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Keith L. Smith, Associate Vice President for Agricultural Administration; Associate Dean, College of Food, Agricultural, and Environmental Sciences; Director, Ohio State University Extension; and Gist Chair in Extension Education and Leadership.

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4/12—800—P62420
4-H Outdoor Adventurer
Fishing for the Intermediate

What We Will Learn

Your 4-H fishing project will give you many chances for fun and learning this coming year. Here is what we hope you will learn your second year in the fishing project:

... to enjoy outdoor experiences in fishing;
... to engage in field and stream activities;
... more about conservation;
... more about fish habits and ecology;
... more about streams, lakes, and ponds;
... to develop fishing methods in casting;
... cleaning and care of your catch;
... more about 4-H.

How We Will Learn

For your second year project, you should try to attend and be part of 4-H club meetings and fill out the project book. The second year project is written so there will be activities year around for you to participate in, either as adventurer club group member or individual. From the suggested activities listed in this project book, your advisor, some parents, club officers, and junior leaders will help you plan the yearly program. Along with suggested activities, we are sure you can come up with more events for everyone to participate in for the coming year. This 4-H fishing project should not be limited by just what is listed under the activities section, but broadened to meet the needs of your location and program ideas.

Demonstrations

Every member should try to give a demonstration for the coming year. Demonstrations or talks will help you show others about safety, fish, fishing, conservation, ecology, care of the catch, casting, or anything else you feel is important. Use everyday materials for your demonstration to show how to do something. For additional help, ask your 4-H agent for 4-H Circular 909, "Demonstrations." Remember, everyone who gives a demonstration is a winner.

Exhibits at County Fair

You may want to make something to exhibit at the county fair. From working through this project book, you will find many ideas—an exhibit may demonstrate fish structure, habits, and habitats; fish in relationship in conservation; cleaning and care of your catch. You will probably think of other possibilities.

Club exhibits should be on conservation.

FISHING IS FUN AND EDUCATIONAL

Welcome to "Outdoor Adventurer... Fishing for the Intermediate." In this project you will learn more about fish, fishing equipment, casting, care of your catch, and ecology. You will find out that fishing is not only fun, but a world full of interesting areas in which you can discover more about fish and man's relationship to his surrounding environment. Good fishermen are wise conservationists. They are observant not only about knowing different types of fish, but also about how fish feed and why water conditions and pollution affect wild life and plant life that depend upon clean water. Good fishermen are always concerned about the well being, health, and cleanliness of lakes, ponds, and streams.
Member Project Guide

Project Background

This intermediate level project is designed for members with some fishing experience. It is an excellent follow-up project to Fishing for Beginners (4-H 623).

Check your county’s project guidelines for additional requirements, especially if you wish to participate in county project judging or plan to exhibit at the county fair.

If you complete this project and want to do more take a self-determined project in fishing (4-H 365). Ask your 4-H advisor for details.

Project Guidelines

1. Complete the Planning Section of this guide (Steps 1 through 4).
2. Explore all five Interest Areas
3. Complete all exercises within each Interest Area.
4. Take part in at least two Learning Experiences
5. Become involved in at least two Citizenship/Leadership activities.
6. Complete all county project requirements. (Check with your advisor for these.)
7. Work with one or more members and adults to complete one of the suggested activities on pages 22 to 26.

Planning Your Project

Step 1: Activity Guides

Explore all five Interest Areas listed. As you begin to investigate an area, place the current date (month and year) next to it.

<table>
<thead>
<tr>
<th>Date Started</th>
<th>Interest Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Fishes’ Body Structure and Habits, Pages 7 to 9</td>
</tr>
<tr>
<td></td>
<td>2. Where to Find Fish, Pages 9 to 13.</td>
</tr>
<tr>
<td></td>
<td>3. Fishing Methods, Pages 13 to 19</td>
</tr>
<tr>
<td></td>
<td>4. Fishing Equipment, Pages 13 to 19</td>
</tr>
<tr>
<td></td>
<td>5. Care and Cleaning of the Catch, Pages 19 to 21</td>
</tr>
</tbody>
</table>

Step 2: Things To Do

Complete all Exercise sections in the Interest Areas. Have your parent or advisor initial and date what you complete.
Step 3: Learning Experiences

Select at least two of the Learning Experiences listed below and plan your involvement in the “Report of the Learning Experiences” chart. Before starting your project, write your choices in the section labeled “Plan to Do.” Once you have completed an activity, record what you did and when. Learning Experiences may be added and changed at any time.

**Sample Learning Experiences**

<table>
<thead>
<tr>
<th>County Project Judging</th>
<th>Fishing Trip</th>
<th>Project Meeting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstration</td>
<td>Illustrated Talk</td>
<td>Radio/TV Presentation</td>
</tr>
<tr>
<td>Fishing Clinic</td>
<td>Mall Show</td>
<td>Speech</td>
</tr>
<tr>
<td>Fishing Exhibit</td>
<td>News Article</td>
<td>Tour</td>
</tr>
</tbody>
</table>

**Report of Learning Experiences**

<table>
<thead>
<tr>
<th>Plan To Do</th>
<th>What I Did</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Example) News Article</td>
<td>I wrote a news article about my club's fishing trip which was printed in the local newspaper.</td>
<td>July 15</td>
</tr>
</tbody>
</table>
Step 4: Leadership/Citizenship Activities

Check the activities you wish to do or plan your own in the space provided. Do at least two. Keep track of your progress by dating (month and year) what you complete. Leadership/Citizenship activities may be added or changed at any time.

<table>
<thead>
<tr>
<th>Plan To Do</th>
<th>Date Completed</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Encourage a friend to join 4-H</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Encourage someone to take a fishing project</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Help another member with their fishing project</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Teach someone outside 4-H about fishing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Help stock a public pond</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Invite someone to talk to your club about fishing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Help clean up a littered fishing area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Help establish fish habitat areas in local ponds or lakes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Help organize a fishing derby or clinic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Apply something you learned about fishing to benefit your family or community</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do a fishing safety presentation at a club meeting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plan your own activity here.</td>
</tr>
</tbody>
</table>

Project Review

Once you finish your planned activities have your parent or advisor review the project with you. Depending on your county system, you could receive special 4-H project awards for your effort. Advisors should refer to Advisors Guide to 4-H Project Planning and Incentive Programs (4-H 956) for details.
Fishes' Body Structure, Habits, and Habitats

Fishes are a varied group of some 40,000 species, most of which have skeletons of bone. The exceptions are the few hundred species of sharks, rays, and lampreys, which have skeletons of cartilage. Most bony fishes are covered with overlapping scales over which there is a thin skin that secretes a coating of slime. This aids the fish in slipping through the water and protects it from parasites (a plant or animal that lives on another). A fish's age can be determined by counting the rings on its scales, much like counting the rings for determining the age of a tree.

