4-H Wildlife Project

Leaders Meeting Guide

FIRST YEAR

University of California Agricultural Extension Service

4-H–Ag183a

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DECEMBER 1968--1500

4-H Wildlife Project

Leaders Meeting Guide

This project meeting outline is designed to supply some suggestions for subjects and possible ways to present them at project meetings. You may cover any number of the suggested meetings you wish during the year. You may adapt them and follow any sequence you like.

Encourage each member of your project group to do the following items during the club year–

a. Attend project meetings.

b. Exhibit results of project work.

c. Develop and give a demonstration.

d. Select and complete during the year one or more items from the Project Idea Book, or other source.

e. Complete the record book.

The first year Wildlife Project program may include —

Meeting	Purpose
1	organize project group and present literature
2	plan project work
3	discuss components of habitat
4	discuss the broad approach to animal classification
5	discuss the history of California wildlife
6	study mammals
7	study birds
8	study fish
9	study beneficial and harmful wildlife
10	have a guest speaker
11	have a field trip

MEETING 1. PURPOSE

This meeting's purpose is to acquaint members and their parents with the Wildlife Project. Include the members and parents in discussing and planning the year's program. Before this meeting, acquire the necessary project literature from the farm advisor's office and encourage the members' parents to attend.

1. Ask members to introduce themselves and their parents and tell why they joined this project.

2. Hand out the project literature. Explain the Wildlife Project, and the goals for the year.

3. Wildlife is often a misunderstood word. Ask each member for his definition of wildlife. Then explain to the group that the

meaning of wildlife is any wild animal or all wild animals collectively–for example, deer, mice, robins, bass, frogs.

4. To stimulate member and parent interest in the wide scope of wildlife give them this quiz. Read the questions and have them mark "yes" or "no" on a sheet of paper:

   a. Is a deer's age determined by the number of points on his antlers?

   b. Do doves migrate?

   c. The term "habitat" refers to an animal's food, water, and shelter requirements?

   d. Is wildlife management the science of obtaining the maximum production of wildlife for the benefit of man?

   e. Is all wildlife beneficial to man?

   f. Are there people in your area who work with wildlife?

   g. Are there treaties between nations on managing wildlife?

5. Ask the group to give their answers to the questions and discuss these correct answers with them.

   a. No. A deer's age is determined from its teeth. Nutrition influences antler growth.

   b. Yes. Doves migrate between Canada and Mexico in routes crossing every state in the United States.

   c. Yes. Habitat includes everything that makes up an animal's home.

   d. Yes. The primary reason wildlife is managed is for man's benefit.

   e. No. Many species damage crops, carry disease, and are a nuisance to man.

   f. Yes. State and federal game managers, forest service, gun club operators, pheasant and fish breeders, etc.

   g. Yes. Canada, Mexico, and the United States have treaties concerning the management of migratory birds (doves, ducks, geese).

6. Discuss and decide with the members and parents the following —

   Number of meetings to be held.

   When and where the meetings will be held.

   The starting date for the project.

   The completion date for the project.

7. Announce the date and place for the next meeting.

MEETING 2. PROJECT GOALS

This meeting is to be devoted to assisting the members with planning their wildlife project. If they have already planned their project they can work on it at this meeting.

1. Check the progress of each member and offer suggestions.

2. If their project plans are complete enough you might use the remaining time to show them how to make ceramic impressions. Impressions can be made of tracks, plants, feathers, skeletons, or fish.
   (Include here steps to take and materials for making impressions.)

3. Announce the date and place of the next meeting.

MEETING 3. HABITAT

This meeting is concerned with defining habitat, and with its importance for wildlife populations.

1. Discuss with the members the meaning of the word habitat.

2. Habitat includes shelter or cover, food, water, space, and the arrangement of these. Ask the members to give examples of each of these. (For leaders' information some examples are given for each component of habitat.)

   a. **Shelter or Cover.** Shrubs, trees, brush piles, tall grass are examples of cover.

   b. **Food.** Many things serve as food for wildlife. Grass, insects, seeds, brush, and other wildlife are some kinds of food.

   c. **Water.** Water needs can be met for some wildlife from dew, and green, lush plants, in addition to free water such as is found in lakes, streams and ponds.

   d. **Space.** Space is very important to all wildlife species. Each needs sufficient "elbow room" in which to live. How much space varies with the species and time of the year. Most animals group closer together in the winter but prefer seclusion when they have their young.

   e. **Arrangement.** It is important that all of these habitat requirements are available and accessible within the area in which the animal lives.

3. Have the members discuss how wildlife is affected when any part of its habitat — cover, food, water, space, or arrangements — is lacking. Any of these may be a result — starvation, disease, predation (pressure of predators), accidents, and undue exposure to weather.

4. With the members, go outdoors and find examples of the different parts (components) of habitat. Discuss how each tree, shrub, and grass serves wildlife.

5. Announce the date and place for the next meeting. Remind members to bring their Wildlife Project manual.

MEETING 4. CLASSIFYING WILDLIFE

What is it? People often ask this question about any animal new to them. Although exact identification of all animals is sometimes difficult, each one has some characteristics that place it in a certain class. The purpose of this meeting is to acquaint members with the 5 classes of wildlife studied in this project.

There are many kinds of wildlife, most differing widely from one another. The deer, trout, duck, and rattlesnake are all different in many respects, yet they do have one thing in common. Ask the members if they know what this is. A backbone is this common characteristic and places many of the world's wildlife in the phylum Chordata (one of primary divisions of the animal kingdom).

Animals are further classified into more specific groups called classes. The classes in which most wildlife are found are fish, amphibians, reptiles, birds, and mammals.

It is important to learn to classify animals in order to manage them properly. The animals of each class have certain characteristics that determine their habitat and management requirements.

1. Ask the members such questions as "What is an amphibian?" "What is a reptile?" "What is a mammal?" "What is a bird?" and "What is a fish?".

2. Ask the members to discuss the major characteristics of each class.

   Fish — scales, gills, cold blooded

   Amphibians — breathe through gills when young and lungs when adult, cold blooded

   Reptiles — creep, cold blooded, scales

   Birds — feathers, wings, beaks, warm blooded

   Mammals — hair, nurse young, warm blooded

3. Announce the date and place for the next meeting. Ask members to bring pictures of many different amphibians and reptiles to this meeting.

MEETING 5. AMPHIBIANS, REPTILES, AND WILDLIFE HISTORY

Because the amphibians and reptiles are a small part of the wildlife world, only a portion of this meeting will be devoted to them. Most of the meeting will concern the history and changes in California's wildlife. The members are now familiar with many wildlife species and their individual habitat requirements. Now they can be more appreciative of why changes have occurred and the importance of properly managing wildlife and its habitat.

1. With the group review the major characteristics of amphibians and reptiles.

2. Have each member read aloud a section of "Wildlife Management" on pages 1 through 4 of his project manual.

3. Discuss with the members the material they have read concerning the changes in wildlife. Suggested topics and questions are:

   What species were in large numbers in the early 1800's?

   What species are now extinct and which ones are still present?

   What species are now in greater numbers than in the early 1800's?

   What habitat changes occurred to affect the deer and antelope?

   What changes occurred to the habitat to cause a reduction in grouse?

   What has man done to damage wildlife habitat?

   What has man done to improve wildlife habitat?

4. Announce the date and place for the next meeting. Ask the members to bring their project material to the next meeting and to be prepared to report on their progress. Ask member's to bring many different pictures of mammals to the next meeting.

MEETING 6. MAMMALS

Mammals vary greatly in size and appearance. This meeting will acquaint members with several species of this class. They should also be familiar with the habitat requirements of each. The grizzly bear is California's state animal.

1. Review with the group the major characteristics of the class, Mammalia.

2. Have members show and identify the mammal pictures they brought to the meeting and make a list of all the mammals they can recall from memory.

3. Discuss with the members the location and and habitat requirements of 6 species. Consider the type of cover and food re-

quired and the amount of space or area in which the animal ranges during its lifetime.

4. Inform the members that they can choose a demonstration to give to the club. Have an older member discuss the elements of a good demonstration.

5. Announce the date and place for the next meeting. Ask members to bring pictures of birds to this meeting.

MEETING 7. BIRDS

The purpose of this meeting is to acquaint members with the characteristics of another class of wildlife — birds. There are many bird species that can be found in cities as well as in the countryside. Members should learn that each species has somewhat different requirements and functions which explain why it lives where it does. The California state bird is the valley quail.

1. With the group review the major characteristics of birds.

2. Have members show and identify the bird pictures they brought to the meeting. Also, have them relate the shape of each bird's bill to the types of food it eats.

3. Take a short walk through the yard, farmyard, around the block, or to a park. Identify as many birds as possible. Note each bird's function or place in the biological community by observing its size, bill, food, and cover requirements, and whether it migrates. If identification is done in the spring the members might also look for nests.

4. Announce the date and place for the next meeting. Ask members to bring pictures of fish to this meeting.

MEETING 8. FISH

Fish comprise the largest class of animals having a backbone. The purpose of this meeting is to become familiar with several species of fish, where they are found, and their habitat requirements. Do the members know that the golden trout is California's state fish?

1. Review with the group the major characteristics of fish.

2. Have members show and identify the fish pictures brought to the meeting. Ask them to indicate whether each is a fresh water or ocean form, and if found in fresh water, whether it is a warm-or cold-water fish.

3. Visit a stream, lake, pond, or the seashore. Have the members determine, based on habitat, the species of fish that might live in the particular body of water — fresh, salt, warm, cold, shallow, deep, etc. Have the members also look for shells of shellfish and insects.

4. Announce the date and place for the next meeting. Ask members to bring their Wildlife Project manuals and record books to the next meeting.

MEETING 9. BENEFICIAL AND HARMFUL WILDLIFE

This meeting is a continuation of the earlier meeting on man's role in managing wildlife. The members have learned that man can benefit or harm wildlife. In turn, they will now learn how wildlife can benefit or harm man. Proper management of wildlife is a complex science and is based on sound research and biological facts. The fact that wildlife is a renewable resource means that proper management can increase its numbers. Renewable resources reproduce themselves.

Man uses many tools or ways to manage wildlife. Ask the members if they have fished, hunted, put out mouse poison or traps, helped burn an irrigation ditch, etc. Each is a management tool and may be beneficial or harmful to wildlife. Since wildlife is renewable, though, and can increase to large numbers, control must often be exercised to prevent conflicts with man's interests.

Discuss with the members the species of wildlife to be found in the agricultural areas in the county. Discuss how agriculture benefits wildlife and its habitat.

Have the members name several wildlife species that are harmful or nuisances to man. Also, have them explain how each species is harmful or a nuisance.

The starling, English sparrow, rat, skunk, field mouse, crow, muskrat, carp, and opossum are noteworthy. All damage crops, carry disease, and may be a nuisance to man's evironment. Any species can be damaging when its numbers exceed the provisions of its habitat. Duck, geese, deer, antelope, and elk are examples.

Wildlife is enjoyed by people in different ways. Therefore, wildlife has many values and each must be considered when wildlife is managed. Ask members to name several wildlife uses that provide value to man.

Hunting, fishing, photography, research, food, camping, recreation, and sporting, equipment are examples that yield many values from wildlife.

A person who works with wildlife can be invited to the next meeting. Discuss with the members what person they would like to invite to talk to them.

MEETING 10. GUEST SPEAKER

The purpose of this meeting is to have the members become aware of the people who work in the wildlife field.

1. Discuss with members the various people working with wildlife and their responsibilities.

   Examples are: Wildlife Biologist of Forest Service; Wildlife Biologist of Bureau of Land Management; Game Manager, California Fish and Game; Fish Biologist, California Fish and Game; Warden, California Fish and Game; manager of a fish hatchery; manager of a hunting or fishing club; manager of Federal Waterfowl Refuge, etc.

2. Introduce your guest speaker.

3. For the final meeting of the year plan a field trip. Discuss with the members where to go and assign the necessary responsibilities. Invite the members' fathers, too.

   Suggested field trips:

   take a fishing trip

   visit a hatchery

   visit a refuge

   visit a gun club

   visit a game farm

   visit a park

MEETING 11. FIELD TRIP

Go on a field trip and use the information learned during the year to identify and better understand and enjoy the outdoors and wildlife.

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SECOND YEAR

University of California Agricultural Extension Service

4-H–Ag183b

The authors are Farm Advisors John W. Melendy, Santa Cruz County; Robert Savage, Modoc County; Arthur L. Scarlett, Plumas County; Gerald St. Andre, Fresno County; Ralph S. Westing, Jr., Monterey County; Robert W. McNulty, Sutter-Yuba Counties; Wildlife Specialist Richard D. Teague, Davis; and 4-H Specialist William G. Schneeflock, Berkeley.

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DECEMBER 1968--1000

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Encourage each member of your project group to do the following items during the club year —

a. Attend project meetings.

b. Exhibit results of project work.

c. Develop and give a demonstration.

d. Select and complete during the year one or more items from the Project Idea Book or other source.

e. Complete the record book.

The second year Wildlife Project program may include —

Meeting	Purpose
1	organize project group and present literature
2	study the habitat of various species of animals
3	study the need and use of taxonomy
4	study the characteristics of mammals
5	explore special interests of the members
6	study the characteristics of waterfowl
7	study the characteristics of fish
8	study the characteristics of amphibians and reptiles
9	explore the values of wildlife
10	field trip

MEETING 1. ORGANIZATION

The purpose of this meeting is to get acquainted and plan the project and goals for the year. Include the members and parents in the discussion and planning. Before this meeting acquire the necessary project literature from the farm advisor's office.

1. Have each member introduce himself and tell the group briefly of his background and why he is interested in the Wildlife Project.

2. Hand out literature to those interested in the project. Either the leader or a junior leader may explain the material.

3. Discuss with the members what the basic needs of animals are: food, water, and shelter. Ask the members to give examples of each.

Have the members explain what happens if one of the following elements is missing. Note that poor reproduction, smaller and less healthy animals, rather than premature death, may often result from inadequate habitat.

Food – starvation, emigration, physical weakness, poor reproduction.

Water

Shelter – overcrowding, low population, greater chance for disease and parasites, less protection from enemies, more exposure to weather.

4. Ask members to identify the food, water, and shelter requirements of the following species:

JACKRABBIT

Food – Weeds, grass, bark, legumes.

Water – Can use water from succulent plants. Needs little "free water." Here "free water" means water in liquid form and of good quality.

Shelter – Very little – brush or grass.

QUAIL

Food – Seeds, insects, and leafy vegetation.

Water – Needs free water most of year.

Shelter – Trees, brush, and grass.

BASS

Food – Insects, small fish, small amphibians.

Water – Needs free water.

Shelter – Rocks, brush, water needs, stump in water.

5. Discuss and outline with the members the meetings for the year.

number of meetings to hold

when and where to meet

project starting date

project completion date

6. Announce the date and place for the next meeting. Remind members to bring their Unit II manual.

MEETING 2. HABITAT

This meeting will consist of a field trip to study wildlife habitat. Your field trip can be to a beach, canyon, gully, river, stream, wooded area, mountains, tidepools, a park or the area around your home or farm. Wildlife habitat is everywhere. Before going on the field trip have the members review the section on habitat in Wildlife Manual Unit II. Be sure and get written permission from the landowner before going on the trip. Permission should include both the privilege of trespass and to collect specimens.

1. Upon arrival at the field trip area first determine if the area is used by animals. Look closely at the ground for tracks, scats (droppings), feathers, fur, burrows, shells, and nests.

2. What species have been identified or might you expect to find here?

3. Now that you have decided what wildlife is living in the area, what plants and ani-

mals may be serving as food? Collect samples of seeds, fruit, grass, leaves, insects, and animals, if in an area where collecting is not prohibited. Do not collect more than you can use.

4. What is the source of water for the species? Is it free water or succulent plants, dew or fog condensation on plants?

5. Cover – what shelter is available? How many of these plants provide both food and shelter?

6. What suggestions could be made for improving habitat?

7. Member can make field notes.

8. Announce date, time, and place of next meeting.

MEETING 3. CLASSIFYING

This meeting is devoted to acquainting members with classifying animals. Read and discuss the following information with your members.

Animal identification is important if we want to study or manage them. The first question a person will ask about an animal new to him is: "What is it?". The correct scientific name of each animal is very important and every animal in the world can be properly identified through classifying.

Animal classifying requires consideration of both external and internal features. The differences in these features distinguish one species from another.

1. The following exercise is designed to acquaint members with classifying. Have members write the correct classification for each category for the coyote and bobcat.

Classification	Characteristics	Name
Kingdom	living	Animal
Phylum	backbone	Chordata
Class	nurses young	Mammalia
	lays eggs and feeds its young	Aves
Order	mostly eats plants	Herbivore
	mostly eats meats	Carnivore
Family	bush tail	Canidae
	retractable claws	Felidae
Genus	pointed ears, short tail	Lynx
	long muzzle, erect ears	Canis
Species	Genus *Canis*:	
	skull length greater than 250 mm	lupus
	skull length less than 250 mm	latrans
	Genus *Lynx*:	
	hindfoot less than 190 mm	rufus
	hindfoot greater than 190 mm	canadensis

2. The correct classification for the coyote and bobcat is as follows. Note that they differ only in the family, genus, and species groupings. The species denotes the differences of animals of like genus. Therefore, the coyote, Canis latrans, is smaller than the wolf, Canis lupus, and the bobcat, Lynx rufus, is smaller than the lynx, Lynx canadensis. The genus and species are

used to make up the scientific name for every animal in the world.

	Coyote	Bobcat
Kingdom	Animal	Animal
Phylum	Chordata	Chordata
Class	Mammalia	Mammalia
Order	Carnivore	Carnivore
Family	Canidae	Felidae
Genus	Canis	Lynx
Species	latrans	rufus

3. Go outdoors and have the members select two plants or insects and study their differences. Identifying the several differences between the samples will further demonstrate how classifying works. Differences that might be considered are:

   Plants – color, fruit, height, shape, shape and size of leaf, bark.

   Insects – shape, size, number of legs, wings.

4. Announce date and place for next meeting.

MEETING 4. MAMMALS

The habitat required for several species of mammals will be studied at this meeting. A field trip is an interesting way to observe habitat. The field trip might be to a farm area, streambed, park, fence row, etc. Remember, if you go on a field trip, get written permission.

1. Ask the members to review the major characteristics of mammals—hair, nurse young, warm blooded.

2. Have the members match the following species of mammals with the proper habitat type. Some species may be found in more than one type. Habitat types are forest, range, brush, cultivated, and city.

Mammal species	Habitat types
jackrabbit	range, cultivated, city
ground squirrel	range, cultivated
skunk	cultivated, city
mink	forest streams
mouse	forest, range, cultivated, city
chipmumk	forest
mule deer	range, forest, brush
coyote	range, forest, cultivated
elk	forest

3. At the field trip site determine with the members the mammal species that you might expect to find. Have the members determine the source of food, cover, and water for the species.

4. Have the members look for mammal species, tracks, and scats. For each species observed, have the members record the following information.

   - location of observation
   - date and time of observation
   - type of cover where seen
   - activity of species (running, eating, loafing)

5. Where were the most mammals seen and why? Where were the most tracks and other signs?

6. You may wish to discuss some of the beneficial and harmful aspects of these species.

7. Announce the date and place of the next meeting.

MEETING 5. SPECIAL INTEREST

This meeting can be devoted to helping the members with ideas of special interest. A member will gain much more from the Wildlife

Project by working on an idea of interest to him. Each member may select a separate item or the entire group may work together on one or more items. Refer to the Project Idea Book for suggestions.

1. Discuss with the members the types of special interests they might have and help them to select one.

2. With the group offer suggestions how each idea might be organized and carried out.

3. If some members have already selected an item they might explain it to the group or they might work on it at this meeting.

4. You may wish to show the members the results of a completed work borrowed from other members, the farm advisor's office, or one you have made.

5. Announce the date and place of the next meeting.

MEETING 6. WATERFOWL

This meeting is devoted to waterfowl and will be made more meaningful to the members by visiting a state or federal waterfowl management area. If there is not one in your area, a visit to a marsh area or sea inlet used by waterfowl would serve as well. If advance arrangements are made for state or federal areas, the authorities will probably provide a guide for your field trip.

If a trip to a waterfowl area is not convenient, the subject can be adequately covered through discussion and use of references. Two excellent references that are available from many sporting goods stores or Fish and Game personnel are: Ducks at a Distance, U. S. Department of Interior and Waterfowl of California, California Department of Fish and Game.

1. Before visiting the waterfowl area have the members answer the following questions, then discuss the correct answers:

a. What is a waterfowl flyway?

It is a migration route. Waterfowl are managed on a flyway basis.

b. How many flyways are there in the United States, and what are they called?

The four flyways in the U.S. are: Pacific, Central, Mississippi and Atlantic.

c. What are three groups of waterfowl?

Swans, geese, and ducks.

d. Ask the members to describe the general characteristics of each.

Swan – very large, white, long necks, sexes are alike in plumage.

Geese – intermediate between the duck and swan in size and length of neck—like the swans no sex difference in plumage.

Ducks – smaller than geese and the sexes are different in color—the males having the brighter colors.

e. Does California primarily serve as a breeding or wintering area for waterfowl?

Wintering area.

f. Where are the breeding and nesting areas for the duck and geese of the Pacific Flyway?

Alaska and Western Canada.

g. Why are waterfowl tagged?

Waterfowl are tagged on the nesting areas. When tags are returned in the fall by hunters, the migration routes of the birds can be determined, along with other management information.

h. Ducks are classified as "puddle" and "diving" ducks. What are the major differences of these two classes of duck?

Puddle ducks – usually found in small, shallow marshes and creeks. They usually feed by tipping over in the water rather than diving. Puddle ducks launch directly upwards when taking flight.

Diving ducks – frequent larger, deeper waters. They feed by diving completely underwater and generally eat more fish than puddle ducks. When launching into flight, they patter along the water before becoming airborne.

i. What are the three most numerous ducks in California?

Mallard, Pintail, and Widgeon.

2. While on the field trip, the members should note the following about each duck, goose or swan they see:

a. Species and sex, if possible.

b. Where observed—deep water, shallow water, on land, ditch, etc.

c. If a duck, is it a puddle or diving duck?

3. What species of duck and geese were the largest in number?

4. Announce the date and place of the next meeting.

MEETING 7. FISH

The purpose of this meeting is to familiarize the members with game fish and their habitat. It is suggested that you have the following references that are available from the Department of Fish and Game and its personnel. Trout of California, Warmwater Game Fishes of California and Inshore Fishes of California.

You may wish to invite a fish biologist from the Department of Fish and Game or a biologist from a college to discuss game fish with the members. Another suggestion would be to visit a private or state fish hatchery or fish farm.

1. California has a wide variety of game fish and they are usually grouped according to the type of water in which they best live and reproduce. The groups or classes are called **warmwater, cold-water, and marine.**

Discuss with members the general characteristics of each group of fish.

a. **Warmwater fish** – those species of fish that best live in water that is 70 F or above during the summer.

b. **Cold-water fish** –those species of fish that best live in water that usually stays below 70 F during the summer.

c. **Marine fish** – those species of fish that live in salt water.

2. Following are several species of game fish found in California. Ask the members to classify each species as a warmwater, cold-water, or marine fish:

rainbow trout – c

crappie – w

yellow perch – w

golden trout – c

flounder – m

bullhead – w

Kokanee – c

rock fish – m

small mouth bass – w

mountain white fish – c

sunfish – w

A few fish live part of their lives in salt water and fresh water. They are called anadromous fish. Can the members name some anadromous fish? Salmon, shad, steelhead, striped bass, sturgeon.

3. Fish habitat includes areas that produce food, provide shelter, and serve for reproduction.

   a. **Food** – Game fish are omnivorous – that is, they eat both animal and plant materials. Animal matter comprises the majority of game fish diet. Major food production areas are the riffles in streams and the shorelines of lakes. Ask the members to give some examples of fish food (larvae and adult forms of insects, water bugs, small fish).

   b. **Shelter** – Limited amount of shelter is necessary to provide protection for fish. Ask members to give examples of shelter in:

      lakes – logs, shrubs, debris, and water plants

      streams – pools, logs, debris, and rocks

   c. **Reproduction** – These are areas in which fish can lay eggs and the young fish can grow with a minimum of danger from adult fish. Ask members to name such areas:

      gravel bottoms for trout

      shelter areas, water weeds for warm-water fish

      shallow pools and areas on the edges of streams and lakes

4. If possible visit a stream, lake, farm pond, or beach area. At this site, have the members determine the type of fish living in the water and identify the habitat areas that provide food, shelter, and reproduction.

5. If a field trip can't be arranged, divide the members into pairs and have them select a fish species from one of the Fish and Game booklets to read and give a brief report to the group.

6. Announce the date and place of the next meeting.

MEETING 8. AMPHIBIANS AND REPTILES

Review with the members the major characteristics of amphibians and reptiles. For reference refer to page 7 of the Wildlife Project, Unit I.

1. Have members name several species of amphibians and reptiles in their area.

   Reptiles – gopher snake, king snake, rattlesnake, lizard, turtle.

   Amphibians – frogs, toads, salamanders.

2. Discuss briefly with the members the beneficial and nonbeneficial aspects of these species.

   Beneficial – eat insects, rodents, serve as food for man and other animals.

   Nonbeneficial – some are poisonous and some destroy bird eggs.

3. The frog is an excellent and readily available example of an amphibian. Have the members draw the life cycle of a frog.

4. Have members collect some tadpoles to keep at home and record their developments weekly.

5. Announce the date and place of the next meeting.

MEETING 9. VALUES OF WILDLIFE

The purpose of this meeting is to explain in more detail the values of wildlife. We have already noted that some animals are beneficial to man and some are harmful to man in an economic sense. Both the positive and negative values of wildlife will be explored. These may be explored by field trips as well as through discussion.

1. Ask members to name some of the positive values or good things they feel wildlife provides.

2. For each of the following positive values have the members elaborate and give examples.

   Positive values

   Esthetic – nature study, beauty

   Recreation – hunting, fishing, guides, motels, sporting goods stores, dogs, horses, etc.

   Useful products

   food

   clothes – hides, furs, feathers, down

   manufacture – oil, fertilizer, dog and cat food, ivory, whalebone

   Useful activities of wildlife

   distribute seeds

   scavengers – coyote, vulture

   impound water – beaver

   Research for human health – rats, mice, experimental animals

   Source of employment – biologists, fish and game guides, game farm managers

   Crops – some species control harmful insects and other animal life

   Public – zoos, circus

3. With the members discuss the negative values of wildlife.

   Negative values

   Destruction of property and crops – all wildlife are a potential

   Predators

   Carry disease

   Nuisance

4. Have the members name several species that are generally harmful or a nuisance. Also discuss the type of nuisance.

starlings	rats
mice	muskrat
English sparrow	skunks
crows	carp

5. Announce the date and place of next meeting.

MEETING 10. FIELD TRIP

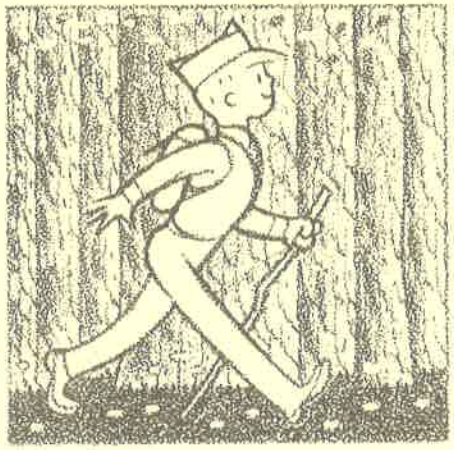
This meeting may be used to conclude the members' project year.

This field trip might include a fish hatchery, private game preserve, fish or bird farm, waterfowl management area, fishing trip, with a weekend camp-out or picnic.

4-H Wildlife Project

Leaders Meeting Guide

THIRD YEAR



University of California Agricultural Extension Service

4-H–Ag183c

The authors are Farm Advisors John W. Melendy, Santa Cruz County; Robert Savage, Modoc County; Arthur L. Scarlett, Plumas County; Gerald St. Andre, Fresno County; Ralph S. Westing, Jr., Monterey County; Robert W. McNulty, Sutter-Yuba Counties; Wildlife Specialist Richard D. Teague, Davis; and 4-H Specialist William G. Schneeflock, Berkeley.

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DECEMBER 1968--750

4-H Wildlife Project

Leaders Meeting Guide

This project meeting outline is designed to supply you with some suggestions for subjects to cover and possible ways to present them at project meetings. You may cover any number of the suggested meetings you wish during the year. You may adapt them and follow any sequence you like.

Encourage each member of your project group to do the following items during the club year —

a. Attend project meetings.

b. Exhibit results of project work.

c. Develop and give a demonstration.

d. Select and complete during the year one or more items from the Project Idea Book or other source.

e. Complete the record book.

The third year Wildlife Project program may include —

Meeting	Purpose
1	organization of project group
2	learn how habitat can be improved
3	applying taxonomy to wildlife
4	learn the life cycle of mammals
5	learn the life cycle of birds
6	learn the life cycle of fishes
7	learn the life cycle of reptiles
8	learn the life cycle of amphibians
9	discuss wildlife productivity
10	study of economic values of wildlife

MEETING 1. ORGANIZATION

Purpose — organization for the new year.

At this first meeting it is extremely important that at least one parent and preferably both parents of all members be present. Be sure that everyone knows each other, that they feel at ease during the meeting and that they understand what is expected to be accomplished during the club year. It may be desirable to have a display of items made by the members during the past years. While these are on display, one review method may have those members with items on display explain the items, their uses, and how they were made. Another review method for the past years' work may be a quiz asking questions of the members as follows:

1. What are the five classes of vertebrate life studied in the wildlife project?

   Mammals, birds, reptiles, amphibians, fish.

2. What examples of these classes are found in this county?

3. What are some of the beneficial animals of the area and how are they beneficial?

4. What are some of the harmful animals of the area and how are they harmful?

5. Name some of the agencies represented in the county involved in wildlife management. How are they involved in the management?

6. Define wildlife.

   All wild animals collectively.

7. Why is it necessary for man to manage various forms of wildlife?

8. Name one or more forms of local wildlife and list some of the necessities for maintenance of the species, such as food, shelter, habitat, etc.

Another avenue of understanding might evolve from the members discussion of any work or observations they may have made since completing the last unit. This could be work done at home or elsewhere and will include possible observations made during the summer while on a trip to other areas. Following this get-acquainted period and review of the past year's work, it would be well to discuss plans and program for the coming year. This will acquaint the members and the parents with project goals.

Members will have a greater interest in the project if they are involved. Here are several ways to involve members:

1. Assign members to contact speakers, arrange meeting plans, arrange field trips, introduce guests, etc.

2. Ask members to prepare and give talks on subjects of interest at meetings.

3. Have a member responsible for reminding other members of meetings, field trips, and special assignments.

4. Have members give talks and demonstrations at club meetings, before service clubs and other organizations.

5. Have one or more members responsible for assisting you with a portion of each project meeting.

MEETING 2. HABITAT

Have members name several local game species of wildlife and discuss the habitat requirements of these species. Discuss how the habitat might be changed to increase or decrease the population. Ask the members to explain "carrying capacity" and "edge effect." Refer to pages 3 and 4 of Unit II, Members Manual.

A field trip is an excellent way to study habtat. A private game farm, public game unit, city or county park, beaches, lakeshores, streams are areas to visit for studying wildlife habitat.

During the field trip members should observe the following:

1. Observe the habitat of the selected local species and identify its elements.

2. Note any habitat components that may be lacking or are in an undesirable location.

3. How can the "edge effect" be increased?

4. Determine if all habitat components are those that are arranged to encourage maximum population. (All components of hab-

itat – food, water, cover, space – must be within the cruising radius of the species for maximum population. Juxtaposition is the term used for this and means that all requirements of a species are within its cruising radius.)

5. How might the habitat be changed to improve its juxtaposition?

If an indoor meeting is preferred, a speaker or film may be used. Refer to the Leader's Guide for a listing of films and agencies as a source of speakers.

MEETING 3. TAXONOMY

The purpose of this meeting is for the members to learn how to identify and classify wildlife of interest to them, preferably those species found in the local area. One or more of the following suggested methods may be used to acquaint the members with identification.

1. Ask a member to secure an identification key from a high school biology or zoology teacher or library.

   a. Using these references, refer to pictures of wildlife and properly identify and classify.

   b. Visit a taxidermist and identify several mounted specimens.

   c. Visit a zoo or museum and apply the identification techniques of the reference.

2. Have a member obtain from a library the book, Mammals of the Pacific States by Ingles. Have several members obtain skulls of mammals and identify the skulls using this reference.

3. Obtain colored pictures of several species of an order of birds or fish (waterfowl, trout, upland game birds, etc.) and have members identify the individual species. Physical differences, coloring, shape, etc., readily identify the several species within each of these orders.

MEETINGS 4 THROUGH 8.

These meetings are designed so members can give a talk or demonstration on the life cycle of wildlife species. Members may select species within the same class or from any of the 5 classes of wildlife.

MEETING 4. MAMMALS

Ask one or two members to develop and give a talk or demonstration on the life cycle of a species of mammal.

The life cycle should include—

minimum breeding age

breeding season

mating ratio

length of gestation

time of birth

number of young at birth

age of weaning

Members may wish to include the species range, habitat, and food requirements.

MEETING 5. BIRDS

Have one or two members develop and give a talk or demonstration on the life cycle of a bird species.

The life cycle should include —

- minimum breeding age
- breeding season
- breeding location if migratory
- mating ratio
- nesting season
- length of incubation
- brooding season
- number of young produced

Habitat, range, and other related facts may be included if the member wishes.

MEETING 6. FISH

A talk or demonstration on the life cycle of a fish species should include —

- identification of whether fish is
  - marine
  - warmwater
  - cold-water
  - game
  - nongame
- minimum breeding age
- breeding season
- fecundity
- nest location
- length of incubation

Members may wish to include food chain, migration, and growth pattern in their presentations.

MEETING 7. REPTILES

The life cycle of a reptile should include —

- minimum breeding age
- breeding season
- mating ratio
- type of birth
- length of gestation or incubation
- size of litter
- time of birth

MEETING 8. AMPHIBIANS

The life cycle of an amphibian should include —

- minimum breeding age
- breeding season
- mating ratio
- number of eggs laid
- length of incubation
- stages of growth

MEETING 9. WILDLIFE PRODUCTIVITY

The number or population of any wildlife species is the balance between its breeding potential and the environmental resistance. Ask a member to review the meaning of these terms from Unit I, Members Manual.

