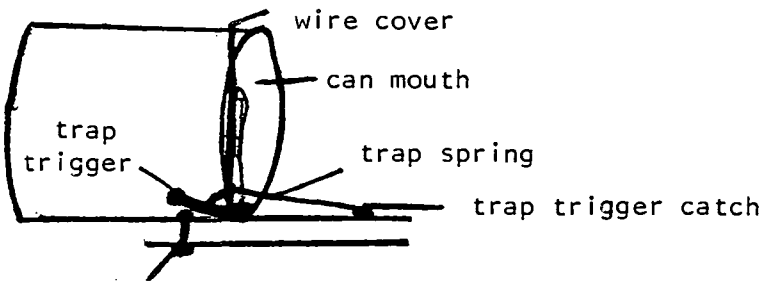


B.

hardware cloth ready for attachment to trap

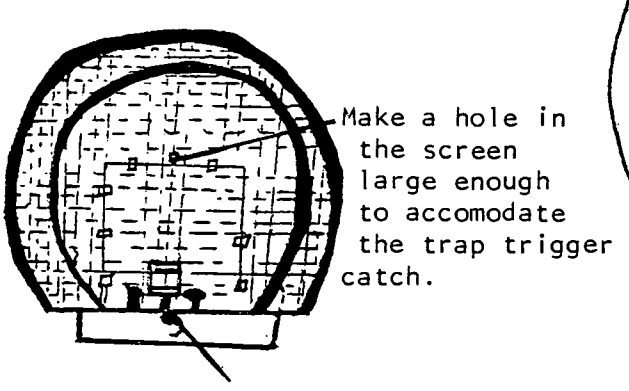
7. Attach wire to the inside of the trap wire with small wires, attach in at least eight places and fasten tightly.

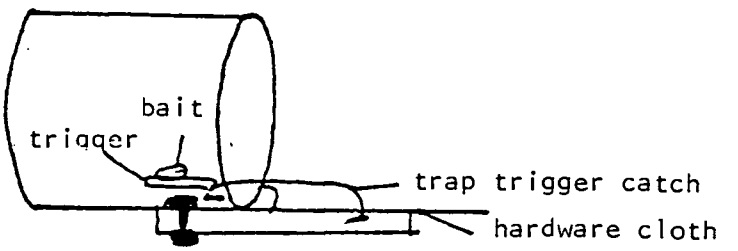
8. Then attach the trap to the can with two bolts. Be sure the can fits snugly against the trap spring. Tighten the stave bolts.



9. Set the trap by running the trap trigger catch through a hole in the hardware cloth just above the trap wire and setting it as you normally would a mousetrap.

10. If you wish to make a very large live animal trap, use a rat trap and a five gallon oil or gas can with the top cut out.





ANIMAL TRACKS

It should not be necessary to have a cow walk down the trail in order to have a track to follow. Tracks are one of the most enjoyable parts of the out-of-doors, but too few people can track properly. Animals are usually timid. Although they see us, we seldom see them, but we can see where they have been. With a little practice we can read the story of their activities. Here are a few pointers:

Approach each muddy area with extreme caution. NEVER step in the mud or you will erase any record that might be there. Always stay on the side opposite the sun, thereby taking advantage of any shadow in the track. Don't walk in the track, you may need to retrace to find a lost trail.

When tracks cross an area too firm for footprints, observe bent grass or moss around the area. On solid rock, seek particles of fresh earth or other matter dropped from feet, crushed lichens, or other signs of disturbance. Some animals (bears, skunks, raccoons, and others) will turn over rocks, sticks, and others things as they amble along. Sometimes it is possible to look ahead and find a continuation of over-turned items and thus 2 trails at the same time. In brush, the bent leaf, broken twig, or the hair rubbed off on a bush is a sign of an animal's passage. In wet weather, observe where the water has been knocked from ferns and brush.

If you are in doubt of which animal you are tracking, its approximate size can be judged by the height and width of any disturbed areas. The nature of the animal might be determined by whether it passes over or under an obstruction in the trail, such as a small log, or by the length of his jump. Some animals eat grass or leaves as they walk. OBSERVE.

You will rarely see the front footprint of a predator. As silence is vital, each foot must be placed with care. To do this, animals will put the hind food in the spot which the front foot has just vacated.

To Help You Identify Footprints:

CAT FAMILY: Four toes on each foot, no claws showing.
DOG FAMILY: Four toes on each foot, usually heavy claws showing.
RABBITS & HARES: Two long hind feet pass two short front feet at each stride. The farther they pass, the faster the animal is going.
RACCOON: Five long toes, somewhat resembling a small human hand.
BEAR: Rear foot like wide human footprint, front like human on tiptoe.
OPOSSUM: Front foot like small hand. Rear foot with three fingers together pointing front, one finger extending away from the body, and one thumb-like finger toward the inside of the body. Very unusual track.

WEASEL FAMILY: Includes mink, marten, fisher, ferrets, wolverine, otter, skunk, badger, all members of this family have five toes on each foot but sometimes the print will only show four. Usually claws will show.
SQUIRRELS: Five toes on hind feet, four on front feet.
RATS, MICE, MOLES: Five toes on hind feet, four on front feet.
SHREWS: Five toes on each foot.

ANIMAL TRACKS

Perching Birds

2"

Game Birds

1-1/2" - 2"

Ducks

1-3/4"

Shorebirds

1" - 2"

Blue Heron

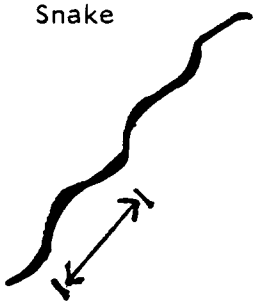
6" - 8"

Frog

2" - 6"

ANIMAL TRACKS (continued)

Snake



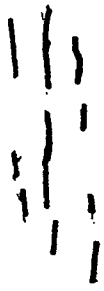
1" - 4"

Beaver

Tail Drag

6-1/2"

Shrew



Running

5"

Rabbit

2-1/2"

Opposum

1-3/4"

Raccoon

4"

Porcupine

Tail Drag

7"

Skunk

4-1/2"

Fox (Dogs)

2"

ANIMAL TRACKS (continued)

Bobcat

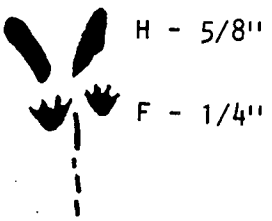
1-3/4" - 2"

Bear

Deer

1-3/4" - 4"

Deer Mouse



Squirrel

3" - 4"

MAKING PLASTER CASTS OF ANIMAL TRACKS

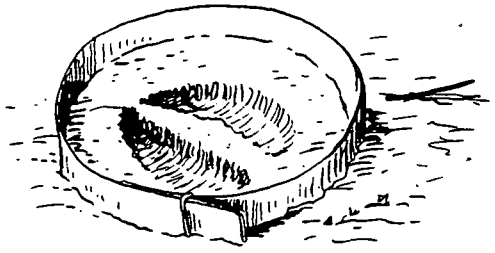
The study of animal tracks is an interesting hobby. Much can be learned about animal habits by carefully examining the various tracks. To the outdoor expert and naturalist, tracks and other signs left by animals are like an open storybook which tells what has been happening in the lives of these wild creatures.

Here is how to preserve good tracks in mud or clay:

1. Clean track of loose particles of soil, twigs, leaves, or other litter.
2. Spray track with shellac or plastic from pressurized can if available.
3. Form 2-inch wide strip of cardboard or tin into a ring surrounding the track. Press firmly into ground to give support, but allow at least 1-inch to form edge of mold for plaster.
4. Mix about 2 cups of plaster of paris in a tin can or plastic bowl, adding water slowly until it is about as thick as heavy cream. Pour carefully into mold until plaster is about to top the mold. Allow plaster to harden at least 15 minutes before lifting it out of the track. If soil is damp, hardening may take longer.
5. When the plaster cast is hardened, lift it out, remove the ring, and clean the cast by scraping with a knife blade and washing.
6. Apply a thin coating of vaseline to the track and surface of the cast. Place on a flat surface and surround casting with a 2-inch strip of cardboard or tin as before.
7. Mix plaster of Paris and pour into mold, making certain that top surface of casting is smooth and level with the mold. If you plan to use the casting as a wall plaque, place a loop of wire in the back of the casting while the plaster is still soft. Allow 2 hours for plaster to harden.
8. Carefully remove mold when plaster is dry. Separate the two layers and wipe excess vaseline from face of cast and track. Scrape any rough edges with a knife blade, or use fine sandpaper to smooth. Wash in running water.
9. When cast is thoroughly dry, paint the inside of track with India ink or black poster paint. Label with name of track. A coat of clear shellac or clear plastic may be applied to protect and preserve the casting.

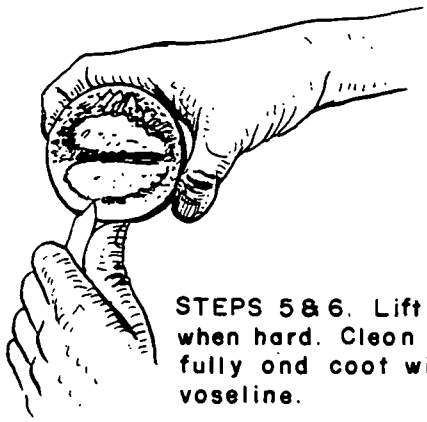
CASTING ANIMAL TRACKS

STEPS 1&2. Cleon trock and spray with shelloc or plostic.

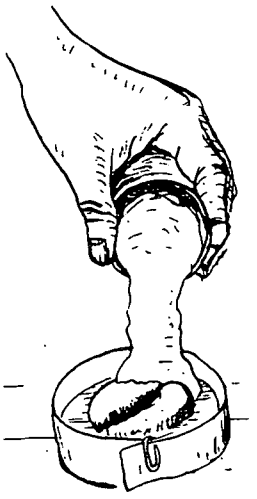


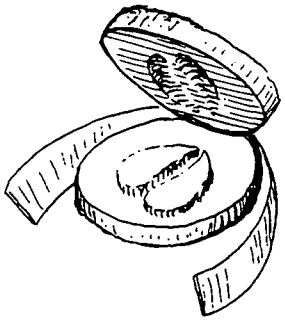
STEP 3. Encircle trock with band of cardboard pressed into soil.

STEP 4. Pour plaster of Paris mixture over trock.



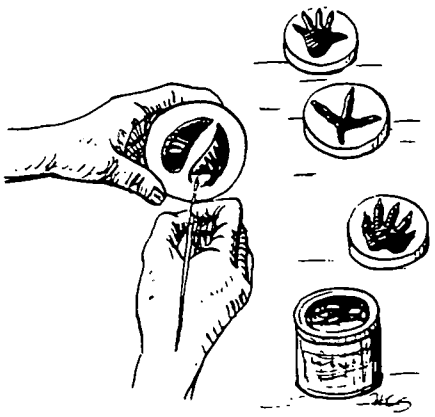
STEPS 5&6. Lift cost when hard. Cleon corefully ond coot with voseline.





STEP 8. Seporate the two loyers of casting. Clean vaseline from trock ond smooth with knife blade.

STEP 7. Surround casting with wide strip and pour plaster level with mold.



STEP 9. When cast is dry paint inside of track with black India ink.

INVESTIGATING BIRDS

Concept: Birds are among the most easily observed wildlife in Oregon. By Observing birds in different seasons, 4-H'ers can gain a greater understanding of where birds live, what they eat, their territory, and their physical adaptations for flight, gathering food, and protecting themselves from natural predators.

Contents:

Color is important. Birds have two kinds of color. Most birds have brown or black pigment, with bright colors formed by light refraction. When the bird exhibits itself, it can be brilliant, but when threatened by danger, it flies into dense shade and becomes a dull-colored bird. WATCH IT HAPPEN. The Stellar's Jay is a good one to watch.

Many birds have a broken pattern of light and dark to blend with the background on which they live. Notice that most birds (and mammals) are lighter colored below than above. Why is this so?

Wings are also adapted to their purpose: large wings, slow beat, for heavy lifting (chicken, grouse); broad wings for soaring (vulture, hawks); short wings for maneuverability (Cooper's Hawk); long narrow wings for speed (falcons, swallows).

Early in the spring, male birds of many species arrive before the females do to find territories and to defend them against other males of the same species. The females then arrive, and housekeeping begins. Each male sings his territory song to notify others of his property rights. A territory can be both horizontal and vertical; one bird having from ground level to six feet high, another from six to 15 feet high, and a third in the treetops. Each respects each other's rights once the territories have been established.

Have 4-H members be <u>alert</u> as to where they are walking when on a nature walk or observation field trip. Careless placement of feet could destory a ground nest.

This is not a complete list of birds in Oregon, but a list of some of the most common birds that you will see. Hopefully you will add more names of birds spotted during your field trips and nature investigations.

NAME OF BIRD	WHERE FOUND	CALL OR SONG
Oregon Junco	conifer & mixed forests	*like a telegraph*
Redwinged Blackbird	anywhere, water edges	*O-ka-lay*
Purple Finch	mixed woods	
Varied Thrush	conifers, dense forests	
Robin	fields, farms, streamsides	*Cheer-upCheerily*
Bewicks Wren	underbrush, mixed woods	*swee-swee-cheeeeee*
Winter Wren	conifer forests	
Red Breasted Nuthatch	conifer forests	*enk-enk-enk-enk-enk*
White Breasted Nuthatch	river woods	*yank-yank-yank-yank*
Common Bushtit	mixed woods	*tsits-tsits-tsits*
Black-capped Chickadee	mixed woods	*chickadee-dee-dee-dee*
Common Crow	woodlands, fields	*Caw-caw-caw*
Scrub Jay	river woods, brush	*shreek*
Stellar's Jay	conifers	*wek-wek-wek*
Dipper (Water Ouzel)	fast flowing streams	*zeet zeet*
Red Breasted Sapsucker	woods	
Downy Woodpecker	mixed woods	*pick-pick*
Hairy Woodpecker	mixed woods	*peek-peek*
Red Shafted Flicker	open forest river woods	*Klee-oo; Flicka-flicka*
Rufous sided Towhee	edge, brush	*Chweeeeeeeee*
Pine Siskin	conifers, mixed woods	*cheeip, chee-ip*
Sparrows	open, edge, bushes, etc.	
Warblers	deciduous, mixed	
Great Horned Owl	forests, streamside	*hoo-hoo-oo, hoo*
Rufous Hummingbird	open, edge	

IDEA 1: Mapping Bird Movements

Objectives:

After completing this activity, the 4-H member should be able to:

1. Describe one example of a territory, and explain how it is defended.
2. Explain "behavior" in terms of reaction to something in the environment.

Suggested Activities:

1. During the nesting season, select a bird that frequents your area and that has established a favorite singing perch nearby. Mockingbirds are excellent subjects for this study.
2. Attempt to locate the nest.
3. Prepare a map of the immediate and surrounding area, locating every post, bush, and tree.
4. Watch the bird as frequently as possible and indicate on the map the location and behavior. How far from the perch does it fly before returning?
5. Observe the bird's behavior when another bird comes into its area.
6. Observe and mark on the map the feeding area, singing perches, and flight patterns.
7. If possible, find a distinction between "territory" (the area defended) and "home range" (the outer limits of its flights).

Equipment:

Binoculars (optional)
Measuring tape
Paper for mapping

Content:

Mapping - bird movements and determining the coundaries of a territory

Inferring - necessities for life maintenance (i.e., food) are often within the territory. Some go beyond the territory for feeding, but stay within the home range.

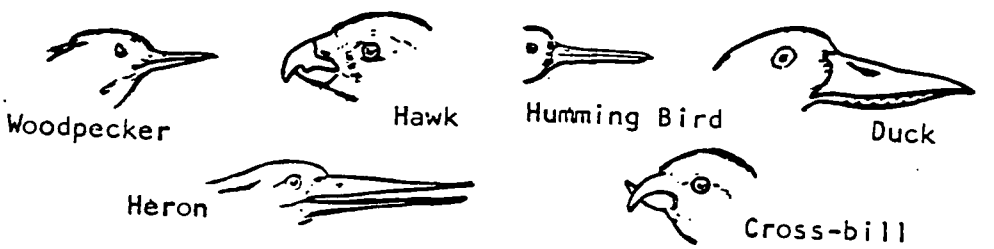
Source: Gross and Railton, Teaching Science in an Outdoor Environment, University of California Press, 1972.

IDEA 2: Bird Beaks

Activity:

Birds have different kinds of beaks. Collect pictures of birds and examine pet birds and notice how their beaks are adapted for getting different kinds of food.

Bird	Kind of Beak	How Used
Woodpecker	Sharp, chesel edged	For cutting holes
Hawk	Sharp, curved	For tearing food
Hummingbird	Long, slender	For sucking nectar from flowers
Duck	Wide, tooth-edged	For sifting food from mud
Heron	Long, sharp	For catching fish
Cross-bill	Like pliers	For opening cones for seeds



IDEA 3: Bird Observation Report

DATE _____

NAME _____

4-H CLUB _____ LEADER _____

NAME OF BIRD _____

SIZE: TINY SPARROW ROBIN CROW LARGER

TYPE OF BEAK _____ TYPE OF FEET _____

COLOR OF HEAD _____ COLOR OF BACK _____

WING _____ TAIL _____ BREAST _____

ACTIONS OBSERVED _____

_____

_____

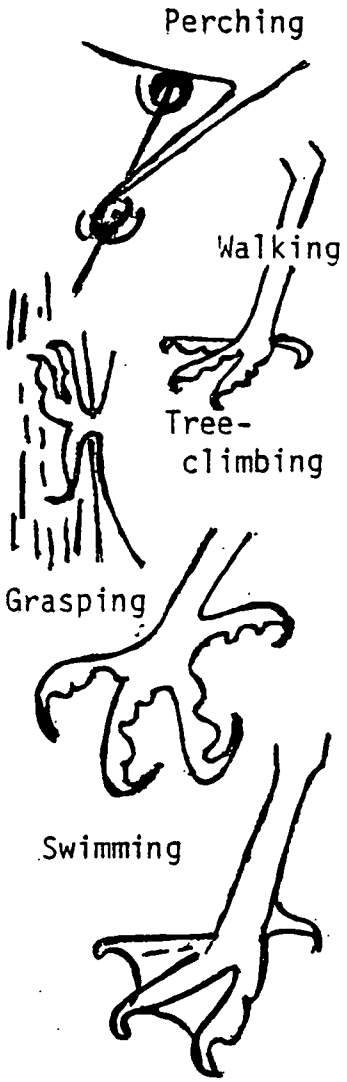
COMMENTS _____

_____

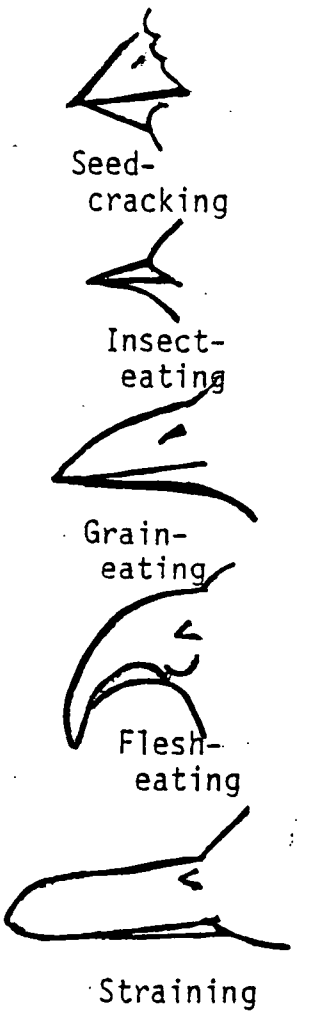
_____

_____

TYPES AND USES OF BIRD'S FEET:



TYPES AND USES OF BIRD'S BEAKS:



DRAW A SKETCH OF THE BIRD YOU ARE OBSERVING HERE

IDEA 4: Feeding Wild Birds

Most important of the three essentials for bird life is food. Water and shelter play a lesser role. Feeding may be of two different kinds -- summer and winter. Correct feeding requires varying diet with the season. Summer feeding is usually unnecessary but will bring more birds to the feeding area for people to enjoy. Winter is the important time for feeding. Begin in early fall to attract and hold birds that would otherwise migrate further south. Once lured from their natural wintering areas, birds concentrate around feeders in larger numbers than the area can naturally support. They are now your dependents. Feeding must continue until spring when natural foods are available again.

Bird Diets

Feeding birds is largely an art which must be learned through experience and observation. On the basis of diet, birds may be roughly separated into seed eaters and insect eaters. This division is not a clean one, for most fit both categories at some time in their life. The use of several different feeders or combination feeders should satisfy requirements of all.

Bird Foods

Suet: Insect eaters like nuthatches and woodpeckers will consume large amounts of suet when insects and larva are not available. Avoid stringy suet. It is hard for birds to eat. Suet may be made available plain or in any large-mesh container. A better way is to grind it, melt in a double boiler, and pour into molds to harden. It is more durable if melted twice before molding into a cake. Small frozen food dishes make good molds. Suet-seed cakes may be made by adding the melted suet to any of the seeds of mixtures listed below. Melted suet or suet-seed mixtures should be placed in suet stick feeders while in a semi-liquid state.

Peanut butter: May be used in place of suet in the manner described above. It is much more expensive, however. Look into obtaining substandard quantities for bird feeding.

Seeds: Even insect eaters consume some seeds, especially in winter. Seeds will attract many different kinds of birds. Grocery, pet, or feed stores will carry the following material for seed feeding:

Sunflower	Millet	Wheat	Rice	Oatmeal
Hempseed	Buckwheat	Cracked corn	Chopped nuts	Popcorn

Dog biscuits, rabbit food, raisins, dried breadcrumbs, and of course, commercial bird seed are also used in mixtures. A good homemade mixture: 3 parts sunflower, 3 parts hempseed, 3 parts millet, and 1 part buckwheat. Several mixtures should be experimented with to determine which is preferred by birds in your area.