The typical fish has two sets of paired fins (pectoral and pelvic) and three unpaired fins (dorsal, anal, and caudal). It swims mainly by wagging its body from side to side and using its fins for steering.

A fish breathes by alternately opening its mouth to let in water, then shutting its mouth and forcing the water back over its gills and out the gill openings. As the water passes over the gill filaments, dissolved oxygen is exchanged for carbon dioxide.

At the opposite extreme are flat or chunky bottom-dwellers. Usually slow swimmers, they do not jump when hooked, but may pull hard as they bore deeper into the water. Some will saw the line in two on pilings or rocks.

Many fish that live in quiet waters between the surface and the bottom have a compressed body—flattened from side to side. Members of the sunfish family in fresh water, among others, or pompanos, in salt water, for example, are of this type.

Many fishes are protected from enemies by sharp spines or spiny fins, some of which are poisonous. A puffer can inflate its body until it is too large for a predator to swallow. Groupers and flounders are among the fish that can change their color or pattern so they blend with their surroundings.

Exercise: By observing the scales of three species of scaled-type fish, estimate their age.

A fish's shape is a clue to where it lives, how it feeds and the sort of fight it puts up when hooked. Fish of the open sea generally have a spindle-shaped body. They depend on speed to escape enemies and to catch food. They fight hard. Many kinds leap from the water as they try to get rid of the hook. Marlings, tunas and mackerels are among these fast, streamlined fish.

---

Exercise: List five fish found in open waters that depend on speed to catch food or escape from enemies.

1. 
2. 
3. 
4. 
5. 

List three bottom-feeding fish.

1. 
2. 
3. 

List four ways fish protect themselves from enemies.

1. 
2. 
3. 
4. 

SENSES. Fish detect danger and find their food by senses of sight, hearing, smell and taste. Generally, fish

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*Adapted From A Guide to Fresh and Salt-Water Fishing, Copyright 1965 by Western Publishing Company, Inc.*
with a well-developed sense of sight are predators; they eat smaller fish or other live, active animals. Their sense of smell is not so well developed as it is in bottom feeders, many of which are scavengers.

SIGHT. A fish's eyes are at the sides of its head; thus, it can see behind as well as in front. Experiments have demonstrated that many fish can detect even slight variations in form and that they can see colors ranging over the spectrum from red to violet. Fresh-water bass, for example, often show strong preference for lures that are red or yellow. A fish can focus on near objects and can detect even slight movements in distant objects. Distance vision is limited by the short range light travels in water. Fish that live at moderate depths or those that feed in dim evening or morning light may have large eyes. Fish that find their food mainly by its odor, as do catfish and eels, have small eyes. Fish that feed mainly by sight readily take artificial lures.

When a fish looks from the water, it sees a "circular window," which varies in size with the clarity of the water and the fish's depth.

Animals on shore or in the air, though, when looking into the water do not see things in the water in their exact positions. This is because light rays bend in passing through water. Thus, a fish's exact location varies with the observer's viewing angle.

HEARING. Vibrations travel more rapidly and also greater distances in water than in the air. Lures that gurgle, pop, or rattle attract a fish's attention; they can be "heard" without being seen and are effective at night or in murky water where silent lures pass unnoticed. Fish do not hear fishermen talking because the sound waves are in the air, but banging on a boat sets up vibrations in the water that may frighten fish away. A fish picks up vibrations through the ear bones in its skull; it has no external ear openings. Also its lateral line (see picture below) with pores opening to the outside, detects low frequency vibrations, such as footsteps on the bank, as well as changes in pressure of current direction.

SMART AND TASTE are closely related, but smell is effective at a distance while an object must be contacted to be tasted. A fish's nostrils are blind sacs lined with a tissue sensitive to odors. At spawning time, salmon find their way from the sea to their parental stream by the odor of its water. They are guided to a new spawning area by an odor path of the old stream. Odor can also be important to detecting food. Odors given off by alarmed or injured minnows attract predators. Thus, a bass may seek a wounded (hooked) minnow used for bait. Some predatory fish have highly developed sense organs located on "whiskers." Taste organs on whiskers or barbels help catfish, drums, and others find food. Natural baits, especially those with strong odor, work best for these fish.

Wise 4-H'ers will learn all they can about fish. They will learn about their habits, why and where they live and how their environment affects eating habits and life cycles.

Exercise: List fish you have caught, or that you believe may depend on odors to find food.
List fish you have caught that depend on sight and speed for catching food.
List types of artificial and natural baits that the following fresh water fish would most likely be attracted to and why:
Bass
Bluegill
Catfish
Carp
Walleye Pike
Northern Pike

At what time of day do the above-named fish feed? Why?
Why Fish Bite*

Fish are opportunists. If conditions suit them, they generally feed whenever food is available. A hatch of insects on a stream brings the trout out of hiding. A school of minnows stirs the appetites of bass or mackerel. Sometimes, often in competition with others of their kind, fish will continue to eat until they are too full to swallow more. On the other hand, they may refuse food for long periods, even when it is dangled in front of them.

There are certain factors that strongly affect fish feeding behavior—temperature and current as well as type of fish, are very important.

The temperature of the water has a direct bearing on a fish's hunger and activity. If the water temperature is too low, fish become inactive. As the temperature climbs, its dissolved oxygen content decreases, and again the fish becomes less active. Somewhere between these extremes is a temperature range that fish seek, and it differs with each species. Largemouth bass are most active when the water temperature is between 65 and 75 degrees, while smallmouth bass prefer slightly cooler water—60 to 70 degrees. For brook trout, the best temperature is from 50 to 65 degrees. Lake trout are active in water in the low 40s. Understanding these temperature zones is important, some fisherman, in fishing deep lakes, lower thermometers to measure the temperature of the water at various levels, then put their baits or lures at the proper depth for the fish they are after.

Stop feeding, at least temporarily, when frightened. Also, most fish seem to feed sparingly during unsettled weather conditions. It seems generally true that fish feed more actively when the barometer is rising than when it is falling, but the availability of food and the temperature of the water are more important. Calendars cannot make accurate predictions of good fishing days with any more reliability than they can predict the weather.

Exercise: List & explain which factors influence fish to bite or feed.