The breeding potential of a species is determined by the minimum breeding age, number of young produced, size of litters, and mating ratio. These factors, of course, vary with each species. The California quail has a high breeding potential because it breeds the first year and produces 10 to 15 young per year. One pair of quail has a breeding potential of 5,000 birds in 4 years compared to

elk which would require over 30 years to reach 5,000 head.

1. Quiz the members on the breeding age, number of young per year, and whether the breeding potential is high, medium, or low for the following species.

	Breeding Age	Number of Young	Breeding Potential
California quail	1	10–15	high
mallard	1	10	high
Canada goose	2	6	high
antelope	2	2	medium
caribou	2	1	low
black bear	4	1	low
bobcat	2	3	medium
deer	2	1½	medium
dove	1	4	high
gray squirrel	1	8	high
pheasant	1	10	high

   This ability to reproduce at rather high rates is an important factor in wildlife management.

   The reason wildlife species do not reach their breeding potential is due to environmental resistance. These factors include hunting, predators, starvation, disease, parasites, and accidents.

2. Have the members discuss the following environmental resistance factors as they relate to a local game species – trout, pheasant, quail, deer, etc.

   a. **Accidents** – generally not an important factor, but can be in some cases. Includes highways, floods, pollution, fire, etc.

   b. **Diseases and parasites** – are usually an indication of another factor – poor health from a lack of feed. Some disease and parasites are found in most wildlife, but if animals are healthy these are usually not a problem.

   c. **Predators** – predators benefit more than they harm most wildlife species by taking sick and weak individuals. Predators can at times become harmful to game species, but generally aren't if adequate cover and food is available.

   d. **Starvation** – lack of adequate food is often the greatest cause limiting wildlife populations. Low nutrition caused by poor quality and insufficient feed is a major reason for low wildlife productivity. Ask the members to name the effects of low nutrition on wildlife.

      Reduces breeding potential

      Postpones maturity

      Reduces the number of young produced

      Slows growth

      Young are weak at birth

      More susceptible to disease, predators, parasites, and weather

   e. **Hunting** – as with any renewable resource, harvest is perhaps the most important part of wildlife management. Have the members read page 8 of Unit II Members Manual and discuss the role of hunting as a wildlife management tool.

The productivity of any wildlife species is then the difference between its breeding potential and environmental resistance.

MEETING 10. ECONOMIC VALUES

The purpose of this meeting is to study the economic values of wildlife in the local area.

This meeting can be handled as a field trip, by inviting a guest speaker or having several members give a talk.

For your area, have the members explore how wildlife contributes to or takes away from man's income.

1. A field trip may be to private game clubs, city parks, forest service, etc. Members can observe and learn how wildlife are beneficial and detrimental to these areas.

2. A field trip may consist of riding around the local area and listing the businesses whose income is partially dependent upon wildlife. Members might also observe those industries and areas where wildlife could be harmful.

3. A guest speaker could discuss the economic value of wildlife as it affects his agency. Some resource people are —

   Department of Fish and Game
   County Agricultural Commissioner
   Park Rangers
   Forest Service
   Game Club Managers
   Aububon Society
   Public Health Department
   Bureau of Sport Fisheries and Wildlife

4. Members might give a talk on some phase of wildlife's economic importance to their local area.

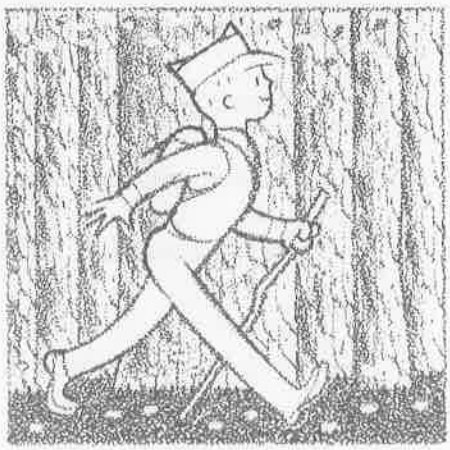
Possible areas for study are —

game clubs
agricultural production problems
endangered species
homeowner's problems
food storage problems
recreational enterprises

4-H Wildlife Project

Leaders Meeting Guide

FOURTH YEAR



University of California Agricultural Extension Service

4-H–Ag183d

4-H Wildlife Project

Leaders Meeting Guide

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b. Exhibit results of project work.

c. Develop and give a demonstration.

d. Select and complete one or more items from the Project Idea Book or other source.

e. Complete the record book.

The fourth year Wildlife Project program and those beyond may include —

Meeting	Purpose
1	organization
2	a continued study of taxonomy
3	study the life cycles of animals
4	study the factors that relate to the productivity of several species
5	study management techniques and learn how to apply to several species
6	improve techniques of making a field study
7	review

MEETING 1. ORGANIZATION

The purpose of this meeting is to get acquainted and plan the project and goals for the year. Include the members and parents in the discussion and planning. Before this meeting obtain the necessary project literature from the farm advisor's office.

1. Have each member introduce himself and tell the group briefly of his background and why he is interested in the Wildlife Project.

2. Pass out literature to those interested in the project. Either the leader or a junior leader may explain the material.

3. Select from the following list the single group of wildlife the group will study —

upland game	warmwater fish
waterfowl	amphibians
big game	cold-water fish
predatory mammals	marine fish
other birds	predatory birds
fur bearers	reptiles
rodents	

4. For the group selected the following project outline is suggested —

   Learn: species identification

   life cycles

   factors related to productivity of the species

   applicable management techniques

   Do: where feasible, develop a field study with one species within a group

   Make: a study of skins

   equipment related to the field work

   collections related to identification and life cycles

5. Explain to members that each member is expected to do the following —

   a. Collect reference material pertaining to the project selection group. (See paragraph 3 of Meeting 1.)

   b. Give a demonstration on some phase of your project program (encourage members to give these at project meetings).

   c. Exhibit a collection or items made in connection with this project.

   d. Complete a record of project work accomplished.

   e. Prepare an ecological field report on a species in the phylum Chordata.

   f. Assist wildlife leaders with younger members.

MEETING 2.

1. Identification of species included in the study group selected by the project group.

2. Classify the various species within the study group.

3. Select the species upon which the comprehensive study will be made.

This meeting could be held in a location where references are readily available (library, Fish and Game office, natural history museum, zoo, park, etc.).

MEETING 3.

1. Learn life cycles of species in study group.

2. Learn weak or stress points in life cycle.

MEETING 4.

1. Learn the factors relating to the productivity of the species within the study group.

   a. breeding potential

   b. environmental resistance

2. Develop a population curve for the species in the study group.

MEETING 5.

1. Learn the applicable management techniques that can be used on the species within the study group.

2. Determine which of these techniques can be used in your locality.

3. Determine which techniques are most feasible in your area.

MEETING 6.

Field Trip:

a. Develop techniques for making field study of individual species.

b. Observe interaction upon each other of members of the study group species.

c. Make extensive notes on observations.

d. Observe and note importance of habitat on behavior of species observed.

MEETING 7.

Year End Meeting:

a. Check over records.

b. Arrange for exhibit entries.

c. Review accomplishments.

d. Complete and label collections.

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DECEMBER 1968--500

4-H
HUMMINGBIRD
OBSERVATION PROJECT

By
Ken R. Churches and Jennifer Mitchell

Cooperative Extension **University of California**
Division of Agriculture and Natural Resources

This manual prepared by:
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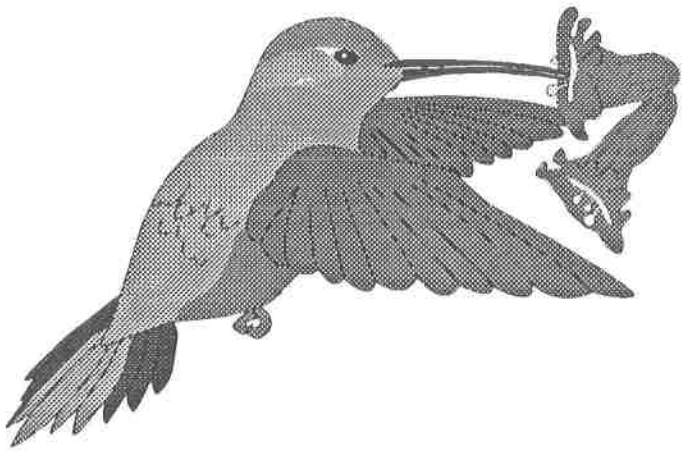
4-H
HUMMINGBIRD OBSERVATION PROJECT

The 4-H Hummingbird observation project is a tool that teachers, 4-H leaders, and other youth professionals can use to teach young people about the beauty and value of wildlife in our world. It can serve as an interesting introduction to ecosystems, natural resources, and conservation practices. Simply observing the beautiful iridescence of a hummingbird allows us to experience a renewed sense of wonder and appreciation for the living things around us.



FASCINATING FACTS

Amazing is the word that most people think of when they view a hummingbird. Here are a few facts that will add to your sense of amazement:

- The ruby-throated hummingbird's wings can beat 78 times per second during normal flight and up to 200 times per second during a display dive.
- The heart of the hummingbird beats 1,260 times per minute.
- While resting, a hummingbird takes 250 breaths per minute.
- Hummingbirds feed 5 to 8 times each hour.
- If man had the same metabolism as that of a hummingbird, he would need to eat 283 pounds of hamburger each day to maintain his weight.
- Each day, the average hummingbird consumes half its weight in sugar.
- Hummingbirds lay the smallest eggs, about half the size of a jellybean.
- Hummingbirds have the largest known relative heart size of all birds. Their hearts are 2.4 percent of their body weight.
- The bee hummingbird of Cuba is only 2 1/4 inches long, the smallest of all birds.
- The ruby-throated hummingbird weighs only 3 grams, which is only one tenth the weight of a first-class letter.
- Some hummingbirds migrate as far as 3,000 miles.

- Ruby-throated hummingbirds fly 500 miles nonstop across the Gulf of Mexico on their migration.
- Hummingbirds live to be from 3 to 12 years old.

HUMMINGBIRD FEEDERS

It is not difficult to attract hummingbirds almost anywhere in the United States by hanging a feeder in a secure location. Many excellent commercial hummingbird feeders are available on the market today. The majority of them are colored red and may have flower patterns on them to make them even more attractive to hummingbirds.

The two basic types that are available are the vacuum type and the shallow dish type. The vacuum type is simply an inverted bottle that empties into a small reservoir with approximately four feeding holes. The draining liquid creates a vacuum in the bottle that keeps the remaining liquid from draining out. The shallow dish type is a covered container with several feeding holes. The hummingbirds can stick their beaks into the holes and draw the fluid directly from the shallow dish. It might be interesting for you to try at least one of each type of feeder to see which is easiest for you to service on a regular basis.

Your hummingbird feeder will require regular filling and cleaning. For this reason, it is important to select a feeder that is easy to take apart and is made to withstand heavy use. Most feeders will require that you use a small bottle brush to clean at least some of the parts. It is better to start with a smaller feeder that will be consumed within a few days and then go to a larger one as you attract more and more birds. If you decide to start with a larger one, remember that you do not have to fill it all of the way up.

Some commercial feeders come with perches and some do not. Perches will be used by the hummingbirds if they are there, but they may also be used by some other unwanted larger birds. If your feeder does not have a perch, the hummingbirds will still use it by hovering as they would to extract nectar from a flower. When they get tired, they simply find a nearby branch to land on. Most hummingbirds spend about 60 percent of their time perched and resting from their intensive flying. If you have a feeder with perches, simply remove them if a

Ruby Throated Male

problem with other birds should begin.

Feeders on the market today may be made from either glass or plastic. Plastic does not break, but it may be harder to clean and easier to scratch. The plastic may become brittle and susceptible to cracks over extended periods of time. Take time to shop around and select the perfect feeder for your needs.

Be sure to hang your feeder where you will be able to observe it from indoors without disturbing the birds. It should be hung where strong winds will not cause the feeder to be swayed and spill its sugar solution. Hanging it out of direct sunlight will prolong the life of the sugar solution. It is best to hang the feeder from a wire suspended from some overhang of a building or from a steady tree.

MAKING SUGAR SOLUTIONS

Using a commercially available mixture to fill your feeder is certainly convenient, but will prove to be much more costly after you begin to attract large numbers of hummingbirds. So, why not learn to make your own solution? Here is a recipe for making your own:

Homemade Hummingbird Sugar Solution

1 part sugar
3-4 parts very hot tap water
Shake or stir until completely dissolved. Store unused portion in the refrigerator for up to a week.

Hummingbirds will find your mixture as attractive as they do flower nectar because granulated sugar is basically composed of sucrose. Flower nectar also contains primarily sucrose, along with two other forms of sugar-- glucose and fructose. Actual hummingbird taste tests reveal that they actually prefer sucrose over the other types of sugar. The recipe above using 4 cups of water will yield a sugar concentration of approximately 21 percent. This is very close to the percentage found in most wildflowers.

Maintaining the correct ratio of sugar to water is important because if the solution is too sweet, it may prove to be difficult for the birds to digest. If it is not sweet enough,

they will likely seek out the natural nectar or another hummingbird feeder. Artificial sweeteners should not be used because they do not contain adequate calories to maintain the hummingbirds very high metabolic rate. Honey should not be used because it ferments or spoils fairly easily and can be fatal to the birds. Red food dye is considered to be safe for human and animal consumption by the U.S. Food and Drug Administration. It may be added to your sugar solution if you wish, but is not at all necessary.

You may be wondering if sugar alone will provide the hummingbird with proper nutrition. Well, if the birds were kept in captivity where that was their only source of food, they would not enjoy a satisfactory diet. However, in the wild the hummingbirds can and do eat many other things besides the sugar solution that you provide for them. They will partake of nectar from many different flowers and eat a wide variety of insects. This variety in their diet should provide a proper nutritional balance. If you are concerned, you may want to try the same formula that many zoos use:

Black Chinned Female

1 gallon water
28 ounces sugar
3/4 ounce human nutritional supplement
(such as "Super Hydramine", "Gevral", or similar supplements found in your drug store)

CLEANING YOUR FEEDER

The health and well being of the hummingbirds that use your feeder depends upon your careful attention to the maintenance of the feeder. The sugar solution is very susceptible to spoilage from mold, yeast, or bacteria. Plan to clean the feeder every 2-3 days with very hot water. A small amount of household bleach is also helpful to sanitize the feeder by killing unwanted microorganisms. Be sure that you rinse the feeder out very thoroughly. Sometimes it may be necessary to use a bottle brush to remove tough deposits or use pipe cleaners to clean the small tubes. Outside air temperatures will make a difference in how often the feeder will need to be cleaned. Pathogens in the sugar solution multiply much more rapidly when the temperatures rise above 65 degrees F. After cleaning, always refill with a fresh sugar solution.

TAKE DOWN YOUR FEEDER IN WINTER?

Many people wonder if they should take their feeders in for the winter. The Department of Fish and Game has advocates on both sides of this long-standing issue. Here are some details to help you decide what to do:

Rufous

- Some experts say that is all right to feed the tiny birds in the fall and winter as long as the feeders are not allowed to go dry during this critical time. Otherwise, birds who are depending upon human handouts may starve if the food is suddenly withdrawn.
- Other experts say that they fear the hummingbirds might freeze while roosting because their sleep is a near comatose state. If you remove the bird feeders in mid fall, the hummingbirds will be forced to migrate to warmer climates for the food they need.
- Finally, some say that Anna's hummingbird is prevalent and it inhabits cooler climates year around. Besides hummingbird feeders, many winter garden flowers and some common trees serve as a food source for these birds.
- A common misconception is that hummingbirds will not migrate if feeders are left up. This does not appear to be true since hummingbirds in many areas begin to migrate even when there are still insects available and flowers in bloom. Changing day length is more likely to be the factor that reminds the birds to move on.

FEEDER PROBLEMS

Having ants, bees, or wasps eating your sugar solution can be quite troubling. The ants can be fairly easily controlled by applying a little petroleum jelly or tanglefoot (sold in most garden supply stores) on the string or wire that supports your feeder. Wasps and bees can be a bit tougher to control. Many feeders come with "bee guards", a small screen device that fits over the feeder holes. It allows the bird beak to penetrate, but keeps the insects out. Applying a small amount of vegetable oil around the feeder hole may make it difficult for the flying insects to get a grip when they land.

Dripping is a very messy problem. To minimize it, keep the feeder hung in the shade so that sunlight cannot heat the liquid and cause it to expand. Hanging it out of the wind will prevent sloshing and subsequent dripping.

Costas

HUMMINGBIRD IDENTIFICATION

Following is a list of the eight major species of hummingbirds that can be found in North America. Only the ruby-throated hummingbird lives in the Mid-west and East. All others live in the West:

1. Ruby-throated
2. Allen's
3. Anna's
4. Black-chinned
5. Broad-tailed
6. Calliope
7. Costa's

8. Rufous

OBSERVING HUMMINGBIRD BEHAVIOR

Take time to stop and observe the interesting behavior patterns of the hummingbird. You will find them to be unique and a source of enrichment for yourself and your students.

Territory

Males are the first to arrive at the breeding ground and they set up territories. When females arrive, they set up their own territories that include their nesting area. Males tend to be aggressive toward nearly every other bird that enters into their territory. Females will defend their breeding territories, but devote much of their time to the building of their nest and raising the young.

Nesting

Allen's

Nest building and the raising of the young is handled by the female only and she will chase away any other hummingbird that comes near the nest. She builds her nest using downy fibers and bits of plant material. The individual fibers are fastened together with spider or insect silk and often covered with lichens.

The female hummingbird then lays only two eggs, incubates them for 2 to 2 1/2 weeks, then she feeds the newly hatched babies in the nest for about 3 weeks. Nests are often built again in the same spot for several years, often right on top of the old nest.

Sounds

The vocal chords of the hummingbirds are not very complex like a song bird. So, their vocalizations are usually just buzzes or chatterings. Hummingbirds do make several sounds with their wings while they fly and hover. These sounds are most common with the male birds and are easiest to hear during an aggressive motion or during a display flight.

Visual Displays

Many visual displays are used to communicate between hummingbirds. Displays can be made while perched or when in flight. Displays made while perched involve spreading out many of the feathers in a way that flashes their iridescence to other birds. Tail spreading is another display that is used while perched. This highlights the white tips of the feathers and is usually done by the females.

Two types of displays are used during flight. The first is the shuttle-flight display, where the bird flies back and forth in a short horizontal arc in front of another bird. The tail and breast feathers may also be flared for added emphasis. The other flight display is called the dive. This is generally only performed by the males. The bird makes several U-shaped dives and makes loud wing or vocal sounds. These dives are intended to be aggressive.

Anna's Male

Behavior at Feeders

Hummingbirds really enjoy the constant and easily accessed supply of "nectar" that they find at a feeder. So, it is not surprising that they tend to act very aggressive and

Anna's Female

attempt to keep it all for themselves. As other hummingbirds arrive to use the feeder, they will either challenge the first bird at the feeder for the whole feeder or just sneak in when the other bird is away and steal food. If many hummingbirds gather at the same feeder, no single bird will be able to defend it, and they will tend to all feed with only an occasional chase.

Observation Record

Date	Cleaned Feeder?	No. of birds	Identification	Comments

The information provided in this publication is intended for educational purposes only.

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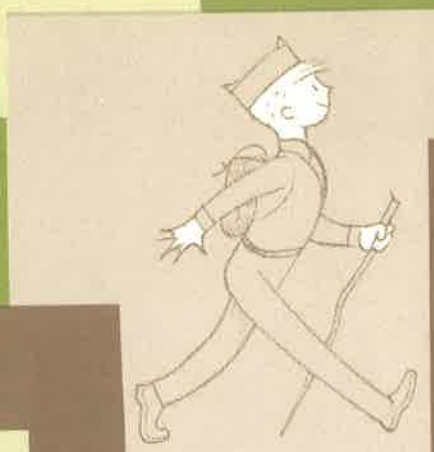

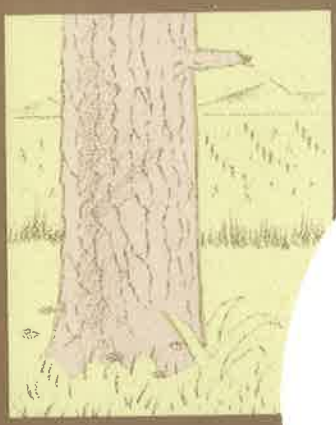

4-H Wildlife project IDEA book

UNIVERSITY OF CALIFORNIA AGRICULTURAL EXTENSION SERVICE

4-H--Ag185

The authors are William G. Schneeflock, 4-H Club Specialist, Berkeley, and Richard D. Teague, Extension Wildlife Specialist, Davis.

Material in this manual is adapted from a number of sources throughout the country, for which we are greatly indebted.

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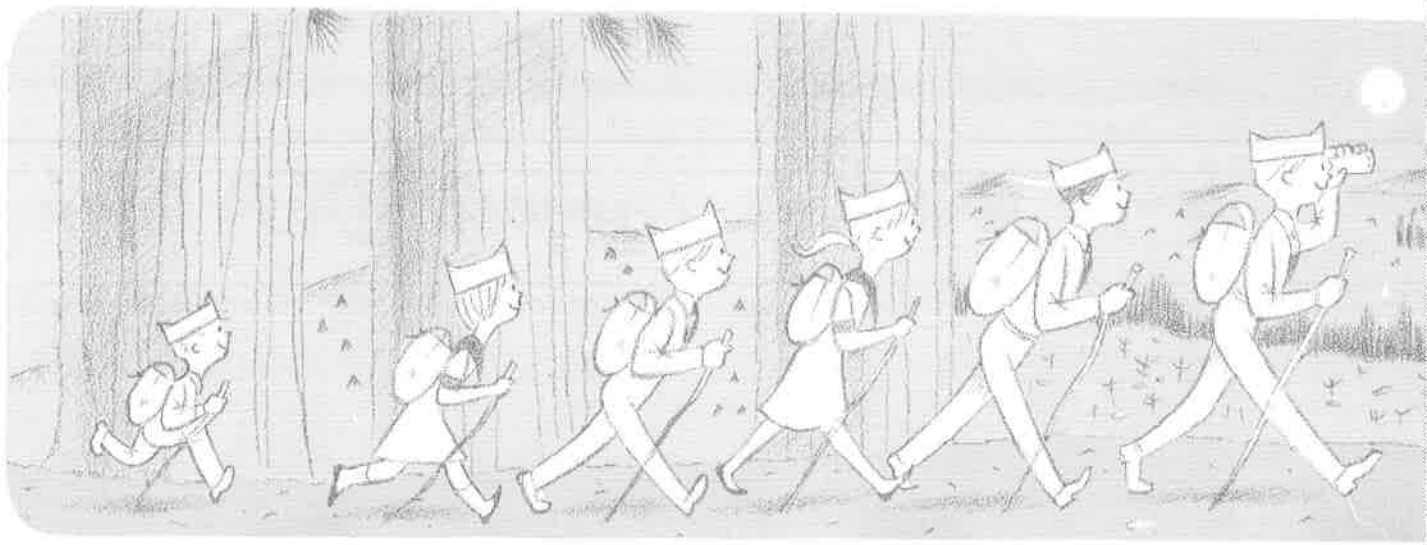
4-H Wildlife project IDEA book

Besides the information covered at your several Wildlife Project meetings, you may choose as a part of your work one of the areas covered in this Project Idea Book. Each member may work as an individual or the entire group may work together. This book presents a number of suggestions and in many cases includes complete instructions. You will find the wide variety of things to do or construct is a challenge to your interests and talents. What's more, as you complete each item you will find it is a source for your continuing interest and increasing knowledge about wildlife.

Be sure to check any proposal with your leader to be sure it is practical and useful in your area. It would not be of much value to set out water barrels for quail, for example, if a great deal of water already exists in the area.



FIELD TRIPS AND TOURS

As you know, projects are the backbone of 4-H Club work. Field trips, when they make use of your knowledge about the habits and needs of wildlife, are important in the Wildlife Project. You can, of course, make your wildlife project interesting without field trips. Still, your own first-hand, on-the-spot experiences will make what you learn all your own. Your interest and ability will have a special sureness—and there is no fun like becoming expert through your own observation. You won't easily forget what you've learned from your field trips.

PLAN IT!

To get all you can out of your field trip you must plan well. Here are some basic questions to answer.

WHY? The reason for the trip.

WHAT? What you are going to do?

WHERE? Is this the place to do it? You and your leader may want to look first. If a group of you are going, involve everyone in the decision.

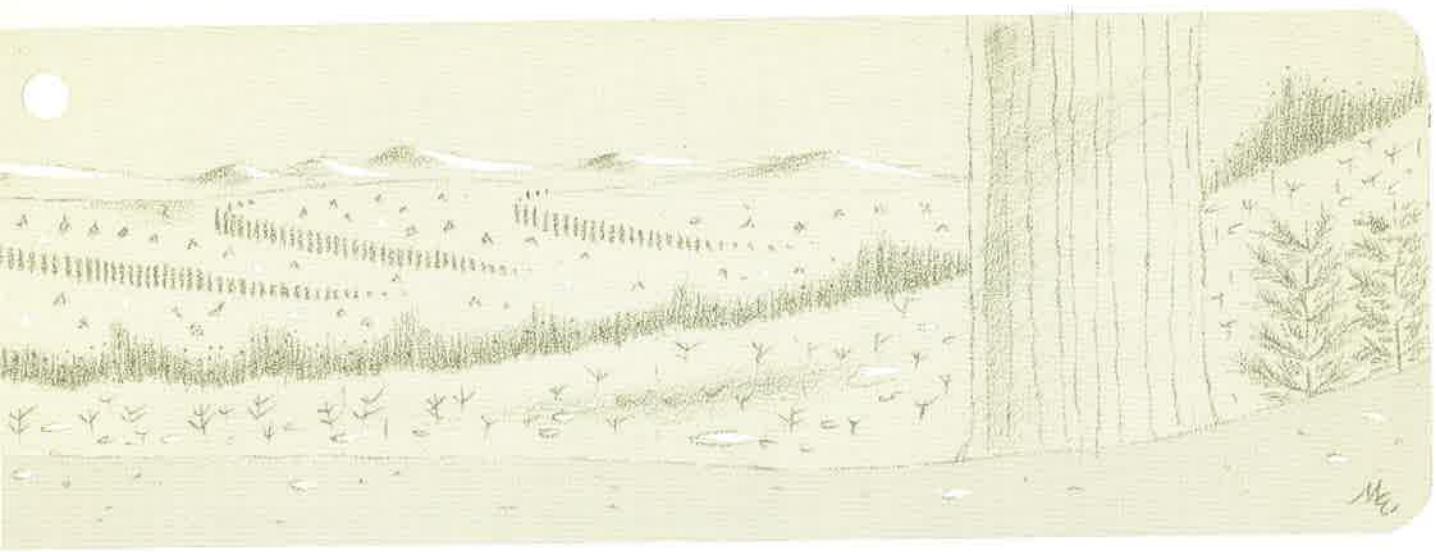
WHO? Should the whole club go? Or a small group? Or just yourself? Your leader will help you decide. Will you divide a big group into smaller ones? Will you need additional leaders?

WHEN? Set a date. If there will be a group, decide together. Set a time to start and a time to return. Estimate how much time you will need for the work of the trip.

HOW? Get advance, written permission from landowner, administrative department concerned, parents when necessary, and any other authorities involved. Provide for transportation and equipment. Arrange financing.

BEFORE YOU GO

A class talk, photographs, literature, etc. can do a lot to capture your group's interest and enthusiasm. Reference materials will provide the needed background. Talk about the problems this trip can help to solve.



Know the rules about collecting specimens.

Have a list of points to watch for during the trip. Go over these with your group.

Be sure to know and be able to keep safety and behavior rules.

With your leader, go over checklist of materials you will need and can use during the trip.

Be sure to say "thank you" or appoint someone to thank anyone who has helped you with your trip.

WHAT WILL YOU NEED?

FOR A GOOD FIELD TRIP YOU WILL NEED SOME SPECIAL QUALITIES.

CURIOSITY—an open mind. Without it the trip is meaningless.

KEENESS OF OBSERVATION—not just eyes, but ears, nose, taste, and fingers—in fact, all your senses, including a sixth—common sense.

PATIENCE—nature is patient and you must be too. If you want to benefit from your trip there isn't any substitute for patience.

HONEST EFFORT—without it you won't have satisfaction. Make the experience count by giving yourself wholeheartedly to it.

YOU WILL ALSO NEED SOME SPECIAL THINGS.

PROPER CLOTHING—warm enough, comfortable, proper footwear.

NOTEBOOK—not a must for young 4-H'ers, but a good habit to have.

POCKET FIELD GUIDES—birds, mammals, plants, etc.

FOOD AND DRINK—enough, but keep it compact.

OTHER—first-aid items, pocketknife, binoculars, tote bag, or small knapsack, etc.

WHEN TO GO

TIME OF YEAR—there is no closed season, but plan what you will observe or do for the different seasons.

TIME OF DAY—dawn or dusk are the best times to observe wild animals. Full daylight is best for insects, plant and water life.

TECHNIQUES FOR A GOOD FIELD TRIP

SMALL GROUPS ARE BEST—less than 12.

FOLLOW THE LEADER—quick assembly.

OBEY SIGNALS—work out simple signals for "silence," "stop," "gather round," "come here."

GOOD MANNERS—stay on trail. Obey posted signs, close gates. Leave no trash. No unsupervised fires.

> "Let no one say—and say it to your shame— that all was beauty here until you came!!"

IF YOU ARE LEADING A GROUP—don't lecture on the trail. Wait for an opening, then draw the group together.

ASK QUESTIONS OF THE MEMBERS—let other 4-H'ers give the answers.

WORK FROM A BASE—make a new base with landmarks from time to time. Let each person work from base independently for a period.

SET AN EASY PACE.

WHEN YOU ARE ACTUALLY OBSERVING

Give all your leaders and members a clear idea of the purpose of the trip (a set of questions you and your club leader have prepared ahead of time).

Prepare everyone to listen attentively to all explanations and advice.

Set aside a time for questions and be sure all questions are answered.

Set aside a time for note taking and sketching.

FOLLOW UP

Write thank you notes.

Evaluate place visited and knowledge gained and whether what was learned met the purpose of the trip.

Answer unanswered questions. Is there anything unfinished or anything you don't completely understand?

How are you going to share your new knowledge? Reports from members? Discussion of what was accomplished? Drawings? Poems? Stories?

What species have been collected? Have they been identified and displayed? You might want to have bulletin board displays, some construction, diaries, etc. based on the trip.

OBSERVING WILDLIFE

Almost everyone, young or old, finds great pleasure in the work and play of wild creatures. Many people spend many hours in order to capture in a photograph the appearance and habits of wild things in their natural surroundings. Many more find sketching animals or tracking their signs an absorbing exploration.

Observing wildlife will add to your appreciation of animals and of the environment that supports them. Because observation is sharper and knowledge of how to use what your senses tell you increases if you take notes and keep records, the following exercise will start you out on an adventure in understanding what you see.

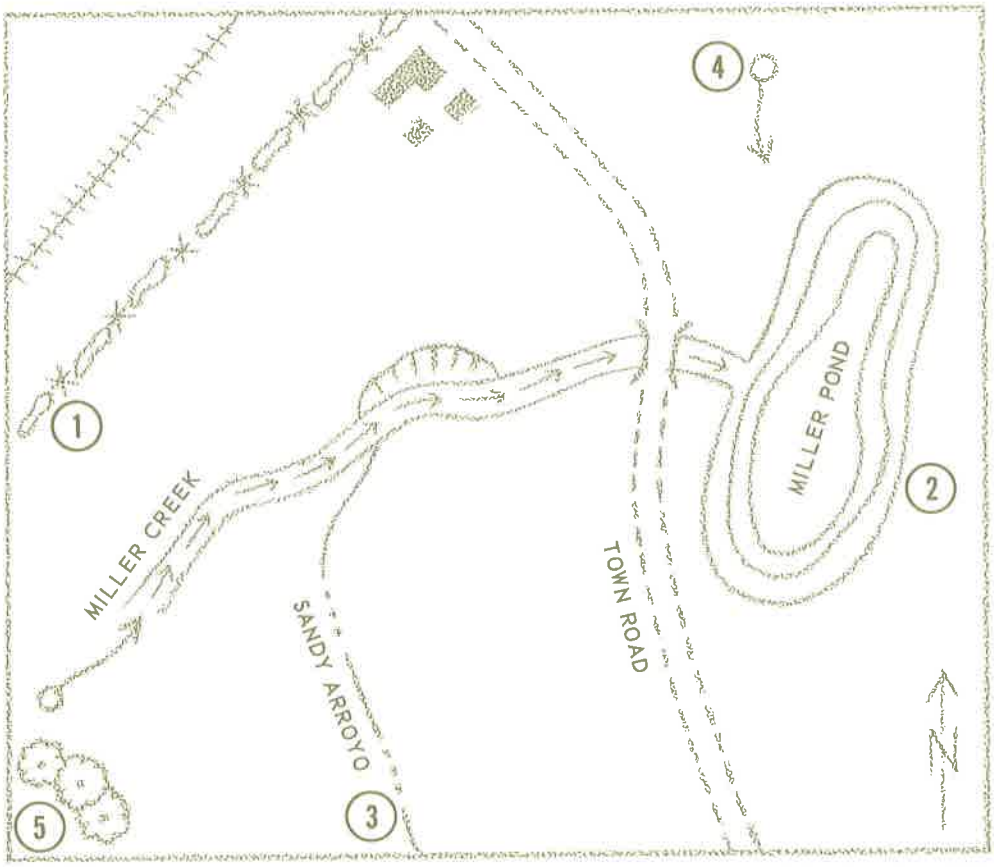
Check the Field Trip section in this book before you begin. Take a pencil and the checksheet on the next page. Record on it the wildlife you see and the other information required. Be very quiet and watchful.

RECORD OF WILDLIFE OBSERVATIONS

(Sample—get additional copies from your 4-H Farm Advisor)

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.							

MAKE A WILDLIFE RESOURCE MAP



① Saw 1 buck deer early morning in fence row shrubs.