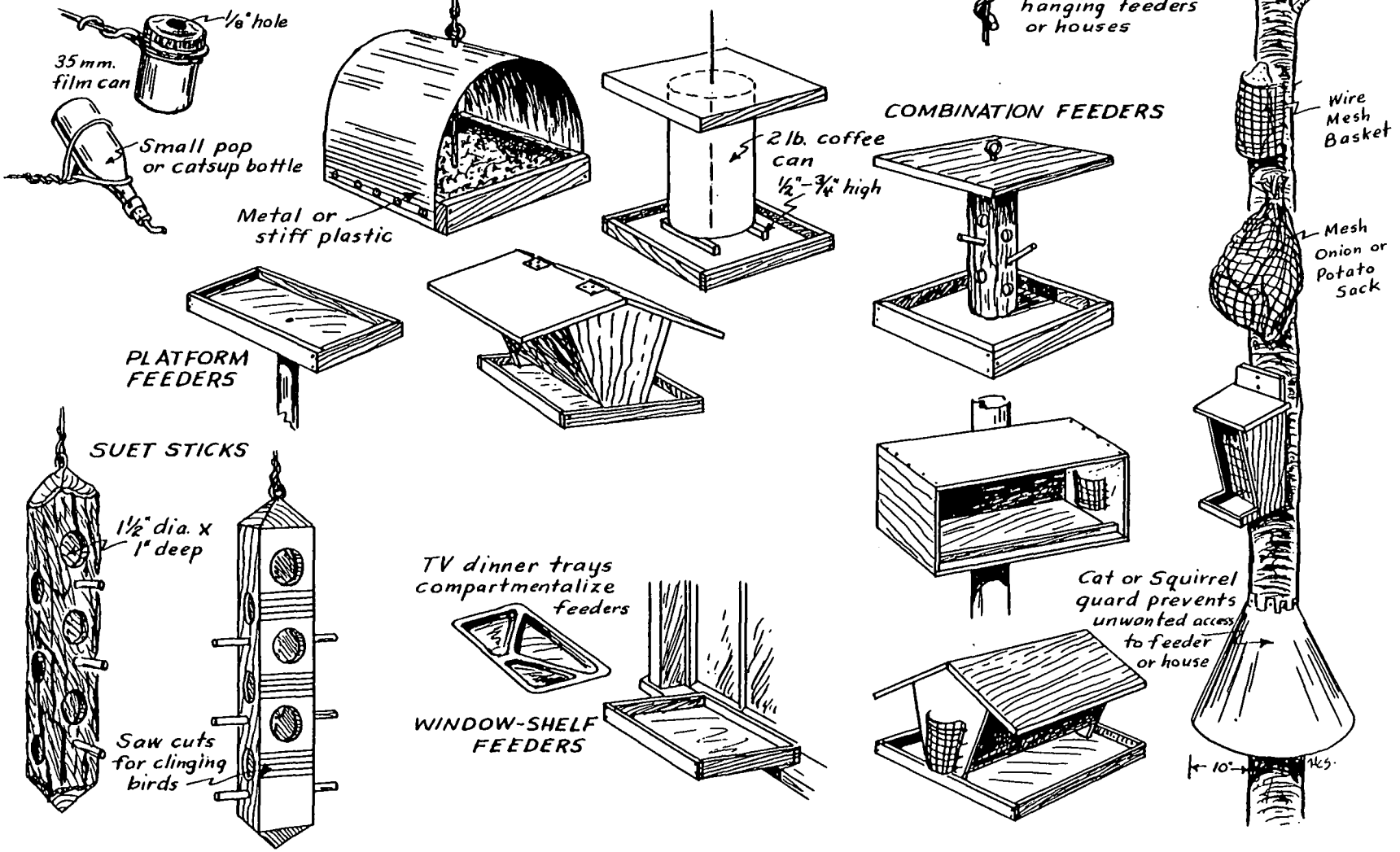
Grit: Sand, very fine gravel, or crushed charcoal should be added in small amounts to suet-seed cakes or seed mixtures to complete the diet.

Hummingbird food: A solution of 1 part sugar or thinned honey to 4 parts water. Red food coloring may be added or the outside of the feeder painted an attractive color.

PLACEMENT OF FEEDERS

Feeders should be placed with protection in mind. Squirrels, cats, or other predators should be unable to gain access to feeding stations. Escape routes to nearby trees or shubbery must be available. These cover plants also provide a place to perch before going to feed. Feeders should be protected from the weather by facing them away from the wind. South or east sides of buildings provide the most sun and warmth. Placement must also consider ease in servicing and refilling. Locations where large drifts form or high ladders are required will likely result in empty and ineffective feeders.

BIRD FEEDERS



ACTIVITY: Feeding Wild Birds

Materials:

Bucket of sand
discarded Christmas tree
food for birds (popped popcorn, seeds, cranberries, peanut butter, raisins)
paper drinking cups
2 wire soap dishes

Directions:

Place the trunk of the Christmas tree in the bucket of sand and put it outdoors. (You may have to bury the bucket in the ground to keep it from tipping over.)

String cranberries, popcorn, and pieces of apple on thread.

Place a mixture of peanut butter and raisins in the paper cups.

Fill the soap dishes with suet and tie them together.

Suspend all the food on the upper branches of the tree out of reach of cats and neighborhood predators.

IDEA 5: BIRD CENSUS

ACTIVITY: Counting Birds

Make a list of the birds seen during the winter months.

Identify them and collect pictures for a display.

Learn all you can about each one.

General characteristics (color, shape, beak, feet)
Where they live
Food they eat

Attract as many as you can by setting out a feeding station and bird baths near a school or your home.

INVESTIGATING FORESTS

Concept: The forest is one of the major components of our Oregon environment. It is important for us to find out how it works and how it affects the rest of the ecosystem.

Content:		Goals:
Idea 1:	Meeting a tree	Using your senses to become familiar with trees.
Idea 2:	Graphing trees	Developing an understanding of how to measure trees in a forest site.
Idea 3:	Tree rings	Using tree rings to infer different conditions that affect tree growth.
Idea 4:	Evaluating tree growth	Observing tree growth characteristics and selecting timber to keep.
Idea 5:	Where trees and plants grow	Observing where different types of trees grow best under certain conditions.
Idea 6:	Describing leaves	Developing descriptive words that will help you learn more about leaves and their characteristics.
Idea 7:	Examining a rotten log	Examining the process of decay in a rotten log and how it interacts with the rest of the forest environment.
Idea 8:	An inventory of plant succession.	Observe and examine the changing conditions of plant communities in a given area.
Idea 9:	Activities and games for identification and uses of trees and shrubs	Learning tree and shrub identification and where to find the specific species.

Note: Other activities related to forestry can be found in the 4-H Forestry Project.

Source: Investigating Your Environment Series, U.S. Forest Service, Portland, Oregon.
Forest Environmental Education Program, Lane E.S.D., Eugene.

IDEA 1: Meeting A Tree

Divide group into teams of two.

Pass out blindfolds (one to a team).

One student will wear the blindfold; the other will be a guide.

Take along a notebook and pencil.

1. Guides take blindfolded partner to a tree.
2. Blindfolded partner must get to know tree by feeling for branches, bumps, holes, vegetation, or whatever.
3. Guide leads partner back to starting place, turns the partner around three times and removes the blindfold.
4. Partner goes to the tree they think they got to know.
5. Repeat for other partner who is now blindfolded and goes through the same procedures.
6. When everyone has a tree, have them observe the tree close-up, writing down all the characteristics that they find out about its leaves, branches, bark, roots, size, condition, color, smell, etc.
7. Have each person view their tree from a distance. Have them record estimated height, estimated age, how it is growing in relation to other trees, etc.
8. Have them write a 5-line poem describing their tree.
9. Report back to the group and have them share their findings with the rest of the group.

IDEA 2: Graphing Trees

Directions:

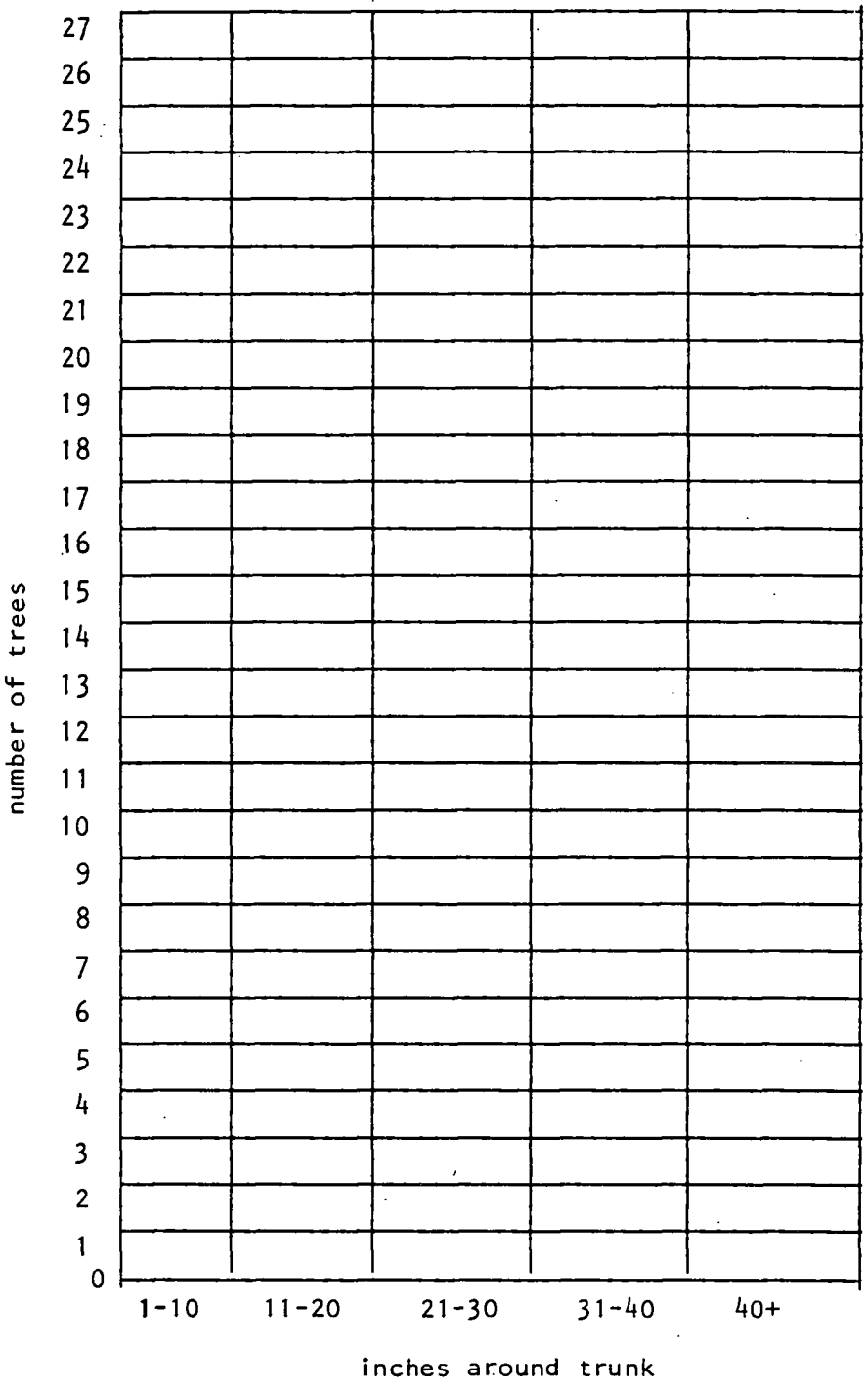
1. You will need a tape measure for every two members.
2. Group your members into teams of two.
3. Pass out the Graphing Trees form.
4. Demonstrate how to measure the tree circumference one foot above the ground. Next show how to record the data on the sheet.
5. Ask the group how they would measure a tree too big for one tape.
6. Select an area and measure as many trees as possible in that area by working in teams.
7. Record data on the Graphing Trees form by placing an "X" in the box representing circumference of each tree measured.
8. Use the Tree Identification Sheet (use different species in Eastern Oregon) and identify four different kinds of trees measured.
9. Identify the largest tree circumference for each species and record it on the Species Sheet.

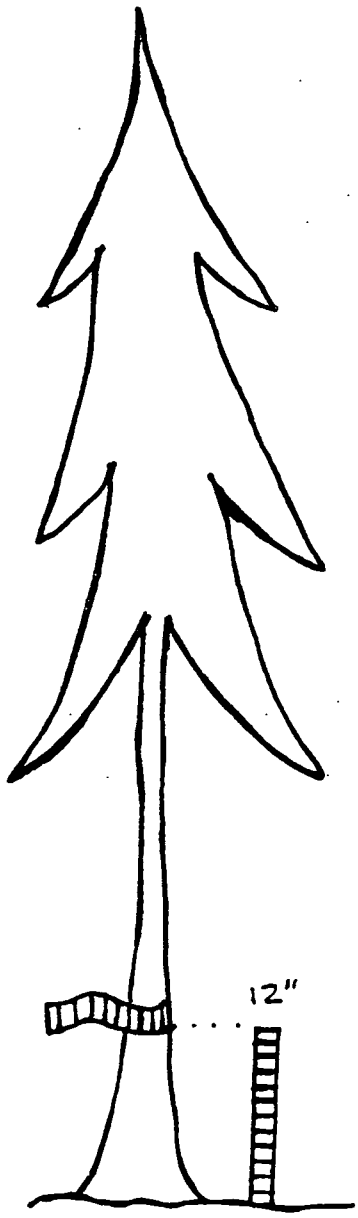
Questions:

1. How many trees are 21 to 30 inches around?
2. The most common-sized tree graphed would be?
3. What was the biggest tree graphed in each of the four dominant species measured?

GRAPHING TREES

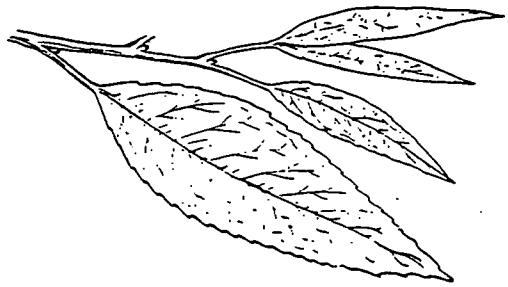
NAME_____



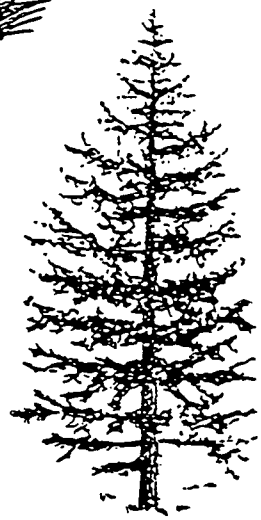


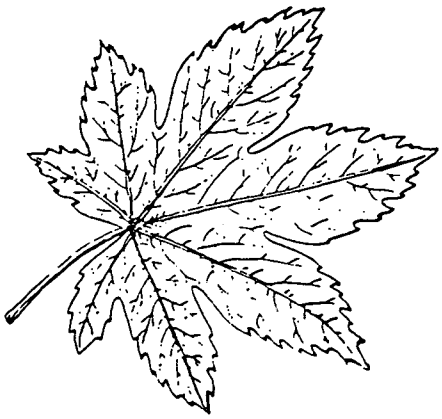
TREE IDENTIFICATION SHEET

Douglas-fir



Willow

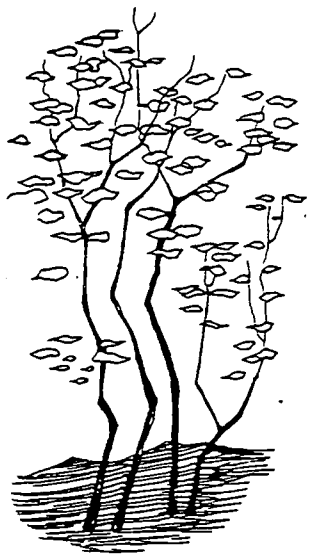


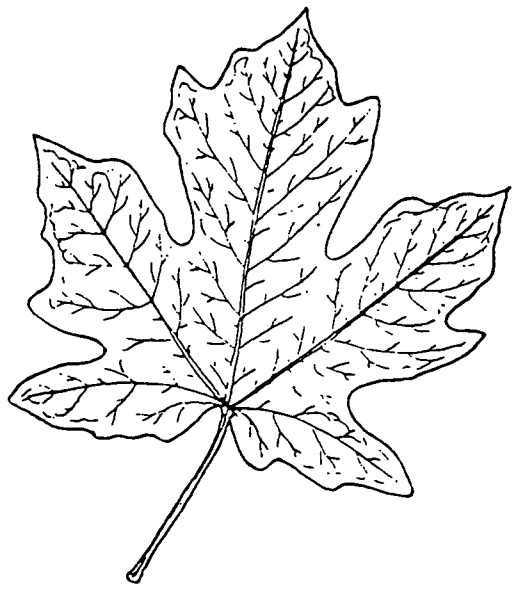


Vine Maple

Most leaves are smaller than your hand

Vine Maple





Bigleaf Maple

- Most Leaves are bigger than your hand

NAME _____

SPECIES SHEET

		Circumference
biggest	_____ (tree name)	_____ (inches)
biggest	_____ (tree name)	_____ (inches)
biggest	_____ (tree name)	_____ (inches)
biggest	_____ (tree name)	_____ (inches)
biggest	_____ (tree name)	_____ (inches)

IDEA 3: Tree Rings

Directions:

1. Cut enough difficult tree cross sections 4" - 6" in diameter for teams of two to examine.
2. Have teams spend a few minutes looking at cross sections.
3. Give them the following task card:

Write down some things you noticed about the cross sections.

OBSERVATION	INFERENCES	INVESTIGATIONS
What you noticed	Possible reasons	How we could find out
1.		
2.		
3.		

What are some of the things you noticed about the cross section?

If there is a question about how tree rings grow, refer to the information below.

Point to 2 or 3 items from the list which deal with growth characteristics and rings. (Varying widths of growth rings, center not in center, etc.)

What are some of the possible reasons for these observations being the way they are?

In general, what could growth rings tell us about a group of trees (e.g., competition, climate, temperature)?

How tree rings grow

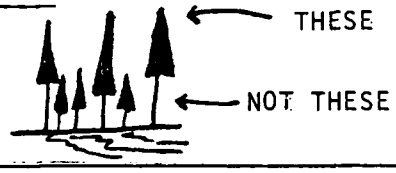
The current year's growth is the ring next to the cambium layer just inside the bark. The rapid spring growth is lighter colored than the growth made in summer, so light and dark colored rings make one year's growth. It is easier to see and count the summer wood or dark rings to determine the age of the tree or log when it was cut.

IDEA 4: Evaluating Tree Growth

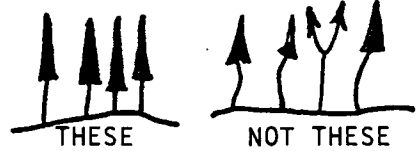
Using the characteristics below look at the trees in a timber stand and mark the trees that you think are the best formed and fastest growing and that should be left standing as the crop trees.

Some Characteristics to Look For in Evaluating Trees in a Coniferous Forest

1. Tallest

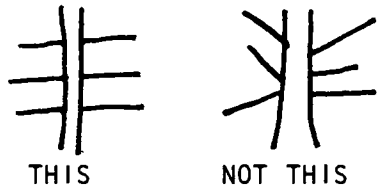


2. Straightest

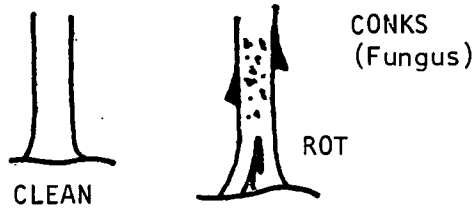


3. Small Rt. Angle

Branches



4. Free of Disease & Insects



5. Healthy Looking Foliage and fast growth.

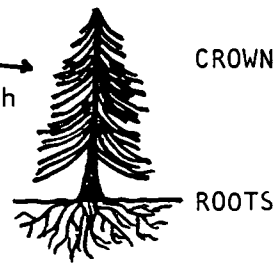
Fast growth is 0-10 growth rings in the last inch of diameter growth.

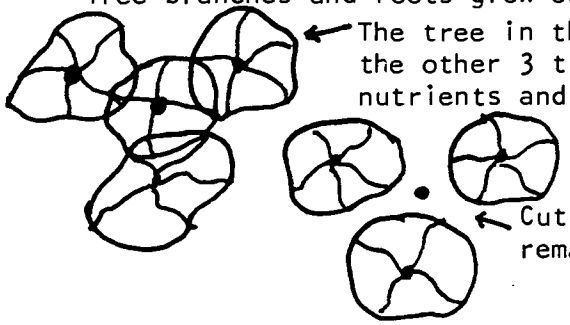
6. No Other Damage

eg: Broken Tops, Frost Seams, Scars, etc.

Competition

Tree branches and roots grow out to the same distance





The tree in the middle is competing with the other 3 trees for soil moisture, nutrients and for sunlight.

Cut the middle tree and the three remaining trees have growing space.

Tree Selection

The trees I selected to keep had the following characteristics:

_____

_____

The trees I selected to remove had the following characteristics:

_____

_____

IDEA 5: Where Trees and Plants Grow

Western Oregon (Use different trees and plants in Eastern Oregon)

Directions:

1. Find three areas to hike through that represent a stream, near a stream, and hill slope.

2. Pass out Record Sheet "Where Trees Grow".

3. Divide group into teams of two. At each area, stop, observe, and have each team determine and record on their record sheets, the quantity of a particular tree species observed using the words "none", "some", or "many".

4. After you have walked through all three areas, discuss the data with such questions as:

   (a) Was there any tree that grew in one place and not another?
   (b) Was there any tree that grew every place?
   (c) Make a mural showing the landscape, slope, density, and distribution of the four trees.