Climate, Water Temperature, and Swift Water May Affect Gameness of Fish

Gameness (or the “fighty-ness”) of fish varies a great deal according to climate, habitat and location. Fresh water fish caught from cool water will battle harder than the same species caught from warm waters. Fish caught in fast-moving waters will usually fight more than fish caught from lakes, slower or warmer bodies or water.

Most anglers agree that salt water fish of the open sea are the hardest-fighting fish to be found in the world.

Where to Find Fish and How to Fish Streams*

Riffles (ripples or little waves formed by rocks or other objects found under water), pockets, (small holes gouged out of the stream bed behind rocks or sunken logs) and pools hold most of the game fish in any stream simply because there is where most of the “cover” is located, along with a large majority of the food. Fish tend to spend most of their time in the pools moving into the riffles, just below the riffles, or at the tail of a pool above the riffles to feed at morning and evening. Both pools and pockets appear as a darker color than the rest of the stream. When fishing upstream, the angler casts the slick pool tail first, then

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*Adapted From A Guide to Fresh and Salt-Water Fishing, Copyright 1965 by Western Publishing Company, Inc.

*Adapted From How to Catch Fish in Fresh Water, Fishermans Information Bureau, American Fishing Tackle Manufacturing Association.
the sides and center of the pool; the angler casts the head or riffle last.

Cut-away banks and overhangs are places gouged out by the current under sod banks or shoreline trees, leaving dark, sheltered holes preferred by trout and smallmouth bass. These are difficult to fish, especially when tree roots are involved; thus many anglers pass them up. However, the biggest fish in the stream often lie there and can be taken by a sinking lure fished up and across or fished straight downstream so the current can swing the lure into the hidden part of the overhang where the big fish lie. This method results in many snags, but it is the only way to put real trophy fish in the creel on most heavily fished streams.

Snags and underwater obstructions consist mainly of waterlogged branches or tree trunks jammed on submerged rocks or caught in a slackwater eddy. (In civilized areas snags could also be sunken oil drums, coils of fence wire, old tires and assorted junk). These tend to break up the flow of the current and create shadowed spots where larger fish like to hide. They are also catch basins for all sorts of food drifting downstream and are generally alive with insects, crawfish, and minnows. The veteran fisherman can spot snags either by the dark shadow in the water or by the “V” on the water surface where the snag breaks the current flow. Fish tend to lie close to the obstructions on one side or the other, and sometimes just slightly ahead. Most fishermen tend to cast the tail of the turbulence behind the snag, but the larger fish stay where the current breaks over the front. To fish these spots properly, the angler should cast well above them so the lure drifts in naturally with the current.

Dams and Waterfalls are natural gathering spots for all types of game fish. The water has usually gouged out deep spots below the spillways, and the turbulence keeps the water well-charged with oxygen. These places also act as barriers to fish migrating upstream, stopping and holding them in hungry schools. Thus, such places are also congregating spots for fishermen, and in urban areas are heavily populated.

**Exercise:** List four places to find fish in streams and explain why fish can be found at these places.

1. 
2. 
3. 
4. 

List factors which affect gameness of fish

Explain how to fish a deep pool when fishing upstream

---

Where to Find Fish and How to Fish Lakes

Weedy shallows are the food production areas of most lakes and therefore are favorite feeding spots for most game fish. Insect life is abundant and minnows seek out the weeds for shelter. Bass, pike, and muskies like to lie in “weed tunnels” at the edge of an opening where they can charge out at schools of small fish darting by. Various types of weedless lures or non-snag lures have been developed just for this type of environment. Generally, the best fishing is in the thickest part of the aquatic “hay stack” where the inexperienced angler would not consider making many casts.
Fallen trees offer shaded cover against the shoreline and attract a variety of fish for different reasons. Crappies gather to hang their spawn on the branches in the early spring, and offer excellent sport on light tackle. Bass and pike will use fallen trees as ambush points, lying motionless in the branches and waiting for unwary baitfish or frogs to pass within reach. An excellent way to score on these fish is to cast a weedless lure into the branches and work it slowly over the obstructions into open water. Bass and pike are used to picking off frogs, mice, salamanders and other food doing the same thing, and this type of retrieve will often trigger them into striking. These are also fine spots for bluegills, and a popping bug dropped close by will bring strikes.

Drop-offs are another place fish gather. Drop-offs are those areas where the bottom of the lake changes abruptly from shallow to deep. In clear water they appear as dark lines against the lighter hue of the shallows. They are spots where fish tend to congregate. Minnows will run in schools along the edge, while larger game fish lie along the dark outer shelf waiting for unwary minnows to pass by. These are also spots where aquatic insects hatch out of the gravel bottoms and swim toward the surface to take flight. In the evening, game fish lie along the drop-offs feeding on these emerging tidbits. Many successful anglers wade the shallows, casting into the deep water and retrieving their lures or flies up to the edge of the drop-off. Another way is to fish by boat from the deep side, working the lure to imitate a minnow swimming from the shallow over the edge into the deep water. A third, and also effective, method is to drift down the edge of the drop and cast parallel to it, just off the deep side.

Gravel bars also are of importance to fishermen. Gravel bars are submerged mounds of sand and gravel at varying depths. They are usually the hatching area for various insects and the home of crawfish and game fry. In shallow water these bars are feeding areas, and in deep water, they are used as “loafing” areas. Best results in the shallows are obtained by casting over the bar and bringing the lure up over the top and down the other side. In deep water, anglers score well by trolling the length of the bar with deep running spoons and plugs.

Exercise:
List four places to find fish in lakes.
1. 
2. 
3. 
4. 
Explain why fish can be found at these places.

Would fishing methods be different in a stream compared to techniques used in ponds?
Explain.

Are Ponds Different from Lakes?
There are considerable differences between ponds and lakes. Lakes are usually larger bodies of water wherein the water is too deep for plants to grow, except for around the shoreline. Ponds are smaller and less deep, and plants usually grow completely around and down in them. Water temperature levels are about the same in lakes due to the larger amounts of water, but
ponds vary greatly because their shallow water is quickly affected by air temperatures. Ponds also are quieter bodies of water. Deep lakes have fairly stable water layers, whereas a pond’s oxygen and temperature may vary a great amount in a 24-hour period.

**Farm Ponds in Ohio**

For more information about farm ponds, contact your county Extension agent for current Extension bulletins containing information on stocking ponds, maintaining good fishing population, weed control, and enjoying wildlife around your pond.