② Bear tracks found near pond.

③ Coyote den in side of arroyo.

④ Five jack rabbits near spring at dusk.

⑤ Saw 2 does near pine trees in early morning.

SCALE (1" = 100')

A map of wildlife resources should show all the kinds of wildlife that are present in any area you choose to map. It is important in your wildlife project to learn how to check an area of land and how to prepare an accurate, informative, scaled map that shows the wildlife actually in the area. You must be very observant and careful if you want to make a good map.

HOW TO DO IT

Choose an area where there is wildlife. It may be the woods, a local park, part of a river or creek bank, forested area, pond, lake, or fence row. If you live in the city, or if an aerial photo is not available, ask your parents or leader to go along with you over the area you have chosen.

Remember—you don't need to map a large land area, or a whole farm. An acre or so is quite large enough. (An acre is an area about the size of a football field.) Probably you will need a week or so to make a good map. Visit the mapping area several times and at different times of the day to be sure your survey of the wildlife resources in the area is complete.

Make a map showing when and where you found animals, the kind of animals, and kind of habitat where you saw them, such as fence row, rock pile, or pond.

YOU WILL NEED THESE MATERIALS

pencil

plain paper

ruler

large piece of cardboard or plywood for a drawing board

STRIVE FOR THESE

- Draw map to scale. Give the scale in the margin of the map.
- Draw map so the top of the page is at north.
- Label important information. (Print.)
- Use symbols that show as much information as possible. Sometimes you will need to make up new symbols in addition to the usual ones shown on the next page. Be sure in this case to explain what your new symbol means in the margin of the map.
- Use reference numbers in the map for places or things that you explain in detail in the margin of the map. (For example, animal tracks and their location—or other such information.)
- Your leader will be happy to help you with your resource map and with animal identification.

NOW THAT YOU'VE MADE A GOOD MAP

Show your map at your project meeting. You may want to take the project group to your map area to point out the things you have seen.

RESOURCE MAP SYMBOLS

ROADS:

PRIVATE

PUBLIC HIGHWAY

RAILROAD

BOUNDARIES:

RESOURCE AREA EDGE (WHEN NOT A FIELD EDGE OR FENCE)

FIELD BOUNDARY (WITHOUT FENCE)

WIRE FENCE

STONE FENCE ROW

SHRUBS & TREES IN FENCE ROW

LAND USE PRACTICES:

SOD WATERWAY

(uphill side)

TERRACE

DIVERSION DIKE

SHELTERBELT OR WINDBREAK

CROP PLANTING

WOODLAND

OTHER:

BUILDINGS

SPRING

PERMANENT STREAM

BRIDGE

LAKE, POND, OR RESERVOIR

MARSH (MOSTLY GRASS AND CATTAILS)

toe of slope

STEEP SLOPES

ERODED AREA (WIND OR WATER)

STREAMBANK EROSION

DRAINAGEWAY (CROSS-ABLE WITH FARM MACHINES)

GULLY

5

% SLOPE AND DIRECTION

3

REFERENCE NO. FOR SPECIAL NOTE

N

NORTH ARROW

1" = 100'

SCALE (EX. 1 INCH = 100 FEET)

(INCLUDE HABITAT IMPROVEMENT IN YOUR MAP—REFER TO PROJECT MANUAL)

SURVEY A POND OR A STREAM

CHECK WITH YOUR GAME WARDEN BEFORE STARTING TO SURVEY A POND OR STREAM. GET HIS APPROVAL.

YOU WILL NEED SOME EQUIPMENT

old shirt and trousers (or swimsuit)

tennis shoes

field identification books

magnifying glass

white dishpan

buckets

minnow seine

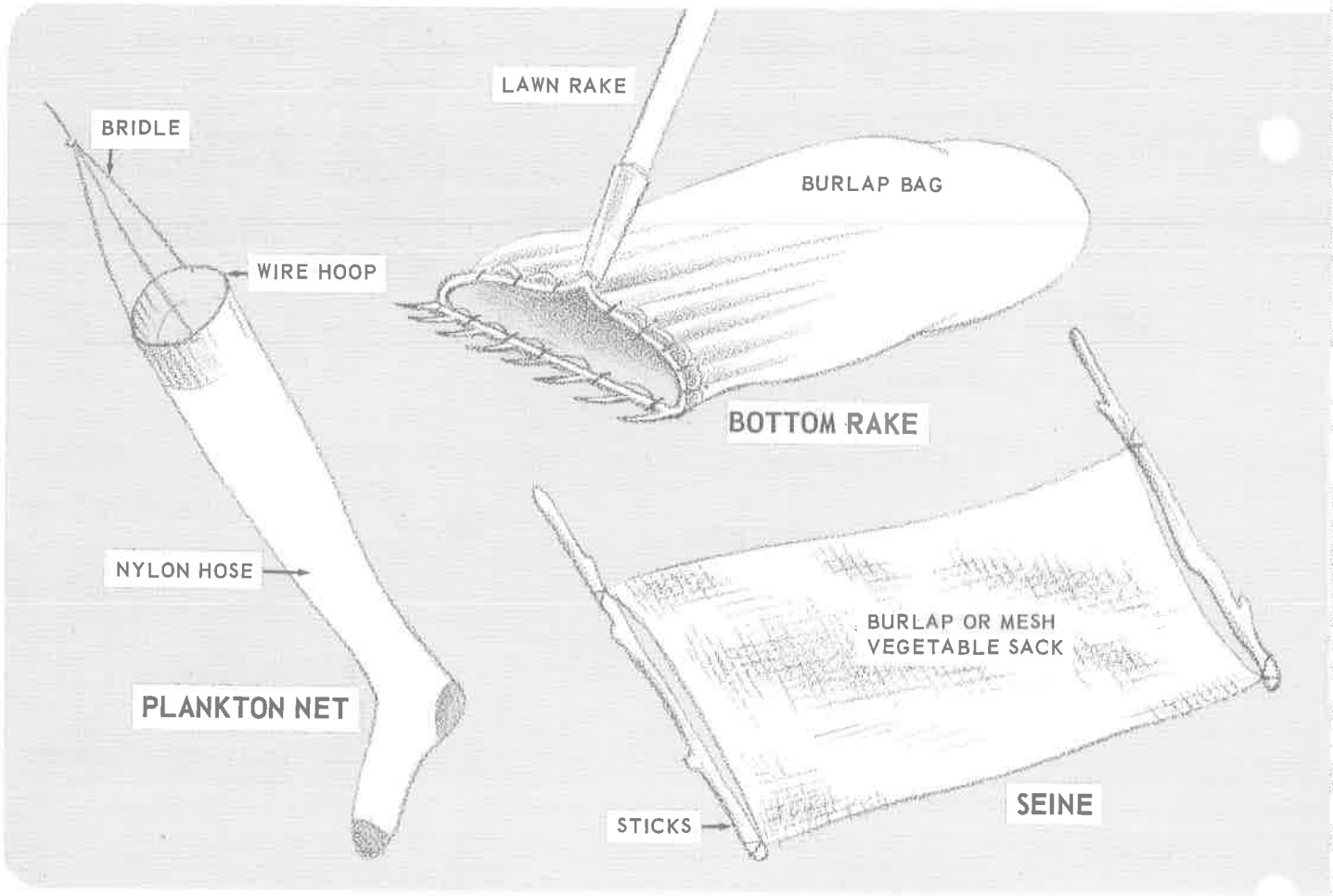
plankton net

bottom rake

WHAT TO LOOK FOR

You will be mostly interested in the creatures living in the water. But don't overlook shorebirds and furbearing animals that are part of water life. Examine the shoreline for their signs. You are apt to find here also—

COLLECTING EQUIPMENT



and in the shallows—frogs, tadpoles, small fish. Snakes and turtles may be found sunning on banks or logs. Newts, salamanders, and crayfish will be found in the shallows under rocks or sunken logs.

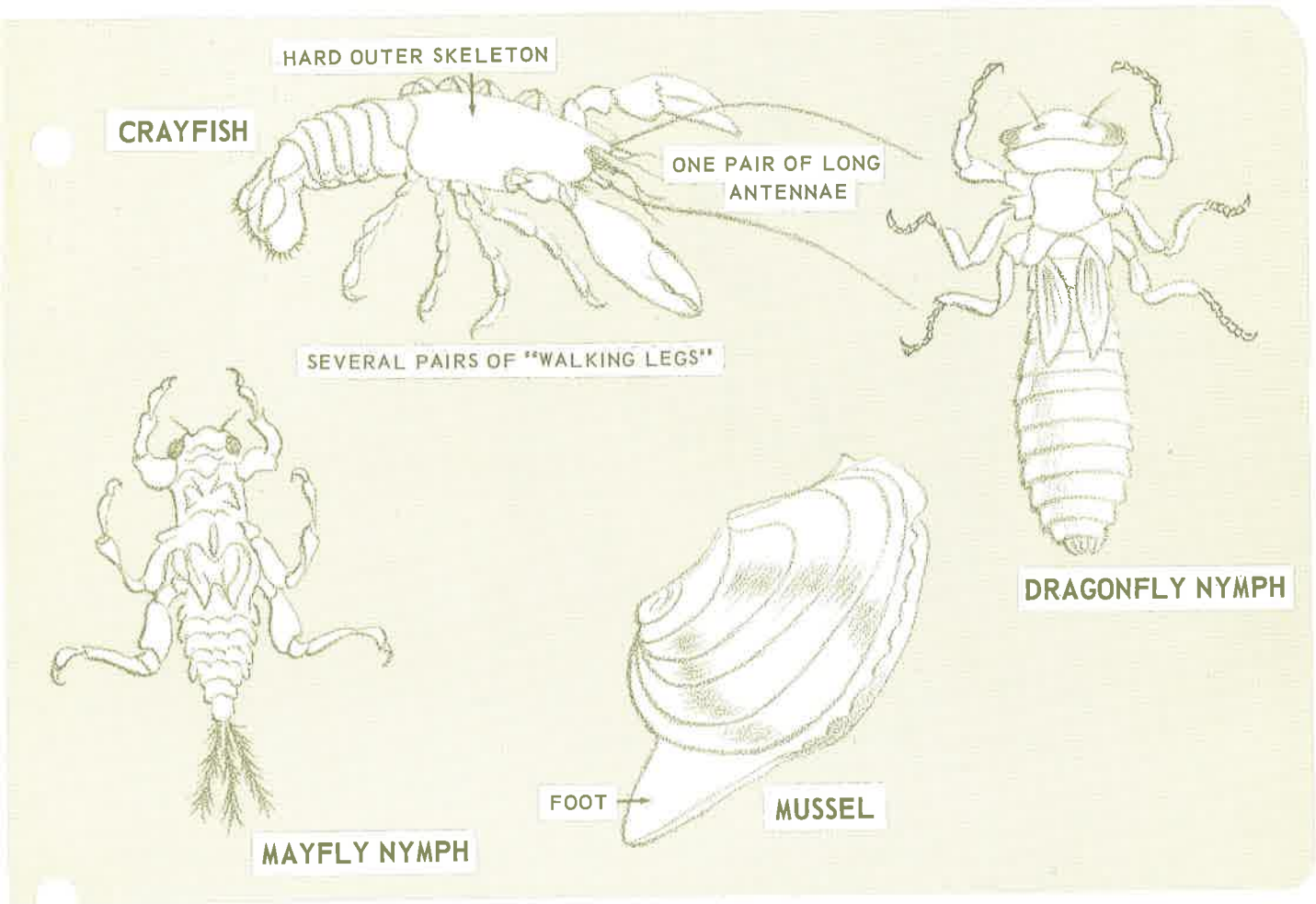
WHAT'S IN THE WATER?

Is the water clear, or is it brownish or greenish? Tow your plankton net through the water for at least 2 minutes. Now turn it inside out over your white dishpan and rinse by pouring a bucket of water through it. Are any animals moving in the pan? (Use your magnifying glass.) Can you see any tiny green plants? Could the color of the pond water be caused by these plants and animals? Work in knee- to waist-deep water, making sure the lower edge of the seine stays on the bottom. When ready to pull the seine out of the water, run it out on dry land. What did you catch?

Use your rake to dredge the pond bottom. You will stir up bottom dwellers and catch them in the bag. Examine the muck and pick out the captured animals. Can you identify them?

Return the animals to the pond unless you have an aquarium to keep them in. If you do plan to keep them, take only one or two of each kind since they will die if overcrowded.

BOTTOM CREATURES



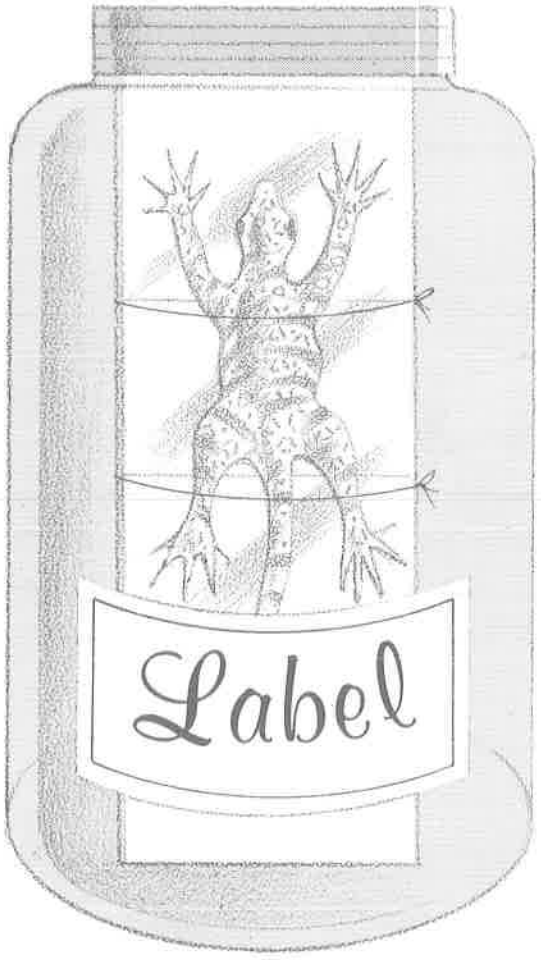
PRESERVING SPECIMENS

One method used to keep captured specimens is to put them in some form of alcohol solution. For preserving agents use one of these: 70% grain or 50% isopropyl alcohol or 10% formalin. *

Tie your specimen to a glass plate so that it is fully exposed inside the jar.

Don't forget to put a waterproof label on the jar with the following information:

species name
where captured
date collected
collector's name



* Be sure, when using these chemicals, to read and follow all instructions on the labels. Store them carefully in a safe place out of the reach of children, pets, and irresponsible persons.

COLLECT AND IDENTIFY SEEDS AS WILDLIFE FOODS

WHAT TO DO

Collect and identify 5 kinds of field-crop seeds and 15 of weed seeds that may be wildlife food. Make a reference collection of these seeds. On a sheet of paper, record seeds you have identified and make a list of the wild animals that eat each type of seed. Look in books, use your knowledge, and ask others to find out what animals eat what seeds.

WHY STUDY THIS?

Both weed and cultivated seeds are very important parts of wildlife diets. Animals are like people and have preferences. Doves like grass seeds, while deer ignore them; but deer like acorns while doves rarely eat them. Remember this though—almost all kinds of seed are food for some wild creature.

The exercise given here is a guide for making a reference collection of seeds that are wildlife foods.

YOU WILL NEED

20 small plastic sandwich bags (waxed paper ones will do)

ball of string

few sheets of typing paper

scissors for cutting labels

20 small vials with caps—about 2" high by ¾" wide. Pill vials are very good.

small funnel

vial stand (drill a ⅞" hole in a block of wood to hold vial so it won't tip while you are pouring in the seed)

pencil

small can of moth crystals

magnifying glass

cellophane tape

pointed tweezers

2 cigar boxes

rubber bands

newspaper or paper towels

HOW TO DO IT

Look through reference books for the many plants and types of seeds. Pick out those you know. Learn to recognize common dangerous plants—like poison oak, castor bean, oleander, etc.

COLLECT SEEDS

When you have studied the references you are ready to collect seeds. Take only ripe and dry seeds. Identify those you know (either by recognizing the seeds or the parent plants) in the field.

Put your collected seeds in small plastic bags. Put the seedhead in the bag if you like and shake the seeds off, or pick the seeds and drop them in the bag. Do not mix different kinds of seeds. Place only one kind in each bag.

When you identify a seed in the field, make a label out of plain white paper and place it in the bag with the seed. The label should have the name of the plant, date collected, location, elevation, and type of place (meadow, edge of woods, creekside, etc.) recorded on it.

Wrap a rubber band around the mouth of the bag so the seeds won't be lost. If you find a seed plant that you think you've seen but cannot identify, collect the seeds just as before but give the seeds a code number on the label, rather than a name, For identification, you should also collect and preserve the plant. When you collect a plant be sure to make a label for it exactly like the one you made for

its seeds. Record the code number, date, and habitat. Tie the label on the plant.

IDENTIFY SEEDS

When you get home, prepare the plants at once. Next choose a bag that holds seeds you identified in the field. Pour the seeds onto a piece of paper. Look at the seeds through a magnifying glass until you are familiar enough to readily identify them. Check your identification against the reference book. Remove all trash, leaves, hulls, etc. Put a vial in the vial stand. Put the funnel in the vial mouth. Pour seeds into vial. Add 2 or 3 moth crystals to prevent insects from damaging the seeds. Make a tiny label with all the information on the original and put it in the vial. Replace cap on vial. When all the identified seeds are prepared, do the unknown ones the same way. Keep your reference books nearby. The only difference in your procedure will be that you will put a tiny label in the vial containing only a code number rather than a plant name.

Place all identified seeds in a cigar box marked "Identified Seeds"; put the others in the cigar box marked "Unidentified Seeds."

After you have mounted your plants and their labels check each one against your reference books, or ask your leader for help. When you identify a plant, get out the proper seed vial from the "Unidentified Seeds," put an identifying label in it, and store with the "Identified Seeds."

MAKE A RECORD

After you have identified the required number of seeds, make your list of seeds and the animals that eat them. Ask your leader to help you with this. Your list should have the following information for each kind of seed.

Identified seed plant	Where found	Animals that eat it

REFERENCES

"Grasses," 1948 Yearbook of Agriculture, Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

"Seeds," 1961 Yearbook of Agriculture, Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

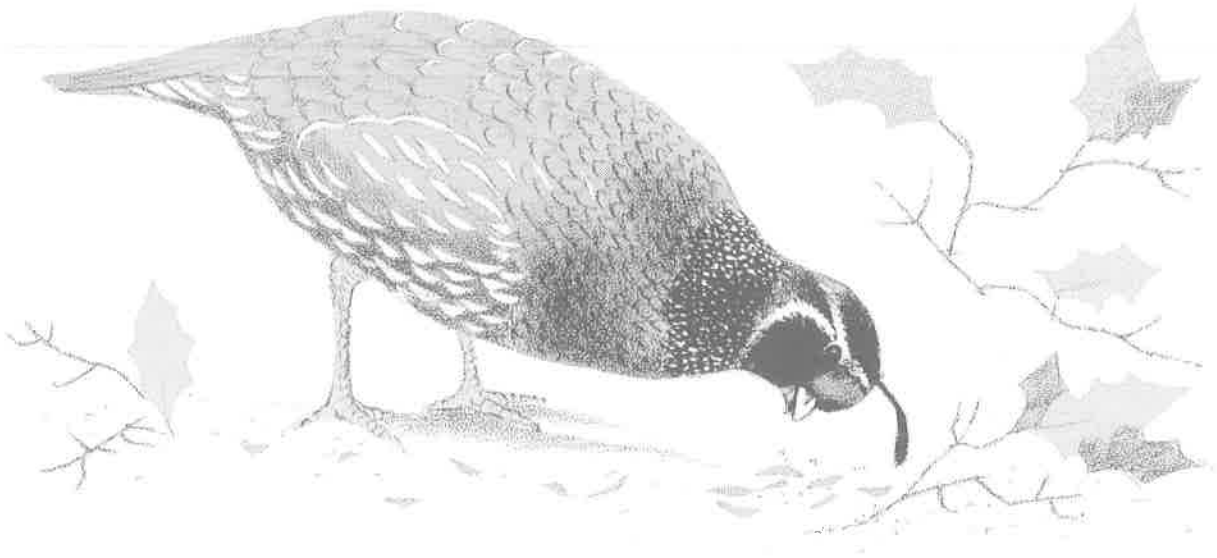
Wood Plant Seed Manual, U. S. Forest Service, USDA, Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

Seed Identification Manual, 1961, Martin, Alexander C., and William D. Barkley, U. C. Press, Berkeley.

Illustrated Manual of California Shrubs, 1939, McMinn, Howard E. University of California, Berkeley. (Out of print, available at libraries.)

California Range and Brush Browse Plants, 1963, Sampson, Arthur W. and Baryl S. Jesterson, Manual 33, Division of Agricultural Sciences, University of California, Berkeley.

WHAT DO QUAILS OR DOVES EAT?



WHY STUDY THIS?

This experiment will help you discover the importance of seeds in the diets of game birds. From it you will also be able to add to your seed collection.

WHAT TO DO

Collect and examine the crop* (craw) contents of 10 doves or 10 quail. Identify the seeds you find. Make a list of the seeds in each crop. Add the seeds to your reference collection. The collection of the crops may be done in cooperation with a hunter.

WHAT YOU WILL NEED

cooperative hunter to supply crops

plastic sandwich bags to store crops in refrigerator

scissors

vials (about 2" high by ¾" in diameter)

teaser (force the blunt end of a needle into eraser end of pencil or end of a sucker stick)

few sheets of typing paper

pointed tweezers

magnifying glass

small funnel

vial stand (see page 14)

pencil

moth crystals

rubber bands

reference books

*The crop, or craw, is a food storage pouch located next to and just in front of the bird's breast. It is under the base of the neck and forward of the wishbone.

HOW TO DO IT

Make a small paper label to keep with each crop. Use the typing paper or other fairly good paper. All writing should be in pencil.

Species _____

Crop No. _____

Date Killed _____

Crops may be prepared at once or stored for a few days in plastic bags in refrigerator. They may spoil if stored too long.

To prepare a crop for examination cut it open and transfer the contents to sheets of paper. Dry contents thoroughly. Keep the label with the contents. Do not mix the contents of different crops.

After crop or craw contents are dry, store them in a vial with the label.

SEPARATING SEEDS INTO KINDS

Place crop contents on sheet of paper. Using your tweezers, magnifying glass, and teaser, separate the different kinds of seeds into groups. Put each group in a separate vial. Make all labels exactly like the originals and put one in each vial. Fasten all vials containing seeds from one crop together with a rubber band. Now the contents are ready for your analysis. You can do this immediately, or you can store them to do at a later date.

IDENTIFICATION OF SEED TYPES

Study your reference books in advance—it will pay dividends. You may recognize seeds you saw as you were processing them and you will become acquainted with seeds you may find in the future. If you have made a seed reference collection, discussed on page 15, you will want to check your crop seeds against that.

When you find a "mystery" seed get some help in identifying it. Ask your leader to help you. If, after you've made a reasonable try, the name of the seed remains a mystery, record it by its code number.

MAKE A SEED LIST

When you have identified or coded all seeds, make a list of seeds found in each crop, with the information shown at the bottom of the page.

YOUR REFERENCE COLLECTION

When your list is finished put all the seeds into one vial, with the seed identification label, and add to your reference collection.

See page 15 for references.

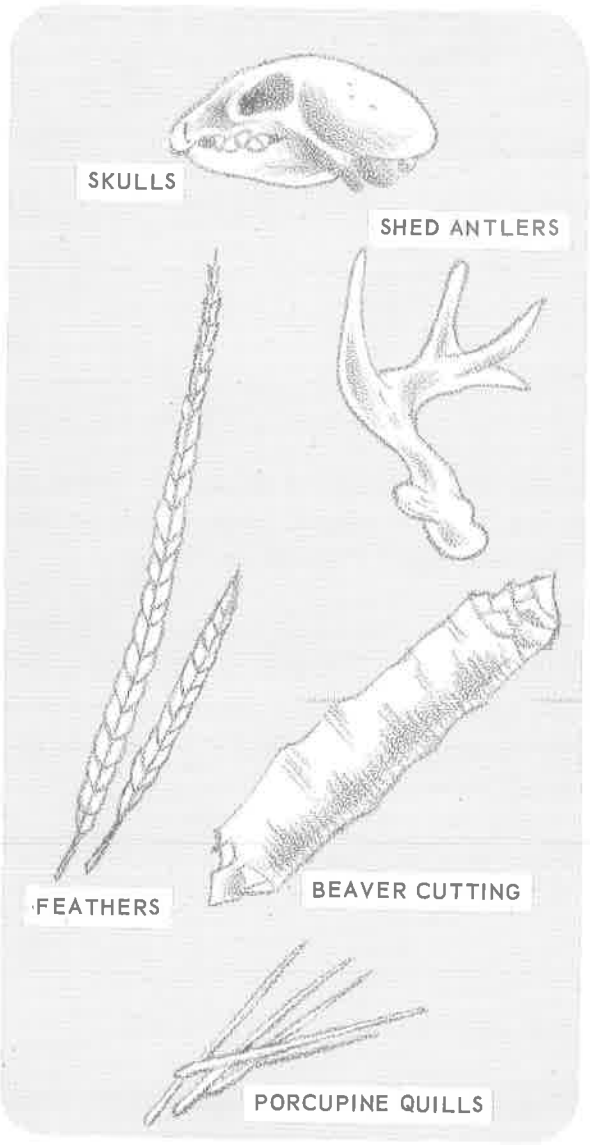
Game bird species	Crop no.	Date killed	Crop contents and percentage of each type seed.

COLLECT AND DISPLAY THE SIGNS OF ANIMAL LIFE

You can demonstrate rather easily that wildlife is always close by. Wherever you are—in the forest, along trails, by streams, lakes, or ponds, near rock piles, or fence rows, or even in your own backyard—you will see signs of animal life.

You can make a collection of these and, if you like, make a display of them. Sometimes you will not want to collect the specimen, but for your display collection you can sketch or photograph it. Sometimes you won't be able to take home evidence of wildlife. Sketching or taking pictures will be a most valuable addition to your collection.

There are many signs to look for—trunks and branches of trees that have been gnawed by mice, rabbits, beaver, or porcupine; nests in trees, skeletons, animal tracks, burrows of ground squirrels, pocket gopher mounds, or ridges constructed by moles. Other animal signs you may find are antlers shed by deer, owl pellets, tufts of fur from animals, feathers, skulls, porcupine quills, and many more.



MATERIALS NEEDED

In order to make your collection you will need materials like these:

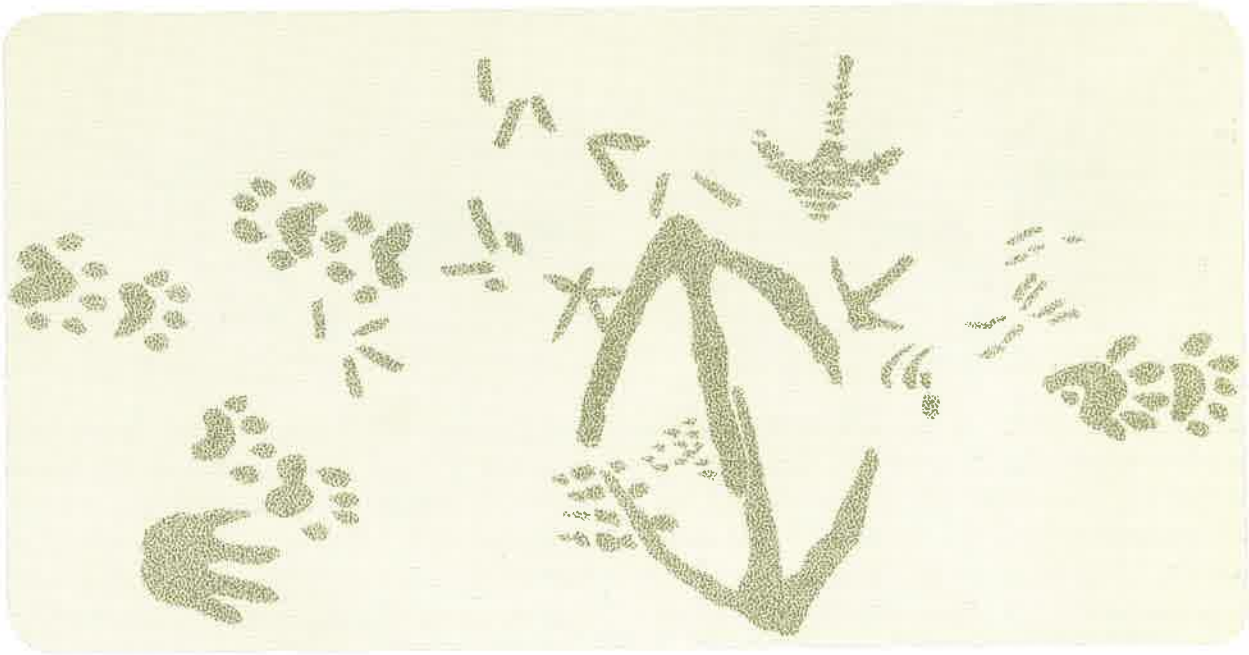
- shovel
- knife
- saw
- pencil
- sketch pad
- camera
- plaster of paris
- cardboard—heavy weight, or plywood
- water
- vaseline

MOUNTING

Mount or attach your animal signs on heavy cardboard or plywood. Don't try to put too many on a board! Label each sign and tell what it is (for example—ANTLERS) and where you found it.

Display your collection at your project meeting.

ANIMAL TRACKS



Animal tracks tell interesting stories about the lives of the animals who traced the evidence of their existence on the land. Sometimes they reveal exciting episodes and almost always an important detail about the habits and needs of some one of the many creatures inhabiting every corner of the earth. For us, it is an entrancing study in discovering the unseen life of many creatures. Where does a deer go as it bounds off through the woods? What was it feeding upon when we came upon it? Look for tracks in the mud of stream and pond banks, along dusty roadsides, in fresh earth trails, or in the snow. If you should be in an area where flooding has occurred and silt covers the earth you will be astounded to see the variety and number of tracks that will tell you of the animal life that inhabits land that seems only to contain a few bluejays and some deer.

Tracks will show you how animals spend their lives and from them you can trace their travels as they look for food and shelter. Most animals are shy; often they are active only at night so they are hard to observe. As you correctly identify and interpret the signs of animals you will discover that you have acquired a greater appreciation of wildlife in its natural environment.

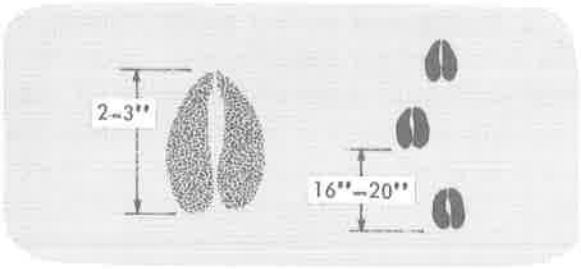
Where animal tracks are found helps to identify the animals. Some animals live in woodlands; others find open farmland and brush attractive; and some prefer the land near water.

It is hard to find perfect prints showing all the details of the animal's feet. Light rains may wash away parts of the tracks, or snow may drift over them or melt into them so that parts of prints may be missing or the impressions distorted, making the tracks hard to read. However, the print pattern, arrangement and size are often more important than the details.

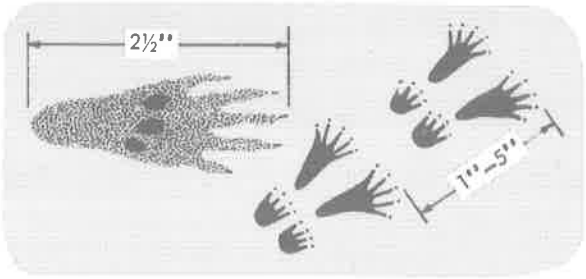
On the following pages are drawings of animal tracks and the patterns they make. Read the descriptions carefully. As you discover similar tracks you will want to make casts of them for your collection. A method for doing that is included at the end of this section.

LOOK FOR THESE IN WOODLANDS

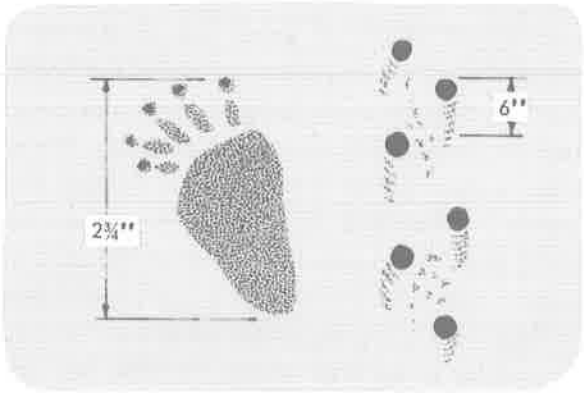
Black Bear—Bear tracks are seldom seen outside large forested areas. Although bears hibernate, they may move about during the winter and leave tracks. In summer, soft earth reveals their passage in tracks along mountain trails or at the edges of fields near mountain forest where the bears may feed. Bear tracks are distinctively large. The track pattern shows the hindfoot in front of the forefoot and the same side. The large hind footprint is very like a human footprint. The size and length of stride depend on the size of the bear, but adults have hind footprints about 7 to 8" long. The fore footprints are 3 to 4" long.



Deer—Deer and deer tracks are a common sight and most everyone can identify them. The split hoofprint is pointed at the front and more rounded at the back. The prints of pig and sheep are rounder at the front than those of the deer. A running deer leaves tracks that show the spreading of the split hoof and the dewclaw (vestigial toe claw) may leave a print. A walking deer leaves a somewhat staggered trail. Prints are about 2 to 3" long.