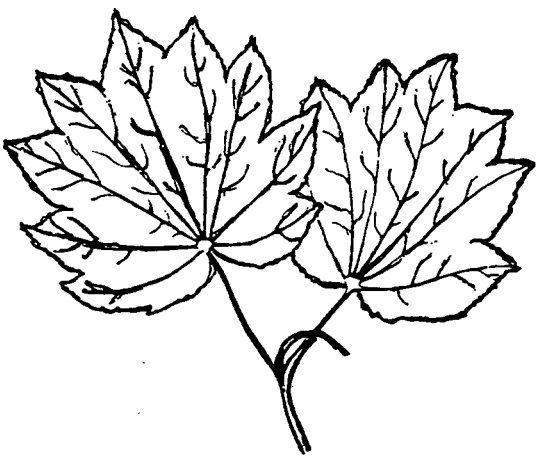
WHERE TREES GROW

RECORD SHEET

	IN STREAM	NEAR STREAM	HILL SIDE
WILLOW Team Names _____ _____			
VINE MAPLE Team Names _____ _____			
ALDER Team Names _____ _____			
DOUGLAS-FIR Team Names _____ _____			

KEY:
NONE 0
SOME 1-10 trees and shrubs
MANY more than 10

WHERE TREES AND PLANTS GROW - PLANT IDENTIFICATION SHEET



VINE MAPLE

WILLOW

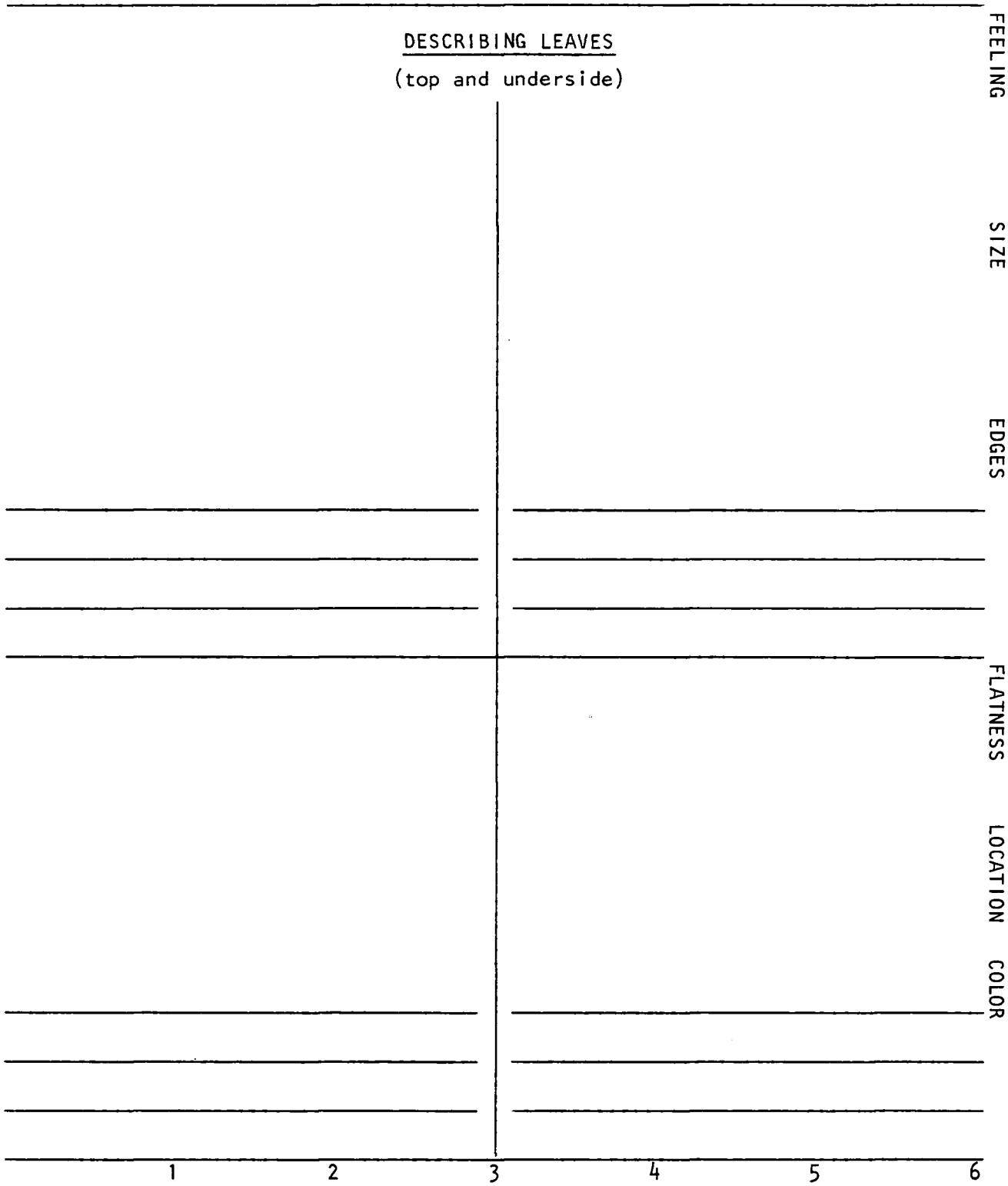
ALDER

DOUGLAS-FIR

IDEA 6: Describing Leaves

Directions:

1. Explain that leaves have different characteristics.
2. Show the members the "Describing Leaves" form.
3. Explain the describing words along the border of the sheet using a leaf to show an example of how this is done.
4. Write in a description of the leaf on the lines at the bottom of one of the four boxes shown on the form.
5. Hand each member a sheet and send them out individually into the area to collect four different leaves.
6. Have them tape the leaves to the sheet and write a description of each leaf.
7. Have a group discussion on specific characteristics of each leaf collected.


DESCRIBING LEAVES
(top and underside)
FEELING
SIZE
EDGES
FLATNESS
LOCATION
COLOR
1
2
3
4
5
6
SCALE IN INCHES

IDEA 7: A Rotten Log

We are part of a living world. Plants and animals are born, grow to maturity, and die. Their place is taken in turn by other plants and animals. As each living thing dies, decays, and returns to the soil, it affects the area around it and changes the conditions that plants need to live. This makes it possible for new plants to grow where they could not before.

As an example, Douglas-fir tree seeds need mineral soil to germinate and grow. When a Douglas-fir tree dies and decays, it covers the forest floor with litter, making it impossible for fir seeds to reach mineral soil. Therefore, the Douglas-fir seeds cannot reproduce themselves in the dense forest.

Shade-tolerant plants, like the western Hemlock, can sprout and grow in shade and on rotten logs and humus. We would expect to find shade-loving plants like the hemlock, western red cedar, red huckleberry, etc., growing where sun-loving plants cannot live and grow.

Many of these shade-tolerant plants grow on rotten logs. They help the log decay back into the soil. Animals find homes in the logs; these supply food for other animals.

Many processes take place in rotten logs. Find a rotten log and record your observations below.

What species of tree did the log come from?

What is its location on the landscape? (aspect, location on slope, etc.)

What is the amount of rainfall per year in this area?

Where is the stump of the tree?

Did the tree die naturally or by other means?

How long has this tree been dead? How old was it when it died?

Is the bark still on it?

Is the inside firm or rotten? Can you push a nail through the wood?

Is the wood dry or moist? How does this help in the decay of the log?

List the animals you see living in or on the log:

Name	Type of home	Food eaten	Enemies

List the plants you see living in or on this log:

Name	Location		Roots growing in		Seed sources	Beneficial or harmful to community. Why?
	Sun-light	shade	Mineral soil	Rotten log		

Develop a classification key for the plants found on or near this log:

Will any of the plants be members of the climax plant community in this area?

What are the climax plants in this plant community?

List ways in which the log is useful to:

Soil _____

Water _____

Plants _____

Animals _____

Humans _____

IDEA 8: An Inventory in Plant Succession

Conditions in a community of plants is always changing, allowing new plants to grow there. Many factors, such as soil temperature, organic matter, shade, and competition permit one group of plants to replace another.

Plant succession is a series of plant communities or stages that replace each other from bare soil to a climax community or the last group of plants that can continually perpetuate its species in its own shade, humus, etc.

Some stages may have sub-stages within them. For example, the trees in the shade-intolerant tree stage might be found in this sequence in forests of Western Oregon and Washington: first, Alder and Maple, followed by Douglas fir, and then by Hemlock, White fir, Spruce, and Western Red Cedar.

EXAMPLES OF PLANT SUCCESSION STAGES ON DRY LAND

1	2	3	4	5	6
Bare Land	Annuals (Flowering Plants)	Grasses	Shrubs (Willow, Shore Pine)	Shade Intolerant Trees-(Alder, Maple Madrone, Douglas-fir, Pine)	Shade Tolerant Trees-(Hemlock White-fir, Spruce, Red Cedar)

EXAMPLES OF PLANT SUCCESSION STAGES IN WET AREAS

1	2	3	4	5	6	7
Submerged Plants (Elodia)	Floating Plants (Water Lillies)	Swamp (Reeds, Cattails)	Meadow Sedge	Brush (Willow, Shore Pine)	Shade Intolerant Trees (Alder, Maple, Madrone, Douglas fir, Pine)	Shade Tolerant Trees-(Hemlock, White Fir, Spruce, Red Cedar)

OUTDOOR INVESTIGATION SKILLS

Looking at Your Area:

List the names of the most abundant plants around you.

_____ _____ _____ _____

List the names of other plants that look like they were here before (look for other plants that seem to have been crowded out or dead and dying from not enough light).

_____ _____ _____ _____

List the names of trees and other plants that seem to be coming in or invading the area (if any).

_____ _____ _____ _____

Based on the diagrams and the trees and other plants you have named, describe the stage (or stages) of plant succession of the area you are in._____

Observe another plant community in your area and record observations about the different stages of plant succession that you notice.

Dry Land or Wet Area

	STAGE	PLANTS	ANIMALS
No. ____	_____ (name)	_____	_____
No. ____	_____	_____	_____
No. ____	_____	_____	_____
No. ____	_____	_____	_____
No. ____	_____	_____	_____

From your observations, describe what changes are taking place in the area.

IDEA 9: Activities and Games for Identification and Uses of Trees and Shrubs

Objectives:

1. Teach youth to identify native trees, shrubs, ferns, and other forest plants.

2. Teach youth uses of trees, shrubs, etc.

3. Teach youth where they might expect to find trees, shrubs, etc., in the forest.

4. Teach youth to become aware of the many different plants it takes to make up a forest environment.

Identification contests:

Start with 10 or 12 specimens of foliage from different trees or forest plants. The leader will correctly identify the specimens and point out identifying characteristics. A little later the same specimens will be shown to the members and they will have a chance to correctly identify the specimens. Since spelling of many of the trees is too difficult for 9 and 10 year olds, you will want to write the names of the specimens on a blackboard or large piece of cardboard for them to see how to spell out the names. Or, perhaps with beginners you may wish to hand out cards with specimen names and have them match the names to the specimen numbers.

Variations of the form of contest would be to use flowers, bark or seed instead of foliage. As your members recognize more and more specimens and become more skilled, you may wish to take a hike and have members identify the specimens as you find them.

If you have members 12 years or older, you may want to teach them how to identify by use of a plant key, as found in many tree and shrub books. If this is the case, you will want to spend considerable time on identification of such things as leaf shapes, types of branching, flowers, seeds, etc. It has been found that most youth can learn to identify most Oregon plants without going into the technical names for shapes, etc., but there definitely is an advantage to knowing these names if you have to depend on a plant key to identify a plant.

Tree Collection:

Your members may want to make a permanent collection of leaves for identification purposes. These exhibits will last many years in good condition if properly prepared, and are a much better aid in identification than looking at pictures in a book.

Games:

1. Give half of your members names of trees. Give the other half important uses of these trees. See how long it takes them to find their partner.

2. Have two members face each other. Pin names of trees on their backs. Turn them loose and let them try to find the name on the back of the other person without giving away their own name.

3. Divide your group into several small groups. Give each group the same list of names of trees that can be found in the area. The winning group will be the one that brings a leaf and properly identifies it from each of the tree names on the list.

4. Nature tic-tac-toe. Make up a display of 9 or 16 leaves arranged in a square. Let your members look at your display for a short time. Then let each member try to duplicate your tic-tac-toe display.

5. Give each member a sheet of paper and a name of a tree. His/her job is to tear the paper to look like a leaf from that tree. After each member has had time to design his leaf, they will be picked up and numbered. Then all members will try to identify all of the leaves.

6. Different corners of the room will be labeled as Eastern Oregon-Western Oregon - statewide, or high mountains - low elevation - dry area - damp area, or coniferous tree-deciduous tree-shrub-herbaceous plant-fern. Each member will be given a name of a tree or plant and he will assemble in the area that nearest fits him.

7. Tree gossip (for beginners). Have members sit in a circle. The leader will whisper a name of a tree in a members's ear, they will pass this on to the next person in a whisper and so on until it goes completely around the circle. It usually doesn't sound anything like the way it did when it started.

8. Indoor hike. The first member will tell where he/she went hiking and the kind of tree they saw. The second member will repeat this and add where they went hiking and the kind of tree they saw. This will continue until the entire group has gone hiking, or when someone fails to repeat what went on before. Example: (1) I went hiking down by the river and saw a red alder; (2) I went hiking down by the river and saw a red alder, then I went hiking on a south slope and saw an Oregon white oak; (3) I went hiking down by the river and saw a red alder, then I went hiking on a south slope and saw an Oregon white oak, then I went hiking in the high mountains and saw a Noble fir; etc.

Source: Ralph Wilkinson, 4-H Leader, Lebanon, Oregon

INVESTIGATING PLANTS AND WILDFLOWERS

Concept: Oregon has an abundant variety of plants and wildflowers growing within the state. An appreciation and understanding of what they are and how they grow can be of benefit to a 4-H'er learning about the outdoors.

Content:

Idea 1 Discovery Hike
Spring Wildflowers

Idea 2 Wilderness Salad

Idea 3 Medicinal Plants

IDEA 1: Discovery Hike - Spring Wildflowers

Objective: To introduce wildflowers to 4-H'ers by observing them in different locations when they come up in the spring.

Number of people involved: Any number

Where this can take place: In the field

DIRECTIONS:

1. Divide club into small groups.
2. Hand out Discovery Hike Worksheet.
3. Have each group find and observe a wildflower.
4. Have group record their observations on the worksheet.
5. Have each group share their findings with the rest.
6. Have general discussion questions for the entire group.

Discovery Hike Worksheet

Look at the leaves:

Color_____

Look at the bottom of the leaf. Is it the same color as the top?
Yes_____No_____

Color of bottom_____

Draw shape of leaf. (Is it round, pointed, thin, heart-shaped, banana-shaped, flat, curled?)

How many parts?_____

Edges of leaf: smooth, jagged, ruffled_____

Veins: thick, thin, many, few_____

Draw your plant showing the stem, blossom, and leaves. (Is the plant big or little, tall or short?)

What would you call this flower?_____

Try to find out the real name of this flower_____

OTHER DISCUSSION QUESTIONS

Why can spring flowers blossom in the woods at this time of year, rather than in the summer or fall?_____

How is the wildflower adapted for survival?_____

What is one great enemy of wildflowers?_____

What wildflowers form a ground cover and help prevent soil erosion?_____

Discovery Hike Worksheet

Find a wildflower in bloom. Look at it closely. DO NOT PICK IT! Think of words that tell:

Color of petals_____

Number of petals_____

Color of center_____

Edges of petals_____
(smooth, rough, etc.)

Number of blossoms_____

Does the blossom have an odor (smell)? Yes or No_____

What does it smell like?_____

Where did you find the wildflower?_____

Look at the stem. Is it

thin or thick

tall or short

smooth or rough

sticky or dry

fuzzy or glossy

Color of stem_____

Are there any holes in the plant:

In the blossom_____

In the stem_____

In the leaves_____

What might have happened to make these holes?_____

IDEA 2: Wilderness Salad

Objective: Obtaining foodstuffs in a wilderness environment.

Number of people involved: Any number.

Where this can take place: In the field: preferably near a natural forest.

Note of Caution: Because of the nature of this activity, it is best if it is undertaken only by a leader or guest leader who has had prior experience in foraging for foodstuffs in the wilderness. The chance of finding and eating a poisionous plant or berry does exist for those who are not completely familiar with this aspect of outdoor investigation.

The best time of year for this project is in the spring or very early summer, while the wild greens are still crisp and tender. Later, many are still edible, but often they require a less-picky palate or some light cooking or steaming. In addition to the "taste-and-experience" objective of this activity, the wild greens may also be combined in real salads for added zestiness and appeal. All of them have food value.

It is very important to stress that some of the flavors and textures of wild foodstuffs will be different than the children are used to. For example, some might be a little tougher than lettuce or tomatoes and will require a little chewing before they can be swallowed. Also, often it is quite proper to eat the blossoms and stems as well as the leaves, as these add not only to the flavor but also to the balance of vitamin content and nutritional value. Another thing you might mention is that the tongue was designed to taste four flavors, not just the usual sweet, sweet/sour, and salt that we are used to. Other very correct and interesting flavor combinations include: sweet/bitter, bitter/salt, salt/sour, and so on. Also, when your nose gets into the act, wild greens may also have slightly earthy overtones, bits of peppery accent, resinous hints, and other subtle flavors we seldom if ever taste in store-bought foodstuffs.

The trick, then, is to approach our first experience with "Wilderness Salad" with an open mind and time to get used to the differences. Take little bites, but not so little that the full flavor is unable to come through. And try not to spit out something that simply tastes different. All of the wild greens mentioned below (as well as a good many others) are fully edible and contain very important vitamins and minerals. Experiment with the new flavors and textures. Experience them for what they are. Is this leaf a little bit gritty? Does this root have a sweet aftertaste when the first little bitterness is over? What do you smell, if anything, when you nibble on this thistle stalk? Does this taste like licorice? Does that taste like celery? Do these

resemble oysters in flavor? What kinds of flavors do you find in those? Thank the plant, once you have tasted it, for giving you a new experience. And if you can't remember its name, then try to remember what it looked like and the new flavors you found. So long as we keep an open mind, wonderful new adventures can be had whenever we sample our "Wilderness Salad."

Here are some of the plants you might like to meet:

Bracken Fern (Pteridium aquilinum): The very young "fiddleheads" that appear in the spring taste a little like mild asparagus. It's all right to eat a few of these raw, to experiment, but if you'd like to eat more, it's best to scrape off the fine brown hairs or soak the leaves overnight in a mild solution of water and wood ashes. Then boil the tender shoots for about four minutes and serve them hot with butter.

Cattail (Typha spp.): Young flowering shoots in the early summer have a texture like celery and a flavor a little like radishes. Later on, in late summer, shake the pollen out of the "heads" and use it like you would hot cereal or coarse flour. The roots develop bulbs in the winter that taste very much like white potatoes.

Watercress (Nasturtium officinale): The leaves and stems of this water plant taste like a cross between alfalfa sprouts and lettuce, and they are very crisp and juicy. But always be sure to gather watercress from moving water. Do not pick it out of stagnant pools or still-water creek pockets, because sometimes in those places it attracks liver flukes.

Oregon Grape (Berberis spp.): The very young, bright green leaves, before they get tough or prickly, are nice to chew. They are high in B vitamins, vitamin A and vitamin C. Young Oregon Grape leaves are crunchy crisp, easy to chew and swallow, and have a pleasant soury taste. The berries, in the fall, make a fine, tart jelly. Indians used to eat the tender leaves to help get rid of acne.

Source: Jorg Bent, Newport, Oregon

IDEA 3: Medicinal Plants

Purpose: To introduce 4-H'ers to healing with nature's medicines.

Where this can take place: Any wilderness setting.

There have been many articles and books written telling about natural herbs and medicines. In truth, there is a natural medicine for every disease known to mankind, though not all of them are known. In your 4-H Outdoors Club you can learn a number of simple remedies that always work, with natural herbs that are available right here in the Pacific Northwest. With a little practice, you could even become a real Medicine Person. But for now, here are a few of the easiest to remember. This is real Medicine, as known and practiced by the American Indians. And it works.

Nettle Stings: If you haven't yet been "kissed" by the Queen Nettle, you don't know what you're missing. Nettles--the stinging kind--grow all over the Pacific Northwest, and chances are good that one day you might bump into one. The "sting" is produced by coming in contact with the fine hairs on the leaves and stems, which carry tiny amounts of formic acid (the same thing that bees have). The funniest thing is that the nettle itself can cure you of its own sting! Look on the plant you "bumped" into until you find some brand-new, bright green, tender leaves. Pick a couple (carefully), crush them, and put the juice of the very young leaf on your sting. The burning and itching should go away very soon. If the plant has no young leaves, try to find some bracken fern "fiddle-heads" to crush and put on the sting. These work very well, too. As a last resort you can also use soft, cool, wet, earthy mud from a creek bank.

Simple Cuts: If your cut is quite small the best quick first aid you can do is put the wound in your mouth and suck or lick it clean. The natural healing enzymes in our own saliva will help heal it quickly and surely, and the bacteria in your mouth are not the kind that will cause infection in a cut. This is a fairly "new" discovery, by the way, and even doctors are beginning to agree with it. If your cut is a little worse than simple you can crush the feathery, aromatic leaf of the common yarrow plant and put it on the wound like a poultice. Yarrow not only helps to stop the bleeding but it's also antiseptic and the juice contains an oil which will reduce pain. For worse cuts, locate some fresh, clean cobwebs in the woods (the ones in your house are likely to contain infection-causing germs) and put these in the wound. They will help stop the bleeding. Then you can put the yarrow poultice over them. Cobwebs will usually stop even fairly serious bleeding, as they act just

like a blood clot. With fairly deep cuts it's a good idea to tie the yarrow poultice in place with strips of clean cloth or other bandages.

Simple Burns: For any kind of mild to moderate first or second-degree burn, cold water is the best immediate first aid. In order for this to be fully effective, however, the burn must be placed in the water immediately after it occurs. That's when healing can be expected. If you wait too long, about the only real benefit water will provide is reduction of pain ... though this, too, is valuable. However, then you will need herbs to help the healing process along. The roots of hound's tongue (Cynoglossum grande) may be crushed and used as a poultice for scalds and burns. You may also boil the flowers of the red penstemon (Figwort) and use the tea to wash burns. This will reduce the pain and promote the growth of the new skin, and may be used to treat third degree burns as well as the less serious kind.

Bee Stings: The simplest natural cure for bee stings is cool, wet, dark mud from your local creek bank. Even damp, dark soil will help. If you happen to stumble across some manroot (big-root chilicote, a member of of the Gourd family) with ripening pods on it, pick one and cut it in half and place that on the sting. The fiery pain will be stopped almost immediately. Also, remember that your own body can make a bee sting worse. Formic acid (the chemical in the bee's stinger) reacts very badly with adrenalin. So if you run around or become afraid the bee sting will become more swollen and painful. If you get stung, as soon as possible sit down and relax. The pain will go away fairly soon even without the mud or manroot. CAUTION: If you are one of those people who are severely allergic to bee stings, don't rely on these natural healers to help you. They may help some, but you better have a regular anti-allergent along or go see a doctor.

Sore Throat: Gargling with salt water is excellent for all kinds of sore throat pain. If your scratchy throat is due to too much yelling, try chewing the root of the licorice fern (try to pick it off maple, birch, hemlock, aspen, apple or cherry trees, as on alder, oak, walnut and some other trees it is quite bitter to taste). Mashing the root of the cow parsnip, steeping it in water, and then gargling with the "tea" is extremely good for sore throat, as is making a poultice of the root and using it applied to the outside of the throat. This is a good remedy if the pain is rather serious, and it will also help to reduce the swelling and inflamation of infected tonsils. Be careful you don't mistake the water hemlock for the cow parsnip. (Caution: the water hemlock is poisonous!) Chewing the root of the false hellebore (Veratrum californicum) is also an effective remedy for sore throat pain.

Headache: You might make a tea out of willow bark for this, as all wild and domesticated willows contain natural acetesalisilic acid (aspirin). You can also collect wild peppermint and mash the leaves, putting the resulting poultice on the forehead, temples, and sinus areas (be careful not to get the juice in your eyes). Drinking a tea made out of wild peppermint, wild sage and camomile will help tension headaches.

Bruises and Sprains: The first thing you might do here is to soak the injured area in water as hot as you can stand. Do this for several hours if the sprain is serious. If you sprain your ankle on a hike, cut a crutch and leave your boot on until you get to camp. This will help support the injury. If you take your boot off, it's not likely you'll be able to get it back on for awhile. After the hot water treatment, cold water can be used to reduce pain and swelling. On bruises, use cold water first. In addition to water, poultices made from cudweed (pearly everlasting), mules ears (Wyethia spp.) and comfrey are good for bruises and sprains.

Poison Oak, Ivy, Sumac: Being plagued by a dose of poison oak can be one of the most unpleasant, painfully bothersome and embarrassing things because every good 4-H outdoorsman should know what poison oak looks like and will stay away from it to begin with. But regardless of caution, you may still get a case of it. One of the best treatments is to wash the affected area in a saturated solution of lime and water (the limestone variety, not the fruit). If you do this within an hour after exposure you probably won't develop a rash at all. But once you've got it, you've got it. There are a few wild plants that will help to relieve the itching and get rid of the rash more quickly. One of these is the flowering tops of the coast tarweed (Media sativa). Crush these and apply them directly to the rash. Also the juice of the western mugwort (Artimisia ludoviciana) will help (this plant also has many other useful medicinal properties), as well as the juice from the berries (mixed with a little water) from the manzanita tree.

There are many other good natural healing herbs that you can find in your own back yard, for all kinds of illnesses or injuries. Maybe a good outdoor project for your club would be to learn as many as you can. Remember, though, there is much to learn. It might take you several years of study and outdoor activity before you start to become a real Medicine Person.

Source: Jorg Bent, Newport, Oregon

INVESTIGATING SOILS

CONCEPT: Soil is a basic component of the environment. All life is dependent upon the productivity of soil in some form or another. Therefore, it is important to understand its capabilities and limitations as much as possible.