You may also be interested in 4-H project #617 “Exploring Ohio Ponds.” If you can obtain a copy of this publication, or another reference, try to answer the following questions:

**Exercise:**

Explain—what are the requirements for a good pond?

<table>
<thead>
<tr>
<th>How can good fishing be maintained in a small pond?</th>
</tr>
</thead>
<tbody>
<tr>
<td>List wildlife that may be found in and around a farm pond.</td>
</tr>
</tbody>
</table>

**Where Fish Live in Deep Lakes and Farm Ponds**

Fish live where their food can be furnished and cover may be found. This is usually around the rocky edges of lakes, weedy shallows, fallen trees, dropoffs and gravel bars.

Deep lakes provide fish with the same sorts of food and cover situation as do ponds and shallow lakes, but because a large, deep lake covers a great area, its best fishing spots may be harder to find.

Throughout the year, deep lakes undergo changes that are interesting and will help fishermen to learn more about catching fish that live in a larger water area. Deep lakes go through seasonal changes that affect the eating habits of fish.

During the winter months, when ponds and lakes start to freeze, the water cools down to 39.2 degrees F., the temperature at which water is heaviest. As water becomes cooler than 39 degrees, it becomes lighter and circulates to the top of the pond, where it will freeze at 32 degrees or less. During the winter, when water is freezing or ice has formed on ponds, fish will become inactive and stay in deep water where the temperature is warmer and there is more oxygen. When spring arrives and the ice melts, a lake is said to “turn” as water circulates from top to bottom. Water temperature becomes the same throughout at this period of time. During this period of spring and fall, fish feed at the surface or in the shallows, where food may be found and oxygen is furnished at a high level throughout the lake.

Oxygen and carbon dioxide in ponds and lakes have an interesting relationship. Oxygen is absorbed much slower in water than carbon dioxide. Movement of the water surface helps oxygen to be absorbed in water. Additionally, during daylight, another process, called photosynthesis, causes water plants to give off more oxygen for fish to use. In daylight a reserve of oxygen builds up. In darkness, when photosynthesis stops, both fish and plants compete and use up this stored oxygen.

Sometimes during winter, a cover of ice stops the wind from circulating the water. Winter stagnation may occur under these conditions. Further, when ice is formed over ponds and snow covers the ice, the snow acts as a blanket and screens out the light, which stops photosynthesis among plant life. This, together with plants using oxygen and decaying materials giving off carbon dioxide, creates a lack of oxygen. “Winterkill” occurs, which means many fish die due to oxygen starvation.

Summer brings about another change in the deep lake that is most interesting. During early summer months, water in reservoirs and deep lakes that have little or no inflowing currents divide into three horizontal layers. These layers keep their positions until

*Adapted from A Guide to Fresh and Salt-Water Fishing, Copyright 1965 by Western Publishing Company, Inc.*
the cool temperatures of fall bring about a "turnover" similar to conditions found in spring.

In deep lakes, these three layers are—
top layer—epilimnion—which contains rich supply of oxygen that sustains fish life;
middle layer—thermocline—which contains a fair supply of oxygen;
bottom layer—hypolimnion—which is a dark, stagnant layer that does not have enough oxygen to support fish. Heavy concentrations of carbon dioxide prevent fish from living in this layer.

To catch fish, you must do your fishing above this bottom layer. You may wish to perform the dip-stick test activity found in the activities section of this project book to determine where fish may be located in a deep lake. Remember, this condition exists only in the summer.

---

**Exercise:**
Could a fisherman be fishing at too deep a level in a deep lake during the summer and not be able to catch fish?
Explain (see dip-stick experiment)

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**FISHING METHODS AND EQUIPMENT**

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**Learning to Cast**

Now that you have learned more about fish, you may wish to learn more about improving your casting skills with different fishing tackle.

**Casting Contest**

**Exercise:** Members of your club may wish to have a casting contest. This would be a good way for you to practice your skills in developing fishing tight spots where fish are most likely to be found.

All you need is a bicycle or car tire to act as a target, plus your tackle, and some group participation. Good luck and happy casting!

---

**Bait Casting**

**Selecting Your Tackle**

For the beginner and for general fishing, the most suitable outfit is one in the light-action, medium-price range. The components of such an outfit are a light-action rod 5- or 5½ feet long, a reel with standard-width spool, a 12- to 15-pound-break-weight testline and a lure weighing about ½-ounce.

After you have developed skill and experience in using bait tackle, you may wish to purchase a very light outfit for getting greater accuracy and distance in your casts. The lighter the breaking weight of a line, the farther and more accurately the lure can be cast.

A very light action outfit consists of the following: a 6- to 6½-foot very light action rod of tubular glass

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*Prepared by Earl F. Kennamer, Extension Fish and Wildlife Specialist, Alabama Extension Service*
or bamboo; a small spool reel; a 6- to 10-pound test line; ¼ - to ¾-ounce lures. Very light action outfits are usually the best, but are expensive—costing $75.00 and more for rod, reel, a half-dozen lures, and a couple of spools of light test line.

**Casting Directions**

Before beginning, make sure the reel spool is filled almost to the edges with line. A spool one-half to three quarters full will not give the accurate performance of a full spool. If you haven’t enough line to fill up the spool, use a cork arbor on the inner half, or fill it with old line.

For practice casts, use an old lure with the hooks removed or a regular tournament plug. A grassy lawn or a pond are good places to practice; to increase your accuracy, aim at an old 26-inch inflated bicycle inner tube placed on the ground or anchored by string and weights in a pond.

In reading the following directions, imagine that you are standing with your left shoulder against a large clock face.

**DIRECTIONS**

1. Hold the rod handle in your right hand (unless you are left-handed), with thumb on the left rim of the spool to stop the line; make sure the reel crank is up.

2. Aim the plug, which should hang two or three inches from the rod tip, toward the spot where you want the lure to land (see Step 1).

3. Begin with the rod held at the 2 o’clock position (Step 2), and then swing it quickly upward until the tip is pointed skyward, at the 12 o’clock position (Step 3).

4. As the rod tip bends backward, reverse the movement, switching the rod quickly forward and downward. At the same moment, release your thumb slightly to let the spool unwind and the lure go out (Step 4).

**NOTE. NEVER REMOVE THE THUMB ENTIRELY FROM THE REEL SPOOL WHEN CASTING. If you do, the spool will spin faster then the line will unwind, and you’ll have a line snarl or “bird’s nest.”**

5. Just before the plug strikes the ground or water, stop the spinning spool with your thumb, quickly change the rod handle to the left hand (if left-handed, to the right hand), and crank the plug in with your casting hand (Step 5).