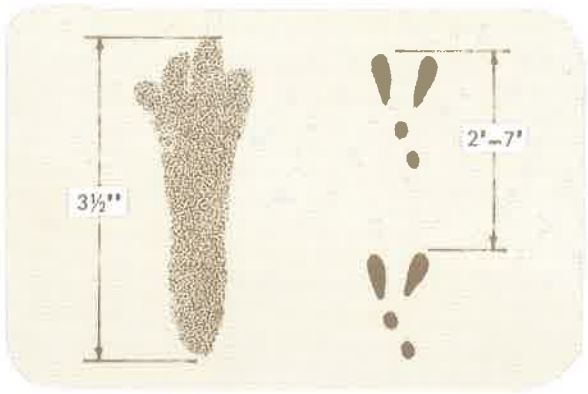
Gray Squirrel—In snow, squirrel tracks lead from tree to tree. Interruptions in the tracks show that the squirrel stopped to dig and eat a buried nut. The large paired hindfeet in front of the small paired forefeet show in their tracks the usual hopping and running pattern of squirrels. Hind tracks are about 2½" long and those of the front feet about 1¼".



Porcupine—Tracks of the porcupine are rarely clearcut but are nevertheless easily recognized. Feet and stiff-quilled tails are dragged over the surface of the land and trails lead from burrows or rock dens to trees where the animals feed on bark and twigs. Track patterns are within a trail 8" wide; front- and hindfeet are often in the same prints, which are toed in. Front prints are about 1¾" and hind prints 2¾".

White-Footed Mouse—The white underparts, legs, and feet of this brownish mouse give it its name. Seeds are stored by this mouse in ground burrows, crevices, or hollow logs. The mice open acorns by cutting a clean opening at the base to leave a thimble-like shell. Track patterns look like miniature rabbit prints. Watch for the tail drag-trail in the snow. The width of the track pattern is about 1½" and the individual prints are only about ½" long.

THESE ARE FOUND NEAR FARMLAND



Cottontail Rabbit—Look in berry patches, thickets, brushy fence rows, or backyard shrubbery for rabbit tracks. Rabbits have special feeding signs in addition to their usual tracks—gnawed bark on small stems, or low-growing twigs clipped with a smooth angled cut. Cottontails' tracks lead to ground dens, hollow logs, or rock crevices where the rabbits seek shelter. Track patterns have long, paired hind footprints well forward of staggered, small front footprints. Front footprints are about 1" long. Hind footprints are about 3½".

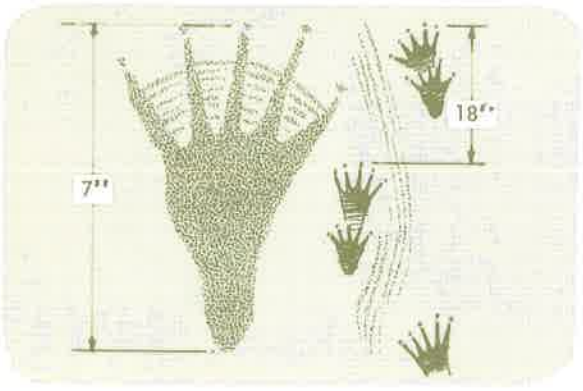
Opossum—Opossum tracks are very common around open farmlands. Look along edges of farm woodlots, in old orchards, brushy fence rows, and along roadsides. Tracks show a trail that wanders as the animal seeks both plant and animal food. Track patterns have the front- and hindfoot nearly side by side, often with tail sweep marks. The hindfoot track is distinguished by a hand-like thumb making the print about 2" long while the front prints are about 1½".

Skunk—Skunks are often inactive for weeks during cold weather but their tracks may be found during warm spells. Skunks live in

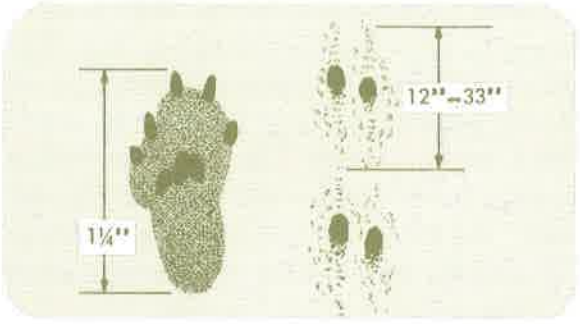
burrows or make dens under buildings. Their running track patterns are in series of diagonal prints. This angled track arrangement is a sure sign of a skunk. Hind footprints are about 2¾", front prints 1¾" long.

Weasel—The weasel is another animal that makes its home in stone walls, under old buildings, or underground in burrows. Tracks usually lead along fence rows, rock piles, and under old logs, where the weasel hunts for his food—field and woodland mice. Usually track patterns show both front and hind footprints made in the same track forming a a line of twin prints. The weasel is a curious creature and his trail may wander about and double back. Front prints are about ¾" long and hind prints 1½".

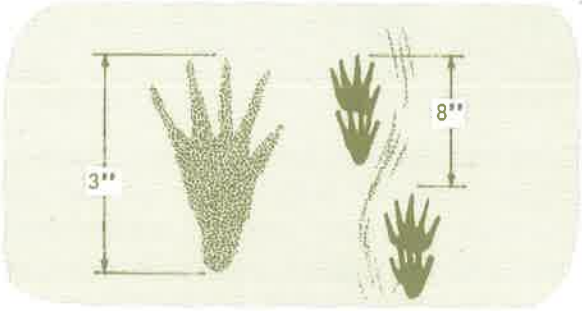
LOOK FOR THESE NEAR WATER



Beaver—Beavers cut aspen, willow, and other trees for food and to build dams and houses. Even if beaver tracks are hard to find you will be able to tell the beaver's cutting signs from those of any other animal. The beaver's track pattern is like the muskrat pattern with hind print slightly ahead of the front print on the same side. The hindfoot is very large and webbed and the tail very broad and flat. These features make a distinctive and easily identifiable trail. Hind footprints are 6 to 7" long, the front ones about 3".

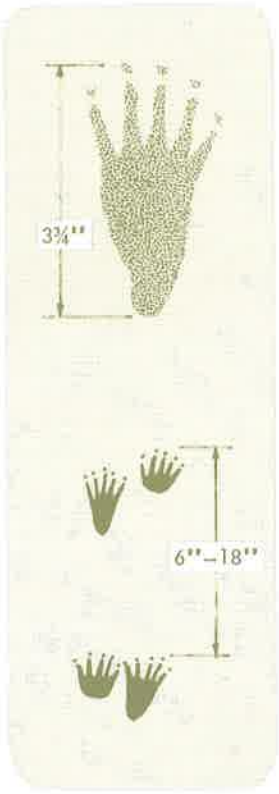


Mink—The mink is a semiaquatic animal that feeds along streams, marshes, and lakes. Mink are fairly rare and so their tracks are hard to find. Their tracks are similar to those of the weasel a close relative. They are found in a double trail with the front and hind prints usually registered in the same track, or sometimes with the hind print slightly in front. Both front and hind prints are about 1¼" long and 12 to 33" apart.



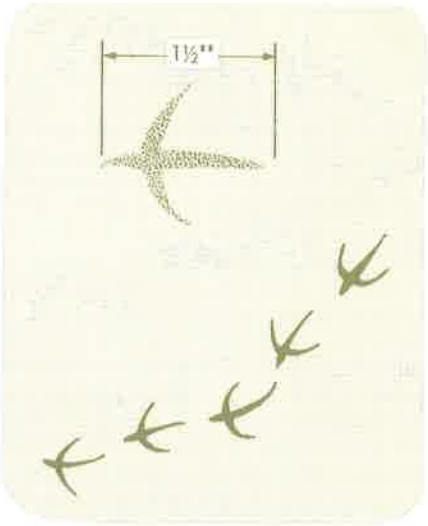
Muskrat—Muskrats are at home in and near water, making underwater burrows in the banks

of ponds or streams. They dig for roots of water plants and build houses from piles of aquatic plants. The track pattern of a muskrat places the hindfoot slightly in front of the front foot on the same side and with about 8" between prints. A wavy line is left by the dragging tail. Hind prints are about 3" and fore prints about 1" in length.

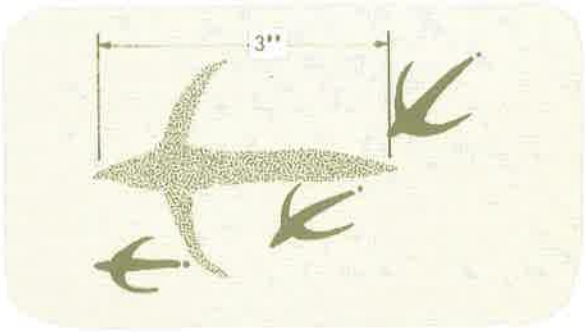


Raccoon—Look for raccoon tracks along river bottoms, streams, and marshes, or near other water areas. Because the raccoon is expert at climbing, he may leave claw marks on den trees. Sometimes he may make his den in rock crevices or in hollow logs. His track pattern places the front and hind prints nearly beside each other. The distance between them, however, may vary from 6 to more than 18". Hind prints look like tiny human footprints about 3¾" long. Front prints are about 2½" long.

BIRDS LEAVE TRACKS, TOO



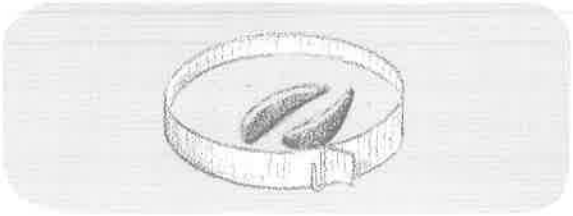
Quail—A covey of quail may have as few as 5 or as many as 100 birds. When feeding, the covey is always close together but may scatter widely when it is disturbed. Quail track patterns resemble dozens of small star-like prints. When the birds separate you will be able to count individual tracks. Quail prints are about 1½" long.



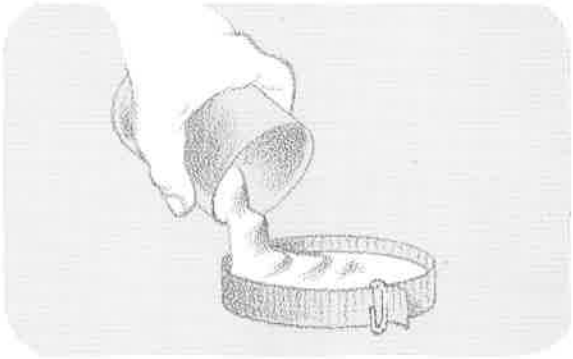
Ring-Necked Pheasant—Pheasants will be found near open farmlands where there is protective cover. They feed in nearby grain fields and their tracks will be found near these. Often flocks will roost in heavy cattails or in other marshy cover. Prints are about 3" long and are nearly in a straight line with only a slight staggering.

HOW TO MAKE PLASTER CASTS OF TRACKS

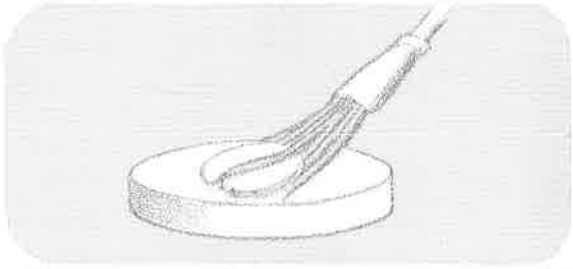
- With a 2-inch-wide strip of cardboard make a circle around the prints. Press it into the soil, mud, or snow to make a form to hold the plaster.



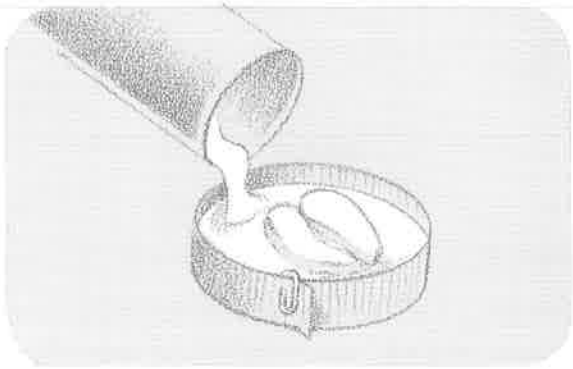
- Make a thin batter by mixing 1⅔ parts plaster of paris and 1 part water. Work quickly as plaster sets fast. When making a cast of a track in snow remember snow will melt unless you put lots of snow in the plaster to cool it, or dust dry plaster of paris into the print to form a base. Pour the mixed plaster carefully over the print.



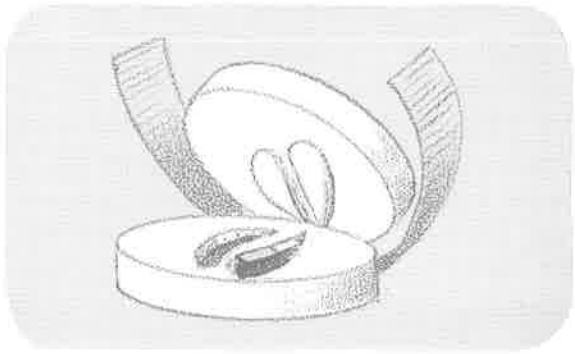
- After the plaster has hardened (depends on your batter) lift case and carefully remove cardboard. Clean gently with a brush. You now have a negative cast.



- For a positive cast, film the negative cast with vaseline and repeat the casting process.



- When hard, take off the cardboard and separate the negative and positive casts with care. The positive cast is a duplicate of the original.



DEER JAW COLLECTION

The age of a deer is told in its teeth. A collection of lower jaws of deer of varying ages will make a good guide for judging the age of other deer.

Jaws may be obtained from animals killed on the roads, or from hunters during deer season.

Be sure to get an o.k. from your warden before using jaws from road kills.

Only one half of the lower jaw is used and all jaws should be from the same side of the skull.

TO PREPARE THE JAWS FOR MOUNTING

Clean off as much skin and flesh as possible.

Boil in water about ½ hour.

Handle with care so as not to break it or chip the teeth.

After boiling remove any foreign matter and remaining flesh.

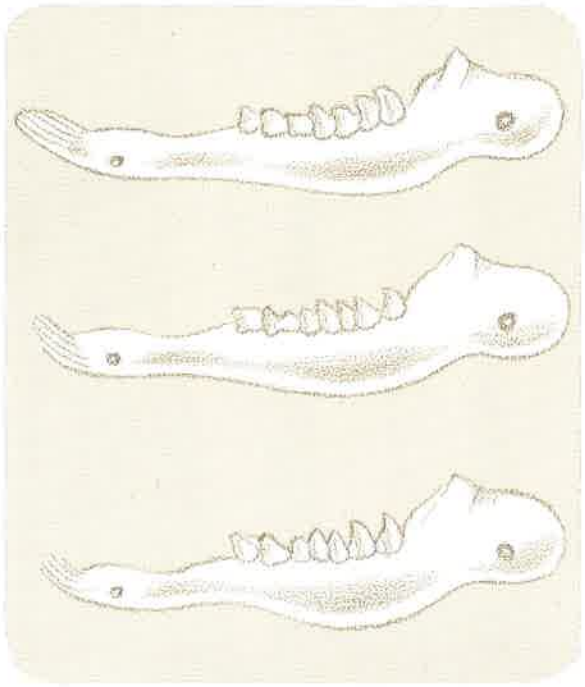
Glue any broken or loose teeth.

Write the age of the deer on the jaw with a felt pen and spray the entire jaw with varnish or clear plastic.

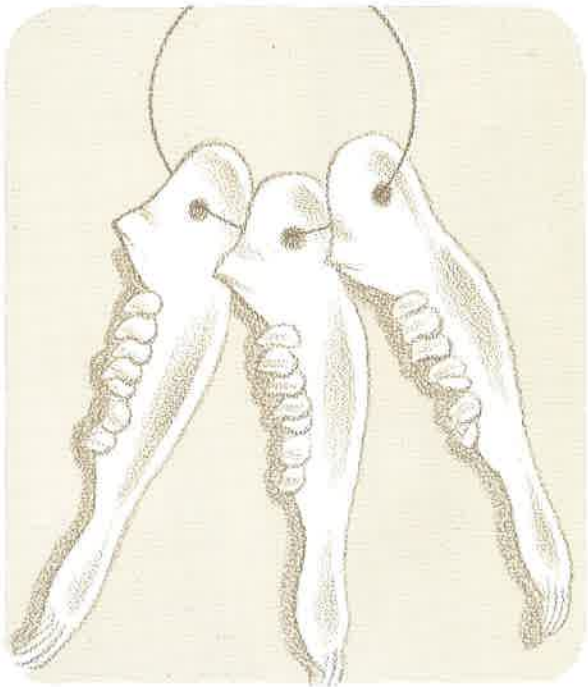
DETERMINING THE AGE OF THE JAW

A game manager, game warden, farm advisor, or references like "Wildlife Investigational Techniques," by Mosby are excellent resources in aging deer jaws.

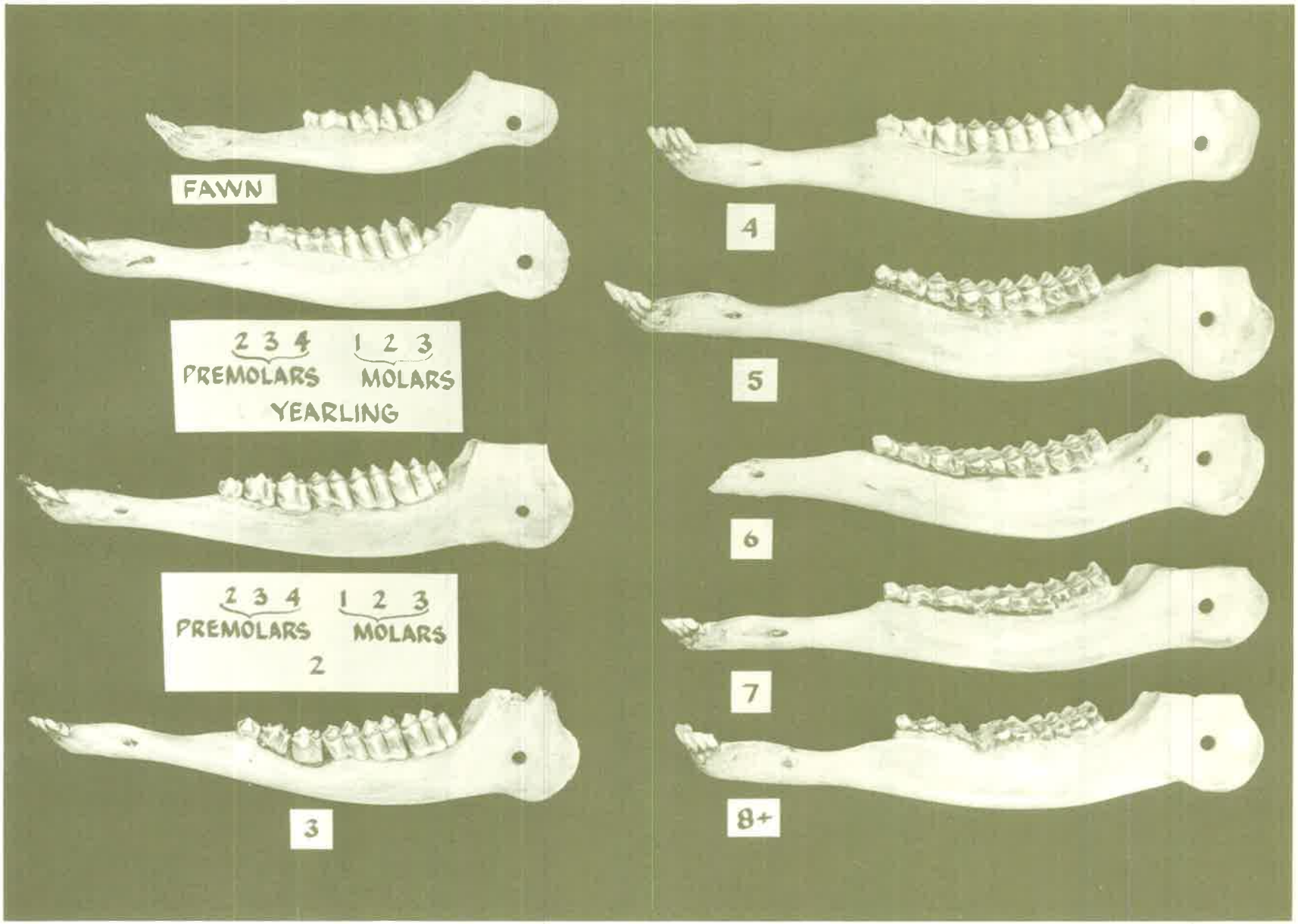
The jaws may be displayed in ways like either of the two shown here.



SMALL HOLES DRILLED IN JAW TO ATTACH TO BOARD



HOLE DRILLED IN JAW AND PLACED ON A WIRE RING


FAWN
2 3 4 1 2 3
PREMOLARS MOLARS
YEARLING
2 3 4 1 2 3
PREMOLARS MOLARS
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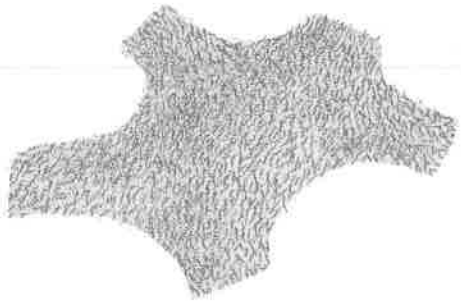
BIG GAME OF CALIFORNIA RANGE MAP AND PICTURE COLLECTION

Collect pictures of the state's big game and draw a map of where each is found in California. Place the picture and range map for each species in a scrapbook.

California's big game include deer, elk, bighorn sheep, pronghorn antelope, wild pig, bear, and mountain lion. You may wish to develop this information on as many big game species as you can.

The Department of Fish and Game booklet, "Big Game of California," and "Mammals of the Pacific States," by Ingles are references for this activity.

HIDE COLLECTION AND TANNING



COLLECTING HIDES

Obtain samples of hides from animals. Arrange, identify, and make a brief description of where the animal is found. You may do your own collecting of hide samples, friends may have some to give you, or you may write to zoos and museums requesting samples of animal hides.

Note the difference in the hair from different animals–for example, the soft texture of fur animals, or the hollow, brittle hair of deer. Animals going through a seasonal moult of pelage (coat) should be determined. Deer have a red summer coat but shed this for a gray one in early fall. Color, texture, length, etc. are hair characteristics that can be used to identify the animal the hair came from.

TANNING HIDES

You can tan a hide yourself!

The alum-salt process given here was developed by the American Museum of Natural History and then simplified for home use.

If the skin of a deer is to be turned into a fine buckskin, the hair must be removed. Soak the untanned skin in strong milk of lime. MAKE SURE THE SOLUTION DOES NOT SPLASH ON THE HANDS OR IN THE EYES. The lime loosens the hair so that it can be easily pulled away. After the hair is out, wash very thoroughly to remove all traces of lime from the skin, then tan in the usual manner.

1. If the animal skin was removed in the field, it has probably already been given a first scraping to remove most of the flesh, fat, and blood. If much time is to pass before tanning, rub handfuls of salt into the hide and then dry in the shade. Because direct sun will harm the skin, do all drying in the shade.

2. Before starting the tanning process the skin must be relaxed. To do this soak the skin in a salt water bath for 5 to 6 hours. Dissolve half as much pounds of salt as there are gallons of water in the container —that is, if you use 10 gallons of water, use 5 pounds of salt.

3. Remove the skin from the solution, and allow the water to drain off it. Rub salt in the flesh side. Then fold the skin, flesh to flesh, roll in a bundle and allow to stand overnight.

4. The next step is scraping and cleaning off the excess fat, flesh, and gristle. The museum uses inclined fleshing-boards. You can make one at home by mounting a smooth plank at a 45-degree angle on another plank. Plane the sides of the inclined plank slightly so that the working surface of a skin is raised slightly in the middle.

5. A dull-edged tool is used for scraping and cleaning. Be careful not to cut the skin during this operation. When you've finished scraping, dry the skin in the shade.

6. You are now ready to tan the skin. For 10 gallons of solution, dissolve 2 pounds of

alum in some hot water. Add 5 pounds of salt to 10 gallons of water, add the alum solution, and mix until both chemicals are thoroughly dissolved. For a 25-gallon solution, use 4 pounds of alum and 15 pounds of salt. A solution of less than 10 gallons is impractical.

7. Place the skin in this solution and soak it for from 3 to 6 days, depending on the size and thickness of the skin. A heavy hide (black bear) requires about 8 days. Smaller animals take 2 to 3 days. Deer should require about 6 to 8 days. The best thing about the alum-salt process is that you can't possibly over-tan the skin—when the process is finished, no further action takes place. So it is better to leave the hide too long than to chance undertanning it. Stir the solution during the soaking stages at least twice a day to make sure that it reaches all parts of the skin.

8. Take out the hide, drain it well, and rinse for at least 20 minutes in running water. To test for salt, taste the skin, touching it with the tongue. If it tastes salty, wash it some more until it tastes fresh.

9. Hang the skin over a wooden pole suspended horizontally. Hang it hair side out for a day or two, always in the shade. Turn it and allow to hang hair side in for the same length of time.

10. When drying is finished, sprinkle the skin with lukewarm water, tamping it on with a sponge. Dampen the skin; do not wet it. Fold it up, flesh to flesh again, roll in a piece of burlap and let it sweat overnight.

11. The next day, soften it as you would a glove that has been washed, pulling and stretching and working it with the fingers over a dull edge. You can pull it over the edge of your fleshing board or over a dull axhead clamped in a vise. After 20 minutes of working, the skin should be ready for oiling.

12. Any vegetable or animal oil can be used. Do not use mineral oil. The Indians used the greasy brains and livers of the animals themselves. Warm the oil and rub it well into the leather, seeing that it reaches all the pores.

13. The museum "kicks" the skin in an ingenious machine. You can do the same thing by putting the skin in a barrel and treading it with your bare feet for about 30 minutes. Treading or kicking breaks down the leather fibers so that the oil reaches every part and makes it soft and supple.

14. After the skin has been well worked and trampled, it is pretty sad looking, matted with oil and dark and stained. The museum tannery "drums" the skins in large drums containing hardwood sawdust. You can rig a barrel so that it will spin slowly and put the skin and several shovels of hardwood sawdust into the drum, close it, and drum it by turning the barrel so that the skin tumbles about inside. Any method that flops the hide around in sawdust may be used though. The particles of sawdust pick up excess oil from the hair and leather.

15. Now you are ready for the last step—finishing the leather. The professional tanner carefully scrapes it with a special curved knife. Coarse sandpaper will do the job for the amateur. Now the skin is tanned and ready to be used as a rug, or cut up into jackets and coats.

This tanning process takes time, but each step is easily followed and the results are very gratifying.

FISH DISPLAYS

An attractive exhibit of common local fishes will not only help you to learn about fish and fishing but will be something that will increase the knowledge and appreciation of the public. Putting together such a display can be very instructive and lots of fun, too.

Plaster casts of common fish of each species caught, or even identification pictures found in sports magazines are worthwhile materials for exhibit.

YOU WILL NEED TO HAVE

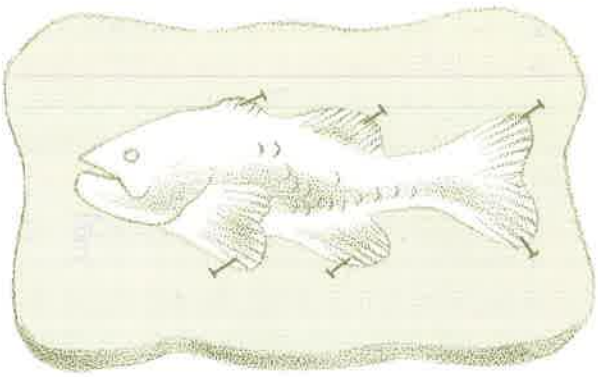
flat board
paintbrush
sand or clay
olive oil or thin lubricating oil
long, headless pins
plaster of paris
large plastic dishpan
bar of white laundry soap
small jar of vaseline
wire screening
burlap or cheesecloth
shellac

HERE'S WHAT TO DO

You can make your plaster casts right at the fishing area. Doing it on the scene will help you in the identification of the fish.

STEP 1

Choose a fresh fish. Remove slime and dirt by rubbing with salt. Rinse in cold water. Make a sand bed or one of clay. Embed the fish in the sand or clay so that one side is covered up to the back fins and the midline of the belly.



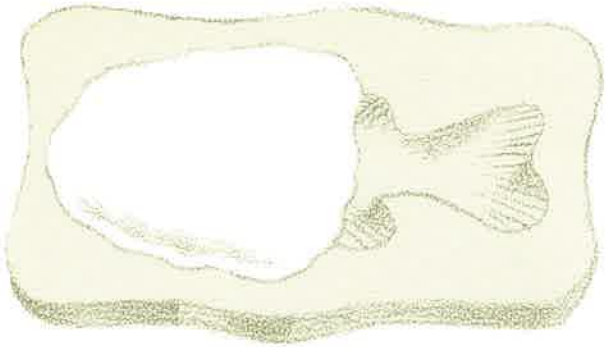
Spread the fins and pin them to the sand or clay with long headless pins. Make sure the fin on the fish's side and the gill cover are pinned flat to the body. Brush the fish with olive or lubricating oil. The oil will prevent the plaster from sticking to the fish. For the first few casts, the fin below and just in back of the head should also be pinned back against the body. Mix enough plaster of paris in your dishpan to cover the fish with a ½-to 1-inch layer of the plaster. (For a 5-lb fish you will need about 10 to 15 lb of plaster of paris.)

To make the plaster of paris batter, mix the dry plaster with enough water to make a thick cream. Add the water in small amounts but work fast. The chemical action of plaster of paris and water is very swift and the plaster will set quickly. Have all your materials on hand and ready before you start.

STEP 2

Pour plaster over the fish so that it is evenly covered all over. (A 10 to 20" fish requires a coating 1" thick.) Allow the plaster to set for 10 to 15 minutes. Wait until the casting is hard before removing. Lift the mold, turn it over and carefully remove the fish. If you have done the job well, you will have a per-

fect negative cast showing all the scale markings.



Note: Clean up your plastic dishpan—the hardened plaster is more difficult to remove from metal or enamel pans than from plastic.

STEP 3

To construct the model, soap the mold thoroughly with the soap and vaseline solution using a stiff paintbrush. The solution is made by shaving a quarter of a bar of white laundry soap into a cup and covering with water. Allow the mixture to sit overnight. It will then have a jelly-like consistency that can be mixed with the small jar of vaseline.

STEP 4

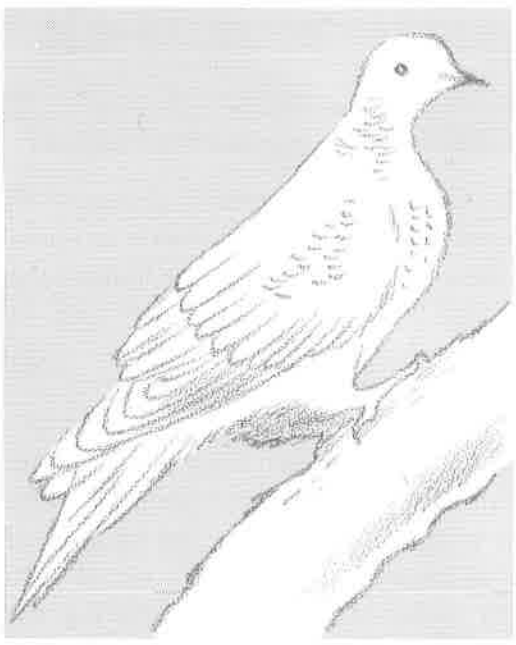
Cut the exact shapes of fins and tail from the wire screening, but add to the shapes a base that can be extended into the body portions of the fish. The screen will reinforce these delicate parts of the fish model that otherwise might easily crack off. Now cover the entire surface of the mold with at least ½ inch of plaster of paris. Press cut screen into the matching parts of the cast. Burlap or cheesecloth can be pressed into the soft plaster on the back of the cast to strengthen it. After 2 to 4 hours, depending upon the size of the model, remove the cast by lifting the edges slightly at several points until it is freed from the form. If it sticks, tap lightly around the edges of the plaster form until it cracks and releases the cast. To protect the model, cover it with light shellac when it is completely dry. Plaster casts can be painted if you like, for a more realistic reproduction of the fish.

Mount the casts on heavy cardboard or plywood with a good glue. Label each fish, telling the kind, where it was caught, and the bait or lure used. Exhibit your casts at a club meeting.