CONTENT	GOALS
IDEA 1 - Investigating the Forest Floor	Identify some of the things found on a forest floor.
IDEA 2 - Construct A Soil Micromonolith	Identify and record information about the observable characteristics of a soil profile.
IDEA 3 - Analyze Soil Data	Analyze the soil data recorded on a soil micromonolith.
IDEA 4 - Measure Slope	Measure the slope of the land near the soil profile.
IDEA 5 - Determining Possible Land Uses	Determine the most appropriate land use for the area based upon information collected here.
IDEA 6 - Soil Management in Your Own Community	Now that you have an understanding of soils, apply it to land uses in your own community.

Source: Investigating Your Environment Series, U.S. Forest Service, Portland, OR.

EQUIPMENT NEEDED TO INVESTIGATE SOILS: (for a club of 30 people)

- 6 La Motte soil pH kits
- 30 micromonolith cards
- 6 tape measures
- 30 sets of lab sheets
- 3 sticks (50" or 100" long)
- *100 jelly cups and lids/etc.
- 3 soil thermometers
- 2 #10 cans of water
- 30 hand lenses
- 3 baby food jars, ½ full of water
- 3 staplers
- 2 boxes staples
- 2 shovels
- 3 yardsticks
- Description of soil being studied
- Length of growing season of area
- Samples of sand, silt, clay (optional)
- Plant samples, drawings or guides to use with soil pH-Plant relationship chart (optional)

* other materials such as plastic bags, plastic wrap, pill bottles, etc., have been used satisfactorily.

IDEA 1: Investigating The Forest Floor

Directions: Divide members in groups of three or four. Walk into a forested area. Give the group ten minutes to complete the task card below.

TASK: Work in small groups.

1. Predict what you will find in the top four inches of the area to be studied. List your predictions.

2. Select an area about 2 or 3 feet square on the ground and sift through the top 3 inches, recording the evidence of plants and animals you observe. Replace the ground in as near original condition as possible.

Name or Description of Item in the Soil	Quantity	Possible Effect on Soil

3. The terms: litter, duff, humus, are used to describe organic matter at the top of the soil. From your study above, complete the following chart:

Term and definition	Describe the feeling	List the identifiable parts of plants and animals you found
Litter (identifiable dead things on surface)		
Duff (partially decomposed organic matter - compacted)		
Humus (almost completely decomposed non-identifiable organic matter)		

QUESTIONS AND DISCUSSIONS:

1. What are some of the things you found?
2. Did you find more or less animals than you thought you might?
3. Under what conditions would you expect to find a different amount or types of animals?
4. What are some ways in which these things affect soil?
5. Make sure each member understands what liffer, duff, and humus is.

DEVELOPING THE SKILLS TO COLLECT SOIL DATA

****
Note to Leader: You will need to have a soil pit or bank already exposed to show at least 3 major layers (if possible) or horizons. You should have pH kits, shovels, measuring tapes, thermometer, micromonolith cards, jelly cups, lids, stapler, extra staples, can of water, and towel on hand. (Some of these materials could be borrowed from your local Soil Conservation Service office.)
****

QUESTIONS AND DISCUSSION:

1. "Now that we've looked at the top of the soil, let's look at a cross-section or profile of what's underneath."

2. "What things do you notice as you look at this profile?"

3. "What are some things that might be important to find out about soil in order to determine its use?"

4. "The various characteristics of soil that you have mentioned such as color, texture, structure, temperature, and the acidity and alkalinity (pH) affect the way land can be used. Knowledge of these conditions is essential to land use planning whether in a forest or in your backyard. We are going to collect, record, and analyze some information about those soil characteristics."

5. Pass out TASK Card: Constructing a Soil Micromonolith. "This task is designed to record your observations for the 7 items listed under the words topsoil. You will need to collect the same information for each of the major layers your group identifies in the profile. What are the 7 items we will be collecting information about?"

IDEA 2: Constructing A Soil Micromonolith

Refer to TASK Card. (45 - 60 Minutes).

"Now work in groups of 3-4, collect and record the information on the TASK Card. Use the equipment in the box. Your first job is to determine how many layers there are."

Here are some ways to collect information about different soil characteristics.

1. soil layers (horizons)
   Mark where the soil changes and general appearance. Many soils have 3 major layers of horizons; i.e., top soil, subsoil, and parent material. Because soil formation has many variables, you may find more or fewer layers.

2. color
   Describe the color of each major layer, using your own descriptive terms. Moisten soil to get a more accurate color description.

3. texture (how the soil feels)
   Determine the texture of each major layer. Texture is determined by feel. Rub a moistened sample of soil between thumb and forefinger. Spit on sample to moisten, if water is not available.

   If it feels very gritty and not plastic----------sandy
   If it feels smooth and slick, or somewhat gritty and sticky----loamy
   (Loamy is a combination of sand, silt, and clay particles.)
   If it feels smooth, plastic, very sticky----------clayey

4. structure (how the soil is put together in geometric shapes)
   Determine the structure of each major layer.
   Carefully break apart a shovelful of soil from each layer and match its characteristics with one of these structure words: blocky, platy, columnar, granular.

5. temperature
   Determine the temperature of each layer. Use the soil thermometer.

6. pH (acidity or alkalinity)
   Determine the pH of each major layer. Soil pH is an indication of how well certain plants can grow in the soil.

   Put a small sample of the soil to be tested in a porcelain dish. Do not touch the sample. Use just enough pH reagent to saturate the soil sample. Match the color of the pH reagent at the edge of the soil sample with the pH color chart.

   Each person should construct a soil micromonolith. (TASK Card.) A micromonolith is a small model of a soil profile in which samples of each soil layer are attached to a card or sheet of paper.

TASK CARD - CONSTRUCTING A SOIL MICROMONOLITH

Work in small groups or by yourself.

Using the information presented and the available equipment, record your observations below. Make a micromonolith using the materials provided.

Sketch your soil profile, label the layers or horizons, and record the data.

DATA

PROFILE SKETCH

Air temperatures
3' above surface _____ Just along surface _____
Contents of layers above topsoil (if existing):
Litter - _____
Duff - _____
Humus - _____
Total depth of layer above topsoil _____

Topsoil (A Horizon)
Depth _____" to _____", Color_____
Texture: Sandy_____, Loamy_____, Clayey _____
Structure: Columns_____, Blocky _____,
Platy _____, Granules _____.
pH _____, Temperature _____
Plant Roots Visible

Subsoil (B Horizon)
Depth _____" to _____", Color_____
Texture: Sandy _____, Loamy _____, Clayey _____
Structure: Columns _____, Blocky _____,
Platy _____, Granules _____.
pH _____, Temperature _____
Plant Roots Visible

Bedrock (C Horizon)
Depth _____" to _____", Color _____
Texture: Sandy _____, Loamy _____, Clayey _____
Structure: Columns_____, Blocky _____,
Platy _____, Granules _____.
pH _____, Temperature _____
Plant Roots Visible
Describe type of rock in the bedrock (if present).

_____

_____

Things to look for in soil:

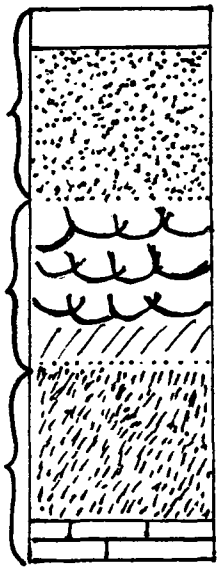
1. Color - tells about organic matter, drainage, biotic activity, fertility.
2. Texture - the feel--sandy, silt, clay--tells water holding capacity; looseness, workability of the soil.
3. Structure - the shape--blocky, platy, granular--tells of drainage, aeration, water intake.
4. Depth - the size of the storage bin -- moisture: availability of minerals for plants.
5. Reaction pH - the suitability of plant growth, the amount of acid or alkalinity in the soil.

The general soil profile below is how you might find some of the different layers:

A horizon

B horizon

C horizon



Surface - Dark gray colored - high organic matter, high biotic activity, abundant roots, commonly leached.

Subsurface - Moderately dark - many roots, moderate organic matter, commonly leached.

Subsoil - Below plow depth - brown or reddish brown, fewer roots.

Lower subsoil - More yellowish and less clay - fewer roots than subsoil, less aeration than above.

Parent material - Unconsolidated - slightly weathered rocky mass from which soil develops. No biotic activity, few roots.

Bedrock - Consolidated rock.

IDEA 3: Analyzing Soil Data

Note: It may be important to have local plant identification books - picture keys, etc. to use by participants in interpreting the soil pH - plant species tables in this task - Analyzing Soil Data.

QUESTIONS AND DISCUSSION:

1. "What are the 7 soil characteristics that you just collected information about?"

2. Pass out TASK Card - Analyzing Soil Data.

   "Now that you have constructed a soil micromonolith, the next task in determining the possible uses of this land is to analyze each of the soil characteristics on the micromonolith. There are seven sentences or questions to finish. Use the data you recorded and the tables on the back of the TASK Card. Remember to analyze each item independent of other items. For example, what was the total depth of the soil you measured? Now look at table #1 that deals with soil depth. Based on the soil depth that you measured, and the table, how would you complete the first sentence of the TASK?"

SOIL DATA TABLES

1. RELATIONSHIPS OF SOIL DEPTH TO PLANT GROWTH AND WATER STORAGE

Soil Depth	Water Storage
Deep Soil (over 42")	Excellent water storage and plant growth
Med. Deep Soil (20"-42")	Good water storage and plant growth
Shallow Soil (20" & under)	Poor water storage and plant growth

2. SOME RELATIONSHIPS OF COLOR TO SOIL CONDITIONS

A. Top Soil (A Horizon)

CONDITION	Color		
	dark (dark grey brown to black)	moderately dark (brown to yellow-brown)	light (pale brown to yellow)
Amount of organic material	High	Medium	Low
Erosion factor	High	Medium	Low
Aeration	High	Medium	Low
Available Nitrogen	High	Medium	Low
Fertility	High	Medium	Low

B. Subsurface Soil (B Horizon)

Subsurface soil color	Condition
Dull Grey (if in low rainfall soils 0-20")	Water logged soils, poor condition
Yellow, med-brown, black (if in forest soils)	Well drained soils
Mottled gray (if in humid soils)	Somewhat poorly to poorly drained soils

3. SOME EFFECTS OF TEXTURE ON SOIL CONDITIONS

texture	Water building capacity	looseness of soil
Sandy	Poor	Good
Loamy	Good to Excellent	Good
Clayey	High (Water held too tightly for plant use)	Poor

4. SOME EFFECTS OF STRUCTURE ON SOIL CONDITIONS

Type	Penetration of Water	Drainage	Aeration
Columnar 	Good	Good	Good
Blocky 	Good	Moderate	Moderate
Granular 	Good	Best	Best
Platey 	Moderate	Moderate	Moderate

5. RELATIONSHIP OF SOIL pH TO PLANT SPECIES

3.5	6.5	7	8.5	14
(3.5 to 4.5 is too acid for many plants)	(Most plants do best here)		(8.5 to 14 is too alkaline for most plants)	

Some examples of soil pH plant indicators:

pH 4.0-5.0: rhododendrons, camellias, azaleas, blueberries, some hemlocks, some pines and spruces, western red cedar

pH 5.0-6.0: some pine, firs, holly, daphne, some spruce, oaks, birch, willow, rhododendron

pH 6.0-7.0: maple, mountain ash, pansy, asters, peaches, carrots, lettuce, pines, firs, ash, basswood elm, yellow poplar, alder, western red cedar

pH 7.0-8.0: mock orange, asparagus, sagebrush, red cedar

Note: These relationships may vary slightly in different environments.

6. SOME RELATIONSHIPS OF SOIL TEMPERATURE TO PLANT GROWTH

Soil temperature	Conditions during growing season
Less than 40°F	No growth, soil bacteria and fungi not very active
40°F to 65°F	Some growth
65°F to 70°F	Fastest growth
70°F to 85°F	Some growth
Above 85°F	No growth

TASK CARD - ANALYZING SOIL DATA

Work in small groups or by yourself.

Using the soil data you collected and the information provided in the soil data tables included in this Task, complete the following:

1. Based on soil depth, complete the following (Refer to Table 1):
   The potential of my soil for water storage is _____
   Why? _____

2. Based on color, complete the following (Refer to Table 2):
   a. The topsoil, or A horizon:
      amount of organic material _____
      erosion factor _____
      fertility _____
   b. The drainage in the subsurface soil or B horizon is: _____
      _____

3. Based on the texture, complete the following (Refer to Table 3):

Layer or horizon	Water Holding Capacity	Looseness of soil
Topsoil A		
Topsoil B		

4. Based on the structure, complete the following (Refer to Table 4):

Layer of horizon	Penetration of Water	Drainage	Aeration
Topsoil A			
Topsoil B			

5. Based on the pH ranges, complete the following (Refer to Table 5):

Some plants that could grow here based on the soil pH plant chart	Some plants actually observed growing here

How well did the plants in the study area check out with the pH you measured?

Describe in a short paragraph how you would set up an experiment to collect data and construct your own soil-pH plant chart.

6. Based on the soil temperature complete the statement below (Refer to Table 6) The plants on my soil have _____ growth taking place now. In 3 months I predict that the growth conditions of the soil based on soil temperature will be _____.

   The growing season (frost free days) in this area is about _____ days.

7. Write a soil description about this soil using the *words* from the data you collected and recorded on the soil micromonolith card. Compare this description with the one you wrote at the beginning of the session.

IDEA 4: Measuring The Slope Of The Land

If there is a Soil Conservation Service soil survey report describing local soils available, read its description of the soil just studied. These reports are prepared from the same information we used. The soil scientists approach soil descriptions using the same observable characteristics that we used.

QUESTIONS AND DISCUSSION:

1. "Using the observed color of the top layer and Tables 2A and 2B, what did you say about the erosion factor of your soil?"

2. "Using the structure of your soil and Table 4, what did you say about the drainage of water?"

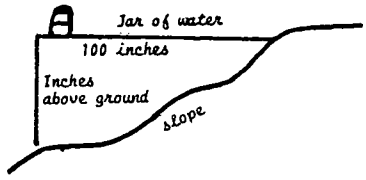
3. "How well did the plants in the study area conform to the soil pH - plant chart?"

4. Have groups read how they would set up their own soil pH - plant chart. Point out that soil scientists determine soil pH and record the plants growing in the area to construct a table or chart for use in interpreting soil pH - plant relationships elsewhere.

5. Ask for people to read their soil descriptions (part 7, of Analyzing Soil Data).

TASK Card - DETERMINING THE SLOPE OF THE LAND

1. Slect a place that represents the average slope of the land being studied or take several measurements and average them.
2. Place one end of a 100" stick on the slope you want to measure. Hold stick so it is about level.
3. Place a level or jar with some liquid in it on the out-right stick. Raise or lower the stick until level.
4. Measure the number of inches the free end of the stick is off the ground.
5. The number of inches is the slope of the land in percent.
6. Repeat the above steps in several different areas to get an average slope of the land being investigated.



Note: If you use a different length stick, then correct by using the conversion table below.

CONVERSION TABLE

Stick Length	Distance the end of the stick is above the ground.		Multiply by conversion factor		Percent of Slope
100"	_____	X	1	=	
50"	_____	X	2	=	
25"	_____	X	4	=	

The average percent of the land measured is _____

DISCUSSION:

1. "In addition to the other data we have collected, measurements of the slope of the land are needed in order to discuss possible uses of the study area. If the slope is varied, measurements from several locations may be needed to obtain a more accurate average."

   Using TASK Card - Determining the Slope of the Land and a 50" stick, tape measure, and level, determine the slope of the land." (10 minutes.)

2. "What was the average slope measurement that the group collected?"

3. "Let's review for a minute. We've identified some of the observable characteristics of the soil layers and determined the average slope of this land. Now we are ready to determine some appropriate uses of this land."

IDEA 5: Determining Possible Land Uses

QUESTIONS AND DISCUSSION:

1. Pass out TASK Card - DETERMINING POSSIBLE LAND USES (20 - 30 minutes).

   "There are different sets of criteria used to evaluate the land for different uses. We are going to evaluate this for 2 main types of use - agriculture and occupancy. Look at the agricultural use tables. Read the directions above the agricultural use chart and determine the best agricultural use by using the soil data, the erosion hazard, soil depth, drainage, texture, and the slope measurement you just gathered. Work in groups of 3 or 4."

2. "When you finish that, then evaluate the land for the 4 occupancy uses.

TASK Card - DETERMINING POSSIBLE LAND USES

Man's great diversity of land uses requires different sets of criteria that analyze a variety of soil and land factors in different ways. These factors must be considered in determining the most appropriate land use for a given area. The most limiting soil factor will be the major influences in determining the best use of the land. See Land Use Data Table for definition of limiting soil factor.

Using the data from the Analyzing Soil Data task, Determining the Slope of the Land, and the Land Use Data Table, answer the following questions:

According to the Land Use Data Tables, this land could be used for:

Agriculture use:
(list and explain why)

Occupancy: Land Uses

Roads and streets

Building sites

Septic tank filter fields

Picnic and camp areas

I feel the best uses of this land would be:

because -

LANO USE OATA TABLES

Agricultural uses

Directions: Circle the item in each of the 5 columns below that best describes each of the 5 soil factors in the soil you studied. The most limiting soil factor will determine the best agricultural use of the land. A limiting soil factor can be defined as something that will restrict the use of land for desired activities. The most limiting factor indicates the most appropriate agricultural use.

SOIL FACTORS					Agricultural Uses
Slope	Erosion hazard of topsoil	Total Soil depth	Drainage	Texture of Topsoil	
0-3	None	Oeep	Well drained	*Loam or silt loam	Farm crops--cultivation good soil mngmt. practices
3-20	Slight to moderate	Mod. deep	Somewhat poorly	Sandy loam or silty clay	Farm crops-few to several special cultivation practices
20-30	Severe	Shallow	Poor	Sandy or clay	Occasional cultivation, many special practices
0-2	None to slight	Deep	Well to poor	Stony (large stones that prevent cultivation)	Pasture-woodland cultivation no machinery can be used
30-90	Very severe	Oeep to shallow	Well to poor	Sandy, Loamy, Clayey or Rocky	Pasture, timber growing, woodland, wildlife, no cultivation machinery
all	None to extreme	Oeep to shallow	Excessive to poor	Rockland, river wash, sand dunes	Wildlife, recreation

* loam is a combination of sand, silt and clay particles.

Occupancy land uses

Select the most limiting factor for each land use and record the overall limitation (slight, moderate or severe).

* Watertable is the place where the soil is saturated and the water can be free standing.

Land uses & factors affecting that use	Slight Limitation	Moderate Limitation	Severe Limitation
Roads and Streets			
Slopes	0-12%	12-30%	Over 30%
Oepth	Over 40"	20-40"	Less than 20"
* Watertable	Over 20"	10-20"	Less than 10"
Building Sites			
Slopes	0-12%	12-20%	Over 20%
Depth	Over 40"	20-40"	Less than 20"
* Watertable	Over 30"	20-30"	Less than 20"
Septic Tank Filter Fields			
Slope	0-7%	7-12%	Over 12%
Oepth	Over 6'	4-6'	Less than 4'
* Watertable depth below trench	Over 4'	2-4'	Less than 2'
Picnic and Camp Areas			
Slope	0-7%	7-15%	Over 15%
Stones	0-20%	20-50%	Over 50%
* Watertable during season of use	Over 30"	20-30"	Less than 20"

IDEA 6: Soil Management In Your Own Community

TASK Card - SOIL MANAGEMENT IN YOUR OWN COMMUNITY

Describe how you feel about the management of the soil environment in your community (good and poor practices).

Describe some practices to improve the management of soil in your community.

Describe one or two things that you can do to improve the management of soil where you live.

List two examples of how you will use the things learned today as a citizen.

List two examples of how you will use the things learned today as an educator.

SOME OBJECTIVES:

As a result of this session, members should be able to:

- Describe three ways in which living organisms contribute to the formation of soil.
- Identify seven physical characteristics of soil, based on skills gained in construction of a micromonolith.
- Analyze the physical characteristics recorded on the micromonolith using the tables on Analyzing Soil Data Task.
- Measure the slope of the land in percent.
- Describe in writing the most appropriate land use for a given area using all the data collected during the session.
- Identify at least two examples of how members can use the things learned in this session as a community service project.

Whenever the member observes land being developed for human occupancy or use, he/she will tend to react by asking questions about the ability and limitation of the soil to be used for that purpose.

INVESTIGATING GEOLOGY

Concept: Oregon is abundant with signs of geological activity. An understanding of the different rock formations and how they developed is an important and exciting aspect of outdoor investigation.

CONTENT	GOALS
IDEA 1 - Meeting a Rock	Remembering characteristics of a rock.
IDEA 2 - Mapping a Rock	Helps member gain a greater awareness of rock size, shape, texture and relationship to things around it.
IDEA 3 - River Rocks	To enable 4-H'ers to discover probable reasons why river rocks are rounded.
IDEA 4 - What Causes Land Forms? Where Do Rocks Come From?	Activities to gain an understanding of rock characteristics and how land forms develop.
IDEA 5 - Major Types of Volcanos	Comparing three major volcano types.
IDEA 6 - Friction Causes Heat	Understand how the shifting of earth to crust causes rock to melt and leads to volcano activity.
IDEA 7 - Pressure Needs Relief	To better understand how volcanic vents form.
IDEA 8 - Simulated Volcanic Eruption	To understand how a volcano erupts.
IDEA 9 - Spell or Tell	Understanding geological terms
IDEA 10 -Ideas on Field Trips	

IDEA 1: Meeting a Rock

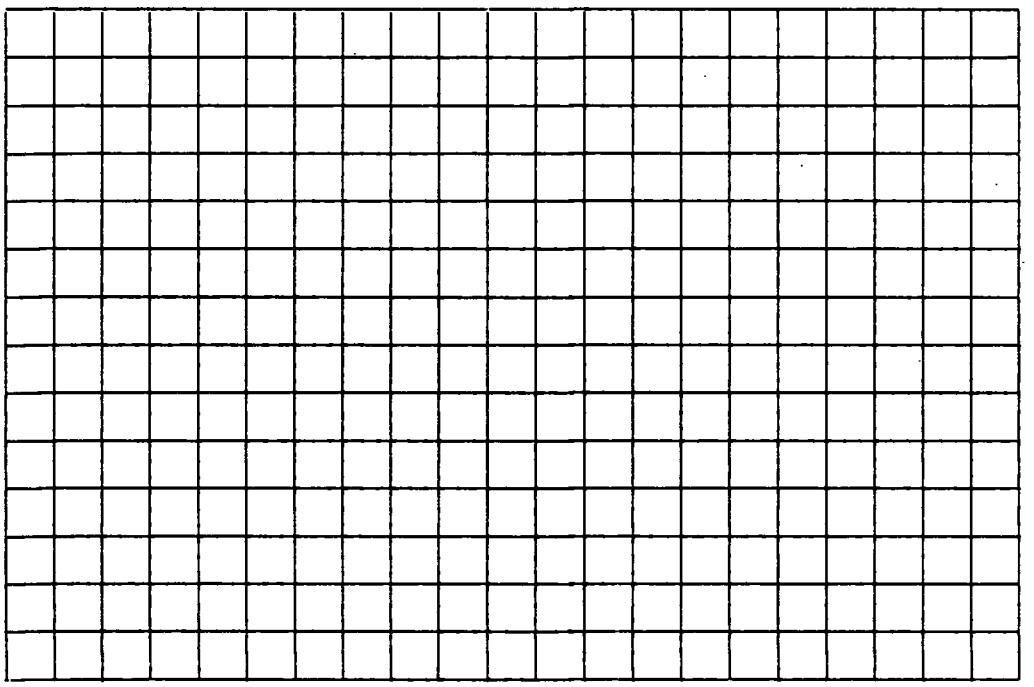
DIRECTIONS:

1. Have 4-H'ers sit in a circle.
2. Make sure that you are a part of the circle.
3. Explain that you are going to try to pick one particular stone out of a group of stones.
4. Pass out one stone to each 4-H'er.
5. Have 4-H'ers look at their stones, noticing any peculiarities which would help them identify stones out of a group.
6. Place all of the stones in the center of the circle when they think they can identify their stones.
7. Have members shut their eyes.
8. You mix the stones in the pile.
9. Have members open their eyes and choose their own stone.