It is important to keep the rod at a 1 to 2 o’clock position while fishing. With it in this position, a fish striking the lure will have the spring of the rod to pull against. If the rod tip points at the plug while you are reeling in the fish, he will pull directly against the line. Result: a lost fish or a broken line.
Speaking of lost fish and broken lines, here’s a good tip that may save a fish. Break off about three feet of the line before each fishing trip. This line has been worn thin by constant friction through the rod tip guide and is weaker than the spooled line.

Retrieving a fishing lure is a matter of technique. You will get best results with most floating lures by letting them lie still for several moments. Then reel them in with jerky, “popping” movements. Sinking lures must be reeled in immediately, or they will catch on underwater trash.

It’s important that you learn to use your lures effectively. The bait caster who knows his lures is the one who brings home the most fish.

Try to master correct form—it is important for fishing enjoyment as well as safety. Use your wrist and hand only in casting. Do not let the forearm move more than the slightest bit, and never cast “side-wise” (with the rod switched parallel to the ground or water). Your casting movements should always be vertical.

To become a good caster you need only two things: serviceable, balanced equipment, and plenty of practice.

Spin Fishing

Choosing Tackle

Get a spinning rod 6½ to 7 feet long with light action. You have a choice of two types of reels—open-face and closed-face. On the open-face reel, the line and spool are in full view. But the closed-face reel has a cone covering the spool and line; the line feeds through a small hole in the center of the cone. Probably the advantage of the open-face reel is that you can see and correct line troubles quickly.

If you are right-handed, get a reel with a left-hand crank; if left-handed, get a reel with a right-hand crank.

As a beginner, you should not buy the cheapest tackle or the most expensive. Pick out name-brand equipment in the medium price range.

OVERHEAD CAST

Pulling Tackle Together

Place the reel on the rod handle in line with the rod guides. Move the reel forward and backward on the handle until the equipment feels balanced to you. Draw the line through the guides and attach a spinning plug or casting weight to it. Grasp the rod in the right hand with the reel beneath the handle and with the lure 6 to 12 inches from the rod tip. Slip the “leg” of the reel between the first and second or second and third fingers of the right hand. With the forefinger holding the line almost against the rod, trip the winding bail or “finger” with the left hand. If using a closed-face “spin casting” or “spin bait casting” reel, follow manufacturer’s directions.

DIRECTIONS

Good casting comes with understanding your particular type of equipment and with practice. You can practice casting on your lawn, using a lure or plug from which the hooks are removed.

Overhead Cast. There are several ways to cast, but the overhead cast is the most popular and the safest of all. Directions for this cast were given on page 11. But for review, here they are again, in brief. In casting, imagine you are standing with your left shoulder against a clock face. Hold the rod at 2 o’clock and aim at the spot you want the lure to hit. Bring the rod up sharply to 12 o’clock. As the lure bends the rod backward, snap the rod forward and release your forefinger when the rod returns to the 2 o’clock position. The lure will sail out, pulling your line from the spool. To stop the lure, merely touch the line or reel face again with your forefinger and turn the reel crank with your left hand to bring in the lure.

If using a spin bait casting reel that is placed on top of the handle, crank with your right hand the same as you would a bait-casting reel. The line on this type of reel is controlled with a thumb device.

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Note—With all top-mounted spin bait casting reels, you can use the regular bait casting rod instead of a spinning rod.
Catapult Cast. If you are standing under overhanging bushes and wish to cast beneath low tree limbs, use the bow-and-arrow or catapult cast. To make this cast, point the rod tip toward the spot you wish to hit. Holding the lure in your left hand so that you will not get hooked, pull about three feet offline from the rod tip. (Your right forefinger is holding the line.) Then pull the lure to you. This will bend the rod tip. Release the lure and—a split second later—your forefinger.

Care and Cleaning of Tackle. Be sure to follow the manufacturer's direction sheet for operation, care and cleaning of your tackle.

Fly Casting*

Selecting Your Tackle

Fly casting equipment consists of five pieces: Rod, reel, line, leader, and lure. You should have several lures—flies, popping bugs and underwater lures.

The Rod. For the beginner, a good choice is a two-piece, 8½-foot tubular glass rod in the medium price range.

Most fly rods today are made of glass, but expensive bamboo rods are also available. For fly casting in Ohio, you need a rod with “bass” action—that is, one heavy enough to cast bugs easily. Trout rods are generally too light for casting bugs.

The Line. Buy a “level” line. This means one even in diameter throughout, not tapered. Make sure it is the right size for your rod. Most rod manufacturers specify the size of line that will best “balance” their rods. Line size is indicated by letter—B, C, D, etc., B being thicker than C, C thicker than D.

Fly lines will sink after a period of casting if not cared for properly. Every hour or two while fishing, you must grease or clean the line so that it will continue to float. When you purchase your equipment, be sure to include dressing or cleaner, depending on the type of line you have.

The Reel. There are two types of reels available: the single action and the automatic. The single action reel is wound by hand, while the automatic reel winds and rewinds the line by itself when a lever is pressed.

Because the reel in fly casting is nothing more than a mechanical spool for holding the section of line that you are not casting, many experts prefer the single action reel. Of course, automatic reels are good, but they are more expensive, and in fly fishing, they are not used for "playing" a fish. Too, some automatic reel models are heavy and tend to throw the rod out of balance.

There are several ways to attach leader to line and lure. You can use a barbed eyelet, which most sporting goods stores carry; push the barb into the end of the fly line and tie the leader through the eyelet; or tie a perfection loop knot* in one end of the leader and attach the line through this loop by using a tucked sheet bend knot*.

The Lure. Tie a bug or fly onto the other end of the leader, using a turle knot*.

In your assortment of lures, you should have some small popping bugs for bluegills and larger bugs for bass, plus a couple of underwater spinners.

Casting with A Fly Rod

Learn to cast with proper form, either on lawn or water, before you try to catch a fish. This means you will use rod, reel, line, and leader, but not a lure with a hook! If you begin by casting over water using a lure, you will concentrate on catching fish and never master the art of good casting. Practice an hour or so daily and you will become a fairly good fly caster within a week.

Before you begin, pull 15 to 20 feet of line through the rod guides—the metal eyelets through which the line is strung. Let the line lie in front of you on the lawn or water. Hold the rod in your right hand, with your thumb lying on top of the handle. The reel and guides will be on the underside of the rod. With your left hand, grasp the line near the reel. You are now ready to follow the five steps discussed below. (Again, it will be easier to understand the following directions

*Directions for tying these knots are illustrated on pages 18 and 19.
for casting if you visualize yourself as standing with your left shoulder against the face of a large clock.)