Other Things To Do

PICTURE COLLECTIONS

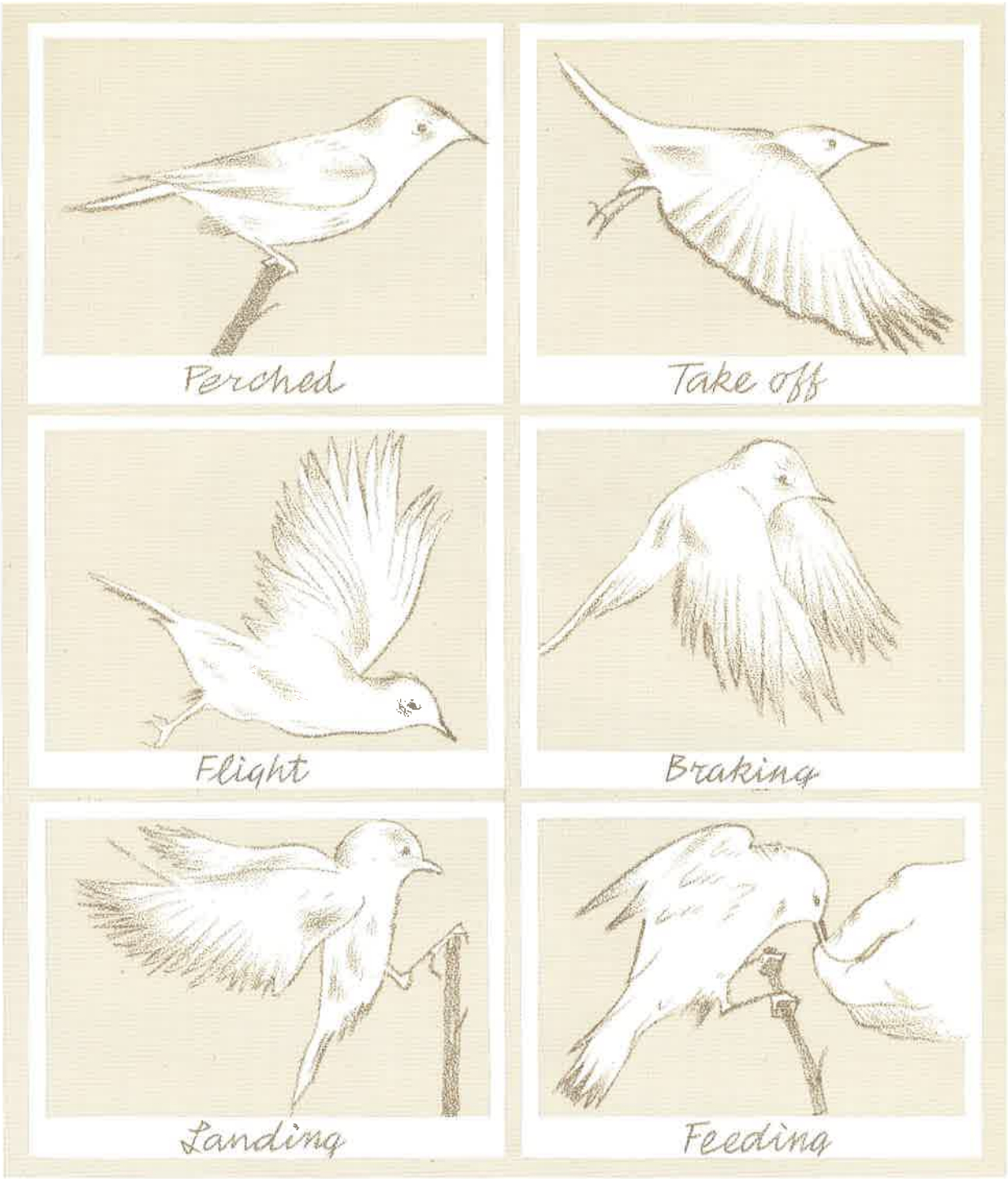
Chukar Partridge



Band-Tailed Pigeon

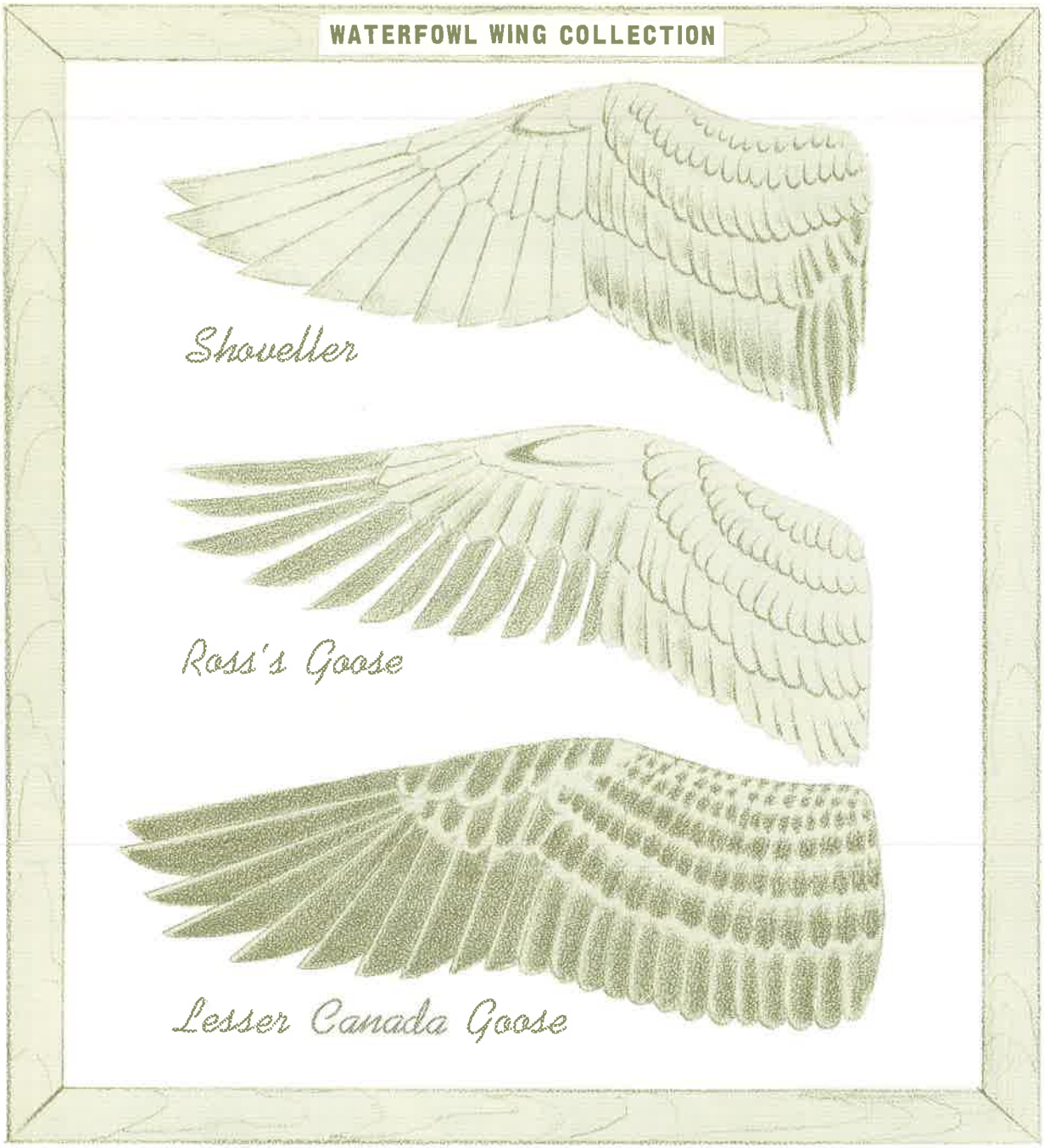
Collect pictures of wildlife species. Label and arrange them in a scrapbook. The pictures may represent species of one or several classes of wildlife, or of those species found in your county, or a special category like songbirds, waterfowl, trout, furbearers, etc., or any group of animals you may wish. Pictures may be those you find in magazines and newspapers, or photographs, or both.

PHOTOGRAPHY



This activity includes photographs of wildlife you have taken yourself. The photographs should represent a class or group of wildlife like gamebirds, songbirds, rodents, etc. You might like to tell a story with your photographs—perhaps of a particular animal or situation, such as the life history of a bird, stream improvement, seashell shapes, etc. Photographs should be arranged, labeled, and placed in an album. See 4-H Photography literature for helps in this activity.

WATERFOWL WING COLLECTION



Waterfowl species are readily identified by their wings. Make arrangements with a duck hunter friend to save wings for you. Collect one wing from mature birds of several species. Arrange the wings by groups (divers, puddlers, geese, etc.) identify and place in a scrapbook, on a board, or loose in a box. A wing collection can serve as an excellent judging quiz.

References include "Ducks at a Distance," U.S. Fish and Wildlife Service; "Waterfowl of California," Department of Fish and Game. Local game managers and farm advisors will also have reference materials available.

Select a species of bird that nests in your area and try to find one of its nests. If nests cannot be found, establish the type of cover in areas of your county used by the species for nesting. By making field trips through the area, determine the time of nesting, time of hatching, length of hatching season, and approximate number of young produced. When a nest is located make records of number of eggs in nest, date of hatch, date young birds leave nest, etc.

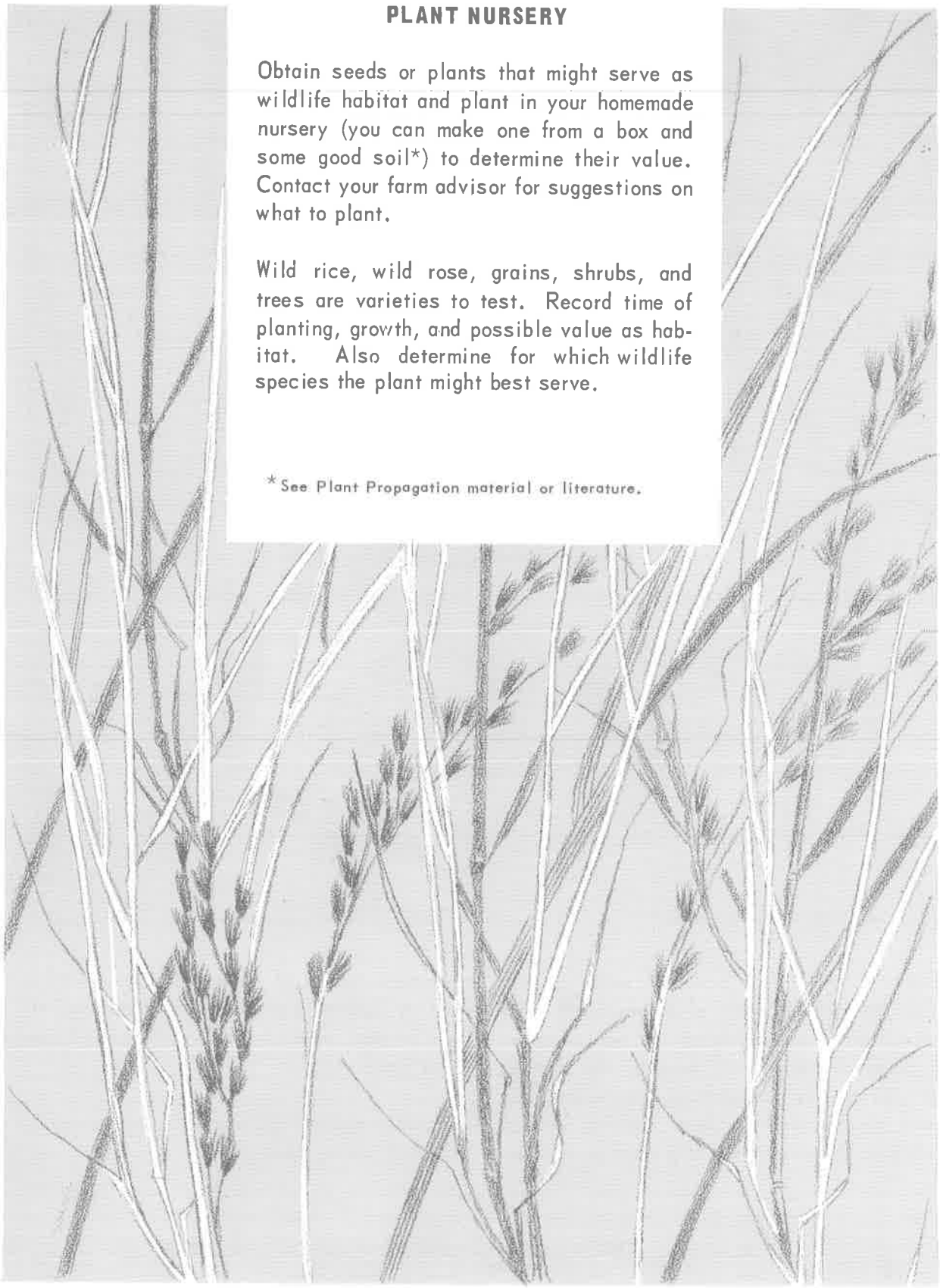
Suggested species include duck, geese, quail, pheasant, dove, robin, etc.

PLANT NURSERY

Obtain seeds or plants that might serve as wildlife habitat and plant in your homemade nursery (you can make one from a box and some good soil*) to determine their value. Contact your farm advisor for suggestions on what to plant.

Wild rice, wild rose, grains, shrubs, and trees are varieties to test. Record time of planting, growth, and possible value as habitat. Also determine for which wildlife species the plant might best serve.

*See Plant Propagation material or literature.



Things To Make

Mourning doves nest in all of California's 58 counties. Most nesting is in orchards or in trees near water in the valleys and foothills. Although doves' nests have been found in every month of the year most nesting takes place between April and September.

The dove makes a loosely built nest of twigs and weeds. These flimsy nests are often destroyed by moderate to strong winds that break the eggs and kill young doves (squabs).

Wire cone nests used in studies and experiments at California's Gray Lodge Waterfowl Management Area near Gridley have proved these manmade nesting aids are most helpful. For example, in two study areas 50 to 80 percent of all wire cone nests placed in trees were used one or more times during the dove nesting season. Nesting productivity was generally higher than in areas where the cones were not installed. Other birds also using these wire cone nests as nesting sites, but to a lesser degree, were the western king bird, northern shrike, and the English sparrow.

The mourning dove is one of California's most important upland birds. Farmers, sportsmen, and the nonhunting public all place a high value on the dove.

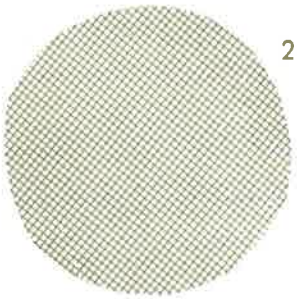
Because the dove lives almost entirely on weed seeds and waste grains it is not a nuisance to agriculture. The dove's lovely appearance and pretty call give aesthetic pleasure to everyone. For the sportsman the dove provides annual recreation that is second to no other single game species, and without harm to the total dove population in the state or nonhunting enjoyment throughout the year.

Placing cone nests for doves in good nesting areas will benefit the mourning dove population in California and of course it will benefit all those who enjoy this remarkable migratory bird.

Construct several cone nests for doves in areas where doves have been seen. Record where you find the nests and the number of nests used, number of young raised, and time of year used.

Materials: ¼- to ⅜-inch mesh hardware cloth.
Cut wire with tin snips and construct as follows.

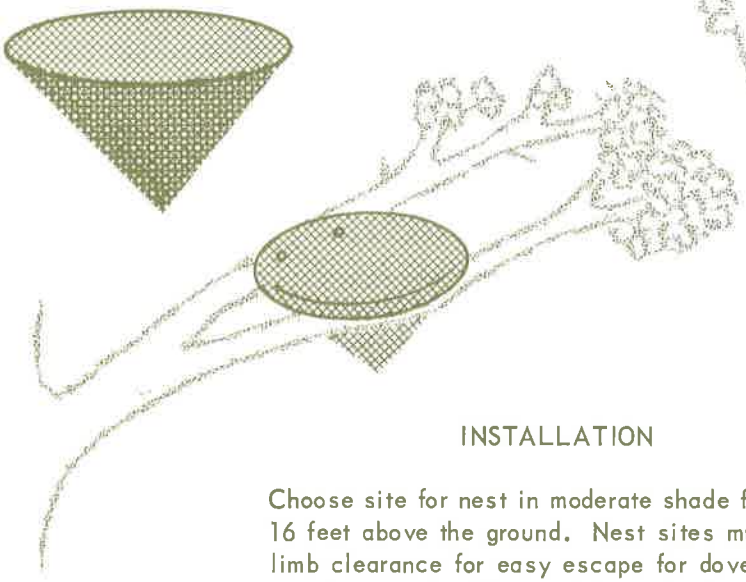
1. Cut out 12"-square pieces of hardware cloth.



2. Trim the 12"-square to form a circle.

3. Cut out piece of pie as shown.

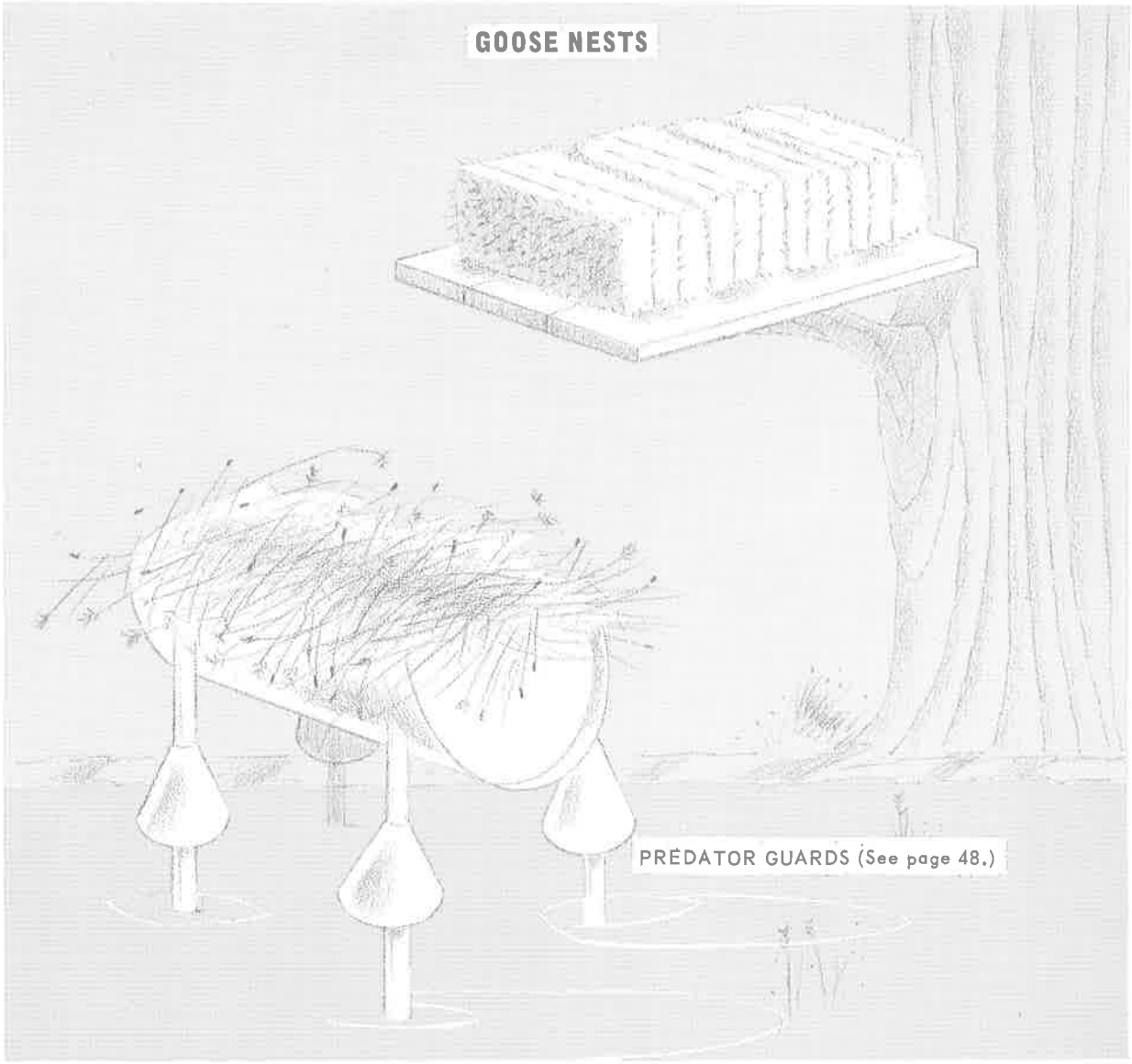
4. Close pie cut by overlapping edges about 3".



5. Side view of cone nest ready for nailing in tree.

INSTALLATION

Choose site for nest in moderate shade from 6 to 16 feet above the ground. Nest sites must have limb clearance for easy escape for doves. Use 2 nails on each side to hold nest in place. Bend edges of nest down slightly after it is nailed to tree or branch.



Construct several nests for geese and locate within 100 yards of water, or on posts in shallow water. Establish the nests no later than March 1. Observe when they are used and the number of goslings raised in each. Several kinds of nests may be used to determine the most acceptable type.

Nests should be located a few feet above the ground, or if on the ground on an elevated site. Do not place nests closer than 100 yards apart.

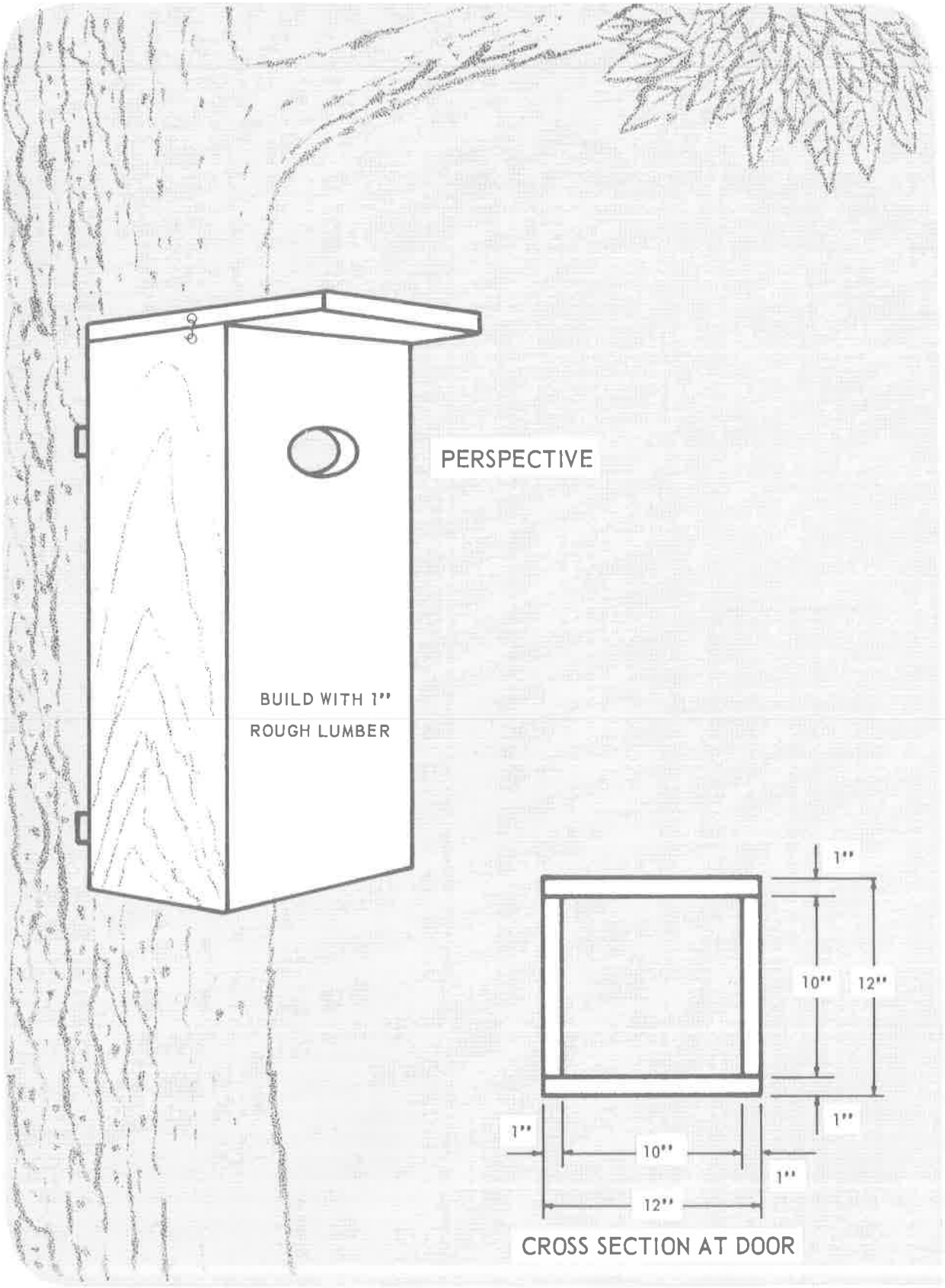
HAY NESTS

Nests may be elevated above the ground in several ways. Place 4 bales of hay or straw on a platform on posts or in a tree. For placement in a tree cut a large limb and place nest on it.

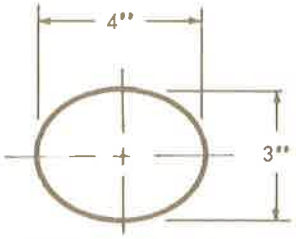
BARREL NESTS

A 50-gallon half-barrel mounted on posts makes a good nest.

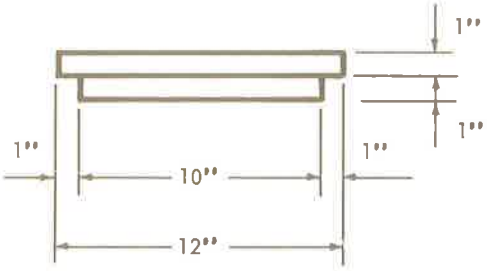
WOOD DUCK NEST BOX



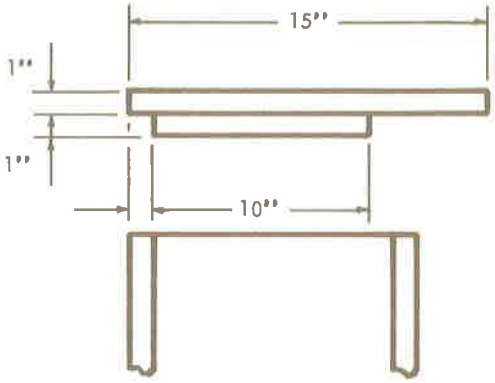
DOOR



ENTRANCE HOLE

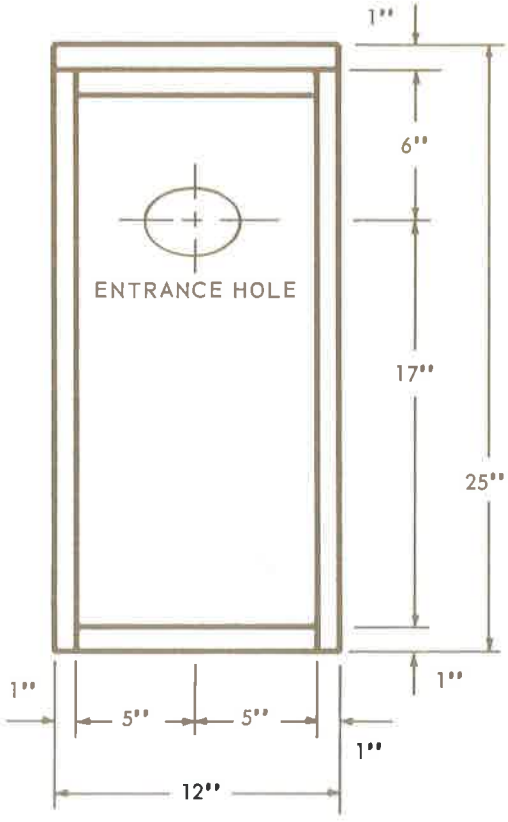


FRONT VIEW OF COVER

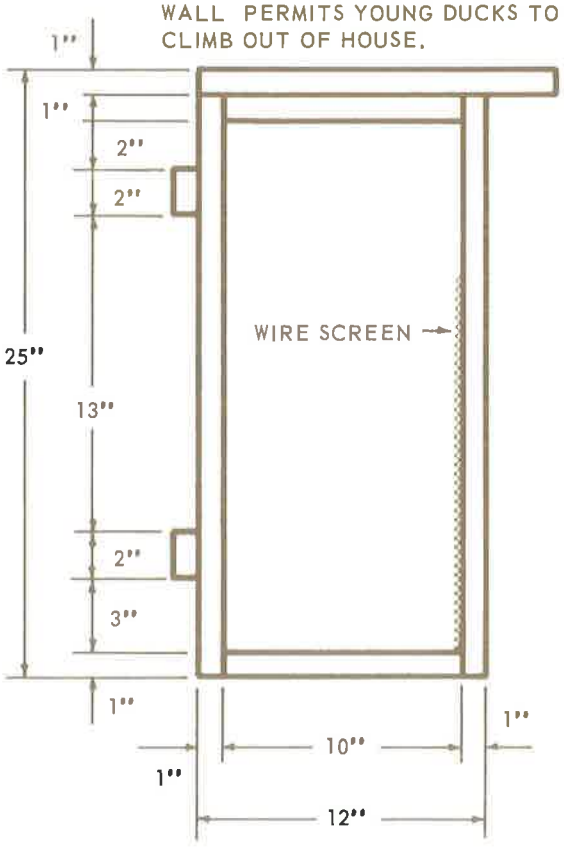


SIDE VIEW OF COVER BOX

SCREENING ON INSIDE OF FRONT WALL PERMITS YOUNG DUCKS TO CLIMB OUT OF HOUSE.

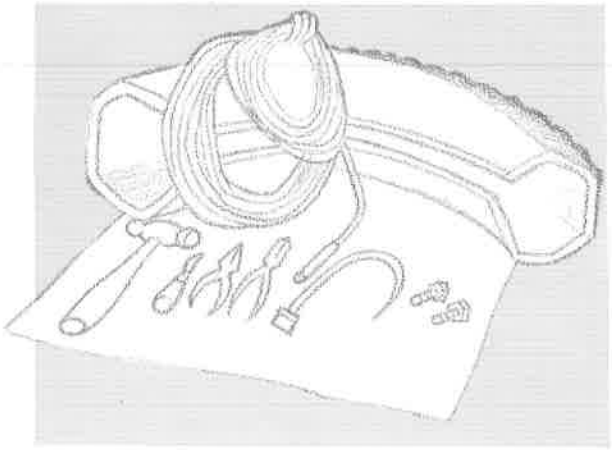


FRONT VIEW

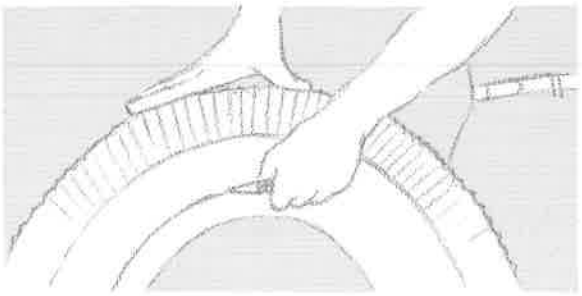


SIDE VIEW

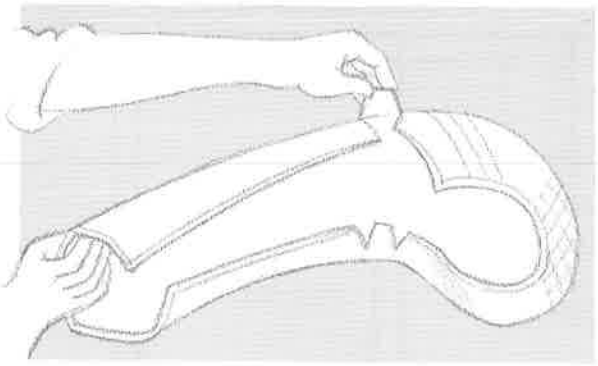
TIRE HOUSING PROJECT FOR SQUIRRELS



1. All the equipment needed to make a tire squirrel den: ½ tire, 75' of rope with metal tubing pinched to one end, hammer, cutting tool, pliers, wirecutters, wire support loop, and nails and washers (or bolts and wingnuts).



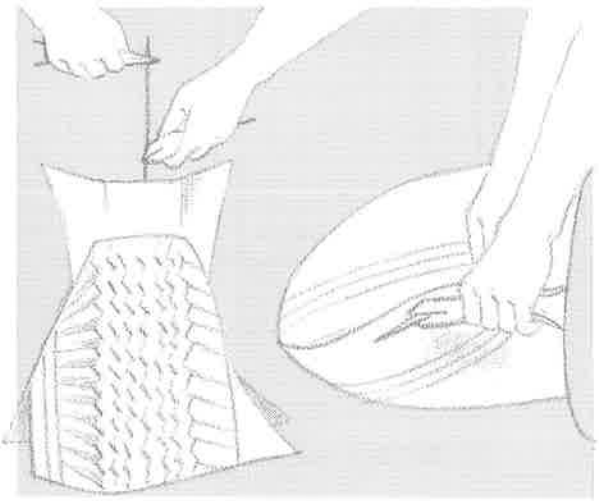
2. Remove the beading and cut tire in half.



3. On each tire half, make cuts in the wall on each side, as shown in drawing 9.

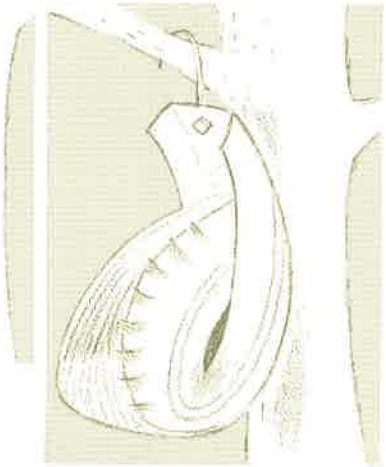
4. Bend the shorter end up and inside the longer one to form the nest opening. Insert heavy wire "loop" to fit over branch.

5. Fasten in three places on each side with 2" galvanized nails and washers, or with bolts and wingnuts, as shown.

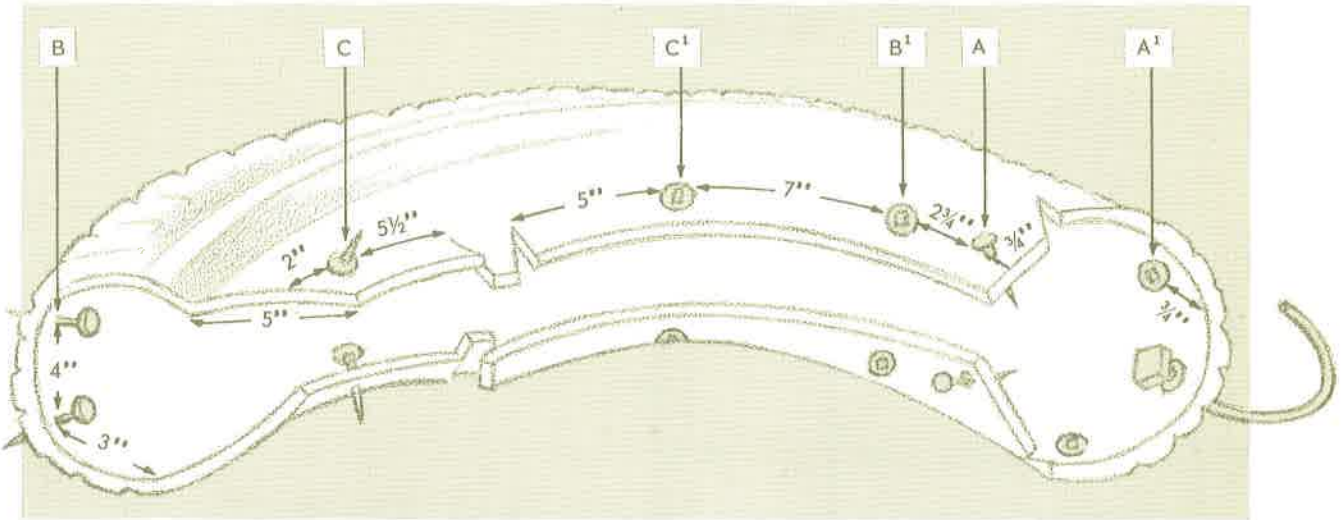


6. Insert the "U-shaped" support wire into the metal tube fixed to one end of the rope. Throw free end of rope over selected branch and pull tire up to branch, being sure the U-shaped support wire slips over branch as in drawing 7.