Source: Lane County E.S.D. Environmental Education, Eugene, OR

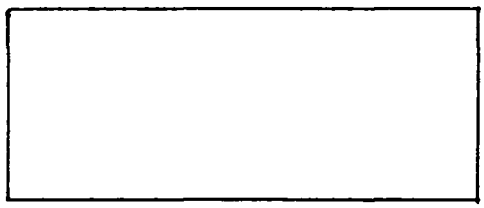
IDEA 2: Mapping a Rock

1. Choose a large rock and use the grid page below to draw a sketch of your rock. Don't forget to make a scale. Color in your sketch with colored pencils.



2. Sketch in these boxes, if possible, the different plant life on your rock.

a



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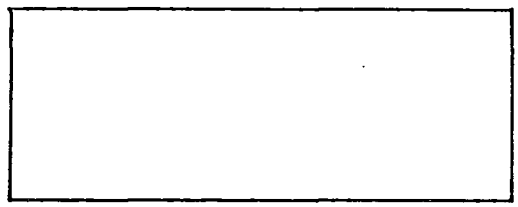

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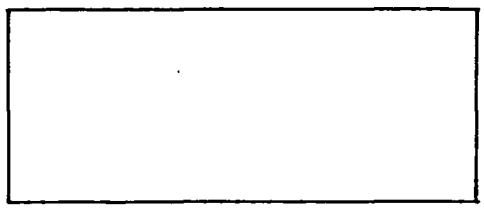

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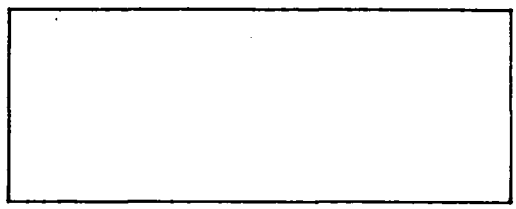


3. Gather this data:

a. Soil pH _____ (on rock) _____ (around rock)

b. Is there a side of the rock with more plant growth? _____
If so, which side? _____

c. Which side of the rock has the most moisture? _____

d. If possible lift the rock and look under it. Describe what you observe: _____

_____

_____

_____

_____

4. Check with others as to the side of the rock with the most plant growth. What conclusions can you draw?

5. Check with others about the side of the rock with the most moisture. What conclusions can you draw?

6. Check with others about the type of plant life they found on their rock. What conclusions can you draw?

7. Was there anything you found on or near your rock that you did not like there?

Explain what it was and why you did not like it.

8. Take another person's sketch from your group and see if you can find their rock:

_____I could

_____I could not

9. Why did you pick this rock?

IDEA 3: River Rocks

Purpose: To enable youngsters to discover probable reasons why river rocks are rounded.

Number of Members: Unlimited

Location: Any river

Directions:

- As part of a field trip to a river, discuss rocks found in the river or along its edges.
- Why are these rocks rounded, while rocks found elsewhere may be sharp?
- Why does this site have smooth rocks?
- How does rushing water help?
- How does sandy bottom help?
- How do other rocks help?

Source: Louella Small, 4-H Leader, Portland, OR

IDEA 4: What Causes Land Forms? Where Do Rocks Come From?

Purpose: To gain an understanding of rock characteristics and how land forms develop.

Suggested Activities:

1. Climb to a point where your club can see surrounding hills and valley. Have group describe what they see -- flat, sloping, etc. Categorize hills, valleys, delta, creek, etc. Develop questions which might lead to a hypothesis on how these were formed.

2. Visit a quarry, gravel company, creek bed or gravel parking lot. Have group find rocks of different colors, textures, rocks that sparkle, etc. Sort into groups as they seem to you to belong. Look for fossils. Are there rocks that can be used to write with? Scratch glass? Can they be scratched with a knife? Do they feel sandy, smooth, or have sharp edges? Find out if all rocks of the same size weigh the same. How do members think the rocks got where they found them? Have they always been the same size? Find a rock that is changing into clay or sand. What else will mix with it to become soil?

3. Ask a geologist where to find a fault line. Look for evidence of movement of the earth. Is the rock the same on both sides of the fault?

4. Locate a fresh road cut (where a hill has been cut away). Have the group look for the different kinds of rock visible. Look at the cut from a distance. Are the lines (strata) level with the surface of the area around you? Explain.

Equipment Needed:

Knife
Hammer or chisel
Pencil and paper
Geological survey map

What You Will Be Teaching Here:

Land forms, rocks and other earth phenomenon can be grouped according to similarities and differences. Different kinds of rocks have different properties and can be grouped accordingly. The land is shaped in various forms, hills valleys, plains, mountains, canyons, bluffs, buttes, etc. The forms are the result of forces acting on and within the earth.

IDEA 5: Major Types of Volcanoes

Purpose: To compare the three main volcano types.

Directions:

In preparation, leader should have collected pictures of various volcanic mountains and have done some research into the differences of the three main types.

- Lava domes or shield volcanoes form quietly as magma oozes its way to the surface through a crack in the earth, then hardens. Example: Hawaiian Islands.

- Composite or strato volcanoes are most common. They build up with alternate layers of lava, cinders and ash, and are explosive. Cinders, ash, lava flows are usual with composite volcanoes, such as Mt. St. Helens. Composites may have been lava domes or shield volcanoes in the past.

- Cinder cones, an explosive volcano formed when a vent erupts gas in molten rock violently, are the smallest type. The cone is made up mostly of ejected material, and since it is a vent it might be on the side of a larger volcano.

Members could compare the pictures and try to categorize them.

Three groups could be formed to do their own research; in this case, the leader would have to select books or other publications that would help in their search.

Members could compile a group (or individual) scrapbook of volcanic information.

Source: Louella Small, 4-H Leader, Portland, OR

IDEA 6: Friction Causes Heat

Purpose: To more easily understand how the shifting of the earth's crust causes rock to melt and lead to volcanic activity.

Directions:

- Explain that as things rub against each other, friction is caused and how this relates to underground movement of tight-fitting, large slabs of rock.
- Instruct members to rub the palms of their hands together, tightly, and feel the results.

Source: Louella Small, 4-H Leader, Portland, OR.

IDEA 7: Pressure Needs Relief

Purpose: To better understand how volcanic vents form.

Directions:

- Leader prepearation may be difficult, but search out any small container, which when pressed sufficiently will spurt out its contents. (The old metal toothpaste tubes were ideal!)

- Explain what vents are and how they form underneath the volcano or underground when something has enough pressure on it that it finds the weakest spot and spurts through.

- Lay the (toothpaste tube) on a table and press on it from two points until the (toothpaste) oozes or spurts out.

Equipment:

Some product that will spurt out of its container if pressure is exerted on it (as the old metal toothpaste tubes). You'll want to choose something that won't cause problems to the table when it breaks through.

Source: Louella Small, 4-H Leader, Portland, OR

IDEA 8: Simulated Volcanic Eruption

Purpose: To gain the "feel" of a volcanic eruption visually, or to communicate how a volcano erupts.

Number of Members: 2 (plus an unlimited audience)

Location: Preferably indoors, where the audience can be at least a meter's distance from the presenters, who need a table and control of the room's lighting.

Directions:

1. Build the volcano of papier mache* around a small metal juice can which has been half-filled with plaster of Paris. (Leave about a 2" opening.)

2. Paint the cinder cone with tempera.
3. Place 1-2 T. ammonium dichromate chemical into can.
4. Place a lighted match into the chemical. For maximum effect, have one person turn out lights while another carefully does the lighting.
5. Listen to the eruption.
   Smell it's gases.
   See the "lava" spit and flow.
6. Turn on the lights and examine the flow results.
   Discuss and compare the demonstration to "the real thing."

Rewards and Recognition:

There is a great enthusiasm (and therefore, learning) experienced with this project. Once seen, "everyone" wants to make one or to try the simulation. If accompanied by a poster by which the presenter can indicate on a cut-away view what is inside a volcano, understanding is improved and it is not just a showy activity. This is a very effective, attention-keeping presentation for Parents' Night, County Fair, etc.

Equipment:

Newspaper, wheat paste (for papier mache*), board (to build volcano on), tempera paint--brown and orange seem desirable, but brown alone is OK, ammonium dichromate (available from OMSI and other chemical suppliers at a cost of about $5 a cup), metal juice can, match.

Source: Louella Small, 4-H Leader, Portland, OR.

IDEA 9: Spell Or Tell

Purpose: To have fun while building vocabulary of geological terms.

Directions:

- In preparation, be familiar through discussion of meanings of the vocabulary term to use (i.e.; canyon, valley, rock, mineral, clay, soil, sand, lava, element, compound, igneous, sedimentary, metamorphic rock). These terms should be familiar in writing, too. Write several of these words on small slips of paper and put them into a container.

- Form two teams, each with a captain whose job it is to give the team answer in a challenge situation.

- Player 1 selects any term and has his/her choice of either spelling or defining it. If done correctly, Team 1 gets a point. Team 2 may challenge the answer for the point, if the answer is incorrect.

- Team 2 now does the unchosen task (i.e., if Team 1 spelled, Team 2 defines the term). If done correctly, score a point. Team 1 may challenge for the point if the answer is incorrect.

- Play continues with Team 2 getting the choice (spell or tell) and Team 1 doing the unchosen (tell or spell).

- Repeat until all terms are used. Winning team has the most points.

Rewards and Recognition:

It may become quickly obvious which members have learned their terms and which members are the better natural spellers. The leader may have to exercise some controls after the group becomes very familiar with the game and/or the terms.

Equipment: None is needed.

Variations:

1. Use names of specific rocks or minerals to spell; tell identifying characteristics.

2. Have samples of easily identified rocks/minerals. Instead of selecting a term, the player selects a sample and names it. The other team gives an identifying characteristic.

Source: Louella Small, 4-H Leader, Portland, OR

IDEA 10: Ideas On Field Trips

1. A rock show or lapidary shop
   (make preparations with lapidarist for tour)

2. Bagby Hot Springs on the Clackamas River
   (hike to former bath house with log "tubs")

3. Austin Hot Springs on the Clackamas River
   (get your water hot from the pipe, naturally. Bathe in the river water with bubbling hot springs in the river)

4. Arnold Ice Cave and South Ice Cave
   (southeast of Bend just off Highway 97)

5. Surveyors Ice Cave
   (south of Newberry Crater, in same vicinity)

6. Newberry Crater
   (a mountain of obsidian)

7. Lava Lands Visitor Center, just south of Bend
   (fascinating action dioramas of how Oregon was formed by volcanic action. An excellent resource)

8. Lava Butte at Lava Lands Visitor Center
   (drive up and examine a crater, along with all its volcanic attributes. Self-guided walking tour)

9. McKenzie Pass, east of Eugene
   (miles and miles of lava, with the Dee Wright Observatroy pinpointing former volcanic activity; beautiful for photography)

10. Crater Lake
    (with its visitor center)

11. Sea Lion Caves
    (limestone worked by the sea in southern Oregon)

12. Highway cuts
    (see the underground geology, especially layers of sedimentation)

13. John Day Fossil Beds

Source: Louella Small, 4-H Leader, Portland, OR

INVESTIGATING WATER

Concept: Issues concerning water are in the news every day. It may be droughts, floods, or diverting water into another state. It's important, then, to find out about some of the characteristics and properties of water and its management.

CONTENT	GOALS
IDEA 1 - Identify a Watershed	Identify the boundaries of a watershed.
IDEA 2 - Observe, Collect and Identify Aquatic Life	Observe, collect and identify some of the aquatic life in a stream or pond.
IDEA 3 - Predict Water Characteristics	Using tables and charts, predict the area's O_2, temperature, and pH, based on the animal life found.
IDEA 4 - Measuring & Recording Water Characteristics to Test Out Predictions	Test out your predictions using testing equipment.
IDEA 5 - Measure Water Volumes	Determine the amount of water in a stream and in a pond.
IDEA 6 - Human Dependence on Water	Understanding the great dependence we have on the existence of water.
IDEA 7 - Drinking Water	Understanding the role of drinking water in our lives.

Source: Investigating Your Environment Series, U.S. Forest Service, Portland, Oregon.

Equipment Needs - Ideas I through V
(for a group of 30 4-H'ers)

- 4 water testing kits (Hatch Co. or equivalent)
- 4 thermometers
- 4 white dishpans
- 30 sets of lab sheets
- 1 Secchi disk
- 30 jelly cups/baby food jars, etc.
- 30 hand lenses
- 15 Pond Life books (Golden Nature Guides)
- 6-7 aerial photos of area
- 30 watershed maps of the area
- 1 50-foot or 100-foot tape
- 4 screens (optional)
- magic markers
- chart paper

IDEA 1: IDENTIFY A WATERSHED

****
* Note to Leader: You should have topographic maps, aerial photos or good planimetric maps of the watershed in which you will be collecting the water data. *
****

Questions and Discussion:

1. Pass out TASK A (10 minutes) "Working in groups of 3-4 write a description of a watershed. Use the information below for background if needed.

2. Pass out the maps, aerial photos, etc. "Find the location where we will be collecting water information and finish TASK A." Have the participants draw a line around the watershed boundaries. You may need to help them draw the watershed boundaries.

3. "What activities could change the characteristics of the water?"

4. "What would be some reasons for having people look at watershed boundaries on a map before investigating a stream in that watershed?"

5. "We will be spending the rest of the session finding out more about the water here."

What is a Watershed?

"Watershed" is a new term to many people. The increasing use of soil and water conservation measures for watershed protection and flood prevention is bringing the term into more common use. Its definition is almost as simple as the well-known phrase "water runs downhill."

The drainboard that carries rinse water into your kitchen sink can be compared to a watershed.

On the land, water that does not evaporate or soak into the soil usually drains into ditches, streams, marshes, or lakes. The land area from which the water drains to a given point is a watershed.

When you were a small child you probably had a favorite mud puddle in which you liked to play. The part of the yard from which the water drained into the pubddle was its watershed.

Possibly a small stream ran by your house. It may have been dry most of the year or it may have flowed continuously. Water from a few acres drained into that little stream. Those few acres were its watershed. This small stream and others like it ran into a larger one. The land areas drained by the small streams made up the watershed of the larger stream into which they flowed.

Small watersheds make up the larger ones. The Mississippi River, for example, drains a watershed of about 1,243,000 square miles.

TASK A. Work in small groups.

Describe what you think a watershed is. _____

_____

_____

_____

Find your location on this creek (pond, lake) on the map.
Where does the water come from? _____
Where does it go? _____
Draw lines around the boundaries of our watershed. We're in the _____ watershed.

What activities in this watershed might change the characteristics of this water?

Activity	Ways the activity might change the characteristics of the water

IDEA 2: Observe, Collect, Identify Aquatic Life

Distribute TASK B

As you approach the water, record your observations on TASK B. (10 minutes)

Questions and Discussion:

1. "What are some things you listed?
2. "In what ways would these things affect the environment?"

TASK B: Work by yourself or in small groups.

As you approach the water, observe and record your observations.

plants _____

animals _____

air _____

rocks _____

water _____

other _____

Questions and Discussion:

1. "What kind of life would you expect to find in this water?"

2. "Where would you expect to find animals in this water environment?"

3. "What are some guidelines that we need to consider in collecting aquatic life so our investigation will cause the least impact on the environment?"

4. "Using collecting equipment (screens, jelly cups, etc.), collect as many types of aquatic animals as possible. Put them in the white pans for observation by the group. (Keep the pans in a cool place.)"

IDENTIFYING AND RECORDING AQUATIC ANIMALS

Questions and Discussion:

1. "Distribute TASK C.

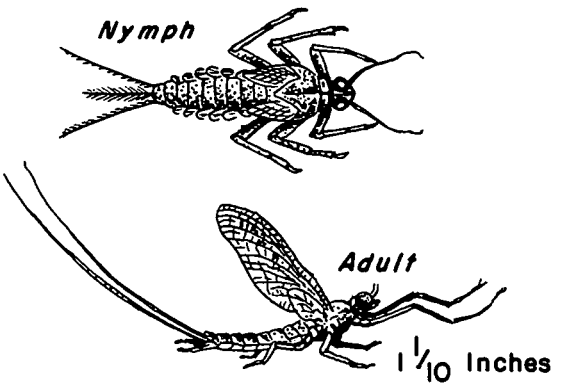
TASK C: Work by yourself or in groups.

Using the "Golden Nature Guide Pond Life" books or similar field manuals or attached picture keys, <u>generally</u> identify the specimens you found.

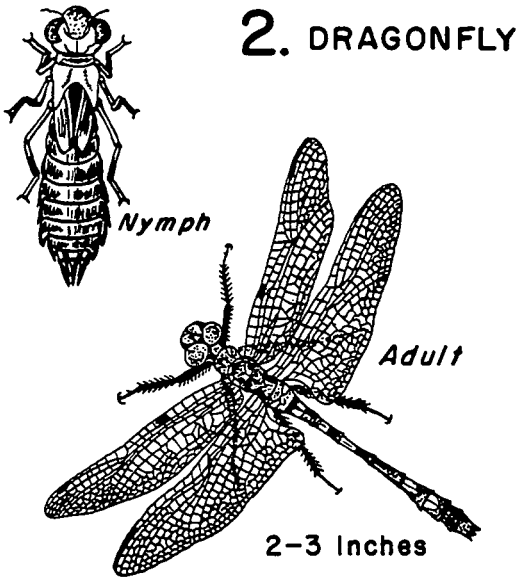
List or sketch the animals you found below. Return animals to water as soon as finished.

Description of where found	Type (name or sketch)	No.	Name

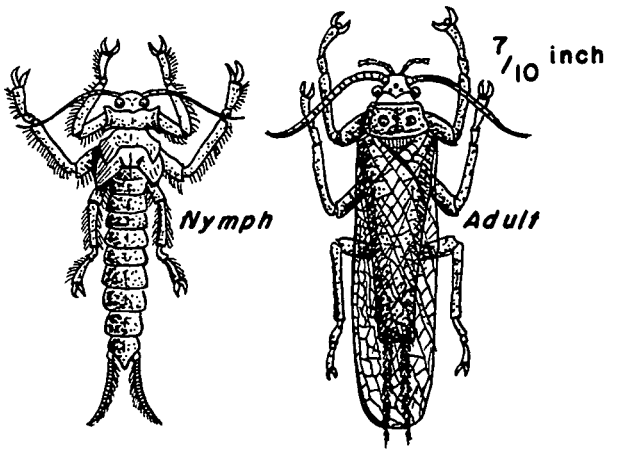
AQUATIC INSECTS



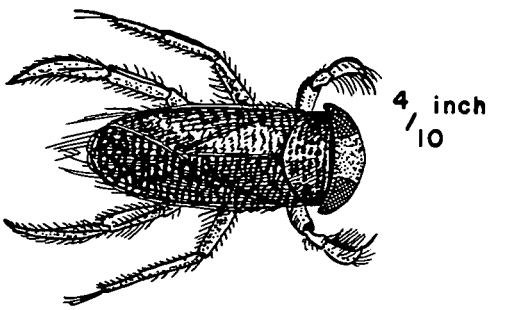
1. MAYFLY



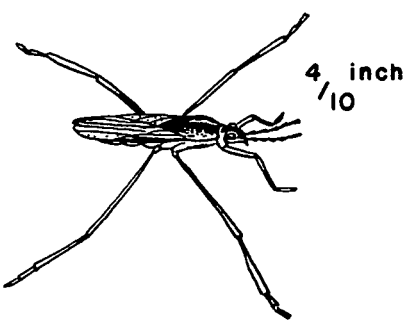
2. DRAGONFLY



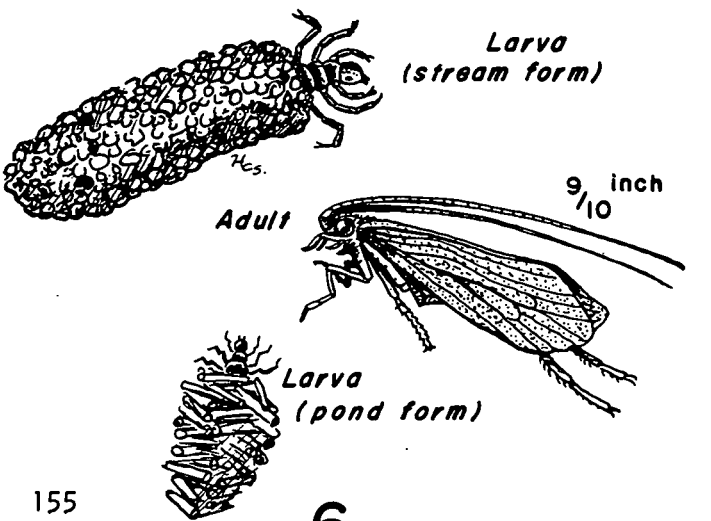
3. STONEFLY



4. WATER BOATMAN



5. WATER STRIDER



6. CADDISFLY

AQUATIC INSECTS

1. May Flies (Ephemerotera)

   May flies are abundant in streams and lakes and can be found in practically all fresh water throughout the state. The nymphs are found on the undersides of rocks or other underwater objects. They have two or three tails. The wings of the adult are held in an upright position while resting.

2. Dragonfly (Odonata)

   They are found in all types of fresh-water areas; ponds, lakes, streams, and swampy areas. The nymphs can be found crawling about on the bottom, on aquatic plants, or other underwater objects. They are one of the largest aquatic insects; most of them are dark brown to greenish as juveniles, change to brighter colors as adults. When resting, their four wings are held outstretched.

3. Stone Fly (Plecoptera)

   Stone flies seem to require running water in which to live. They are never found in lakes except in the inlets and outlets. When the adult is resting its wings lie lengthwise upon the back. Nymphs are found in abundance only among the rocks in streams. Stone fly nymphs have two long and stiff tails.

4. Water Boatman (Hemiptera)

   Boatmen are found in nearly all waters. They swim in an erratic pattern underwater, and usually found in slow moving waters. Boatmen are normally brownish in color and equipped with leathery wings.