**Step 1.** Holding the rod almost horizontal to the ground, begin pulling in, with your left hand, the line lying on the lawn or water. You are now ready to begin the cast.

**Step 2.** Continue pulling with your left hand until the end of the line moves. Then swing the rod upward with a brisk motion until it is straight up, or at the 12 o'clock position.

**Step 3.** Stop the rod at this position. The line will sail over your head and behind you and will bend the rod slightly backward.

**Step 4.** Just before the end of the line straightens out behind you, swing the rod quickly forward and stop for a split second at the 2 o'clock position to allow the line to sail over your head.

**Step 5.** As the leader nears the ground, lower the rod until it is horizontal to the water or ground. This will allow the line and bug to land smoothly.

### FALSE CASTING

If you want to make a longer cast, you can lengthen your line by “false casting.” This means swinging the rod forward and backward several times without letting the line touch the water.

First, pull a few extra feet of line from the reel before beginning to haul in line through the tip guide (as in Step 1). Then, following the same procedure as in casting, you can bring the rod forward (Step 4), release the extra line from your left hand, and before the leader flying overhead touches the water, begin another backcast, at the same time pulling more extra line through the reel. You release this extra line with each forward motion of the rod and pull more line from the reel as you make the next backcast.

To make a shorter cast, pull out less than 15 feet of line.

### FISHING WITH A FLY ROD

After the line strikes the water, wait a moment, then begin moving the lure across the water toward you slowly pulling the line in while twitching the rod tip slightly to make the lure look like a live insect. After you have moved the lure in 3 or 4 feet, make another cast.

When a fish strikes, quickly snap the rod upward at the same instant, or else you will not hook him. Once he has taken the hook, keep a bend in the rod tip while you pull in line and fish together by hauling the line in with your left hand. To keep the line from slipping when you reach upward to pull in more line, clasp it against the rod handle with the fingers of the right hand. Or, instead of pressing it against the rod, simply grasp the line between the right thumb and forefinger.

### PERFECTING YOUR TECHNIQUE

As the greatest fault of the beginner is not giving the line time to straighten out in the backcast (Step 2), it may be helpful to count “one-two-three” rhythmically during the cast. Follow the directions for casting, counting “one” as you lift the rod upward in Step 2. The rod will get to the 12 o’clock position before you can say “two.” Count “two” then; as you say “three,” whip the rod forward. By holding the rod up for the whole length of count “two,” you give the line time to almost straighten out behind you before you begin the forward cast.

Keep in mind that in fly casting the wrist and forearm are used, not the upper arm. You can teach yourself this trick by placing a folded newspaper between the upper part of your arm and your side. If the newspaper falls, you are casting incorrectly—using your upper arm rather than wrist and forearm.

It pays to master skill in casting before you ever tie a lure to a leader.

### Frequently Used Fisherman’s Knots

Frequently, you will need to tie knots to secure lures, hooks, etc. on your line. The diagrams below show how to tie several different knots that may be of help to you while fishing. Learn how to tie several of these knots and show your ability to club members by giving a demonstration on knot tying and telling how the knot is used. This would be a good activity for a club meeting. If you enjoy tying knots, you may also be interested in 4-H project 540, *Rope*.

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*Improved Clinch Knot*—for tying on lures, hooks, swivels.

*Turle Knot*—for tying flies or lures to leader material.
Turning Back Unwanted or Non-Keeper Fish

Make sure that you turn back all unwanted or smaller "non-keeper" game-fish so that they may grow up and be food and fun for someone else to catch. Never take home or meaningfully kill fish that you will not eat.

Releasing Fish. Be gentle and handle unwanted fish as little as possible. Keep hand moist by dipping in water when removing hook from turn backs. If hook is embedded so deep that damage may occur, cut off hook between eye and leader. Lay fish back into water. When reviving is necessary, hold fish forward in current or move fish through water in a gentle swim-like fashion.

Chilling Fish just as soon after they are caught is absolutely necessary for freshness. However, this can rarely be done, so fish should be kept alive or cool and moist until they can be cleaned.

Keep fish alive on a stringer (chain, cord, or plastic) by hooking stringer through lower jaw and placing back into the water. If fish cannot be kept alive and several hours will pass before they will be cleaned, make sure that gills and entrails are cut out to prevent spoilage.

Scale Fish. To scale fish, you will need a dull hunting knife or scaling tool. Hold fish by tail and scrape from tail to head. Sometimes fish are easier to scale if they are dipped into hot water for a few seconds. After scaling, cut off head and pectoral fins and remove dorsal, anal pelvic, and caudal fins. See figure 1, Dressed Fish.

Dressed Fish. Fish that have been drawn and scaled usually have had the head, fins, and tail removed (Figure 1). Fillets. Ready-to-cook, boneless solid pieces of fish cut lengthwise away from the backbone (Figure 2). Steaks. Ready-to-cook cross section slices of large dressed fish (Figure 3). Fish Sticks. Pieces of fish cut lengthwise or crosswise from fillets or steaks into pieces 1 inch wide and 3 inches long (Figure 4).

*Adapted From A Guide to Fresh and Salt-Water Fishing, Copyright 1966 by Western Publishing Company, Inc.
Skinning and Cleaning Catfish. For best results and ease of skinning, dip catfish into hot water for a few seconds to loosen skin. Bring out of hot water and (1) nail head to board by laying flat-side down and nailing through head; (2) cut skin around head and pull back skin by using pliers; (3) pull skin off to tail; (4) cut catfish head off by cutting behind dorsal fin at angle toward head; (5) break off head and make a cut along stomach from pelvic fins to anal fins. Pull entrails out and clean inside of catfish from excess blood and vessels. Your fish is now—with a little cornmeal or flour and grease—ready to put into a skillet.

Freezing Fish. Scale, dress, wash and cut fish as for cooking. Small fish are usually frozen whole, while large fish are cut into round steaks or fillets (boneless strips). Dip the fish or pieces in cold water and package. Place pieces of packing material (freezer paper, wax paper, something similar) between the fish or pieces to keep them from freezing together.

Freeze fish promptly, as stale odors and flavors develop rapidly if kept at warm temperatures. Frozen fish dry out easily and special care is necessary in packaging.

**HOW TO FILLET A FISH**

Fish can be frozen whole or cut up.