7. Shake rope free of wire tire support.

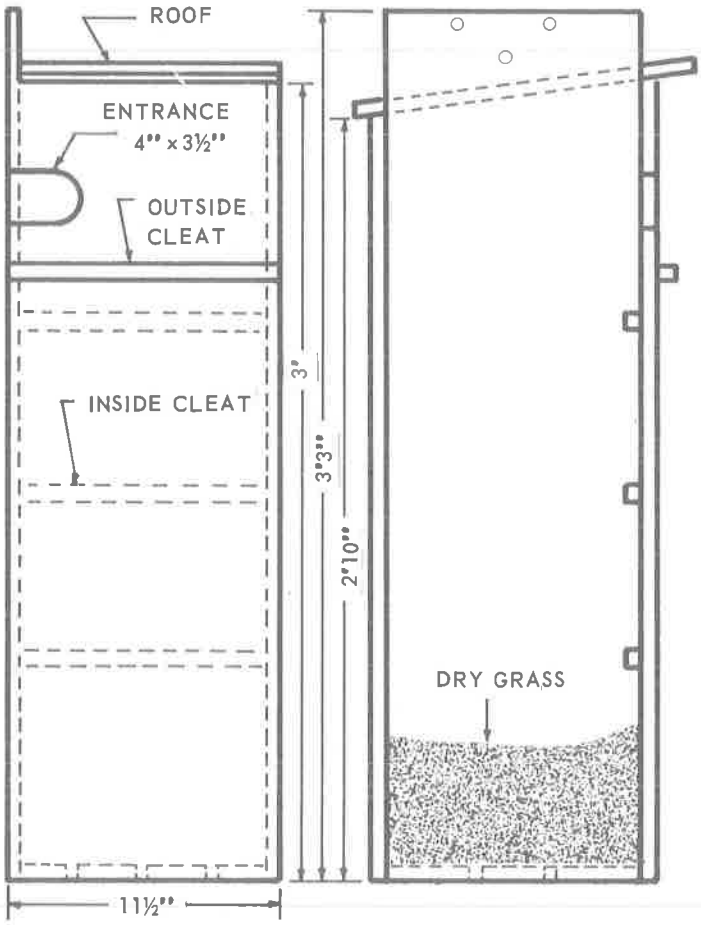


8. One completed squirrel den, ready for occupancy.



9. The cuts indicated in the above perspective drawing of the tire squirrel den may be approximated without endangering the usability of the den by squirrels. The holes, however, need to be cut so that the appropriate pairs match. Holes A, B, and C should hold the nails, or bolts, which are then inserted in holes A^1, B^1, and C^1 respectively. All holes are punched ¾" from the respective margins, except hole C which is 2" from the end of the tire.

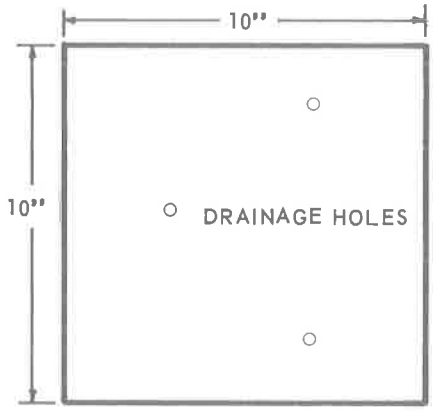
SQUIRREL NEST BOX



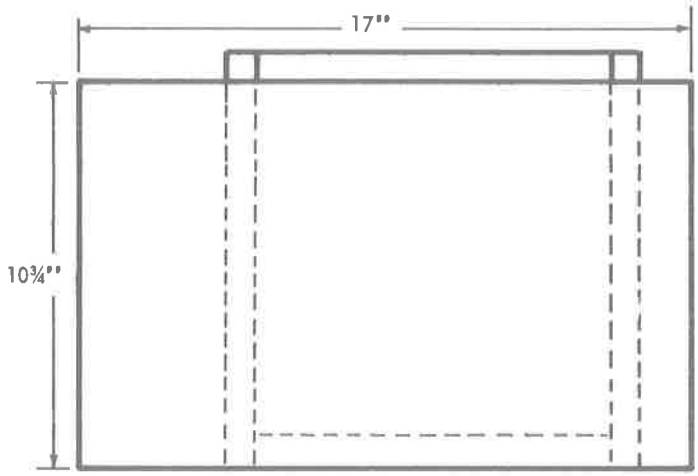
FRONT RIGHT SIDE

Constructing and Erecting Hints:

1. Left side ends at roof level, right side does not.
2. Add cleats for climbing inside and outside.
3. Make roof easily removable for cleaning.
4. Do not paint.
5. Add dry grass for nesting material.
6. Place box at height of 15' or more.
7. Designed for ¾"-plywood or 1"-board dressed to ¾".



BOTTOM



TOP

BIRD INCUBATORS

Some of you may wish to hatch an egg to study the requirements and habits of chicks. To hatch a small number of eggs, purchase or construct an incubator that provides controlled conditions. You may be interested in a model with transparent sides or top so that you can observe hatching.

You can buy or make your incubator. Here are some types.

SOURCES OF SMALL INCUBATORS, MATERIAL, AND PLANS FOR BUILDING

CHICKEN EGG CAPACITY AND MODEL	APPROX. COST	VENDOR
2-egg Chick-U-Bator	$ 5.00	Fleet Mfg. Co., 842 Del Tio San Gabriel, Calif. 91776
30-egg Transparent Hen	30.00	Lyon Rural Elec. Co. P.O. Box 30, San Diego, Calif. 92115
100-egg Glass Incubator	115.00	
50-egg	17.00	Sears, Roebuck & Co. and Montgomery Ward
30-egg Midget Display kit of electrical parts	7.95	
thermometer	1.60	Lyon Rural Elec. Co.
24-egg estimated capacity, WAES-1 electrical kit, builder provides cardboard box, glass top	6.80	Carse Elec. Corp. P.O. Box 71, Latham, New York 12110
100-egg Lyon A-452, electrifier with pilot light and thermostat	22.00	Lyon Rural Elec. Co.

INCUBATION PERIOD

Chicken – 21 days

Most ducks – 28 days

Muscovy ducks – 35 days

Most geese – 30 days

Canada and Egyptian geese – 35 days

Guinea fowl – 28 days

Pheasant – 24 days

Peafowl – 28 days

Japanese quail – 17½ days

Valley quail – 24 days

INCUBATING CONDITIONS

Temperature. Incubators with fans are set at 99½ to 99¾ F; incubators with gravity ventilation are set at temperatures of 101 to 103 F, as measured at the top of the egg. Temperatures that will kill the chicks in their eggs are 103 F in fan-ventilated incubators and 107 F to 110 F in gravity-ventilated incubators. To regulate temperature, humidity, etc., follow the manufacturer's directions, if available.

Humidity. During incubation, a relative humidity of about 60 percent is a good one; at hatching this is raised to about 70 percent. Trays of water inside the incubator are needed to give these humidity levels. In fan-ventilated machines, humidity is measured indirectly but quite accurately with a wet-bulb thermometer. (A wet-bulb thermometer is merely an ordinary thermometer with its bulb wrapped in a damp cloth.) At 99.5 F dry-bulb, a reading of 85 to 86 F on the wet-bulb thermometer gives the desired humidity. At hatching the dry-bulb temperature is reduced about 1 degree F and the wet-bulb temperature is increased to 88 to 90 F. Humidity can be a problem in a very small incubator; you must provide extra moisture if the incubator is opened frequently to turn the eggs.

Turning Eggs. Eggs must be turned until late in incubation. For example, it is necessary to turn chicken eggs to the 15th day. For many small incubators, lay eggs on their sides and turn them by hand an odd number of times (at least three) per day. A pencil mark on the side of the egg will be a useful guide. Do not rotate the eggs in the same direction each time.

Ventilation. Your incubator is equipped with vents to permit a slow change of air. Little ventilation is needed when incubation starts; it should be increased gradually as incubation continues. During hatching, close the vents again.

If you wish to make an incubator from a cigar box, see the diagram on the next page.

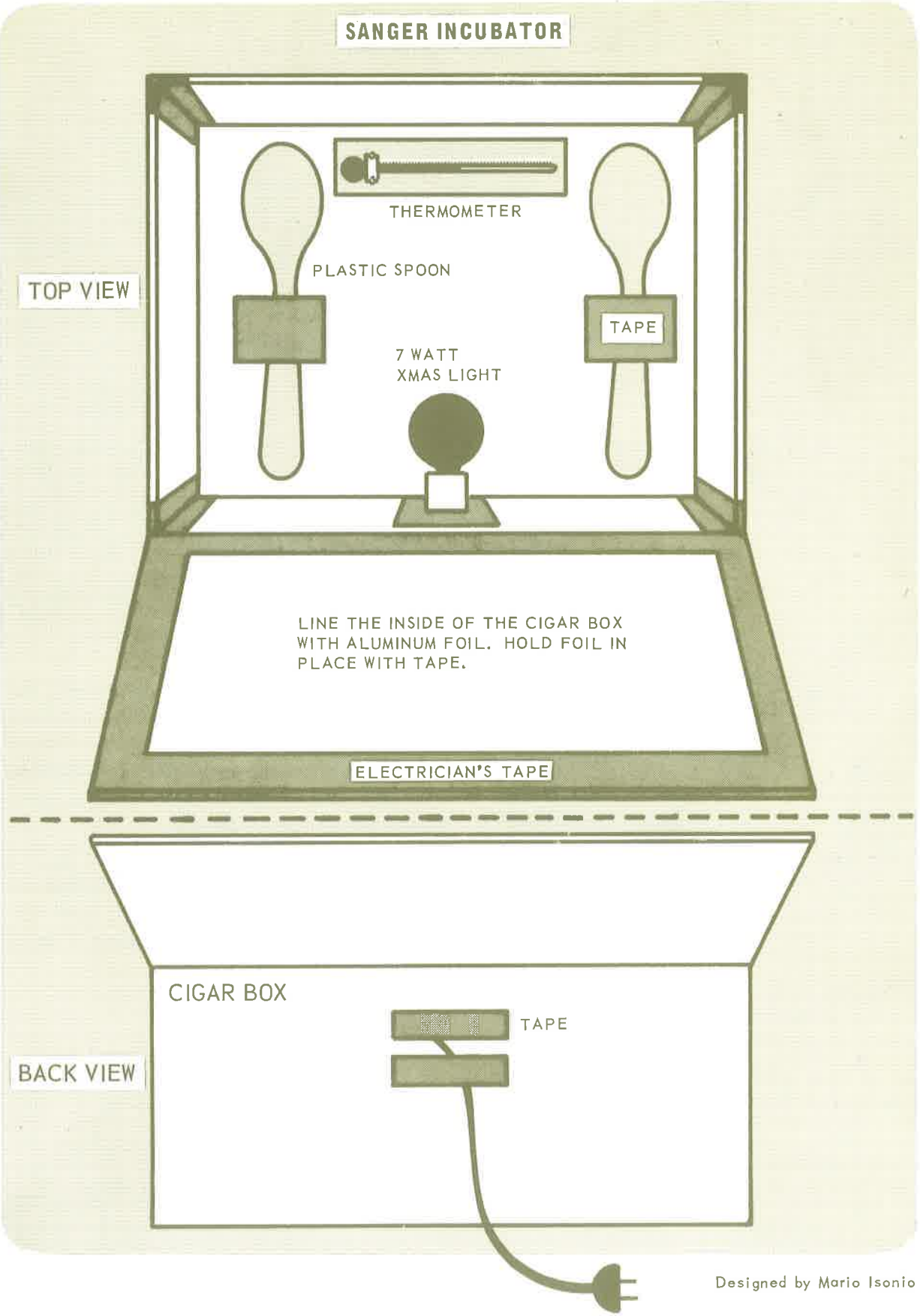
SPECIAL DETAILS FOR SANGER (CIGAR BOX) INCUBATOR

In the Sanger Incubator adjust the angle of the lid opening to obtain the correct ventilation and temperature. Keep a small accurate thermometer in the box.

The purpose of a foil lining is to reflect light in the incubator and help maintain even heat.

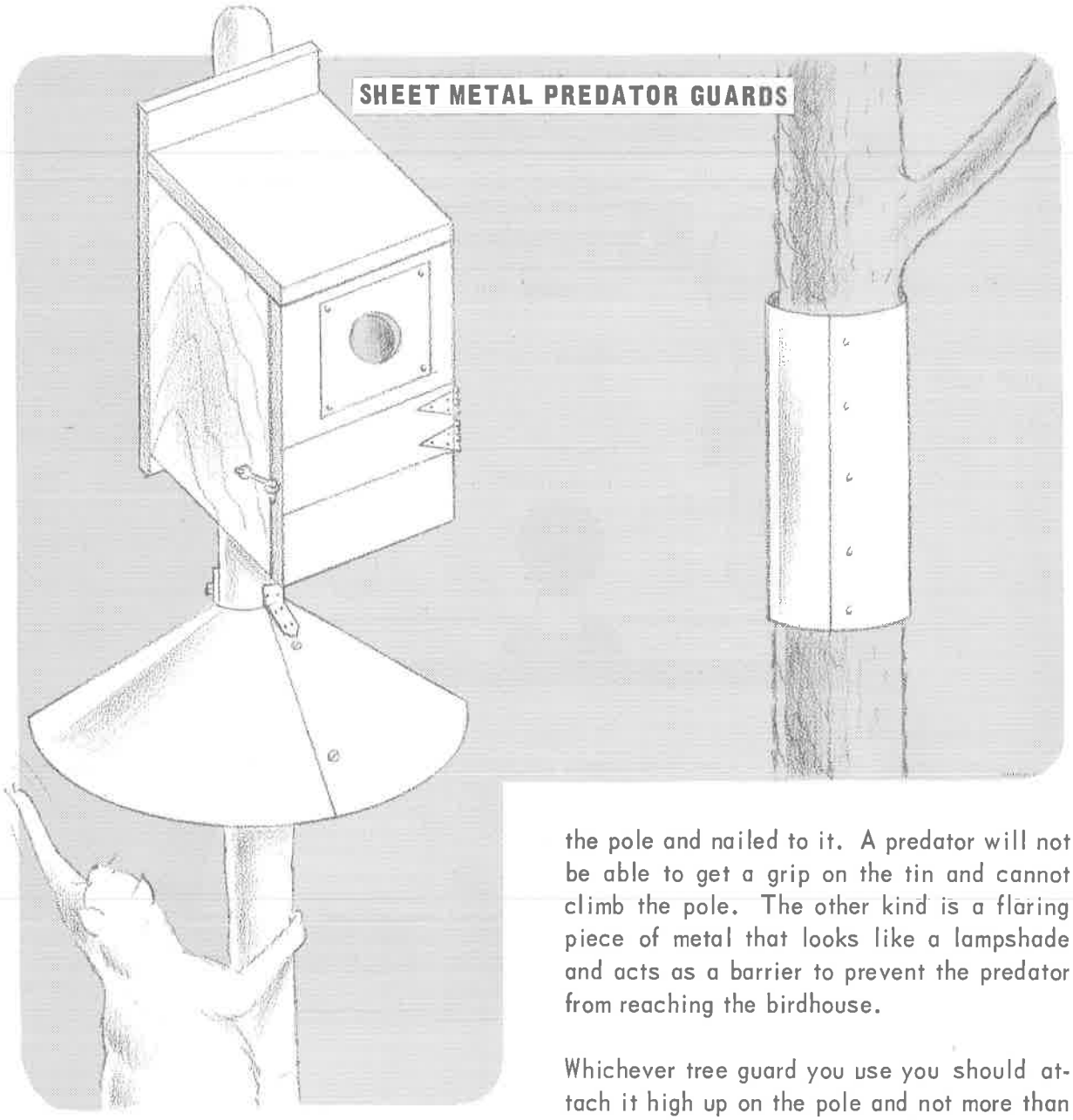
Cradles for the eggs can be made by using plastic spoons taped into place.

Whether you build or buy an incubator, be sure to test it for a couple of days to be sure that it is working properly.



Designed by Mario Isonio

SHEET METAL PREDATOR GUARDS



Birdhouses or bird feeding stations attached to poles should have guards that protect against predators like cats and raccoons. One way to keep predators out of birdhouses is to put a sheet metal guard on the pole or tree*.

You can make one or two kinds of tree guards. One type uses a piece of tin wrapped around the pole and nailed to it. A predator will not be able to get a grip on the tin and cannot climb the pole. The other kind is a flaring piece of metal that looks like a lampshade and acts as a barrier to prevent the predator from reaching the birdhouse.

Whichever tree guard you use you should attach it high up on the pole and not more than 12 to 18 inches below the birdhouse or feeding station.

YOU WILL NEED THESE MATERIALS

3 pieces of strap iron, $\frac{3}{16}$" thick, 1" wide and 12" long

1 piece of tin 18" wide and long enough to wrap all the way around the tree or pole (for the wraparound type) or a round piece of tin 36" in diameter

* Be sure to check with your leader and the owner of the tree before attaching anything to a live tree.

protractor, or some other tool for measuring angles

sheet metal and wood screws, or bolts

screwdriver

tin snips

THIS IS WHAT YOU'LL DO

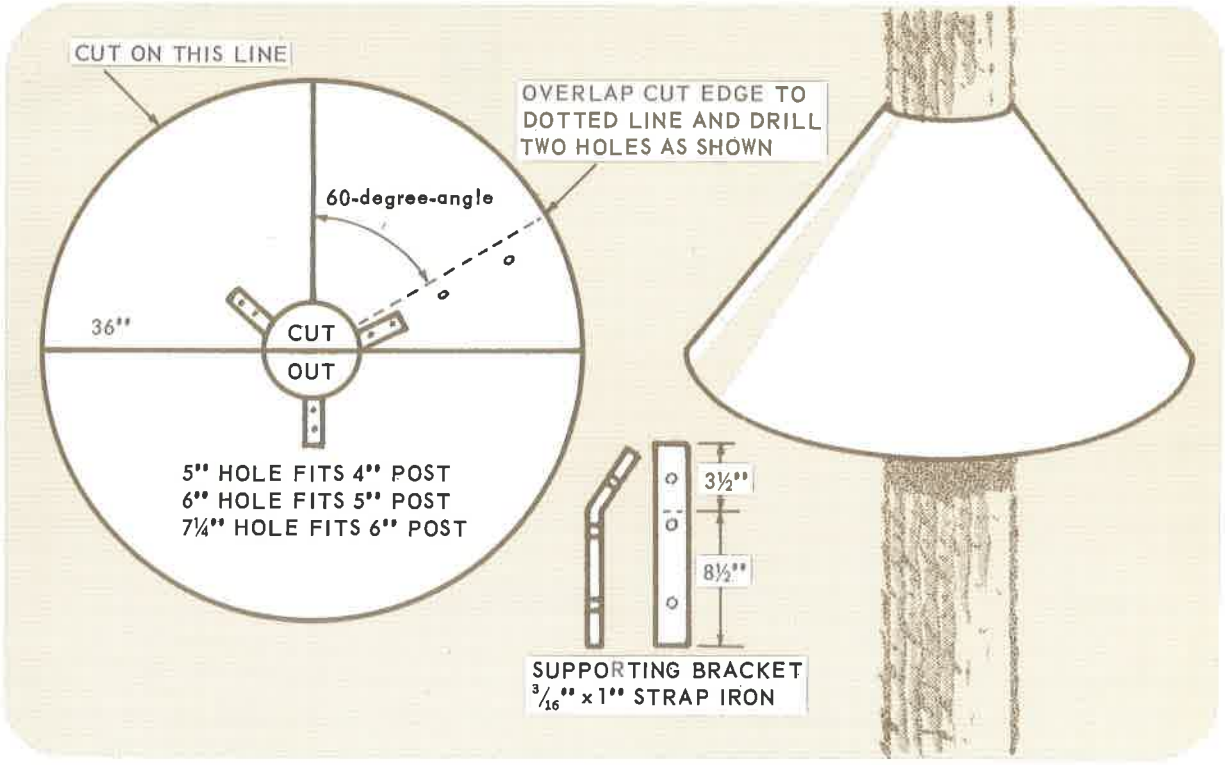
If you decide to make a wraparound kind of tree guard, nail the end of the 18" wide tin to the pole or tree and wrap tightly around it. Now nail the other end to the tree. Remember to put the tree guard 12 to 18" below the birdhouse or feeding station.

The flared tree guard is harder to make. Do ask for help if you need it.

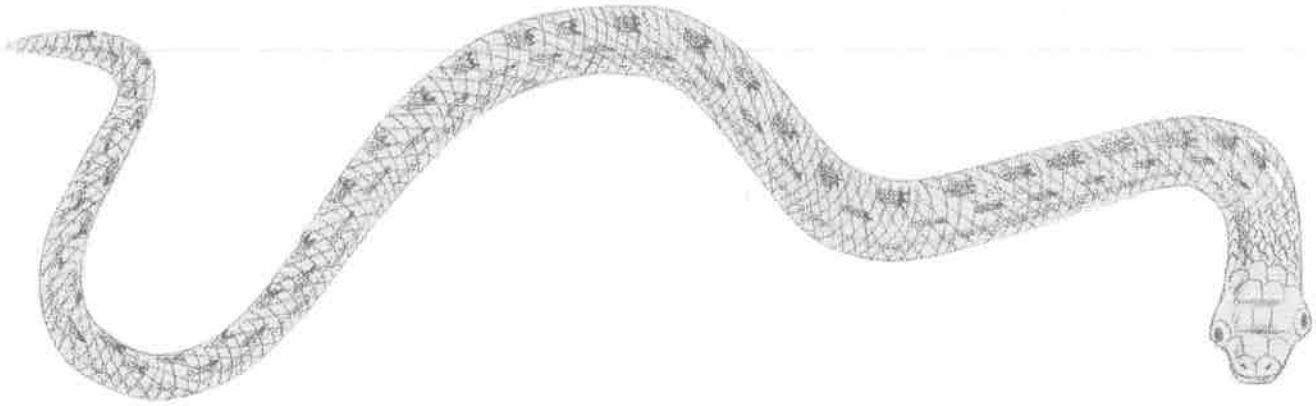
Take a round 36"-diameter piece of tin. Cut a hole in the center. (A 5"-hole will fit a 4"-pole, a 6"-hole a 5"-pole and a 7¼"-hole a 6"-pole.) Cut a line from the edge of the tin to the hole in the center (see diagram). Mark a 60-degree angle from the line and overlap the tin. Now drill 2 holes through the tin so you can fasten both ends together later on.

Take the strap-iron pieces and bend them slightly—about 3½" from one end. (Look at the small diagram.) Overlap the cut edge of the tin and put 2 sheet-metal screws through the holes you drilled. Now the tin looks like a funnel. Drill 2 holes for each of the strap-iron brackets as the diagram shows, and attach the brackets to the tin funnel with sheet-metal screws or stove bolts. Unfasten the 2 screws holding the tin together. Take the tin to the pole and wrap it around so it looks like an upside-down funnel. (See drawing.) Put the 2 screws back into the tin and attach the other ends of the strap-iron brackets to the pole.

Watch the birdhouse or feeding station to see if any predators try to climb the pole.



TAN A SNAKESKIN FOR DISPLAY



In this section you'll learn how to tan a snakeskin. To display the tanned skin you will want to attach it to felt or to a board. Before beginning, you and your leader must be able to identify POISONOUS SNAKES. You must have your father or adult leader accompany you on your trip to kill a snake. The rattlesnake is the only poisonous snake in California.

YOU'LL NEED THESE MATERIALS

sharp knife, or sharp-pointed scissors

old tablespoon (one edge should be ground sharp)

detergent powder like Ivory Snow

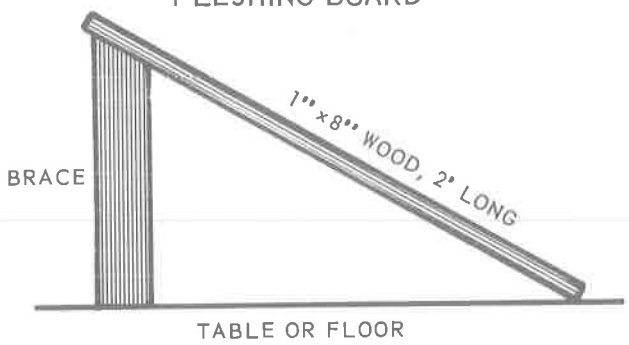
mineral oil

borax

paintbrush

fleshing board (a fleshing board can be made of 1" by 8" wood about 2' long). Nail a brace to the top of the board so it will fit at a 30- to 45-degree angle on the floor or table. (See drawing.)

FLESHING BOARD



bulletin or cloth board (piece of bulletin board-like material or some other soft material, about 14" wide and up to 8' long, depending on the length of the snake)

package of straight pins

HERE'S HOW YOU DO IT

First, remove and discard the head. Place the dead snake on its back on the fleshing board with the tail at the bottom. Use a very

sharp knife or scissors to slit the skin. Be sure to cut in a straight line along the belly except around the anal opening. Here you will have to cut around the opening on both sides. The anal opening is found between the midsection of the snake and its tail.

As you slit the skin slide the snake over the top of the fleshing board. Carefully peel off all of the skin from the snake. You may need to use your knife in a few difficult places.

Put the skin back on the fleshing board with the flesh side up. Use the sharpened tablespoon to remove all flesh that is still clinging to the skin. Remove all flesh before tanning.

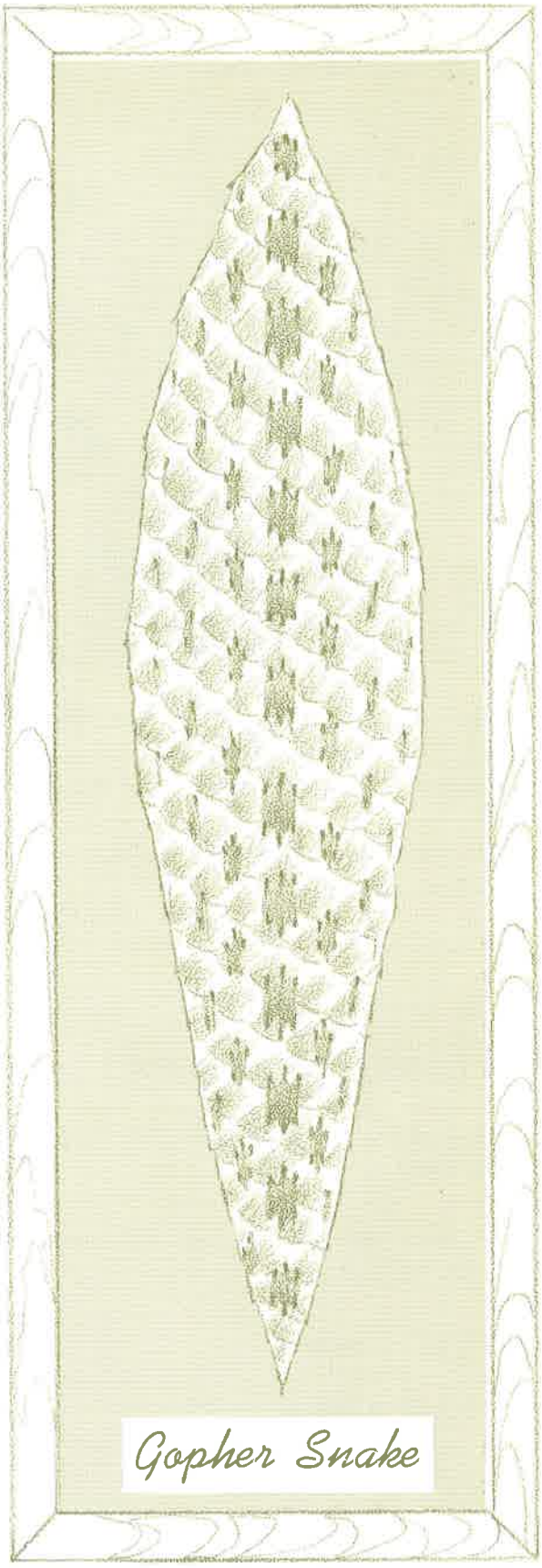
Lay the skin, flesh side up, on the piece of bulletin board-like material. Stretch and pin the skin to the board. Stretch and pin both sides of the skin at the same time. Be sure that the midline of the skin is a straight line for the whole length. A crooked midline may make a distortion in the design of the skin.

Mix 1 cup of detergent, 1 tablespoon mineral oil, and 1 tablespoon of borax into a bowl. Add water slowly and mix until it becomes thick. Brush 1 coat of the tanning mixture onto the skin. Let dry 24 hours and apply a second coat. Let the second coat dry another 24 hours, then apply a third coat.

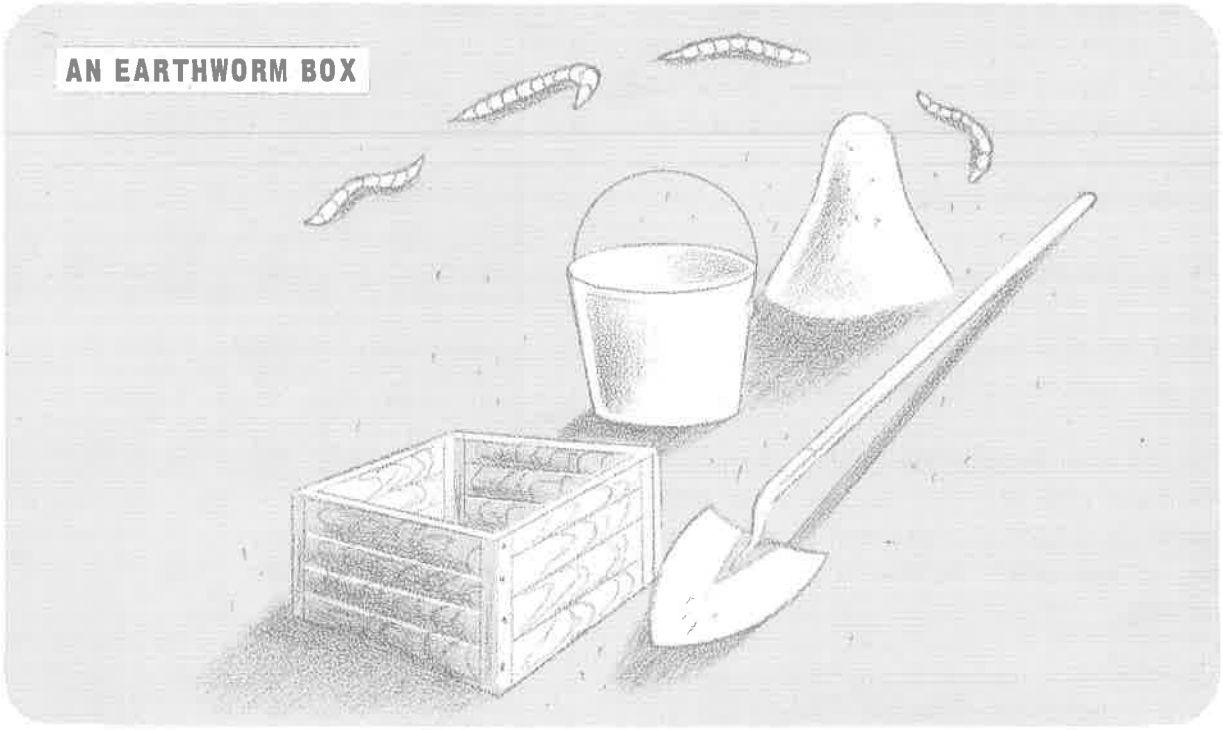
After the third coat has dried 24 hours, you can scrape off the excess tanning mixture from the skin.

Sew the skin, fleshy side down, to a piece of felt that is a little larger than the skin, or tack it carefully to a board. You now have a tanned snakeskin for display.

You may want to display your snakeskin, along with its history, at a club meeting or at school.



AN EARTHWORM BOX



Earthworms—known as angleworms, gardenworms, nightcrawlers, and redworms—have been used as bait by fishermen for centuries and for scientific study for many years. This activity will teach you how to collect, raise, and harvest earthworms.

YOU'LL NEED THESE MATERIALS

wooden box about 24" wide, 24" long, and 24" high or

a metal washtub punched with tiny pin holes in the bottom

a 3-gallon bucket

a bucket of manure

a bucket of good soil

cornmeal

old newspapers

bucket of dry grass clippings free of pesticides

burlap bag

shovel

COLLECTING THE EARTHWORMS

Turn the soil over with the shovel and look in the dirt and grass roots. Sometimes earthworms come out of their tunnels at night under trees or in wet grassy spots. Use a flashlight with tissue paper over the lens to look for worms at night. During dry weather, earthworms go deep in the ground so sprinkle a grassy piece of ground with water just before sundown. Usually the earthworms will come to the surface after dark. Another good place to find worms is under boards and under piles of dead leaves. (When doing this be careful of snakes!)

RAISING EARTHWORMS

Place a layer of grass clippings or hay in the bottom of the wooden box. Hay improves drainage and is also a food for the worms.

Mix the manure and soil into the wooden box on top of the dry grass or hay. Then sprinkle 2 or 3 handfuls of cornmeal on top of the soil. Other worm food like table scraps (except citrus) can also be ground with newspaper and added at the top of the soil.

Wet the material in the box with water. Sprinkling is best.

Place about 2 or 3 dozen earthworms in the box and cover lightly with the wet material. Put a wet burlap bag over the top of the box to help save moisture and to keep the material wet and dark. It is best to put the box in a damp shady place.

Sprinkle water on the bag about twice a week. Check the food supply from time to time. To do this, lift out a handful of soil and look for food. Add chopped table scraps, water-soaked bread, cooked oatmeal, coffee grounds, chopped newspapers, or more cornmeal, when food is needed.

The box should be on a base about 6" from the ground to keep the wooden bottom from rotting and allowing the worms to escape. You can use a metal washtub instead of the wooden box.