5. Water Strider (Hemiptera)

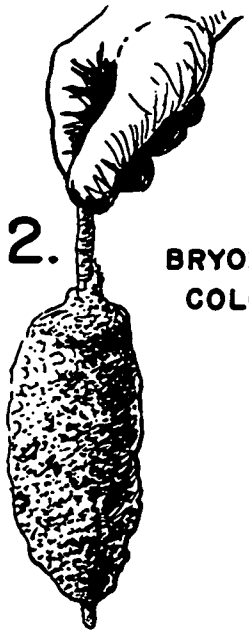
   Water striders are a familiar sight on the surface of slow moving waters, ponds, and lakes. They resemble long legged spiders. Although equipped with wings, they are rarely observed in flight. Their color is usually brown to gray. Many persons call them "water skippers".

6. Caddis Fly (Trichoptera)

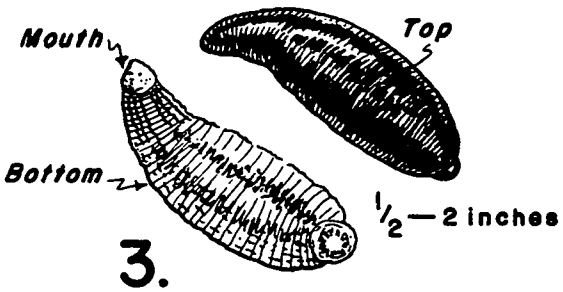
   Caddis flies are found in nearly all lakes, streams, and ponds. During their underwater life, they live in cases made from sticks and small particles of rock. These can usually be seen moving about on the bottom. When the adults are at rest the wings are held roof-like over the body and sloping down at the sides. The adults are generally dull brown or black in color. Sometimes the larvae are called "penny winkles" by fishermen. "Periwinkle" is another common name.

SUB-SURFACE FRESH WATER ORGANISMS

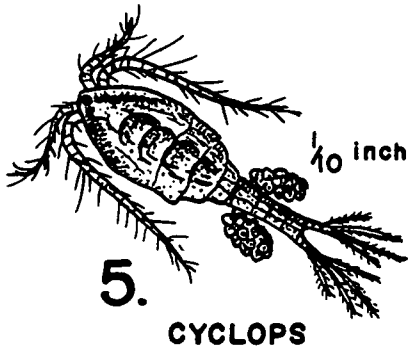
1. PLANARIA



2. BRYOZOAN COLONY



3. LEECH



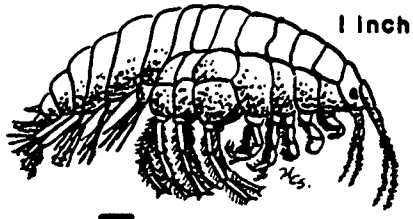
5. CYCLOPS

DAPHNIA

4.

FAIRY SHRIMP 1 inch

6.



7. FRESH WATER SHRIMP

1. Planaria (Turbellaria)

Planarians are fairly common in ponds, lakes, springs, and other fresh waters among vegetation, beneath stones, or crawling over the bottom. These free-living flatworms are usually arrow-shaped and vary in color from white to black depending on species and environment. Small planaria look much the same as the adult differing only in size.

2. Bryozoan Colony (Broyozoa)

Fresh-water Bryozoa are very common in lakes, ponds, and rivers. They are community dwellers, living in jelly type substance which is formed on sticks as a gelatinous ball or a mossy mat over the surface of underwater objects. There is a wide range in color, some colonies are brownish and still others have a greenish tinge. Colonies are made up of thousands of these tiny animals.

3. Leech (Hirudinea)

Leeches make homes in lakes, ponds, or other fresh-water areas. They can be seen moving about underwater by their well-known "Measuring Worm" type of travel, or swimming freely. Leaches are predatory or parasite segmented worms with sucking discs which are used in attachment, movement, and feeding. They are usually dark brown to black in coloration.

4. Daphnia (Cladocera)

Daphnia are found in all sorts of fresh waters. The shallow, weedy backwaters of a lake whose water level is fairly permanent harbors greater numbers that any other kind of locality. These little crustaceans are virtually transparent, and are best recognized by their two-branched antennae, robust bodies, and sharp-tailed spine.

5. Cyclops (Copepoda)

These little fresh-water crustaceans are very familiar in all slow moving waters, especially shallow ponds. Their bodies, like the Daphnia, are very transparent and are characterized by the forked antenna and the branched tail. The female usually has two groups of eggs attached to her body just ahead of the tail.

6. Fairy Shrimps (Anostraca)

For the most part, fairy shrimps live in temporary pools and ponds of fresh water. They are frequently seen underwater, rowing themselves about on their backs, by means of numerous, similar, flattened appendages. These appendages are always faced toward the source of light.

7. Fresh-Water Shrimp (Malacostraca)

These are found in lakes, streams, and ponds in eastern and western Oregon. Shrimp are usually found among the aquatic plants, rocks, and algae. Usually they are nearly transparent and look something like a "sow bug".

Questions and Discussion:

1. "What animals did you find?" You might compile a group list, (preferably on a chart). Each person records their own list.

2. "Where did you find most of the specimens?"

3. "What other life would you expect to find in this stream?"

IDEA 3: Predict Water Characteristics

"Based on aquatic animals you found, and the tables in TASK D, predict the temperature, pH, and O_2 count. Record your predictions on TASK D.

Distribute TASK D. (10 minutes)

TASK D: Work by yourself.

Based on the aquatic animals you found, and the tables below in the Aquatic Data section, and your observations, predict the following characteristics of this stream:

I predict:
the water temperature will be _____ because _____
the air temperature will be _____ because _____
the pH will be _____ because _____
the dissolved O_2 count will be _____ because _____
I can see about _____ ft. down into the water.
The color of the water is _____.

Keep these predictions for future use.

AQUATIC DATA

Table A: pH RANGES THAT SUPPORT AQUATIC LIFE

	MOST ACID					NEUTRAL					MOST ALKALINE		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Bacteria	1.0												13.0	
Plants (algae, rooted, etc.)						6.5						12.0		
Carp, suckers, catfish some insects						6.0			9.0					
Bass, crappie						6.5		8.5						
Snails, clams, mussels							7.0		9.0					
Largest variety of animals (trout, mayfly, stonefly, caddisfly)						6.5	7.5							

Table B: DISSOLVED OXYGEN REQUIREMENTS FOR NATIVE FISH AND OTHER AQUATIC LIFE

Examples of Life	D.O. in parts per million or/milligrams per liter
Cold-Water Organisms including (salmon and trout) (below 68 degrees F.) Spawning, Growth and well-being (caddisfly, stonefly, mayfly.	6 ppm and above
Warm-Water Organisms (including game fish such as bass, crappie, cat fish and carp) (above 68 degrees F.) Growth and well-being (some caddis fly)	5 ppm and above

Table C: TEMPERATURE RANGES (APPROXIMATE) REQUIRED FOR CERTAIN ORGANISMS

Temperature (Fahrenheit)	Examples of Life
Greater than 68°. (warm water)	Much plant life, many fish diseases. Most bass, crappie, bluegill, carp, catfish, caddisfly.
Middle range (55 - 58°)	Some plant life, some fish diseases. Salmon, trout, stonefly, mayfly, caddisfly, water beetles.
Low range (cold) (Less than 55°)	Trout, caddisfly, stonefly, mayfly

Questions and Discussion:

1. "Now let's check out our predictions using some easy-to-use testing kits."

IDEA 4: Measuring And Recording Water Characteristics To Test Out Predictions

Questions and Discussion:

1. "One way to test out the predictions is to use this (Hatch Water O_2pH) Testing Kit or equivalent. Open kit. The instructions are inside lid. There are lots of jobs to be done in testing (Clipping, squirting, dipping, counting, reading, etc.)"

2. Pass out TASK E - "Transfer your predictions from TASK D to TASK F and then record the test measurements beside the prediction for comparison. Work in groups of 4-5 people each. Each group take a kit. Spread out along the edge of the water."

> Note: Do not demonstrate the use of the kit. Let the participants read the instructions and learn to use the kit as they collect the data. You should check among the groups as they work and make sure they use the right bottles, chemicals, etc.

Questions and Discussion:

1. "How did the test results compare with your predictions?"

2. "Under what conditions might we expect to get different results than we did today?"

3. "What can we say about the quality of the water in this stream so far?"

4. "What would we need to know to decide whether or not to drink this water and to determine what kind of community it can serve?" (Coloform bacteria count, turbidity, minerals)

TASK E: Work in groups of 4-6 people.

MAKE SURE EVERYONE IN YOUR GROUP GETS INVOLVED IN THE TESTING.

1. Using the water test kit, determine the water and air temperature, dissolved oxygen count, and pH of the stream or pond. Record predictions from TASK C.

Record the data below:

Name of stream, pond or lake:

Location of water sample (edge or middle of stream bank or pond, etc.)	Time Taken	Temperature				pH		Useable Oxygen (ppm) (mg/liter)	
		Water		Air					
		My Pred.	Act. Test	My Pred.	Act. Test	My Pred.	Act. Test	My Pred.	Actual Test

2. Water productivity and color.

Based on the color you recorded in TASK C and the table a, what can you say about this water?

_____

_____

_____

3. Light penetration

My estimate of how far I could see into water from TASK C, is _____ft. Transparency of lake and pond waters can be roughly determined by the use of a white and black plate (called a secchi disk) which is lowered on a line until it can no longer be seen. It is approximately 8 inches in diameter, painted white and black in alternate quadrants. Very little sunlight penetrates below the point at which the disk disappears.

Lower the Secchi disk into the water until it can no longer be seen. Measure depth from surface of the water to the disk and record _____ft.

Based on the depth of the Secchi disk and table b, which can you say about the water?

_____

_____

_____

4. Temperature layering (pond or lake)

Based on the temperatures you recorded for your pond, the season of year and the information in table c, describe what you think is happening in the water now.

_____

_____

_____

Table a: Relationships of water color to productivity.

The quantity of life that may be present in any given body of water at any given time is often referred to as the "productivity." A water of low productivity is a poor water, biologically speaking, but is a clean water and desirable as a water supply or for recreational use. A productive water may be either a nuisance to man or it may be highly desirable. Foul odors and weed-choked waterways are usually branded a nuisance; however, bumper crops of bass, catfish or sunfish may be the result and are highly desirable.

Color of Water	Probable Cause	Fish Food Productivity
Clear	Absence of algae and microorganisms	Low
Greenish Hue	Blue-green algae	Moderate
Yellow to Yellow-Brown	Diatoms (microscopic, one-celled algae)	Moderately High
Red	Micro-crustaceans	High
Dark Brown	Peat, Humus	Low
GEOLOGICAL FACTORS HAVING BEARING ON COLOR		
In limestone geology-Green	Abundant Calcium	Moderate
In volcanic geology-Yellow-Green Red	Abundant Sulfur Abundant Iron	Low Moderate

Table b: Relationship of Water Clarity to Fish Food Production and Watershed Condition

Depth you can see into water (secchi disk reading)	Interpretations of Depth Reading		
	Fish Food Production (If reasons for degree of clarity are biological (algae, etc.)	Condition of Watershed above Water Readings (If reasons for degree of clarity are physical--soil siltation, etc.)	Possibility of Dissolved Minerals
0" - 6" ↓ + 24"	Most productive water for fish food Maximum oxygen from photosynthesis (greatest) diurnal variation) Maximum algae growth ↓ Least productive for fish food Minimum oxygen from photosynthesis (least diurnal variation) Minimum algae growth	Poor condition due to soil runoff, slides, etc. ↓ May indicate better condition because of vegetation cover - more stable soil, etc.	Most ↓ Least

Table c: Temperature Layering in Ponds - Lakes

In summer, the surface water absorbs the sun's heat and warms faster than the water below. The warmed water is lighter than the cold water, so it floats on the cool layers. By midsummer there are three distinct layers.

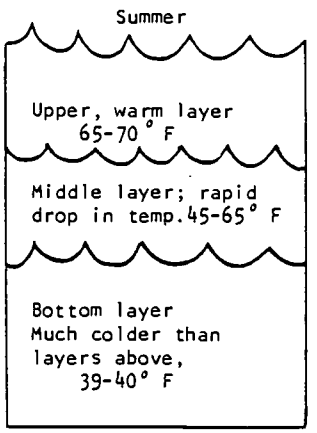
During the summer, mixing or circulation is prevented by these stratified layers of water which act as a barrier.

The upper layer of water cools in autumn until it approaches the temperature of the water in the middle and lower layers. Aided by winds, the surface water sinks causing circulation from top to bottom.

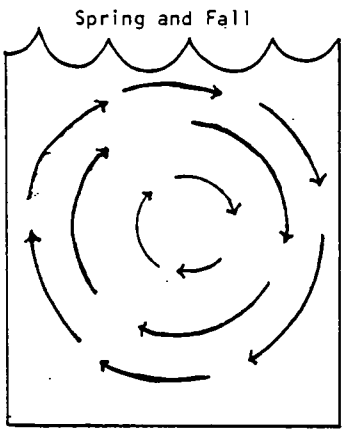
In winter, the cold surface water continues to sink and the water becomes stagnated, photosynthesis slows, and oxygen levels drop.

In the spring, aided by winds, another circulation and mixing occurs, called the "Spring Overturn."

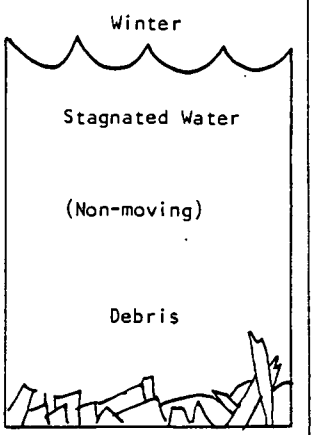
1. Seasonal Change Diagram



During the summer, fish and aquatic life are most active.

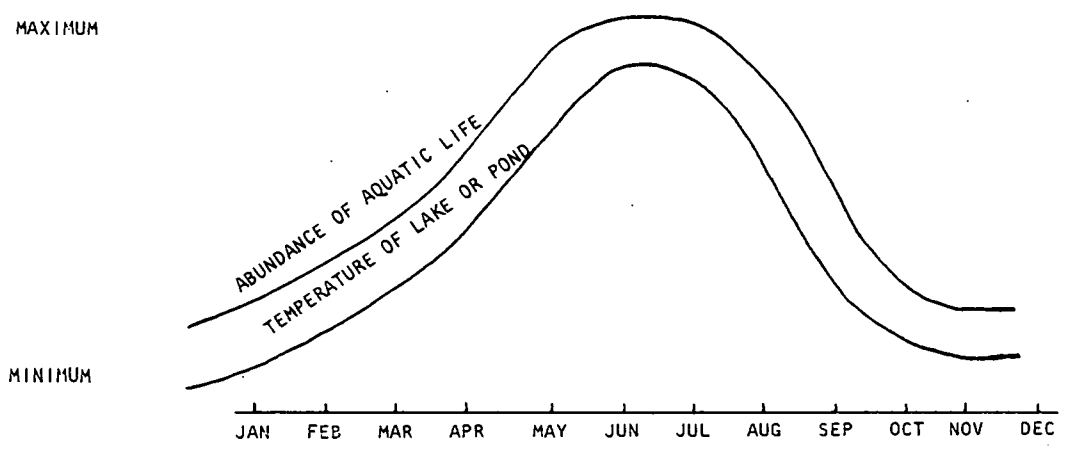


During spring and fall overturns, the temperature of the water is equalized throughout the lake. Fishes and other animals are more active than in summer.



Activity is greatly reduced during the winter. Many animals hibernate in the mud or debris at the bottom.

2. Seasonal Change Chart



IDEA 5: Measuring Water Volumes For Stream or Pond

Questions and Discussion:

1. "How many people do you think could live off the water in this stream (pond)?" (domestic water use only)

2. "What measurements do we need to know in order to determine the amount of water in this stream (pond)?" Discuss how to make different measurements.

3. Pass out TASK Card F, for stream - TASK Card G for pond.

4. Have group collect the measurement parts together. (15 minutes)

5. Work in groups of 3-4 and calculate how many people could live off the water here.

Questions and Discussion:

1. "How many people could live off the water in this stream for one day?"

2. "How did your prediction compare with your calculations?"

3. "What would happen to this environment if we piped all the water at this point to a community?"

4. "If we were going to use some of this water, how would we determine the amount to be left to maintain the environment?"

5. "What might affect the amount of water?"

TASK F: For Streams — Work in groups.

Instructions for collecting and recording streamflow measurements.

a. Measure and mark a 100-foot distance along a straight section of your stream. If you can't find a 100' section, use 25' or 50'. Throw a stick (5 or 6 inches long) in the water above the upstream marker. Record the number of seconds it takes to float downstream between the markers. Record below. Now divide the 100-foot distance by the total seconds it took the stick to float between the stakes. Oo this three times and use the average time.

1st measurement 100 ft ÷ _____ (total seconds to float 100 ft) = _____ (number of feet stick floated each second) ft. per second.

2nd measurement 100 ft ÷ _____ = _____ ft. per second.

3rd measurement 100 ft ÷ _____ = _____ ft. per second.

TOTAL _____ (ft. per second) ÷ 3 = _____ (ft. per second average)

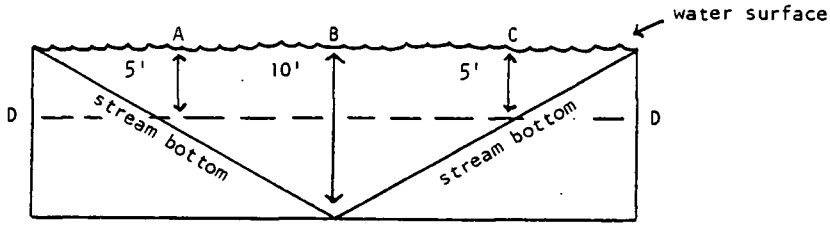
b. Find the average width of your section of the stream. Measure the width of the stream at 3 places within the 100-foot area. Divide the total by 3 to get the average width of the stream.

First measurement _____ feet
Second measurement _____ feet
Third measurement _____ feet
TOTAL _____ feet ÷ 3 = _____ ft. (average width)

c. Find the average depth of your section of the stream. Measure the depth of the stream in 3 places across the stream in the straight line. Oivide the total by 4 to get the average depth of this stream.

First measurement _____ feet
Second measurement _____ feet
Third measurement _____ feet
TOTAL _____ feet ÷ 4 = _____ ft. (average depth)

NOTE: The reason you take 3 depth measurements then divide by 4 is to take into account the shallow areas of the stream. It can be explained by the following example of a drawing of a stream cross-section. If depth in 3 places is A(5'), B(10') and C(5'), (total 20') find an average by dividing by 3 then 20' ÷ 3 = 6 2/3'. Now look at the mean or average depth (D) which is 5'. Take total of depths and divide by 4. 20' ÷ 4 = 5', the correct average depth.



d. Find the cubic feet of water per second. Multiply the average width, average depth, and the number of feet the stick floats each second.

_____ (Average width) ft. X _____ (Average depth) ft. X _____ (Number of feet per second) = _____ (Cubic feet of water flowing per second)

NOTE: A cubic foot of water is the water in a container 1 foot wide, 1 foot high and 1 foot long, and contains 7.48 gallons.

In order to find out how many people could live from the water in this stream, complete the following calculations.

_____ (Stream flow in Cu. Ft. per sec.) X _____ (Gallons in 1 Cu. ft. of water) = _____ (Gallons of water per second)

_____ (Gallons per second) X _____ (Seconds in minute) = _____ (Gallons of water per second)

_____ (Gallons of water per min.) x _____ (No. minutes in a day) = _____ (Total gallons water per day) ÷ *200 Gals. (Amount of water one person uses per day) = _____ (Total No. people who could live from water in this stream)

*The average person uses about 200 gallons of water a day for home use. This does not reflect each persons share of water used for industrial, public services, and commercial. U.S. Office of Education figures.

TASK G: For Ponds & Lakes — Work in Groups

Instructions for collecting and recording volumes of water in ponds or lakes.

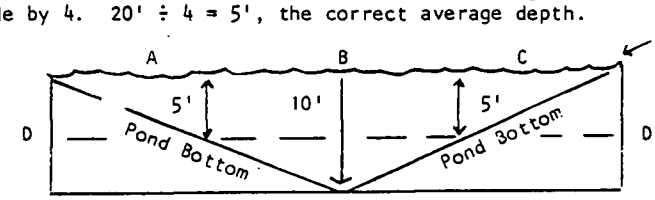
a. Find the average diameter (distance across) of the pond. Measure the length and width of the pond. You may have to take several length and width measurements and get the average of them.

Pond width _____ft.
Pond length_____ft.
Total _____ft. ÷ 2 = _____ft. (average diameter)
Average diameter _____ft. x 3.14(π) ÷ 4 = _____ sq. ft. surface (area of pond)

b. Find the average depth of the pond or lake. Measure the depth in 3 places along a line (transect) across the pond, as near the middle as possible. Add these depths and divide by 4 (see explanation below) to get the average depth. (If additional accuracy is desired, repeat this process along additional transects and average results.)

First measurement _____ feet
Second measurement _____ feet
Third measurement _____ feet
Total _____ feet ÷ 4 = _____feet (average depth)

NOTE: The reason you take 3 depth measurements then divide by 4 is to take into account the shallow areas of the pond. It can be explained by the following drawing of a pond cross-section. If depth in 3 places is A(5'), B(10') and C(5'), (total 20') and you find an average by dividing by 3 then 20' ÷ 3 = 6 2/3'. Note that the actual mean or average depth (D) is 5'. Take total of depths and divide by 4. 20' ÷ 4 = 5', the correct average depth.



c. Formula for computing number of gallons of water in pond.

1. _____ (Area of pond) X _____ (Average depth) = _____ (Volume in Cubic feet)
2. _____ (Volume in Cu. Ft.) X 7.48 = _____ (No. Gals. water in pond)

NOTE: A cubic foot of water is the water in a container 1-foot wide, 1-foot high, and 1-foot long and contains 7.48 gallons.

d. Formula for computing the volume using acre feet of water.

1. (Surface) _____ (Area of pond in feet) X _____ (Average depth in feet) = _____ (Volume Cu. Ft.)
2. _____ (Volume Cu. Ft.) ÷ 43560 (sq. ft. in an acres) = _____ acre feet of water.
3. _____ (Acre Feet) X 395,900 (Gal./Acre Foot) = _____ (No. Gallons in pond)

e. In order to find out how many people could get their domestic needs for one day from the water in the pond, complete the following calculations.

_____ (Gallons of water in the pond) ÷ *200 Gals. (Amount of water one person uses per day) = _____ (Total No. people who could live one day from this water)

*The average person uses about 200 gallons of water a day for home use. This does not reflect each person's share of water used for industrial, public services, and commercial. U.S. Office of Education figures.

IDEA 6: Human Dependence on Water

Activities:

Questions to ask:

Did anybody do without water for a day?
Can you tell us what you ate for breakfast?
Do these foods contain water?
How much? (Research needed by 4-H'ers to find out.)
How much water do you drink?
Did each drink the same amount? (The amount of water needed by individuals varies.)
Why? (Weight, heat, activity, age, heredity and health varies the amount needed, but basic needs must be met if life is to be sustained.)

Take a field trip to the town water treatment plant. Find out whether the water supply comes from underground or surface reservoirs.

Questions to ask:

What is done to make the water pure?
Is the degree of impurity in the water the same at all times?

Visit a watershed. 4'H'ers can be taken outside to observe the tiny watershed in the yard. A tiny hill with water running down to a more level place will develop the idea of a watershed. Before the visit, learn what a watershed is.