1. From a camp cook’s point of view, here’s an analysis of a fish’s essential parts.

"How to Freeze Meat, Poultry, Fish and Game" University of Arizona Circular 281.
2. With a sharp knife, slit skin along back from tail to head and along line (A).

3. Grasp skin with pliers as shown. Peel back. Use knife as "helper" if necessary.

4. Insert knife carefully under flesh next to back bone. Remove fillets on both sides.

5. Here is the fillet. From most fresh-water fish it will be boneless, ready to fry.

Exercise:
Explain how to care for caught fish.
Explain how to handle fish to be released.
Explain how to clean, scale, and skin different types of fish.
ACTIVITIES SECTION

Foreword

Listed below and on the following pages are some program ideas that may be of help to you in planning and conducting programs for the coming year. These suggestions are only suggestions, and it is hoped that you will develop many more ideas for adventure club meetings throughout the year. Hopefully, some of the listed exercises will help you to develop more meaningful programs for all who participate in Outdoor Adventurer activities. It is strongly urged that members and advisors of your club sit down, plan, and organize meetings and programs for the coming year. The following suggestions should help you to meet this goal.

OHIO FISH IDENTIFICATION MEETING

Purpose: Learn to identify ten or more species of fish that are found in Ohio.

<table>
<thead>
<tr>
<th>Business</th>
<th>Answer roll call by naming your favorite fish or a different fish.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Work</td>
<td>Fish identification: Free fish identification sheets may be secured from:</td>
</tr>
<tr>
<td></td>
<td>Ohio Department of Natural Resources</td>
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<tr>
<td></td>
<td>Publications Center, Bldg. B</td>
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<td></td>
<td>Fountain Square</td>
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<tr>
<td></td>
<td>Columbus, Ohio 43224</td>
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<tr>
<td></td>
<td>Phone: 614-265-6300</td>
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<tr>
<td></td>
<td>Ask for publication 334, and fish identification sheets on common fish found in Ohio.</td>
</tr>
<tr>
<td>Other Educational &amp; Service Programs</td>
<td>Pin the part on the fish.</td>
</tr>
<tr>
<td>Recreation and Social Activities</td>
<td>Name-the-fish contest.</td>
</tr>
<tr>
<td></td>
<td>Tell about your favorite fish.</td>
</tr>
</tbody>
</table>

KNOT TYING

Purpose: To learn how to tie simple but frequently used fisherman’s knots while fishing.

See frequently used fisherman’s knots in project book and learn to tie and use these during a club meeting and while fishing.

FISHING STORIES AND TALES MEETING AND PARENT’S NIGHT

Purpose: To invite elderly anglers and members’ parents out to a meeting. Anglers will share fishing stories, exhibit gear and show pictures of fish caught through years of fishing experience.

VISIT FROM COUNTY AGENT OR EXTENSION STAFF

Purpose: To have 4-H Agent talk about all the opportunities in 4-H, about projects, County Fair, and give some suggestions about camping.

A VISIT FROM THE COUNTY GAME PROTECTOR

Purpose: To have the county game protector visit a club meeting and talk about fishing and hunting laws, exhibit some equipment and answer questions for your Adventurer Fishing Club.

CLEAN UP EQUIPMENT

Purpose: To clean fishing equipment and prepare gear for spring fishing.

During a winter club meeting, bring dirty equipment and gear to meeting for an evening devoted to cleaning up equipment and getting ready for spring.
CASTING CONTEST

Purpose: To develop skills and accurate casting techniques.
All that would be needed is an old tire, bucket, etc. to act as a target, and fishing tackle.

RAISING LIVE BAIT

Purpose: Because fishing is such a popular sport in Ohio and because there are so many farm ponds in the state, raising live bait may be a good money-earning project for a club or individual 4-H member.
Persons who would like to know more about the live bait industry and how to get into it should contact the District Wildlife Office of their county.

OVERNIGHT CAMP-OUT AND FISHING TRIP
(only by adult supervision)

(secondary fishing members should make two or more camp-out trips)

Purpose: To enjoy the fullness of outdoor group living and adventure by a camp out.

Suggested Equipment needed:
1. Shelter (tent or some kind of covering).
2. Ground Cloth. Material to be used between you and the ground.
3. Sleeping bag or two or more blankets.
4. Proper clothing for season and occasion.
5. Poncho or raincoat if you expect rain.
6. Insect repellant.
7. Flashlight & matches.
8. First aid kit.
9. Cooking utensils (one pot, one pan, plate, cup, fork, knife, and spoon).
10. Water.
11. Food

Don’t forget your fishing equipment and bait.
Answer the following questions at the next 4-H Club meeting after the camp-out.
1. What were some camping problems? How will we improve our next camping trip?
2. Who was the best cook?
3. When was the best time for catching fish? Why?
4. What kind of fish did we catch at night? Why?
5. List some things the club would like to try out on the next camp-out.

A BAIT HUNT

Purpose: To learn about minnows and earthworms and secure bait for a club fishing trip.

Suggested ideas:
Catching bait or raising bait may be just as much fun and educational as fishing. There are many different types of baits to use and fish with, but only two types of activities are suggested here.
Catching Minnows

Equipment needed to catch minnows: Seine, minnow trap bucket, & wading shoes. Members of the club should go out to a small stream and seine for minnows or set bottled or wire traps.
Answer the following questions:
1. Where did you catch most of the minnows? Why?
2. What purpose do minnows serve?
3. What kind of minnows did you catch?
4. Are there streams close by that should have minnows but do not? Why?
5. How is the best way to keep captured minnows alive?

Nightcrawler Hunt

Equipment needed: dim flashlight, patience, bucket with dirt and coffee grounds.

Nightcrawlers are an excellent bait to use in catching many different types of fish in Ohio. After a spring or summer rain or when the ground is damp is a good time to go nightcrawler hunting at a place where it is known the worms can be found.

Ask the following questions:
1. How are worms beneficial?
2. What do you have to do to keep the worms alive and healthy?
3. Why do you see so many worms on the ground after a heavy rain?

WATER SAFETY

Purpose: To learn more about safety.

Without too much thought, everyone of us can recall a serious accident that occurred to one of our friends or relatives. It isn’t fun to be hurt. Club members with broken arms or legs can’t play ball or go swimming. Our parents must pay the costly doctor and hospital bill. An effective safety program may help to prevent many accidents.