TO HARVEST YOUR EARTHWORMS

By the 21st day the box will have many earthworm eggs or small yellow egg capsules. These are about the size of a small pea. Dump the material in the box on a smooth table or piece of canvas on the ground. Rake it into a pile and allow a few minutes for the worms to move into the center of the pile. Working slowly transfer about half this material into another box like the one you've been using. Since this material contains the earthworm eggs treat it gently. Put any worms you find back into the old box with the old material. Make more soil/manure mix just as you did before and add this to both old and new boxes. Continue to care for them as you did at the start. In about 60 to 90 days, the worms in the new box will be ready for harvesting. Don't let the boxes get too crowded with worms. Usually a box should contain no more than 500 to 1,000 worms. Take the extra worms and start new boxes. Use them for bait, or sell them.

THINGS TO DO

Demonstrate how to harvest earthworms with one of your worm boxes.

Make a list of the places where you found earthworms.

Were you able to see the earthworm eggs?

List all foods worms will eat.

List the enemies of earthworms.

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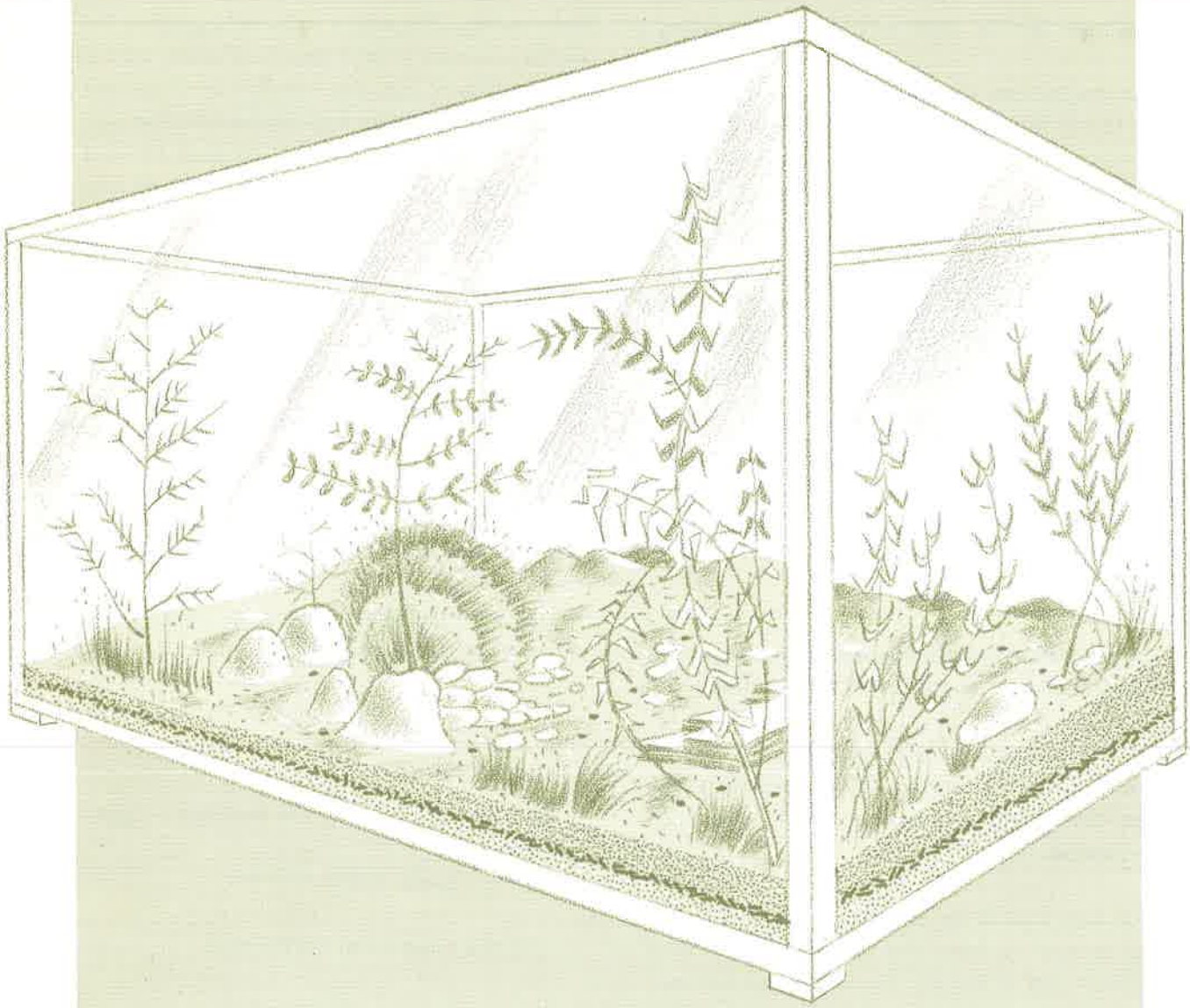
BUILD A TERRARIUM



A terrarium is an enclosure for either keeping small animals or a garden of small plants. It may be a bottle, bowl, or other container. In this case you will be dealing with a terrarium for plants. For someone with no interest in either plants or animals this may sound dull, but for those of you with interest and imagination there won't be anything dull about it.

You don't need to be an expert. Follow the basic recipe and use your imagination. Your terrarium's size depends, of course, on what you have to work with. A clear bowl, like a small fish bowl, will do—or for a larger one use an aquarium. Build one if you have some wood around; tools, a piece of glass, and a little constructing ability are all you need.

WHAT TO DO

Line the sides with moss leaving the green side out.

Spread an inch or two of clean sand in the bottom for good drainage.

Add a layer of chopped charcoal. Bits of charred wood from the fireplace will do.

Add a layer of good soil (2 parts loam, 2 parts sand, and 1 part leafmold) to a depth sufficient for the root mass of the plants. Heap the soil up at the back if the terrarium is to be viewed only from one side, or grade it with miniature hills and valleys. Soil should be baked in the oven for about 1 hour at 350 F to purify it.

Set the plants where you want them, carefully placing each plant in the soil but not in the sand.

After the plants are placed, cover any bare soil with moss, and, if desired, lay paths of sand or gravel and insert tiny stumps, "boulders," etc.

Sprinkle lightly with a fine spray of water.

Cover the terrarium with glass a few days after it is planted.

KEEP OUT OF DIRECT SUNLIGHT

For a woodland terrarium use "evergreen" seedlings, dogtooth violets, Dutchman's breeches, hepatica, moss, ferns, and others. Lichen covered twigs and rocks are interesting if tucked in among the plants, as are bits of tree fungi.

OTHER PLANTS THAT MIGHT BE USED IN A TERRARIUM

African violets, begonia (everblooming), caladiums, crotons, English ivy (miniature), ferns, philodendron, and wandering Jew. Succulents and cactus may be used in terrariums but should be given all possible sun and little or no water.

Leave an opening in the glass for ventilation. If moisture condenses inside, remove cover entirely. Water is seldom needed because little evaporates. Remember there are no drain holes.

If you can't get the terrarium near sunlight a fluorescent bulb to provide artificial sunlight is manufactured and can be found at most electrical stores.

4-H WILDLIFE PROJECT

Leaders Guide

University of California Agricultural Extension Service

4-H—Ag183

The authors are Extension Wildlife Management Specialists Maynard W. Cummings and Richard D. Teague, and 4-H Club Specialists John A. Emo and Wm. G. Schneeflock.

Co-operative Extension work in Agriculture and Home Economics, College of Agriculture, University of California, and United States Department of Agriculture co-operating.
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George B. Alcorn, Director, California Agricultural Extension Service.

MAY 1966--3M

4-H WILDLIFE PROJECT

Leaders Guide

THIS IS FOR YOU!

The continued development of youth through 4-H work depends largely on people like you who are deeply interested in boys and girls. Encouragement and guidance from volunteer leaders inspire young people to progress in the fundamental aims of 4-H work. This leaders guide will help you acquaint 4-H members with the many opportunities in wildlife today. Subjects range from collecting animal tracks, raising game birds, and studying animals and their homes, to the opportunities for a career. In this guide you'll find aids for planning and conducting 4-H project meetings and many ideas for teaching 4-H members about wildlife. Remember that learning can be fun, so feel free to adapt any ideas you find to your special needs and the purposes of your project group.

PROJECT OBJECTIVES

To develop in young people:

- An understanding of biological principles involved in wildlife management
- The knowledge and skills necessary to successfully conduct a Wildlife Management project
- A realization of the potentials of wildlife as an economic resource in California
- An appreciation of the aesthetic values of wildlife
- An understanding of the true meaning of multiple and wise use of wildlife resources
- An awareness of their responsibilities as citizens toward good wildlife management programs
- An appreciation of the potentials of wildlife management as a career.

WHAT'S 4-H WORK?

4-H Club work is that part of the University of California and the Cooperative Extension Service which deals with youth development. Young people in a community organize themselves in a group with their own officers and their own local program based on their needs. An adult leader guides them. Each member has one or more projects centering around his interests and his responsibility in the home, farm, or community. Members serve as officers and on committees of their own club. They have camps, tours, recreation, community service projects, exhibits, and shows. They learn to cooperate and to compete by working and playing together.

Many ideas, persons, and programs were involved in the growth of 4-H. Early youth clubs were organized on a project basis. The first projects were corn production and tomato canning, followed by cotton, poultry, and pigs.

The 4-H name and emblem, developed in 1911, continue to serve as a badge for members. Early records stated: "The four H's represent the equal training of head, heart, hand, and health for every child."

The central theme, LEARNING BY DOING, is as important today as it was when 4-H work first started in America.

The Wildlife project is one of the many that have been added to 4-H work. While wildlife played an important part in the development of our country, it was not until some species started to fade from the scene that we become concerned enough to start learning about our wild animals and why they either thrived or became extinct.

YOUNG PEOPLE NEED YOU!

Leadership is everybody's business. The adult volunteer 4-H leader advises and teaches 4-H members in the local project group. He is supported by the University of California which provides him with information about 4-H Club work as well as the project in which he is interested. 4-H provides unlimited opportunities for adults to help youth grow in wisdom, skill, stature, and character. Also, there are many personal satisfactions for you as a 4-H leader. You meet new friends, learn new facts and methods, share recognition and honors with members, and develop leadership skills. Receiving the gratitude and respect of members, parents, and the community, and watching boys and girls develop into successful young men and women are fitting rewards for your efforts.

Leadership competence varies among individuals, but everyone can improve his leadership skills by using them as often as possible.

The relationship between adults and young people changes as the boys and girls grow. The 10- and 11-year-old member wants and needs more direction than the 14- or 15-year old. Let's look at some of the characteristics of boys and girls.

LATE CHILDHOOD (9 to 11)

STAGE OF DEVELOPMENT	ADAPTATION TO PROJECT
1. Likes to work in groups of the same age and sex.	Most activities will be individual ones. Introduce some group activities with members of the same sex.
2. Likes to learn physical skills.	Encourage members to use their hands, to make things. Teach skills but without pressure.
3. The interest span is short and the interest varied.	Plan short activities which members want to do. Allow members some choice in activities they want to complete.
4. Idealizes older person, such as leader, parent, athlete, movie star, or local popular figure.	Visit places where people are working in the field of game management. Make arrangements ahead of time so the members can talk to the people and ask questions.
5. Establishes appropriate dependence-independence patterns with adults.	Let members do independent work. Urge each member to discuss plans and activities with his parents so they will be a part of his plans.
6. Learns to exchange ideas and to influence an audience.	Encourage members to give simple demonstrations at club meetings.

7. Develops an inquiring mind.	Help members learn the whys as well as the hows. For instance: What does a particular animal look for in choosing a home.
8. Desires approval from leader and from group.	Plan tasks within member's abilities. Have members give short demonstrations. Leaders, parents, and other members should compliment and encourage members in their work.

12- TO 14-YEAR-OLD ADOLESCENT

STAGE OF DEVELOPMENT	ADAPTATION TO PROJECT
1. Starts to strive for approval of the opposite sex but also retains strong group ties with the same sex.	Group activities to include own age and sex with only occasional activities with other sex. Help members learn how to act in a variety of situations.
2. Wants increasing freedom from parental and adult control, yet with assurance of security in family and home.	Wants to work independently at home and at club meetings in getting materials ready and in doing things.
3. Wants increasing responsibility in making decisions and has more understanding of possible results.	Encourage members to use originality and to develop initiative in the project.
4. Needs opportunities to discover capabilities and limitations.	Encourage members to try new things and to set higher standards after each success.
5. Wants to learn more advanced manual skills, and to continue to be creative.	Encourage members to try more difficult assignments.
6. Wants to express himself more clearly.	Demonstrations and judging activities should be promoted with emphasis on giving reasons why he placed items as he did.
7. Continues to develop an inquiring mind.	Help members to develop judgment. Teach "why."
8. Has increasing understanding of self and others.	Encourage members to be more considerate of others. Help them learn to cooperate.

14- TO 15-YEAR-OLD ADOLESCENT

STAGE OF DEVELOPMENT	ADAPTATION TO PROJECT
1. Begins to establish independence as an adult.	Urge individual activity in planning.
2. Interested in learning social skills and in acquiring more managerial ability.	Encourage members to take responsibility for planning meetings, events, and activities. Let members assume some adult responsibility in the club.
3. Tends to be realistic, objective, and practical-minded.	Be sure anything you give members to do meets a real need and is not just "busy work." Hold them to their best work and they will appreciate it.
4. Shows interest in details.	Help members learn to plan and manage their time efficiently and effectively.
5. Aware of appearance and personality.	Encourage cleanliness and neatness.
6. Developing broader interests.	Help members explore many avenues of knowledge, especially career opportunities.

Remember, there is a great difference between assisting boys and girls as an adviser and dominating them as a boss.

Let parents help. It is very important that you let parents know what is expected of their children in 4-H. Have your members "talk it over" with parents before selecting their projects. Encourage parents to help their son or daughter select projects and activities to fit their home situation. Wildlife projects provide special opportunities for sharing and being together as a family unit.

The entire family can enjoy and be proud of the 4-H member's achievements. Encourage the parents of your members to:

- Give their children opportunities for challenging projects.
- Help plan projects in keeping with the child's interest, abilities, and home situation.
- Help provide materials and equipment such as handtools for building nesting boxes, etc.
- Be a resource person in the project group where special talents relate to the project work of the members.
- Provide transportation for meetings and other club events and activities.
- Hold occasional meetings in the home if possible.
- Show approval of member's 4-H accomplishments.

SHARE THE WORK!

As an adult 4-H leader, you need not feel that all the burden of planning, arranging, and carrying on the program rests on your shoulders. There are many resources — people, organizations, and literature — that contribute to the overall learning experience of your members and help you become a successful leader.

Older members who have carried successful wildlife and related projects usually will share their knowledge and experience with younger members. They can give talks and demonstrations on practices they have learned and can suggest ideas for programs that appealed to them when they were younger. Older members, depending on their experience, also may serve as junior leaders, giving special help to beginning members.

Junior leaders can be a great deal of help. A junior leader is an older, experienced 4-H member, and will assume many responsibilities. Junior leaders may:

- Work with members on their projects.
- Assist the club officers in your project group.
- Help committees plan programs, events, and activities.
- Lead songs and recreation.
- Arrange for transportation of members to club activities and to county and state events.
- Make contacts for speakers, films, and tours.
- Check record books at meetings and help members complete them at the end of the year.
- Enroll new members and re-enroll continuing members.
- Visit members' projects and talk with parents about the club's program, events, and activities.

Remember that your junior leader needs guidance and support. Don't expect him to carry responsibility beyond his capability. From time to time, review and evaluate his work with him.

Your 4-H advisor and local game warden can help you meet persons with backgrounds in wildlife and wildlife management. These are good sources for project leaders, speakers, subject matter information, and, on occasion, financial assistance for special programs.

Businesses and organizations related to wildlife may furnish speakers for club meetings or provide materials for use in demonstrations and exhibits. Your 4-H member can learn about career opportunities by visiting such organizations and talking with the staffs.

Books, magazines, catalogs, and films are helpful aids; many are free except for mailing charges. Local and county libraries have some of these. Others can be obtained from colleges, business firms, and organizations. Have one of your junior leaders be the librarian for source materials.

TEACHING METHODS AND TECHNIQUES

A successful meeting with your members should:

- Fit the needs of the project group.
- Begin on time.
- Last not more than 1½ hours.

Here is an outline of a typical meeting:

- Junior leader or chairman (may be a member) calls the meeting to order.
- Hear report of the members (what they've done since the last meeting in their project work) — 20 to 30 minutes.
- Question and answer session — 20 to 30 minutes.
- Topic for the meeting (have a different one unless the same topic is to continue for more than one meeting) — 30 minutes. A leader, junior leader, or member could make a 10-minute presentation on a topic, followed by 20 minutes of group discussion. Films, charts, etc. can be used.
- Junior leader or chairman explains the next meeting's program, time, and place, making sure that everyone understands his responsibilities.

CONSERVATION AGENCIES

Many agencies and organizations deal with resource conservation. We mention only certain state and federal agencies whose functions influence the management and abundance of our wildlife. **Don't forget,** many of them have local representatives where you live and will be happy to explain what they are doing to promote better wildlife management.

State Agencies

Department of Agriculture – broad responsibilities in agriculture and animal health. Agricultural commissioners in each county important in pest animal and plant control programs.

The Resources Agency –

Wildlife Conservation Board – primary responsibility to select and purchase land for recreation purposes including restoration of wildlife.

Fish and Game Commission – five men appointed by the Governor and has powers (as delegated by the Legislature) to set hunting and fishing seasons. Also makes working rules (policy) for Department of Fish and Game.

Department of Fish and Game – has the basic responsibility of managing inland fisheries, marine and wildlife resources of the state. Supported entirely by revenue from hunting and fishing license sales, special tax on hunting and fishing equipment, 50 percent of fines for violation of fish and game laws, and a commercial fishing tax.

Department of Conservation – whose Division of Forestry has administration of some 70,000 acres of state forest land and gives fire protection to additional extensive acreages of forest, brush- and grassland.

Department of Water Resources – created in 1956 to coordinate water resource planning and has broad functions over development of this resource. Results have been expressed in California Water Plan.

Department of Parks and Recreation – in charge of state's 106 state parks and 21 state historical monuments. These areas are maintained for their scenic, recreational, historic, or scientific values.

Federal Agencies

U.S. Department of Agriculture:

Forest Service – The state of California has 17 national forests encompassing some 19 million acres. This agency is responsible for the wise use and administration of all natural resources on these lands. National forests and their California headquarters are:

Angeles	Pasadena
Cleveland	San Diego
Eldorado	Placerville
Inyo	Bishop
Klamath	Yreka
Lassen	Susanville
Los Padres	Santa Barbara
Mendocino	Willows
Modoc	Alturas
Plumas	Quincy
San Bernardino	San Bernardino
Sequoia	Porterville
Shasta-Trinity	Redding
Sierra	Fresno
Six Rivers	Eureka
Stanislaus	Sonora
Tahoe	Nevada

Soil Conservation Service – provides technical assistance in various land use and rural area programs dealing with watersheds, wildlife, erosion control, recreation, etc. Offices in Sacramento, Berkeley, and various districts.

U.S. Department of Interior:

Bureau of Land Management – administers some 15½ million acres of so-called Public Domain lands in California with the objective of wise use of all natural resources. District offices located at Bakersfield, Susanville, Redding, Sacramento, Ukiah, and Riverside.

Bureau of Outdoor Recreation – established in 1963 with regional office in San Francisco. Responsible for inventory of recreation needs, recreation plans; provides technical assistance, and sponsors research and education programs.

Bureau of Reclamation – administers the federal program for water resource development and use to provide multiple-purpose projects furnishing fish and wildlife protection and recreational opportunities; water for farm irrigation, municipal and industrial use; hydroelectric power; flood control, etc.

Fish and Wildlife Service – aids in the conservation of the nation's migratory birds, certain mammals, and sport and commercial fishes. This includes research, law enforcement, wildlife refuge management, inventories, predator and rodent control programs, and exotic game bird introductions (see map).

National Park Service – administers national parks, monuments, and recreation areas; these areas primarily to preserve objects of outstanding scenic, botanical, geologic, or historic interest and value. Vegetation and wildlife are maintained, as much as possible, as when found by white man. The four national parks in California are Yosemite, Lassen Volcanic, Sequoia, and Kings Canyon. There are eight national monuments: Cabrillo, Devils Postpile, Lava Beds, Muir Woods, Pinnacles, Joshua Tree, Channel Islands, and Death Valley.

California Department of Fish and Game Major Installations

FISH HATCHERIES

Name	Nearest town	Name	Nearest town
1 Mount Shasta	Mount Shasta	10 Fish Springs	Big Pine
2 Crystal Lake	Burney	11 Black Rock Rearing Ponds	Independence
3 Darrah Springs	Red Bluff	12 Mount Whitney	Independence
4 Trinity River	Lewiston	13 San Joaquin	Friant
5 Cedar Creek Experimental Station	Leggett	14 Moorehouse Springs	Springville
6 Nimbus	Fair Oaks	15 Kern River	Kernville
7 Central Valley	Elk Grove	16 Fillmore	Fillmore
8 Moccasin Creek	Sonora	17 Mojave River	Victorville
9 Hot Creek	Bishop		

WATERFOWL MANAGEMENT AREAS

(1) Honey Lake
(2) Gray Lodge
(3) Grizzly Island
(4) Los Banos
(5) Imperial
(6) Mendota

DEER MANAGEMENT AREAS

1 Doyle
2 Tehama
3 Cow Mountain (managed in cooperation with Lake and Mendocino Counties)

STREAM IMPROVEMENT HEADQUARTERS

[1] Yreka
[2] Red Bluff
[3] Elk Grove

GAME FARMS

1 Vacaville
2 C.I.M. (Chino)

⊛ CENTRAL OFFICE – Sacramento

★ REGIONAL OFFICES

Region I Redding
Region II Sacramento
Region III San Francisco
Region IV Fresno
Region V Los Angeles
Marine Resources Operations, State Fisheries Laboratory, Terminal Island

*** BRANCH OFFICES**

Eureka Monterey
Bishop San Diego

• RESEARCH FACILITIES (Marine)

Eureka Laboratory
Menlo Park Laboratory
Pacific Grove Laboratory

***Sacramento Field Station (Multiple Use Laboratory)** Adjacent to Region II Headquarters on State College Campus

U. S. Department of Interior Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife

DIVISION OF WILDLIFE SERVICES
CALIFORNIA HEADQUARTERS — Sacramento

District	Headquarters
1	Eureka
2	Red Bluff
3	Susanville
4	Placerville
5	Santa Rosa
6	Sacramento
7	Modesto
8	Fresno
9	Bakersfield
10	Riverside

Heavy line denotes District boundary.

DIVISION OF WILDLIFE REFUGES

Location	Refuge
A	Clear Lake
B	Cibola
C	Colusa
D	Develon
E	Farallon
F	Havasu L.
G	Imperial
H	Kern
I	Lower Klamath
J	Merced
K	Modoc
L	Pixley
M	Sacramento
N	Salton Sea
O	Sutter
P	Tule Lake

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Raising Bait Fishes, 1956, U.S. Fish and Wildlife Circular 35, Washington, D. C.

The Book of Fishes, La Gorce, 1939, National Geographic Society.

The Fresh Water Fishes, Eddy, 1957, Wm. C. Brown Co. Publishers, Dubuque, Iowa.

The Life Story of the Fish, Curtis, 1949, Harcourt, Brace and Co., New York.

The Ways of Fishes, Schultz, 1948, D. Van Nostrand Co., Inc., New York.

Trout, Bergman, 1952, Knopf, New York.

Trout in Farm and Ranch Ponds, 1961, USDA Farmer's Bulletin No. 2154, Washington, D.C.

Trout of California, Wales, 1957, California Fish and Game Department, Sacramento, California.

Warm Water Ponds for Fishing, 1965, USDA Farmer's Bulletin No. 2154, Washington, D.C.

NATURAL RESOURCE MOVIES

Many excellent 16-mm movies are available from university and resource management agencies. In some instances there is no charge except postage; in other cases a nominal fee is required. Perhaps the following list of movies can be drawn from to make the "great outdoors" more meaningful to 4-H youngsters. Plan ahead and order far enough in advance to get the right film at the right time.

From the University of California, Visual Aids Office, 257 University Hall, 2200 University Avenue, Berkeley, California 94720.

Adventures In Conservation #27-555
Animal Classification #27-494
Safe Use of Pesticides #27-501
The Food Cycle & Food Chain #27-505
Camping: A Key to Conservation #27-554
Let's Keep America Beautiful #27-415

From the University of California, Extension Media Center, 2223 Fulton Street, Berkeley, California 94720.

The Organism & the Environment #6553
Genetics #6550
California Deer #3795
Animals in Winter #4239
Characteristics of Plants & Animals #2535
Wild Animal Homes #3595
Life in an Aquarium #4415
The Beaver #4244
Beaver Valley #3212
Big Game Salting #4287
Big Game Winter Range #4288
Birds of Prey #2708
Birds of the Marshes #3701
What is an Amphibian? #6017
What is a Bird? #6032
What is a Fish? #6026
What is a Mammal? #6016
What is Ecology? #6024
How Nature Protects Animals #2526
Beach & Sea Animals #2527
Retrievers at Work #5187
Marsh Marauders #4169
Water Birds #3521
Wild Fowl in Slow Motion #4168
African Fauna #3387
Embryonic Development of the Chick #4802
Reproduction Among Mammals #2650
Shotgun Shooting & How #5188
Salmon – Life Cycle of the Sockeye #4221

The Salmon's Struggle for Survival #4865
Sierra Fish & Game #4113
Underwater Spearfishing #2592
Battling Bass #3997
Big Fish #2846
Blue Warriors of the Pacific #3998
Canada's Tackle Busters #2809
Fishing the Last Frontier #4840
Great Northern Tackle Busters #3995
Spinning for Silvers & Steelhead #4845
Tarpon on Light Tackle #3996
Grouse of the Grasslands #4246
Lost Hunter #3283
Newfoundland Double Header #4842
Hunting Animals of the Past #4272
Hupa Indian White Deer Skin Dance #4990
Pond Insects #2532
Native Flowering Plants of California #2584
Rabies #2498
Careers in Recreation #4799
State Parks of California #4257
Asexual Reproduction #2538
Mitosis & Meiosis #2900
Reptiles #2698
Kentuckie Rifle #3134
Snakes Are Interesting #2560
The Viper #951
The Prairie #5319
Soil Resources #4009
The Anatomy of the Dogfish #4135
Whales and Whalemen #4697
Antarctic Whale Hunt #4282
The Wildlands of California #4613
The Magnificent Canada Goose #2836
Wildlife in the Rockies #4847

From the California Fish & Game Department – Regional Offices: 627 Cypress Street, Redding; 1001 Jedsmith Drive, Sacramento; Ferry Building, San Francisco; 1234 East Shaw Avenue, Fresno; and State Building, 217 W. First Street, Los Angeles.

Big Horn Sheep of Death Valley
California Deer Unlimited
Upland Game Birds of California
Ring-Necked Pheasants
Rainbow Hatcheries
High Jumpers
Flying Trout of California
Sardines – Disappearing Silver
Fish in the Sea
The Sea Otter
Spawning Streams
Water – Let's Use It Wisely
Water – Let's Keep It Clean
Shooting Safety
Trigger Happy Harry
Wildlife for the Future
The Landowner & the Sportsmen
The Mourning Dove Story
California's Golden Trout
Chukar of California

From the Audio-Visual Service, Colorado State University, Ft. Collins, Colorado.

Realm of the Wild
The Cottontail
Duck Hunter's Dilemma
Farmer Gets the Bird
Fishing in the Clouds
Flight of the Teal
George Washington's River
Going Fishing?
Lost Hunter
Shooting Safety
Sunrise Serenade
Two Buck Jones
Prairie World of the Kit Fox

From West Virginia University Library, Audio Visual Department, Morgantown, West Virginia 26506:

Birds of Prey #225
Careers in Conservation #A785
The Earth is the Lord's #A725
Every Man's Empire #A301
High Over the Borders #A360
Hunting with Camera #A502
Realm of the Wild #A137
The Sunfish #293

From the Canadian Travel Film Library, 233 Sansome Street, San Francisco, California 94104:

Arctic Fishing
Beautiful Bonne Bay
Big Country, Big Fish
Big Game Camera Holiday
Birds of the Prairie Marshes
Bluefin Rodeo

A Double in Bluefins
Family Fishing
Fishing the Foothills Providence
Fishing the Last Frontier
Goose Hunt
Grey Trout
High Country Safari
Hunting the Foothills Flyway
Lure of the North
Pay-Dirt Angling
Project Muskie
A Salmon for Junior
Wildlife in the Rockies
Wildlife Rendezvous
With Camera & Gun in Newfoundland
The Enduring Wilderness
The Valley of the Swans
Let's Talk Hunting
Arctic Goose Hunt

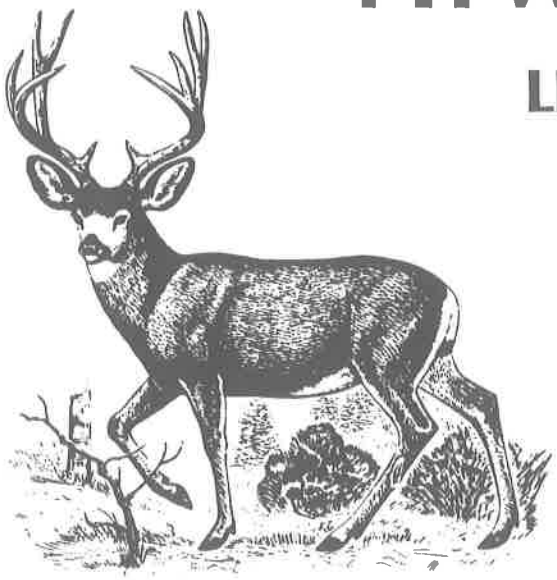
There are many other sources of good films. Perhaps you will want to request a list or catalog. Examples of sources are:

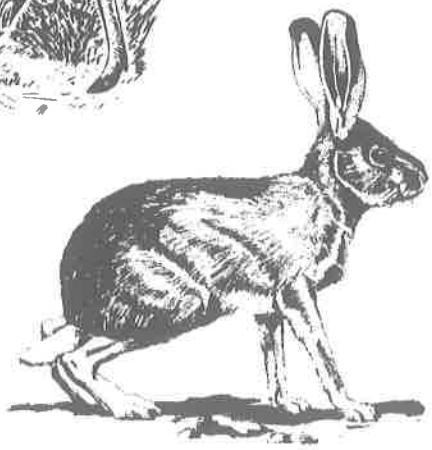
U.S. Department of Agriculture
Motion Picture Service
Washington 25, D. C.

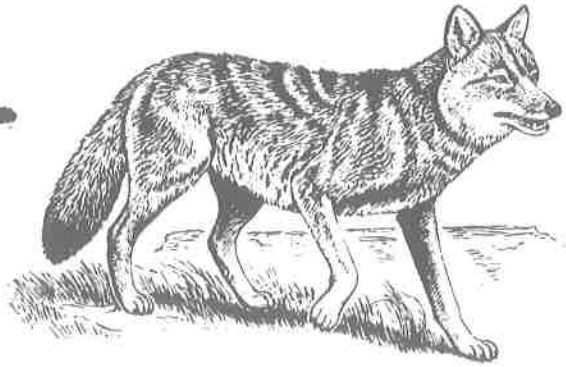
Sportsmen Service Bureau
250 East 43rd Street
New York 17, New York

4-H WILDLIFE PROJECT

LEADER'S MANUAL







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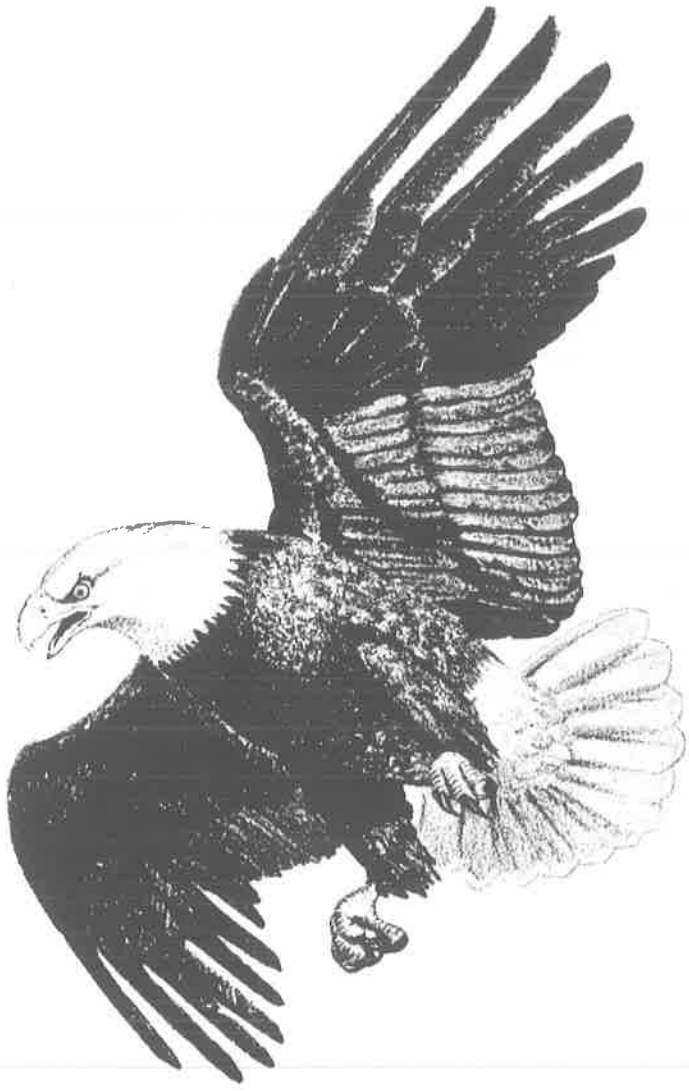

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4-H WILDLIFE PROJECT

LEADER'S MANUAL

BEGINNING UNIT

The objectives of the wildlife project are to develop in young people:

- ☐ An understanding of the biological principles of wildlife management.
- ☐ An appreciation of the aesthetic qualities of wildlife.
- ☐ An awareness that everyone has a responsibility to see that wildlife is correctly managed.
- ☐ The knowledge and skills necessary to conduct a successful wildlife management project.