Questions to ask:

Does a watershed consume water?
On a watershed basis, does one natural resource affect another?
How do people work together to maintain a watershed?

NOTE: The group could discuss together what each can do to conserve water and try to decide whether they want to be a part of the problem or part of the answer. The following questions could be asked and 4-H'ers could be encouraged to discuss answers at home, thereby making the community more water conservation conscious. What conservation practices must people follow to:

prevent water pollution?
leave natural gathering places for water?
build reservoirs?

Feed three plants with three different types of water--tap water, salt water, polluted water.

Observe plant growth over a period of time. Which grows best? Why?

Construct graphs to show the increase in use of water in your city over the past 50 years.

Source: Environmental Education Curriculum Guide--Danbury, Connecticut

IDEA 7: Drinking Water

Goals and Objectives:

The goals of this investigation are to help 4-H'ers better understand the roles of drinking water in their lives, the means by which it is made safe for consumption, and how the purification and distribution of drinking water influences, and is influenced by, other aspects of the environment. During this investigation members will:

- Determine the means by which drinking water is distributed in their homes.
- Identify a variety of uses for drinking water in their homes.
- Determine the nature and extent of the community drinking water distribution system.
- Trace the origins of drinking water prior to processing in a purification plant.
- Determine uses of drinking water which do not require that it be purified.
- Determine the standards employed in describing water which is safe to drink.
- Determine the methods employed in water purification plants.
- Determine the factors which influence demand on the purification capacity of a water purification plant.
- Determine the cost of water purification to the community.
- Identify human activities which affect water in such a way that it must be purified for drinking purposes.
- Relate purification plant capacity to demand patterns in the community over a period of years.
- Determine the various individuals and agencies in the community which draw upon the drinking water supply and the relative amounts required by each.
- Make judgements as to the "necessity" of a variety of uses for purified water in their homes and in the community.
- Consider the choices available to them in making wiser use of drinking water.

NOTE: The procedures suggested in the following might be easily adapted to a study of food in the environment (e.g., food-use practices, procedures for diminishing food wastage, community agencies responsible for regulating food processing, distribution and storage).

Questions:

- What is the origin of the drinking water which comes from a tap?
- What steps are taken to insure that water is safe to drink?
- Are there limits to the supply of drinking water?

Source: Environmental Education Curriculum Guide--Danbury, Connecticut

Activities:

Have the 4-H'ers investigate the network of pipes which makes up the water distribution system in their homes to determine what uses, other than for drinking, water has in their homes. For example:

- in toilets
- in showers
- in washing machines
- in refrigerators with automatic ice-makers
- in heating systems with humidifiers
- in automatic dishwashers
- for disposal units in sinks
- for lawn sprinkling and other outdoor uses.

Compose a letter to an official of the community water department inviting him/her to visit the group and/or to answer questions concerning the origins of water entering their homes from the community water distribution system. Among the questions which might be raised are the following:

- What is the nature and extent of the community water distribution system? (A map of the community showing the water distribution system is probably available for this purpose.)
- What is the origin of water entering the community distribution system?
- What is the origin of water entering the community's purification plant(s)?
- Where does water which falls in the form of rain or snow originate?

What tentative conclusions may be drawn from the information gathered in the previous investigations concerning:

- The need for purified water for various household uses.
- The relationship among various bodies of water and the water we drink.

Contact the community health department to determine the standards employed in describing water that is safe to drink. Determine:

- Acceptable levels of suspended particles.
- Acceptable levels and kinds of microorganisms.
- What toxic substances must be removed?
- Requirements related to unpleasant odors.

Arrange a visit to the local water purification plant to determine:

- The various methods used to purify water (e.g., filtration, aeration, chemical treatment).
- The rate at which purified water can be produced for community consumption.
- Seasonal variation in water treatment practices.
- Daily and seasonal variation in water demand by the community.
- Human activities which affect water in such a way that it requires purification.
- The cost to the community of maintaining the water purification plant and the way in which these costs are met.

What tentative conclusions may be drawn from the information gathered in the previous investigations concerning:

- The role of community agencies in safeguarding the health of the resident?
- The factors which affect water in such a way that it must be purified before being consumed by humans.
- The cost to the community for supplying water which is safe to drink?
- The factors which tend to increase the costs of water purification over the years.

From officials at the local water purification plant,solicit information to help determine:

- The relationship between the purification plant and community demand over the past ten years.
- The percentage of purified water in the community used by:
  - various industries
  - various commercial establishments (e.g., car washes, laundries)
  - institutions (e.g., schools, hospitals)
  - private homes
  - hotels and motels
- The relationship between water purification costs and the quality of water entering the purification plant during a ten year period.
- The cost of labor and maintenance for operating the purification plant during the same ten year period.
- The relationship between the intake volume for the water purification plant and the volume in the community water supply during the same ten year period.

Have the 4-H'ers survey their homes and the community to determine:

- If water-use practices they observe are "necessary".
- If the volume of water used exceeds the minimum requirements for that function--for example:
  - too-frequent use of automatic dishwashers
  - excessive volumes of water for flushing toilets
  - leaking water fixtures
  - lawn-watering during the hottest hours of the day when evaportaion rates are highest

Compare the findings in the above question. Are there any relationships between water-use practices and the long-term changes in demand on water purification capability in the community?

If taking a bath uses less water than taking a shower, yet you prefer showers, are you willing to change your bathing habits to reduce the demand on purified water?

If the supply of drinking water in your community should become limited, which of the following groups should get preference in the use of available water:

- private homes
- institution or
- industries

INVESTIGATING WEATHER

IDEA 1 - Building and Maintaining a Weather Station

How are Weather Predictions Made?

OBJECTIVES:

After this activity, the member should be able to:

Keep careful, cumulative records of observations.
Research for information not available by observation.
Analyze data and researched information.
Predict weather, basing the predition on analysis of recorded data.

SUGGESTED ACTIVITIES:

Keep daily records on a weather chart showing time, temperature, air pressure, humidity, direction and speed of wind and condition of the sky. A committee might do this for weekly periods. After a few weeks of records have been kept and studied, predict the weather. Help decide which day would be good (or bad) for a field trip. Compare with news forecasts and weather proverbs.

1. Temperature. Install an outside thermometer away from direct sunlight. Read, record, and compare indoor and outdoor temperatures. Use maximum-minimum thermometers if available. Take temperatures at different places of your land. Average readings. Compare readings taken at different places at the same time of the day. Continue through the season.

2. Air Pressure: Make a tin can barometer and measure changes in pressure.

3. Humidity. Discuss the experience of feeling fog on damp days or play with static electricity on dry days.

   To estimate fire hazard, place ground cover typical of the area on the ground in the sun. If you live in grassland, cut up and place a square foot of turf where you can visit it readily. Include all dry material lying on the ground.

   In a forest, gather a typical sample of all the duff and bits of wood lying under the trees. Place a hygrometer about two feet over your sample. Read it to find out whether the air is relatively dry or humid. What does this tell you about fire hazard?

   Learn to read a chart based on wet and dry bulb readings.

Compare day and night temperatures (from the newspaper or television reports) when dew or frost is heavy.

4. Rainfall. Observe the tracks that raindrops make in fine dust during a light rainfall. How high does dust splash against a building? Is there the same splash where the ground is covered with grass? (Test with a splash board).

   Catch rain in a straight-sided pan. Measure with a ruler. How many inches fell during a shower? Measure snow depth in the same way. Melt it indoors to see how much rainfall would be equivalent.

   Catch a hailstone and cut it with a sharp knife. Are there layers in it? (They show how many times the droplet was wafted up into freezing temperatures before it fell.)

   If you take a field trip or attend an outdoor school in the mountains, catch snowflakes on dark wool and look at them through a magnifying glass.

5. Wind. Make a weather vane. Be sure the arrow pivots easily and has a wide vane to catch the light breezes. Use it to determine wind direction. From what direction does the wind blow just before a storm? See if you can predict the next storm.

   Make an anemometer by fastening four paper cups to the end of crossed sticks. Color one a bright hue. Place on a pivot. Calibrate by counting the number of times per minute it goes around on a bicycle with a speedometer, ridden at five, ten, and fifteen miles per hour.

6. Clouds. Watch the sky each day and decide what kinds of clouds are observed. Which kinds indicate a storm is coming? Correlate wind direction and cloud formation.

7. Read about rotation of the earth and correlated movements of air masses.

EQUIPMENT:

Tin can	Pencils, paper	Pan or wide can, with straight sides
Straw	Thermometer	Ruler
Paper	Wet and dry bulb thermometer	Four paper cups
Plastic wrap	Hygrometer	Two strips of wood
Paper clip	Sling psychometer	Nail
Scotch tape	Knife	Wind-speed indicator

Source: Gross and Railton, Teaching Science in an Outdoor Environment.

IDEA 2 - Effects of Wind

How Does Wind Affect Living Things?

SUGGESTED ACTIVITIES:

1. On a windy day, the group walks around the area.

2. The group scatters to find the spot where the wind blows strongest and where the wind is felt least. The findings are shared. The group decides why this is so.

3. They hypothesize about whether the same would be true if the wind were blowing from another direction.

   Leader questions:

   Are you sure?
   How do you know?
   How can you find out? (Testing the hypothesis.)

4. The group observes how the wind affects plants, and infers the prevailing direction of the wind by observation of the way the trees lean.

5. The group describes the movement of birds on a still day and contrasts it with their activities on a windy day. They notice whether many birds and animals are in windy places. They may formulate hypotheses to explain the difference in behavior.

6. Look for evidence of wind erosion.

RELATED LEARNING ACTIVITIES:

Build simple weather instruments.
Keep charts of weather changes.
Keep census of birds; compare to wind velocity.
Study wind erosion.

INVESTIGATING MATH AND MEASURING IN THE OUT-OF-DOORS

Concept: Many investigations you can do in the out-of-doors incorporate the use of math and measurements. This is an important skill in gathering pertinent data about the area your group is exploring. Math and measurement can be incorporated into your investigations or it can be treated separately.

Source: Fernbark Science Center, Atlanta, GA.

ACTIVITIES:

PART I. Basic activities which need to be learned before mathematics activities are conducted outdoors.

Pacing: Measure a distance of 100 feet. Have members pace normally all the way down and back. Divide the number of paces into 100 feet. This gives you the amount of feet which are included in one normal pacing step. To find out any distance, pace it off, and multiply the number of paces by the number which you obtained on the 100-foot walk.

Surveying the area: To mark off an area, use a compass to determine directions. Then determine the number of paces you need to mark off your chosen distance. Use the compass to locate north. Pace in that direction until distance is reached. Use compass to determine 90° angle if area desired is a rectangle (or square). Pace again the desired distance. Continue until area is marked off. Use twine and posts to mark boundaries.

Acreage: To mark off an acre, pace a distance of 66 feet x 660 feet. If you multiply these two numbers, the product is 43,560 square feet, which is the area of one acre. (A new measurement can be introduced here: 1 chain = 66 feet. 10 chains = 660 feet. This measurement is used in forestry and surveying.)

Part II: Activities using numeration and graphing.

Know Count: Go outside and count something so you know more about it after you have counted it than you did before you counted it.

- ☐ bricks
- ☐ broken windows
- ☐ sand grains
- ☐ insects
- ☐ leaves
- ☐ how much garbage is produced by the school
- ☐ how much gasoline is sold at a service station
- ☐ cars in traffic periods

How can the various things that were counted be related? Should any of the things counted increase or decrease? How could they be made to increase or decrease?

Ups and Downs: Find something in the environment that is increasing in number and something that is decreasing in number--and prove it.

- ☐ number of kids in school
- ☐ number of leaves during certain seasons
- ☐ number of flies in the fall

Classify the increases and decreases you found as good, bad and neutral.

- ☐ find some things that increase and decrease but not in numbers
- ☐ find some things that always increase
- ☐ find some things that always decrease

Taking a Tree Census: Count all the trees of each variety that can be seen in a walk around the block or along a woodland trail. A simple method of tallying can be taught in connection with this activity.

Counting and Averaging: Find the average number of miles per hour traveled by a bus on a trip. Calculate the average temperature for a week or a month. Count the number of cars passing your location in a certain 15-minute period of the day. Count and tally the number of birds or animals of each kind encountered on a hike.

Making Graphs: Have the members make tables, charts, or graphs of the data collected in projects such as those described in the preceding activity.

Toothpick Birds:

Materials needed: ball of cord, 4 stakes, graph paper, crayons, colored toothpicks (50 each of red, blue, yellow, green, and pink).

Use stakes as corner pegs to form a rectangular garden plot.

Push 250 toothpicks of five different colors into the garden plot. Make certain that the colors are well distributed over the area. To avoid breakage, shove each toothpick into the ground at a slight angle. About half an inch of the toothpick should be left showing.

Imagine that the club are "toothpick birds". Toothpick birds eat toothpick worms, which are the colored toothpicks. Gather round the garden's perimeter. When the starting signal is given, each 4-H'er, or "toothpick bird", pulls out as many toothpick worms as he can see. Stay behind the cord and avoid feeling for toothpicks, as they have sharp points. In two or three minutes the group will receive a signal to stop.

All toothpicks collected are sorted into five colored piles. The number of each color is recorded.

Put the results into a bar graph, and decide how the results will show protective coloration. Which toothpicks were easiest to find? Which ones were the hardest? If you were a toothpick worm which color would you rather be? How would the time of year affect your results? Name some birds which match their surroundings. How does this pattern help to protect the species?

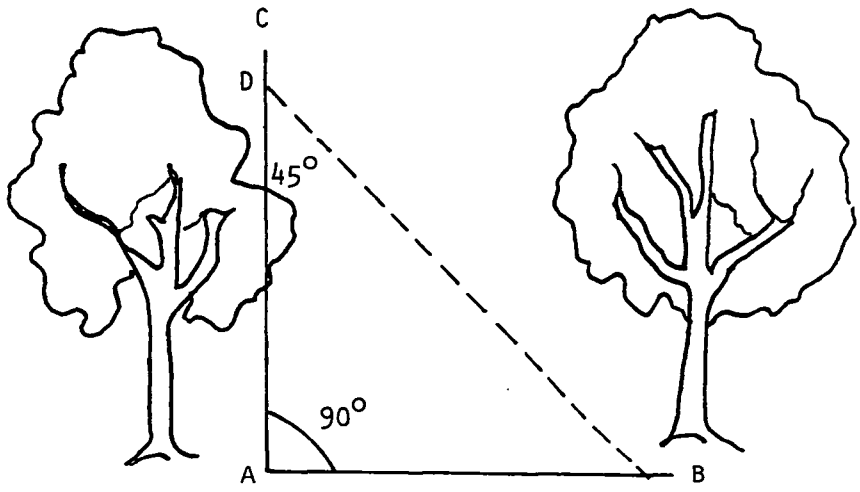
PART III. Activities using operations (add, subtract, multiply, divide).

Measuring how far away lightning is: During an electrical storm, the time interval between seeing lightning and hearing its thunder indicates how far the lightning is from the observer. Sound travels at approximately 1,100 feet per second. The lightning is seen immediately, but the sound of the thunder is heard only after covering the distance at a speed of 1,100 feet per second. If there is an interval of five seconds between the flash of the lightning and the sound of the thunder, then the lightning is 5,500 feet (5 x 1,100 feet) away. What is the smallest number of seconds that could be counted between seeing the lightning and hearing the thunder in order to call a storm a distant one? (Ten, because 10 times 1,100 feet is 11,000 feet, just over two miles.) How far has a storm moved toward you if the time interval between the lightning and the thunder changes from 11 seconds to 4 seconds? (7,700 feet)

Devising tree ring problems: Count the rings of a tree stump to find out how many years the tree lived. If it is true that it was cut in 1964, then when did it begin to grow?

Estimating Inaccessible Distances: A distance that cannot be estimated by pacing-for example, the width of a stream--can be estimated with the aid of a protractor.

Drive a stake or place a stone at a selected point A. Sight from point A to point B (the location of a rock, shrub, tree, or other object easily sighted on the opposite side). Use a straight stick or a string (or vine pulled taut to mark this line of sight, AB.)



By crossing sticks or strings at a right angle (using the protractor for determining the angle), set up a line (AC) perpendicular to AB.

Walk along this perpendicular line (AC) until you come to a point, D, where the line of sight from D to B will make an angle of 45° with the line DA. Use a stick or a string to mark this line of sight, and check the 45° angle with the protractor.

Pace or measure the distance DA. This distance will be the same as AB, because the triangle ABD is a right isosceles triangle.

Making Calculations Related to Conservation: After a hard rain, have the members collect the soil that has washed into the street or along a section of the curb. Place this soil in a box, and have the members determine its volume to find out how much soil was washed away at the place where they collected it.

Older members could calculate to what depth that amount of topsoil could cover a square foot of land, or how many square feet it could cover to a depth of one-eighth of an inch. They might also be able to find the number of cubic feet (1 cubic foot equals 1,728 cubic inches) of topsoil that would be lost from a whole acre (43,560 square feet).

Determining the Speed of Water Flow: Members are often curious about the speed at which water flows, regardless of whehter the water is flowing in a river or in an irrigation ditch. The speed can easily be determined by floating an object in the moving water and measuring the distance it travels in one minute (or a certain number of seconds).

For example: Suppose a small piece of paper or a part of a leaf is carried 176 feet in 1 minute. Then, because there are 60 minutes in one hour, it would travel 60 times 176 feet, or 10,560 feet in 1 hour. By dividing 10,560 by 5,280 (the number of feet in a mile), the members would find that the speed of the object and the water carrying it is 2 miles per hour.

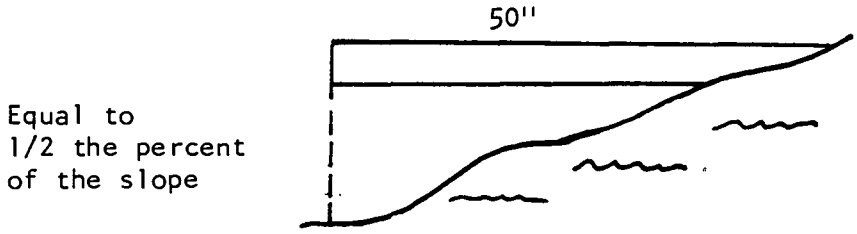
Find the number of seconds a floating object takes to travel 100 feet.

From the results of the preceding step, determine the number of feet the object travels in one second. (If the object travels the 100 feet in 20 seconds- then dividing 100 by 20 gives 5, the number of feet traveled per second.)

Determine the number of seconds in one hour. (3,600) then multiply this number by the number of feet per second that the object is traveling (refer to preceding step) to find the number of feet it travels in 1 hour. (If the object is traveling 5 feet per second, 3,600 times 5 gives 18,000, the number of feet it travels in 1 hour.)

Divide the number of feet the object travels in 1 hour (as found in preceding step) by the number of feet in a mile (5,280) to find the number of miles per hour that is the speed of the object--and the water. (If the object travels 18,000 feet in 1 hour, then 18,000 divided by 5,280 gives 3.4 miles per hour, approximately, as the speed.)

Finding the Per Cent of Slope of a Hill: The slope of a hill or a grade may be expressed as a percent. A 1 percent slope has a 1-unit rise vertically for each 100 units of horizontal distance.



Using a straight board 50 inches long, rest one end of the board on the side of the hill whose slope is to be found. Raise or lower the other end until the board is level. You may use a carpenter's level if available. Measure the vertical distance from the bottom edge of the board to a point on the ground directly below the end of the board. The number of inches measured is equal to half the percent of the slope, so you must multiply the number obtained by 2.

Studying the Strength of Insects: The members have probably watched ants or other insects moving objects many times their size. The members should note that if a person had comparable strength he could move a boulder weighing several tons.

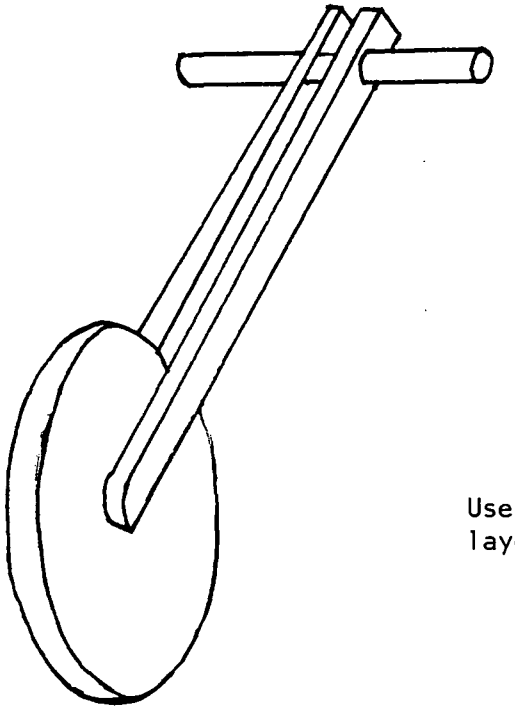
If a man weighing 200 pounds could move 20 times his own weight, how many tons could he move? (4,000 pounds, or 2 tons)

A stag beetle can lift 120 times its weight. At the same weight ratio, how much could each person lift? (For a 100 pound person, 12,000 pounds or 6 tons.)

If a bee flies eight miles per hour, how long would it take to make six round trips to flowers half a mile from the beehive, not counting time at the beehive or at the flowers? (22-1/2 minutes)

Measuring Horizontal Distances: To make a circular yardstick, measure and drill a 1/32" hole, 1" from the end of each of two 40" pieces of board. Glue the spacer in the other end of the 40" pieces. Insert the dowel handle and nail it in place. Cut out a wheel with an

approximate 11.45" diameter. Have members measure and draw the wheel as close to 36" circumference as possible. (An 11.45" diameter equals 35.97 circumference.) Be certain to find the center of the wheel and drill a 9/32" hole before cutting out the circle. Position two washers on the outside of the 40" handle pieces and fasten the carriage bolt. Make a line on the periphery of the wheel. This line will serve as an indicator mark for measurements.



Supplies needed:

1 - space block, 3/4" X 1-1/2" X 6"
1 - 1" diameter X 15" dowel
2 - 3/4" X 1-1/2" X 40" board
1 - 3/4" X 11.45" circle
1 - 1/4" X 2-1/2" carriage bolt
4 - 1/4" washers

Use exterior plywood or several layers of heavy cardboard.

Using Crickets as "Thermometers": If the day's temperature is between 55° and 100°, a cricket can help the members to estimate the temperature with reasonable accuracy. To determine the number of degrees of temperature, count the number of times the cricket chirps in 15 seconds and then add 40. Write the formula for finding the number of degrees in the temperature, T, when the number of cricket chirps is represented by C. (T = C + 40)

Studying the Travel Rate of Ants: Have the members find a large ant running along the ground and measure the distance it travels for a short period of time, perhaps a minute. Then measure the ant and find how many of its body lengths were represented by the distance it traveled in the period of time that was observed.

Have the members determine how far they would go if they traveled the same number of their own body lengths in the same period of time. Then have them find the rate of speed (in miles per hour) that this would represent.

Measuring Vertical Distances: The Merritt Hypsometer is used for estimating heights of trees. It works on a rotation of 1 inch to 1 foot. To set up the ratio, two similar triangles must be formed. One triangle is with the eye and yardstick, and the other is with the eye and the object to be measured.