What could club emphasize at meetings?
Areas needing attention include:
a. water safety
b. boat safety
c. swimming safety
d. farm pond and pool safety
e. mouth-to-mouth resuscitation
f. why swimming skills are important
g. how to float

Where you can get help with program:
a. Fire chief or other firemen
b. Civil Defense
c. Red Cross
d. County Department of Health
e. Highway Patrol, sheriff, or police
f. Nurses and doctors
g. Club members and parents

For additional help, ask county 4-H agent about 4-H club safety material.

STREAM POLLUTION HUNT

Purpose: To become aware of pollution problems near home and decide what you or the club can do about these problems.

Stream Pollution

“Of silts and sands, chemicals and cans, tires and toys and socks of boys.” Is that what your favorite stream is made of, and where your fish friends live? Virtually every stream, river, lake, and pond in the country is polluted to some degree.
Does this affect wildlife and fish that live there? If streams are given a chance, they tend to purify themselves, but sometimes they stink, kill fish, and look terrible. Is your stream a dream or a nightmare? What do you find along the streams or in them that says, “Look out, man, you are a polluter.”

**What 4-H members, Club, or Families Can Do as Exercise.**

Follow a stream for a mile and list the litter and pollution problems you find—decide what you can do about it—then do it!

Make sure you and your family don’t contribute to stream pollution—never use streams for dumping cans, old tires, trash, or dead animals.

When hiking or walking along a stream, take along a container for your own litter and do a little “clean-up” along the way.

**Club Project for Year on Conservation**

- Adopt a stream—clean it up and keep it clean.
- When a stream is used by the public, provide trash cans for depositing litter; provide for emptying the cans.
- Take a walking trip with a Soil Conservation Technician and learn how farmers can reduce the amount of silt going into streams.
- Conduct a “pollution items” treasure hunt contest. Set up your own rules first.

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**DAY TIME FISHING TRIP**

Purpose: To go on a daytime fishing trip as a club activity.

<table>
<thead>
<tr>
<th>MY PLAN FOR WHAT, HOW AND WHO</th>
<th>Assignments for Next Meeting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business</strong></td>
<td></td>
</tr>
<tr>
<td>Fishing Activity</td>
<td>Suggestions:</td>
</tr>
<tr>
<td></td>
<td>Go carp fishing.</td>
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<tr>
<td></td>
<td>Go fishing at a farm pond.</td>
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<td></td>
<td>Go fishing at a pay lake.</td>
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<tr>
<td></td>
<td>Go fishing in nearby river or stream.</td>
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<tr>
<td><strong>Other Educational &amp; Service Programs</strong></td>
<td></td>
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<tr>
<td>Recreation and Social Activities</td>
<td>Casting contest. Who can cast the farthest?</td>
</tr>
<tr>
<td></td>
<td>Picnic.</td>
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<tr>
<td></td>
<td>Outdoor cooking.</td>
</tr>
</tbody>
</table>

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**RIVER VISIT OR FISHING TRIP**

Purpose: To learn about rivers, fish that live in rivers, and problems that face us in keeping our rivers clean.

Suggested activity would be to go to a river for an all-day fishing trip. Answer the following questions about the river you visited.

1. ___________________________ 2. ___________________________ 3. ___________________________

4. ___________________________ 5. ___________________________

List some of the litter and pollution problems you saw at the river you visited.

1. ___________________________ 2. ___________________________ 3. ___________________________
4. ___________________________ 5. ___________________________

Does this affect wildlife and fish that live there? ___________________________ How? ___________________________
Can you eat the fish out of the river you visited? Why?

Why not?

What are the names of some of the smaller streams that feed into the river you visited?

---

**DIP-STICK TEST FOR DEEP LAKES** *(Summer Only)*

Purpose: To determine the depth at which oxygen levels may be found in deep lakes. This will give an indication of where fish may be located so that fishing may be more successful.

**FOREWORD**

Summer brings about a change in the deep lake which is most interesting. During early summer months, water in reservoirs and deep lakes that have little or no inflowing currents divide into three horizontal layers. The top of these three layers contains a rich supply of oxygen that sustains fish life. The middle layer contains a fair supply of oxygen, but sustains a smaller number of fish. The bottom layer is a dark, stagnant layer that does not have enough oxygen to support fish life. Heavy concentrations of carbon dioxide may kill fish if they tried to live in this area. See *Project Book*, page 13.

**HOW TO MAKE & USE A DIP-STICK**

The dip stick test is an attempt to measure where the three summer layers of a lake are located, so you might know at what depth fish will be living and feeding. The material needed to perform this activity is as follows.

1. Buy a 16-foot strip of white oak or red oak shoemold (quarter-round molding) that is nailed to the baseboard of most houses.
   If the molding is dirty, clean it with sandpaper at least on one side and then mark strip of mold in feet.

2. One empty chlorox bottle – attach to the end of the molding or near the end as a float.

3. Some heavy cord attached to the chlorox bottle or molding.

**HOW TO TEST FOR OXYGEN LEVELS**

After you have made your dip-stick, you should go to the lake you wish to measure and lower and push the mold into the bottom of the pond or lake where the water is the deepest. If you do not have a boat, you will need to put a weight at one end of the mold with the float at the other end and throw the stick into the deepest water area of the lake. Be sure to mark the molding where it goes into the mud as well as the level that is exposed above the water. Leave the stick in the water for 45 minutes. Letting it stay longer will not improve the results. If lake is very deep, you may need to tie several sticks together with float and weight and throw into deep water area like a javelin.

Raise stick and observe and mark where the wood begins to stain. Subtract mud area and above-surface areas. The area where the wood begins to stain will give you the depth at which dissolved oxygen in the water is too low for game fish, such as bass and bluegill, to live. Notice that the lower part of the stick will be darkly stained. Water at that level has no oxygen. What causes staining is that water with no or little oxygen reacts with the tannic acid in the white oak molding and darkens the wood. Where oxygen is found, iron also is found, and no staining will take place under these conditions.

**HOW TO APPLY RESULTS**

About midmorning to late afternoon on hot summer days, most game fish will move around to feed just above the point where the wood begins to stain.

You may be fishing too deep where there really are no fish to be found in the summer.

If the stain starts at eight feet, then you should fish with lures or bait at about seven feet or above.

Good luck with your dip stick test!

*Adapted from material by Earl F. Kennamer, Extension Fish and Wildlife Specialist, Alabama Extension Service*
THE 4-H

PLEDGE

I pledge
My Head to clearer thinking,
My Heart to greater loyalty,
My Hands to larger service and
My Health to better living, for
My Club, my Community, My Country
and My World.