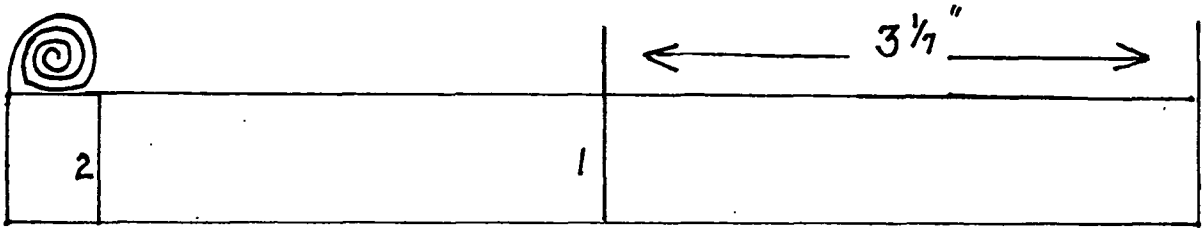
Hold the stick at arm's length and measure the distance from the eye to the stick in inches. For every inch pace off one foot from the object. For example, if the stick is held 25" from the eye, pace off 25 feet from the tree.

Holding your head steady, sight the bottom of the tree along the bottom of the yardstick. Without moving your head, move your eyes to the top of the tree and read the height. The number of inches corresponds to the number of feet.

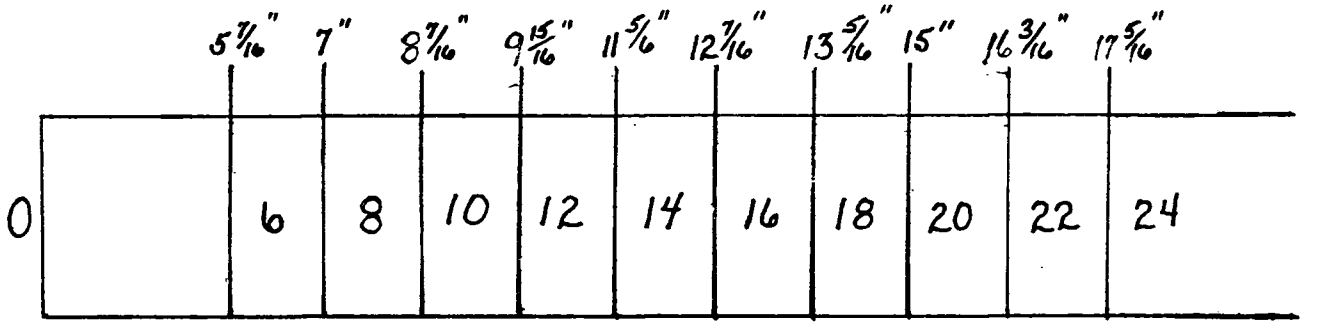
Another method of measuring vertical distances is the Pencil method. Have a person of known height stand beside the tree. Stand at a distance from him and hold a pencil or short stick at arm's length and sight across the top of it to the top of his head, and slide your thumb up or down on the stick until you are able to sight across the top of the thumb to his feet. Move the length of the pencil which you have measured up the height of the tree. Keep track of the number of pencil lengths which you count. The height of the tree is this number times the height of the person.

Measuring the Diameter of Trees: The Diameter Tape determines the diameter of trees. Materials needed are a tapelike material, or two pieces of masking tape back to back. Mark the tape off in 3-1/7 inch sections, as many as you wish. Why 3-1/7 inch sections? It is found if you wind paper around a stick 1 inch in diameter, this paper is 3-1/7 inches circumference. This 3-1/7 inch is a constant. It never changes, and it is usually written with the Greek letter pi (π) in the formula $C = \pi D$.

Wrap the tape around the tree trunk 4-1/2 feet above the ground. Where the tape meets, read the diameter in inches.



The Biltmore Stick is also used to estimate the diameter of trees. Materials needed are a yardstick or similar piece of thin wood, and masking tape. Place the tape over the back of the yardstick or piece of wood. Mark off spaces from 6 to 24 using the measurements as seen in the diagram below.



Hold the stick horizontally, about four and a half feet from the ground.

Hold the stick against the tree, about 25 inches from your eye. Hold your head steady, and line the "0" up on the outside of the tree on the left side.

Glance at the other side of the stick without turning your head. The line that lines up with the outside of the tree on the right side indicates the diameter.

Estimating Board Feet of Lumber: After determining the diameter of a tree, the following chart can be used to estimate the number of board feet of lumber in the tree. Determine the height of the tree by using the Merritt Hypsometer, divide the height by 16. This gives you the number of sawlogs. Locate the number of 16-foot sawlogs in the left column, and then find the diameter in inches along the top column. The number at the point where the columns intersect indicates the number of board feet of lumber in the tree.

CHART OF ESTIMATING BOARD FEET OF LUMBER

Diameter	10	11	12	13	14	16	18	20	22	24	26	28	30	32	34
Number of Sawlogs															
1	39	49	59	71	83	110	140	180	220	270	320	370	420	480	550
1-1/2	51	64	78	96	112	150	200	250	300	370	440	510	590	680	770
2	63	80	98	120	141	190	250	310	390	470	560	650	760	870	990
2-1/2	72	92	112	138	164	220	290	370	460	560	660	780	900	1040	1190
3	--	--	127	156	186	260	340	430	530	640	770	900	1050	1210	1380
3-1/2	--	--	--	--	201	280	370	470	580	710	850	1000	1160	1350	1540
4	--	--	--	--	--	300	400	510	640	770	930	1100	1270	1480	1690

PART IV: Other Activities.

Mark off quadrants of one square meter in different plant communities to compare: the types of plants, amount of bare ground to compare to that covered with vegetation, amount of basal area of each plant compared to the area covered by the foliage, light intensity, temperature of the air and soil, moisture present, soil compactness, water absorption rate, and air movement.

From a sample, estimate the number of leaves on a tree.

Compare the relationship between tree circumference and its diameter. Compare the different kinds of trees.

Compare the amount of area covered by the tree and shrub canopies of different forest species.

Estimate how many seeds that have fallen from a plant have begun to grow. Estimate the total number of seeds that were formed by the plant.

Make a population census of small animals in an area.

Estimate the number of birds in a flock.

Make a survey of insects and the plants on which their evidences are found. Estimate the total number of certain kinds of insects in an area.

Compare temperature of the water to the temperature of the soil around it and to the temperature of the air above it.

Determine if the temperature of the air varies in different places (next to a building, under a tree, in shade, in direct sunlight). What factors may cause these differences?

PROJECT UNIT V: ARTISTIC EXPRESSION THROUGH NATURE

OBJECTIVES: Oregon has many natural wonders which can be captured through the eye, camera, poetry or creative arrangement of natural objects. 4-H members can become more visually aware by creating and expressing their artistic interests through use of their natural surroundings.

The following are a few of many activity ideas you can incorporate into your club.

SKETCHING:

Materials: charcoal, black crayon, brush, India ink, and newsprint

Methods:
- observing
- record impressions on a sketch pad. Examples might be action of wind on trees, water, grass, designs found on wings of butterflies, seeds, petals of flowers, snowflakes
- look for designs and patterns in small objects
- sketch shapes you find in a bird's nest, honeycomb, trees

COLLECTING SPIDER WEBS:

Materials: dark colored construction paper for backing, turpentine, white spray enamel, scissors, piece of old cloth, newspaper to protect shrub

Methods:
- locate spider web, chase spider off web
- spread newspaper to protect shrub and surrounding plants
- spray web from angle with white paint, coating both sides
- touch the colored construction paper to the entire web at once
- clip the supporting guy positions of the web with the scissors to free the web from the edges of the paper
- collect up newspaper
- after the painted web dries you can frame it or put it in a nature notebook

NATURE PRINTS:

Prints of native plants (leaves, flowers, grasses) are easy to do, inexpensive and rewarding. The choise of the type of print to be made will depend upon:

the natural material and supplies available
the age, interest and ability of the group
the time available for the activity
the purpose for the activity (use of finished print)

The prints outlined on the list below range from the simplest to the more difficult.

Fixative may be used on most prints for preserving.

ACTIVITY	MATERIALS	METHOD
crayon prints	natural material (leaves with strong veining) paper, crayons scissors, paste	place leaf veined side up on a rubbing surface cover leaf with paper and rub over in one direction OR place leaf on paper and rub from leaf to paper
spatter prints	natural material, (leaves flowers, etc., press before using) poster paints fabric paint paper, fabric newspaper toothbrushes window screen over a small box	place leaf on paper or fabric place under screen dip toothbrush in paint and rub over screen
spray prints	spray paints leaves, flowers, etc. paper, fabric newspaper	place leaf on paper or fabric spray and allow to dry

Source: Environmental Education Manual, Georgia

NATURE PRINTS (continued):

ACTIVITY	MATERIALS	METHOD
rub prints	cotton colored chalk rubber roller newspapers leaves, flowers	place paper on newspapers coat leaf on vein side with chalk using cotton place leaf on paper, cover and roll firmly
leaf prints	ink pad paper leaves flowers, etc.	place leaf, etc., veined side down on pad--press firmly--remove and place on paper cover with a second sheet of paper--press and rub firmly
block prints	leaves, grass flowers (press before using) printing ink, oil, etc. paper, fabric one piece linoleum tweezers newspapers rubber roller	arrange material as desired put a small amount of paint on the linoleum and roll with roller lift leaf and place on paper or fabric ink side down--cover and roll
dye printing	leaves, flowers water colors dye brushes paper, cloth, etc. rubber roller scissors, paste	cover leaf with paint or dye brush well into leaf and shake off excess place leaf on newspaper pad moisten paper towel and place over leaf--cover with another piece of towel and a magazine and roll cut out when dried and paste to backing

SAND CASTING IN NATURE:

Materials: plaster of Paris and water

Activities:

Go to a park, sand bar or other natural area near the meeting place.
Find a sandy site.
Students form free-form shapes in the sand.
Mix plaster of Paris to a creamy consistency.
Pour into form.
Let dry and then remove.

Note: Sand casting, of course, can be done in the meeting place, but it is most fun in an isolated spot in nature.

In addition to free-form casting you might have 4-H'ers find and cast animal tracks. Best results are obtained by putting a round object, such as a tin can open at both ends, around the track. Pour until the can fills up to one inch. Whey dry, gently remove the cast from the track and then from the can.

HAIKU POETRY:

Haiku is a three-line verse form which originated in thirteenth century Japan.

Characteristics of authentic Haiku:

Three lines: Line one contains five syllables;
Line two contains seven syllables;
Line three contains five syllables 17 syllables in all

English translations do not always follow this pattern.

Each poem includes the season, location, reference to nature.

The subject matter deals with simple things.

There is no rhyme (Japanese words end in vowels or "n" sounds.)

Haiku has few articles or pronouns - syllables can be used for better purpose.

Thought comes first; then the syllables are adjusted to fit the form.

Here are examples of Haiku for inspiration and demonstration by the Japanese masters:

Departing Spring
Hesitates
In the late cherry-blossoms
--Buson

Simply trust:
Do not the petals flutter down
Just like that?
--Issa

The old pond;
A frog jumps in--
The sound of the water
--Basho

Some student expressions:

Earthquake

A monster trying
To escape from his dungeon
Beneath the earth's crust
--Bob Thompson

Mother Tree

Stretching out her arms
To protect the world from the
Fury of the skies
--Judy Harrison

HAIKU POETRY (continued):

The Sea

The sea is like life--
Mighty, big and beautiful
At dawn and at dusk
--Jimmy Farnsworth

Sadness

The dying of the
Flowers, the turning of the
Grass, the autumn breeze
--Jean Gregory

TRACK SILHOUETTES:

Sketch a track of some animal on black paper. Cut it out and paste it on white paper. The class might make a whole collection of these.

TRACK CERAMIC DECORATIONS:

Impressions of small tracks may be made in the wet clay of various ceramic objects which will become permanent when the object is fired. Track pendants, pins, and other clay objects may be made.

TRACKING BLOCKS:

Tracking blocks can be made and then used for trailing and tracking games. Get some blocks of soft wood two to four inches thick and in proportion to the size of the track desired. Trace the outline of the track of the animal upon the wood and then with a pocket knife or gouge, cut around the track so that it will leave a lifelike impression of the animal's foot when pressed into soft earth. Two holes should be bored into the block and cord threaded through the holes. This is used to bind the blocks to the soles of the feet. When the wearer walks across soft earth, he will leave tracks. Games such as "Hare and Hounds" can be played using the tracking blocks.

WIRE TREE:

You may use No. 18 copper wire for this project. Fold wire back and forth in 18 inch folds. When you have sufficient wire (at least 10 folds and maybe more), fold the wires in half again. Then begin twisting the wire. Twist it tightly. Cut the ends of the wires. Begin pulling wires apart and twisting two or three together to form "branches" for the tree. Continue dividing and shaping until the desired "tree" is formed. Using bond glue, glue the "tree" to a rock or piece of driftwood.

NATURE COLLAGE:

On a piece of cardboard, glue rocks, sand, small pieces of wood or bark, pinecones, etc. Arrange in an interesting design.

NATURE PHOTOGRAPHS:

In a darkroom, arrange leaves, twigs, seeds, or any other natural object on photographic or blueprint paper. Expose to high intensity light. Dip into developer, stop bath, fixer, and washbath. Frame picture with cardboard frame.

MINI-NATURE:

Have children draw in detail a very small thing such as a knot hole, small area of bark, one leaf, one blossom, one wing of a butterfly. Teach them to really look at details. See all the lines, color changes. textures, etc.

VIEW-FINDER PICTURE:

Sometimes children have difficulty drawing landscapes or outdoor pictures because of the immensity of their surroundings. In order to focus in on just a part of it, have them cut a 10-inch square hole in the center of a 12-inch piece of cardboard. They use this as a camera by looking through the hole and drawing just what they see through it.

NATURE MOBILE:

Make mobile from a wire hanger and thread. Tie things from nature on it, such as pinecones, seeds, twigs, rocks, leaves, etc.

SLICES OF WOOD:

(Maybe from the stump of a Christmas tree). Slice the trunk at a slight angle so that the slices are about 1/4 to 1/2 inch. Carve designs, paint pictures, etch or glue things onto the slice. These can also be used as I.D. tags for camp by painting the child's name on it. Drill holes in it and put a strap of leather or yarn through it to use it as a pendant.

WEAVING-WITH-NATURE:

Make a simple loom from sticks and tie on yarn. Weave in leaves, grasses, seed pods, and other objects from nature.

PINE CONE DECOR:

By twisting pipe stem cleaners into various shapes around the cone, all kinds of animals can be made. Also, large pinecones make excellent bird feeding stations by turning them upside down and pouring in melted suet in which seeds and grain have been stirred. When it hardens, hang it on a tree or shrub.

DRIED SEED PODS:

Dried seed pods can be used in various ways. Such plants as the poppy, milkweed, honey locust, or other pods may be painted in bright colors and strung in a large cluster to hang as ones you see in florists or Mexican shops.

CHARCOAL ETCHING:

Have the students blacken sticks in the campfire. After they are burned black at the end, dip them in water which acts as a fixative for the burned end. Drawing should be realistic, stressing light and dark, bold and subtle actions in composition.

COLOR HIKE:

Materials: Collecting bag

Activities:

Take a nature walk around the neighborhood or to a nearby park.

Look for things in nature that are different colors.

Have 4-H'ers identify the colors.

Have 4-H'ers compare and discuss various shades of each color, (i.e.,lightest, darker, darkest).

Have each 4-H'er collect four to five different green leaves.

Upon return to the group, have them arrange leaves in order from lightest to darkest. Discuss this arrangement.

Note: The most variety of colors perhaps could be seen in the spring, but a fall hike would be a good introduction to nature and to color perception.

CINQUAIN POETRY:

Materials: paper, pencil

Activities:

Take a nature walk.

Return to the starting point or find a quiet spot in nature.

Each 4-H'er independently thinks of a subject related to the nature walk.

Copy the following form:

1._____

2._____ _____

3._____ _____ _____

4._____ _____ _____ _____

5._____

Follow these directions for each line:

Use one two-syllable word to name the subject you are thinking about.
Use two two-syllable words to describe #1.
Use three two-syllable words to tell about what #1 is doing
Use four two-syllable words to tell how you feel about #1
Use one two-syllable word that means the same as #1.

The students each read their poem and lead a discussion on their subject.

Note: Cinquain (pronounced sin-kān) is defined as a five-line stanza. In the strict poetic sense, cinquain poetry has five lines with a certain number of syllables per line (i.e., 2, 4, 6, 8, 2). Therefore, the number of syllables per word can be left to the teacher's discretion.

Environmental cinquain poetry can follow other activities also, (i.e., pollution discussion, film on the environment, etc.)

HAIKU AND CINQUAIN POETRY:

Poetry forms or other self-expression activities can be used most effectively in the middle or near the end of a hike. Ask the participants to write about something they have experienced in the hike up to that point (a sound, a smell, an object, a thought, a feeling, etc.). Let those who wish to do so share their poetry with the others. (See the formats for Haiku and Cinquain.)

GROUP STORY:

At a spot that particularly sparks the imagination, let the group make up a story. You could start it off, then let each person add something to the story.

GROUP POETRY:

Group poetry can be done by letting each person write a line or two as part of one whole poem.

OUTDOOR CRAFTS:

Objectives:

1. Teach youth to identify by repetition in handling materials.
2. Teach youth to appreciate natural surroundings.
3. Teach youth to display specimens in a pleasing manner.
4. Let youth teach others through questions asked about different materials used.
5. Teach youth to share specimens through finished craft gifts.

Locating Suitable Materials:

Nature has provided materials almost any place one cares to look. The forest yields many varieties of cones and mosses. Open fields and meadows provide seeds and seed pods from the many weeds and flowers. Walks through parks, along roadsides, and around your own yard can often yield a surprising variety of materials. Some trees provide colorful berries suitable for craft projects. (Leaders should encourage children to use good conservation habits when gathering specimens for any purpose.) Do not climb trees to gather cones, use only those that have dropped. When gathering pods and seeds, always leave a few.

Treatment of Materials:

To rid pods and cones of insects, place on a foil-lined cookie sheet and place in a 200° oven for just a few minutes.

Waterless hand cleaner is handy for removing pitch and floor tile glue from hands.

Texture, Size and Color:

Children should be encouraged to blend different textures, sizes, and colors together for more pleasing eye appeal. By adding yellow, orange, red, and green materials to the many shades of brown, a bright cherry effect is obtained. The two best sources for yellow color are yellow yarrow and Tansy blossoms. (This Tansy is the button type flower, not the ragwort variety.)

A few suggested materials:

Cones	Pods	Seeds & Nuts
Pine	Oak acorns & caps	Wheat
Spruce	Beachnut	Pine
Redwood	Rose Hips	Hazelnut
Hemlock	Teasel	Pecan
Cedar	Poppy	Black Walnut

Moss, Mountain Ash Berries (must be pre-dipped in shellac), eating chestnuts (use the green, immature husks), horse chestnuts (use the brown nut).

Source: Jeanette Benson, 4-H Leader, Washington County, Oregon

Activity #1 - WALL PLAQUE:

Materials Needed:

Extra tacky white craft glue (this glue dries clear)
3-1/4 inch heavy cardboard circle
3-1/4 inch green felt circle
18 inches of 5/8 inch velour ribbon (green)
1 pine cone (White Pine)
Assorted pods and cones (smaller varieties)
Moss
1 can of clear plastic spray

1. Glue and staple velour ribbon to back of cardboard circle with a 1-1/2 inch loop at the top. Glue felt circle to back of cardboard and ribbon. Cut petals from middle area of White Pine cone (save tip and bottom ends for other projects.)
2. Petals should be approximately 1 inch long.
3. Glue cone petals onto right side of cardboard. (Glue must be used generously.)
4. Let dry for at least one day.
5. Glue largest cone or pod (use medium-sized Lodgepole Pine or medium pod) in center of plaque.
6. Add smaller pods and cones around the center cone and work to outside to within 1/2 inch of edge.
7. Fill in moss between cones and pods whenever needed for color. (Moss may be added without glue by pushing it between the cones and pods with a toothpick.)
8. Let dry. When thoroughly dry, spray with a clear plastic.

Note: If members have trouble getting pods and cones to stay with the white glue, they may use the adhesive used in activity #3, if they are supervised by one or more adults. THE ADHESIVE IS TOXIC IF INGESTED.

ACTIVITY #2 - ECOLOGY BOX

Materials Needed:

Cigar box or other strong, firm box of appropriate size
Heavy duty cardboard for shelves and dividers (shelves and dividers are to be same depth as box)
Extra tacky craft glue that dries clear
Assorted seeds, pods, cones and rocks
Paint

1. Cut lid off of cigar box.

2. Glue shelves and dividers into box and let dry.

3. Paint or cover outside of box.

4. Add seeds, pods, etc., to each cubicle.

5. Apply glue to outer surfaces of dividers, shelves and box edges.

6. Apply heavy-duty clear plastic to front of box, thereby sealing in all materials.

ACTIVITY #3 - VOTIVE CANDLE HOLDER:

Note: Caution must prevail when using the adhesive glue used in this project. IT IS TOXIC IF INGESTED.

Materials Needed:

popsicle sticks
small containers to hold individual amounts of adhesive
green colored floor tile glue (other glues not tacky enough or thick enough to sufficiently hold cones and pods in place)
glass votive candle holder
1/4" x 4" plywood or chipboard circle
1 Sugar Pine cone
Douglas Fir cones
moss
assorted pods and cones
1 can of clear plastic spray

1. Cut 10-11 Sugar Pine petals from center of cone (save the tip ends for other projects)
2. Petals should be approximately 1-3/4" to 2" long
3. USE GENEROUS AMOUNTS OF GLUE ON PODS AND CONES
4. Glue candle holder onto center of circle. Let dry.
5. Apply tile glue to bottom end (seed end) of petals with a popsicle stick and glue to outer edge of circle with petals extended from circle approximately 3/4" - 1". Let dry.
6. Cut Douglas Fir cones (cones should not be large ones) lengthwise into quarters.
7. Glue the quartered fir cones to circle around the glass candle holder (The fir cones are to add depth and will be covered by the more attractive materials.)
8. Apply three largest cones or pods equally spaced around the glass on top of fir cones (slant these cones and pods slightly away from glass).
9. Fill in with other pods and cones until full.
10. Fill in slight gaps here and there with moss and yellow flowers (moss needs no glue if pushed into gaps with a toothpick).
11. When dry spray with clear plastic.

WHERE TO FIND ADDITIONAL INFORMATION

Your library contains a wealth of reference materials you can use to plan outdoor activities. Look in the subject index guides under Camping, Birds, Trees, Wildflowers, Geology, Water, Weather, or whatever topic you are interested in. Also check the periodical section for relevant magazine articles.

For background information for planning field trips, localized publications are frequently more helpful than nationally distributed books in giving the specifics you need about routes and weather conditions. Outdoor stores usually have a good supply of regional publications on hand if you can't find the information you need at your library.

Also, the Oregon State University Cooperative Extension Service has many pamphlets and brochures which pertain directly to Oregon and the outdoors.

Other agencies which will provide films and/or additional support materials are:

U.S. Dpeartment of the Interior - Bureau of Land Management
Oregon State Office
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