Each member of your project group should do the following during the beginning unit:

- ☐ Read and understand *Principles of Wildlife Management*, Leaflet 2218.
- ☐ Attend and participate in project meetings.
- ☐ Select and complete a group or individual wildlife management project, such as a scrapbook, birdhouse, or track casts (this item is optional).
- ☐ Complete a record book.

This guide outlines suggestions for topics at project meetings. You may cover as many of the suggested meetings as you wish or add other meetings that are of interest to you. Suggestions for additional meetings are on page 11. Feel free to adapt any ideas you find to special needs of your project group.

The table of contents lists suggested topics for the beginning unit. All of the subject-matter material is in *Principles of Wildlife Management*, Leaflet 2218. This guide includes a few suggestions for project activities. Additional suggestions are in *Principles of Wildlife Management* and in the *Wildlife Project Idea Book*, Leaflet 2940. These two booklets are available from your local University of California Cooperative Extension 4-H youth advisor.

Do not feel that you, as a leader, have to do all the planning and conducting of the project. There are many resources — people, organizations, and literature. For example, older members who have completed wildlife projects can share their knowledge and experience with younger members. Your 4-H youth advisor and local Department of Fish and Game conservation officer (game warden) or wildlife biologist can introduce you to people in wildlife management. Businesses and organizations concerned with wildlife may furnish speakers and materials. Many books, magazines, and films are available. Suggested sources of information are listed at the end of this guide.

Meeting 1. *Introduction to Wildlife*

The purpose of this meeting is to acquaint members with the Wildlife Project and get them interested in studying about wildlife. Include the members in discussing and planning activities. Before this meeting, obtain a copy of *Principles of Wildlife Management* and *Wildlife Project Idea Book* for each member.

1. Ask members to introduce themselves and tell why they joined the Wildlife Project.
2. Give each member a copy of *Principles of Wildlife Management* and *Wildlife Project Idea Book*, and talk about:

   Project requirements

   Number of meetings

   When and where meetings will be held

   Length of meetings

   Discussion topics

3. To stimulate interest, ask some of the following questions and discuss the answers:

   What is wildlife?

   Is wildlife increasing or decreasing in the area? Why?

   What are the positive and negative values of wildlife?

   Are predators good or bad?

   What are game and nongame animals?

   Who owns wildlife in the United States?

   Where do the funds for managing wildlife come from?

4. Ask members to define wildlife management.
5. Do one or more of the following suggested activities:

   Ask members to list wildlife species found in the area and where they are found. (This may be a contest between two or more teams.)

   Play charades, acting out the names of wildlife species.

   Design a club wildlife emblem.

   Ask members to list local businesses, organizations, and people that benefit from wildlife in their area and to tell how they benefit (economics, recreation, aesthetics, and the like).

6. Announce the date, time, and place of the next meeting. Briefly explain what material will be covered (Wildlife Habitat). Ask members to read the appropriate pages in *Principles of Wildlife Management* and think about wildlife management projects.

Meeting 2. *Wildlife Habitat*

This meeting is designed to teach members the concept of habitat and its importance to wildlife.

1. Ask members to define habitat.
   - ☐ Discuss the four habitat factors.

     Give examples of the four factors.

     What happens to wildlife if any of the habitat factors is in short supply?
   - ☐ Talk about the arrangement of habitat factors.

     Why is arrangement important?

     What is the best arrangement?

     Give examples of good and bad arrangements.
   - ☐ Discuss edge effect.

     Why is wildlife often described as an edge species?

     Why does wildlife commonly live along the edges of vegetation types?

     How can the arrangement of food and cover be changed to create more edge?
2. Ask members to define carrying capacity.

   What happens when wildlife numbers exceed the carrying capacity of the habitat?

   What happens to the carrying capacity if the habitat is damaged?

   What is the only way to increase carrying capacity?

3. Discuss succession.

   What is a biotic community?

   Why are most wildlife species called intermediate successional species?

   How can wildlife benefit from disturbances that set back succession to earlier stages?

4. Talk with members about the type of group or individual wildlife projects they wish to do.
5. Do one or more of the following suggested activities:

   Ask members to list what *they* need to survive,

then put each item into categories (food, cover, and water). Is there a good arrangement of these factors? How does this list compare with the needs of wildlife?

Make a wildlife resource map of an area where there is wildlife (such as a farm, park, backyard). Show all locations where food, cover, and water are available. List the wildlife species that occur in the area and indicate on the map where they are found. Is the arrangement of habitat factors good? How can the habitat be improved? (Refer to the activity on making a wildlife resource map in the *Wildlife Project Idea Book.)*

Have members participate in a role-playing game based on the loss of wildlife habitat. Members may act out roles individually or with someone else and should be encouraged to use their imaginations in preparing arguments. Develop your own role-playing situation or use the following example:

> *SITUATION:* A marshland is scheduled to be drained and replaced by a new housing development and grocery store. The City Planning Commission is considering whether or not development should be allowed (select three to five members to serve on this commission). The commission will listen to testimony on both sides, asking questions of speakers, especially if there appears to be a contradiction. The commission must make a decision.

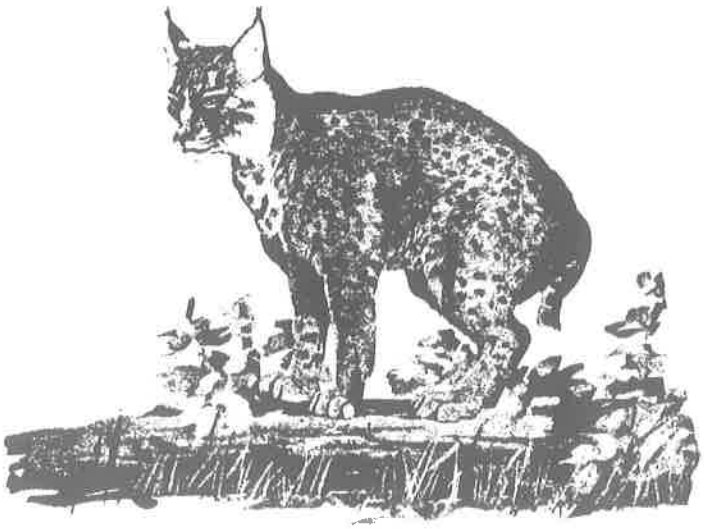
Arguments for:

- ☐ This development will help relieve the housing shortage that has been caused by the town's rapid growth rate.
- ☐ Additional people living in the area will be good for the local economy.
- ☐ The new grocery store is vitally needed. The closest one is 3 miles away.
- ☐ The marshland is virtually worthless, consisting of a few birds that no one cares about and millions of mosquitoes that plague everyone.

Arguments against:

- ☐ Our town is getting too big. We need fewer people, not more. The traffic is getting bad, and property values are skyrocketing.
- ☐ Valuable wildlife habitat will be destroyed forever if the development is approved. Twenty-seven species of birds will be affected, in addition to a large number of mammals, reptiles, amphibians, and fish.
- ☐ Local schools will no longer be able to use the marsh as an outdoor classroom. Also, many local residents use the area for bird watching, fishing, nature walks, and picnicking. This valuable educational and recreational area should be maintained.
- ☐ The marsh provides an aesthetic view for people now living in the area. This development is opposed by these landowners.

6. Announce the date, time, and place for the next meeting. Briefly explain what material will be covered in the next meeting (Wildlife Population Dynamics). Ask members to read the appropriate pages in *Principles of Wildlife Management* for the next meeting.



Meeting 3. *Wildlife Population Dynamics*

This meeting presents the concept of population dynamics. The study of the factors that affect the growth and decline of wildlife populations helps explain why and how wildlife populations must be managed.

1. Ask members to define population dynamics.

   What is a population?

   What does "dynamics" refer to?

   What two major factors affect the population dynamics of wildlife?

2. Discuss the factors that affect birth rate.

   Number of young per birth.

   Number of births per year.

   Age at which breeding begins.

3. Quiz members on the birth rates of the species shown in the following table. (Ask at what age breeding begins, how many young are produced each year, and whether the birth rate is high, medium, or low.)

Species	Age at first breeding (years)	Approximate number of young each year	Birth rate
California quail	1	12	High
Mallard	1	10	High
Pheasant	1	8	High
Gray squirrel	1	8	High
Dove	1	6	High
Canada goose	2	6	High
Coyote	1	5	High
Bobcat	2	3	Medium
Antelope	2	1½	Medium
Deer	2	1½	Medium
Black bear	3	1½	Low

4. Review the factors that affect the death rate:

   Starvation, hunting, climate, predation, and diseases and parasites

   Give examples of each death factor.

   Which factor limits wildlife populations the most severely?

5. Quiz members on the death rates of the following wildlife species:

Species	Approximate percentage of population dying each year
California quail	80
Mallard	60
Pheasant	75
Gray squirrel	50
Dove	70
Canada goose	60
Bobcat	50
Antelope	30
Deer	25
Black bear	25
Coyote	55

6. Discuss the annual wildlife population curve:

   Follow a wildlife population through a year of growth and decline (use a graph).

   What is the breeding stock?

   Why does the population decline after reaching its peak?

7. Do the following activity:

   Construct two 3-year population dynamics models (tables and graphs) for a mallard population using mortality rates of 50 and 90 percent and the following assumptions:

   All adults breed at 1 year of age

   Sex ratio — 50:50

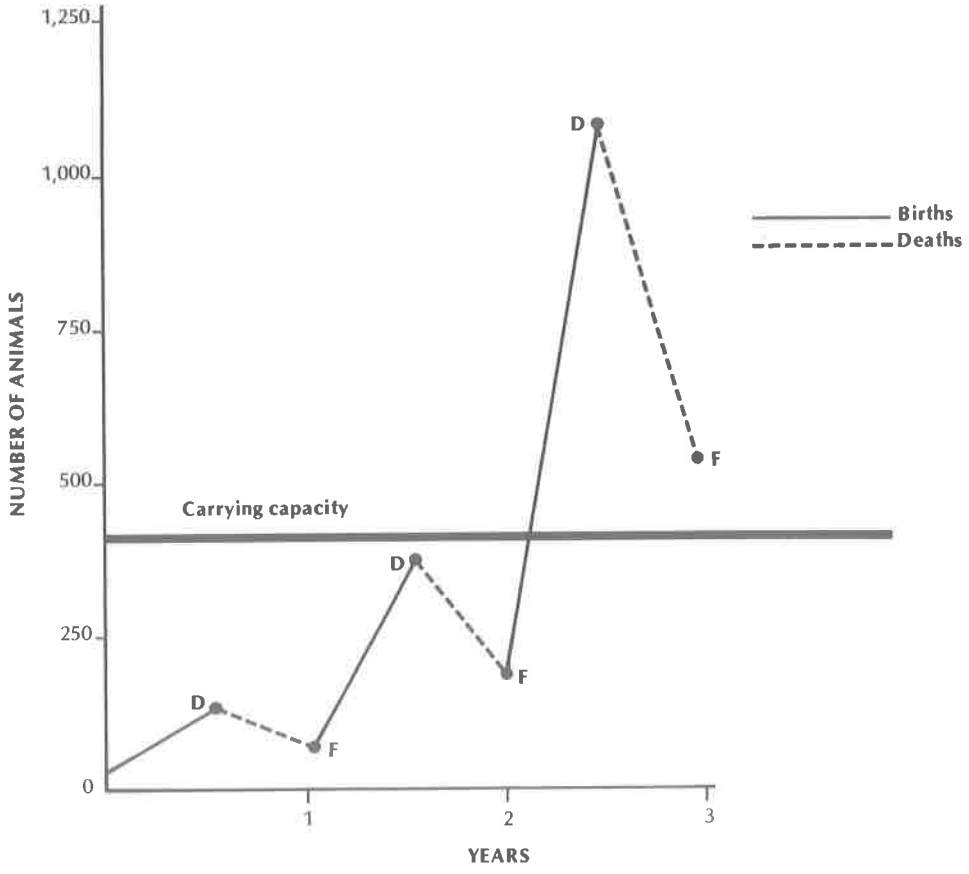
   Birth rate — 10 young per female

   Carrying capacity — 400 birds

   Beginning population — 10 males and 10 females (breeding stock)

POPULATION DYNAMICS — 50 PERCENT MORTALITY

	A	B	C	D	E	F
	Breeding stock		(10xB)	(A+B+C) Total population	(0.5xD) Mortality	(D-E) Total population
Year	Males	Females	Young	(after birth)	(50%)	(end of year)
1	10	10	100	120	60	60
2	30	30	300	360	180	180
3	90	90	900	1,080	540	540



□ Ask the following questions about the model based on 50 percent mortality:

Is the population increasing or decreasing? (Increasing. Births exceed deaths.)

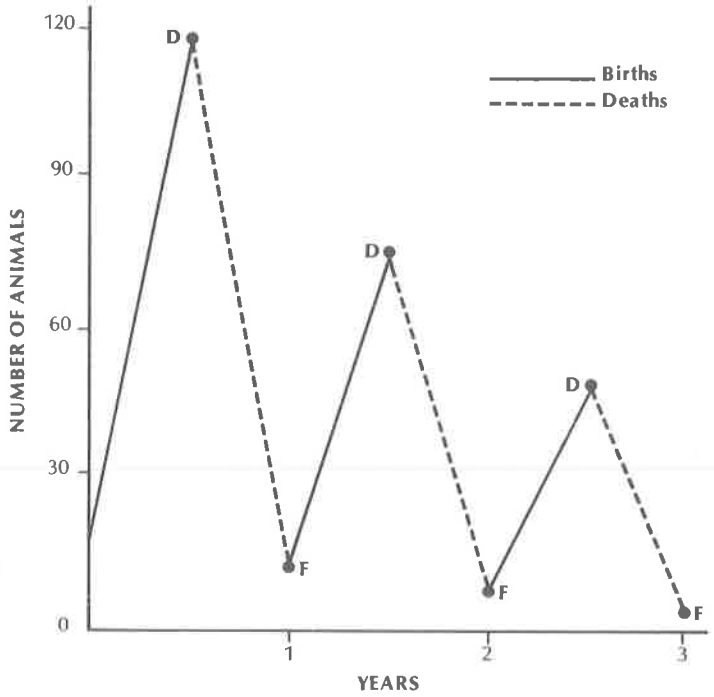
How long did it take for the population to reach 400 birds? (3 years)

Is the situation at the end of the 3 years desirable? (No. There are too many birds for the available habitat, and the population is still growing. Habitat damage, disease outbreaks, starvation, and crop damage could result.)

POPULATION DYNAMICS — 90 PERCENT MORTALITY

	A	B	C	D	E	F
	Breeding stock		(10xB)	(A+B+C)	(0.9xD)	(D-E)
Year	Males	Females	Young	Total population (after birth)	Mortality (90%)	Total population (end of year)
1	10	10	100	120	108	12
2	6	6	60	72	65	7*
3	4	4	40	48	43	5

* Round uneven numbers up in determining breeding pairs for next year.



□ Ask the following questions about the model based on 90 percent mortality:

Is the population increasing or decreasing? (Decreasing. Deaths exceed births.)

Is this situation desirable? (No. The population will eventually be eliminated.)

What can be done to make this a desirable situation? (Decrease the mortality rate so that the population will increase to 400 birds — the carrying capacity. Then adjust the mortality rate to keep the population at that level.)

With the preceding exercises and assumptions in mind, design your own population dynamics model (table and graph) for a mallard population using the following additional assumptions:

Objective — to build up and maintain the population at 400 birds

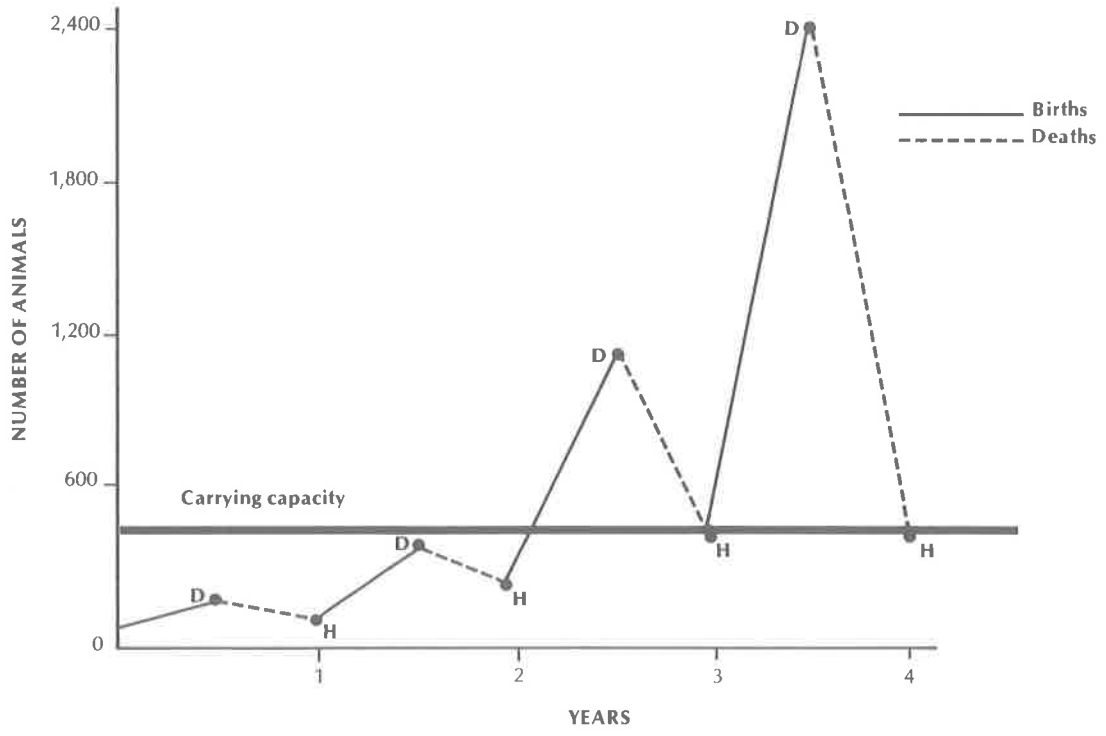
Natural losses (starvation, etc.) — 50 percent

Losses through hunting — variable (note additional columns in table)

There are several possibilities for this exercise. The following is only one example.

MAINTAINING POPULATION AT CARRYING CAPACITY

Year	A Breeding stock Males	B Females	C (10xB) Young	D (A+B+C) Total population (after birth)	E (0.5xD) Natural losses (50%)	F Hunting (variable)	G (E+F) Total mortality	H (D-G) Total population (end of year)
1	10	10	100	120	60	-	60	60
2	30	30	300	360	180	-	180	180
3	90	90	900	1,080	540	140 (13%)	680	400
4	200	200	2,000	2,400	1,200	800 (33%)	2,000	400



□ Discuss the following:

How long did it take for the population to reach and be stabilized at the carrying capacity? (3 years)

What is the total mortality rate needed to stabilize the population at 400 birds? (About 83 percent — 2,000 birds — so that births equal deaths.)

Is this situation desirable ? (Yes, the population is maintained at the carrying capacity of the habitat.)

Explain how hunting is used as a management tool in this situation. (To maintain the population at the carrying capacity each year, 2,000 birds must be removed. Natural losses remove only 1,200 birds. Hunting is used to remove the other 800.)

Do the basic principles illustrated by this model also apply to other wildlife populations? (Yes)

8. Announce the date, time, and place for the next meeting. Briefly explain what the next meeting will cover (Wildlife Management Tools — Part 1). Ask members to read the appropriate pages in *Principles of Wildlife Management* for the next meeting.

Meeting 4. *Wildlife Management Tools — Part 1*

This meeting deals with the various means used to manage wildlife. Because this topic is so extensive and important, it is split into two meetings. Throughout the two meetings, emphasize that a good wildlife management program is flexible and uses a combination of management tools, because wildlife populations and habitat factors change from year to year.

1. Discuss wildlife laws:

   What is the purpose of the laws? What would happen if all the laws were eliminated?

   Why do inflexible laws prevent effective management?

   Who enforces the laws? Discuss the duties of a conservation officer (game warden).

   How is money from licenses used? Is any of it used to manage nongame wildlife?

2. Review predator control:

   What are the four factors that determine the extent and effect of predation?

   What is a bounty? Does controlling predators result in more wildlife?

   What is the biggest cause of excessive predation?

   When is it necessary to control predators?

3. Talk about refuges:

   What is the main goal of a refuge?

   Talk about the four types of refuge and their effectiveness.

   Ask members to give examples of each of the four types of refuge.

4. Discuss stocking:

   What is the purpose of stocking?

   What are the two methods used to stock wildlife?

   Why is stocking usually unnecessary in good wildlife habitat?

   When is stocking most useful?

5. Do one or more of the following suggested activities:

   Obtain copies of federal and state laws that regulate hunting. Discuss the purposes of these laws. Discuss differences in seasons, bag limits, weapons, and so on, for different animals.

   List wildlife species that have been stocked in your area and where they were stocked. (You may want to ask you local wildlife biologist or game warden for answers to these questions.)

   Make a list of the refuges in your area. Why were they created? Are they effective?

6. Announce the date, time, and place for the next meeting. Briefly explain what material will be covered in the next meeting (Wildlife Management Tools — Part 2). Ask members to read the appropriate pages in *Principles of Wildlife Management* for the next meeting.

Meeting 5. *Wildlife Management Tools — Part 2*

1. Discuss introduction of exotic species:

   What is the purpose of introducing exotic wildlife?

   Name two factors that must be considered before introducing exotic wildlife.

   Why do most exotics disappear soon after release?

2. Review habitat management:

   What is the main purpose of habitat management?

   Why is wildlife habitat declining in the United States?

   What is the most important thing you can do to help wildlife?

   What habitat management projects for wildlife have been undertaken in your area? (You may want to ask your local wildlife biologist or game warden for this information.)

3. Talk about hunting and trapping:

   How are hunting and trapping used in wildlife management?

   Are hunting and trapping harmful to wildlife populations?

   Where do most funds for game and nongame wildlife management programs come from? What would happen to wildlife if all hunting and trapping were eliminated?

   How do hunting and trapping help prevent habitat damage?

4. Discuss public education:

   Why is public education an important management tool?

   Give examples of a misinformed public having

opposed needed management programs.

How can the general public help in funding management programs?

5. Do one or more of the following suggested activities:

   Name the desirable and undesirable exotic wildlife species in your area. Which other exotic species were unsuccessfully introduced into your area? (You may want to contact your local wildlife biologist or game warden for answers to these questions.)

   Begin a wildlife habitat improvement project. First, make a wildlife resource map of the area (see meeting 2, item 5), then decide how the habitat can be improved. (Refer to the section on habitat management in *Principles of Wildlife Management* for suggested projects; also seek advice from a Cooperative Extension advisor, wildlife biologist, or game warden.)

   Ask members to read their local newspaper, cutting out articles about wildlife and collecting them in a scrapbook. Discuss the clippings at a future meeting to determine if the articles are factual or biased.

   Ask members to list 10 rules a hunter should follow to be a good sportsman. Why are some people poor sportsmen? What can be done to change these people so that they are good sportsmen?

   Have members participate in a role-playing game in which wildlife habitat is lost. Develop your own role-playing situation or use the example described in meeting 2, item 5, third activity.

6. Announce the date, time, and place for the next meeting. Briefly describe the next meeting (Guest Speaker).

Meeting 6. *Guest Speaker*

The purpose of this meeting is to make members aware of the people who work in the wildlife profession. Invite one of these people to talk to your group.

1. Talk about the people who work in the wildlife profession, such as wildlife biologists, game wardens, shooting-preserve managers, gun-club owners, waterfowl refuge managers, game bird breeders. What are their responsibilities?
2. Introduce the guest speaker to your group.
3. Announce the date, time, and place for the next meeting. Briefly explain what will happen in the next meeting (Field Trip).

Meeting 7. *Field Trip*

Take members on a field trip so that they can use what they learned during the past meetings to better enjoy and understand wildlife and its management.

1. Suggested field trips include:

   State Department of Fish and Game office

   Refuge

   Gun club

   Game bird farm

   Shooting preserve

   Park

   Museum

2. Announce the date, time, and place for the next meeting. Briefly explain what material will be covered in the next meeting (Review). Ask the members to reread all of *Principles of Wildlife Management* for the next meeting.

NOTE: Only one meeting remains in the Beginning Unit of the Wildlife Project. If you want to add more meetings to this section, they should come here (before the review meeting). Ideas for additional meetings include:

Student reports (written or oral, on some aspect of wildlife management)

History of wildlife management

Other speakers

More field trips

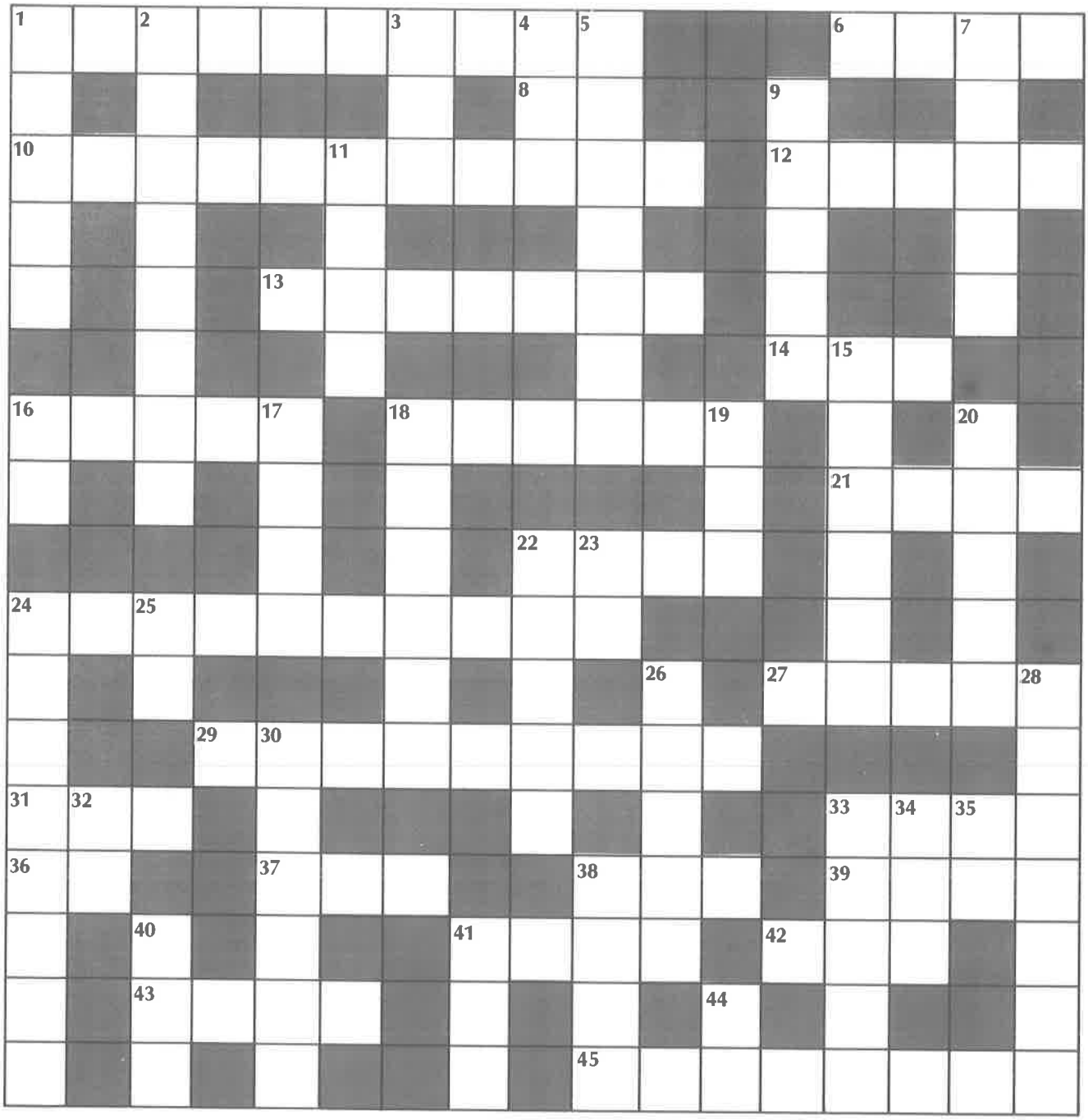
Additional meetings on topics previously discussed

A test on principles of wildlife management

Any of the suggested activities in *Principles of Wildlife Management*

Enrollment in the Hunter Safety Program sponsored by the Department of Fish and Game

WILDLIFE CROSSWORD PUZZLE

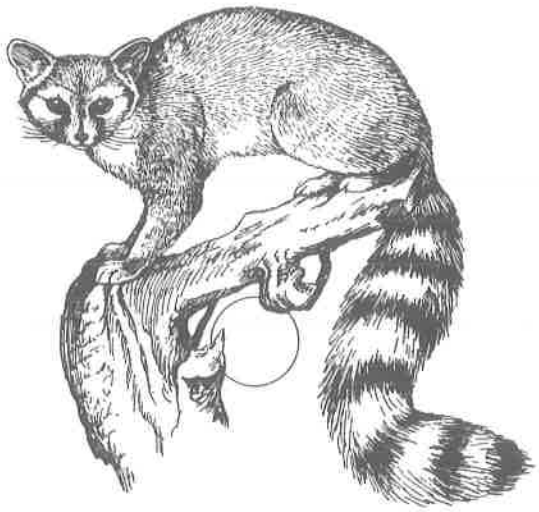


ACROSS

1. The replacement of one plant and animal community with another.
6. A management tool used to regulate man.
8. Does hunting or trapping cause wildlife to be endangered?
10. The proper ____ of food, cover, and water results in more wildlife.
12. The ____ rate is only one factor that affects population size.
13. Save wildlife ____ and you save wildlife.
14. We should all ____to help wildlife survive.
16. Be willing to spend more ____ on wildlife.
18. Animals above the carrying capacity of the habitat.
21. The quality of this habitat factor is especially important.
22. Long, ____ winters are hard on wildlife.
24. A group of raccoons that occupy a specific area.
27. The end of life.
29. The process of learning; a management tool.
31. Animals above the carrying capacity of the habitat will ____.
33. Because of good management, the trumpeter ____ is no longer an endangered species.
36. Wildlife must be kept ____ or below the carrying capacity of the habitat so that no damage is done to the animals or their habitat.
37. The greatest threat to wildlife survival.
38. A female duck is called a ____.
39. A portable house used by campers and hunters.
41. ____ wildlife habitat will not support many animals.
42. Destroy habitat? Absolutely ____!
43. The area where two vegetative types come together.
45. A management tool used to increase wild turkey populations.

DOWN

1. Room for wildlife — a habitat factor.
2. ____ capacity is the number of each wildlife species that the habitat can support.
3. It is fun to ____ wildlife.
4. The number ____ priority is saving wildlife habitat.
5. Songbirds and eagles are placed in this category.
7. A critical habitat factor during a drought.
9. The birth rate for coyotes is ____ five young per female.
11. Saving wildlife habitat makes a person feel ____.
15. A sanctuary.
16. Someone who can help wildlife.
17. Doing something good for wildlife can make you ____ for joy.
18. Not native.
19. It is ____ to see wildlife habitat destroyed.
20. On a field trip, one might ____ more than five deer.
22. ____ are also called mud hens.
23. Wildlife management programs must be based ____ biological knowledge.
24. An animal that kills other animals for food.
25. A federal act that is a major source of revenue for management programs (abbreviation).
26. Used for protection against predators and climate.
28. The activity that is the major source of money for management programs.
30. Overpopulation often results in ____ to the habitat.
32. Refuges preserve wildlife habitat and keep ____ in good condition.
33. Animals needed to replenish the population are called the breeding ____.
34. The vegetation is ____ after a rain.
35. The California Condor is ____ endangered species.
38. A cottontail rabbit ____ from one place to another.
40. Habitat is the ____ to wildlife survival.
41. Everyone should be willing to ____ for wildlife management.
44. Save wildlife habitat ____ wildlife can survive.



ANSWERS TO CROSSWORD PUZZLE

ACROSS

1. succession
6. laws
8. no
10. arrangement
12. birth
13. habitat
14. try
16. money
18. excess
21. food
22. cold
24. population
27. death
29. education
31. die
33. swan
36. at
37. man
38. hen
39. tent
41. poor
42. not
43. edge
45. stocking

DOWN

1. space
2. carrying
3. see
4. one
5. nongame
7. water
9. about
11. glad
15. refuge
16. me
17. yell
18. exotic
19. sad
20. count
22. coots
23. on
24. predator
25. P.R. (Pittman-Robertson)
26. cover
28. hunting
30. damage
32. it
33. stock
34. wet
35. an
38. hops
40. key
41. pay
44. so

Meeting 8. *Review*

This meeting reviews the principles of wildlife management and prepares members for studying the next wildlife leaflet.

1. Discuss each of the 19 principles of wildlife management. Be sure that each member thoroughly understands and can adequately explain each principle. This is essential for an understanding of the other wildlife leaflets.

2. Ask members to give a short review of what they accomplished in their wildlife projects. How will the knowledge they gained help wildlife?

3. Complete a *4-H Annual Project Report*, 4-H—1070, and fill in the appropriate categories of the *4-H Personal Development Report*, 4-H—1071.

4. Discuss which wildlife leaflet will be covered next:

   California Big Game, Leaflet 2223

   California Waterfowl, Leaflet 2247

   California Upland Game, Leaflet 2720

   California Furbearers, Leaflet 2721

   California Birds, Leaflet 2707

5. Do one or more of the following suggested activities:

   Ask members to use their wildlife projects as exhibits. Explain how and where the exhibits can be displayed in their community, such as at school or in a local store window (refer to the activity on making a wildlife exhibit in the *Wildlife Project Idea Book*).

   Have members do the crossword puzzle. You will need to have those pages duplicated for them.

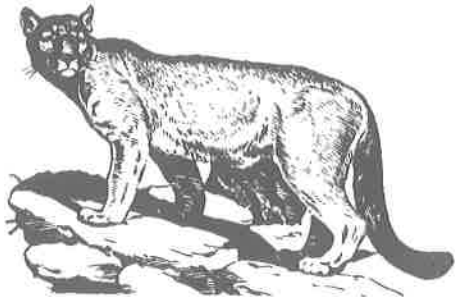
6. Announce the date, time, and place for the next meeting. Briefly explain what material will be covered in the next meeting. Ask members to read the appropriate pages for the next meeting.

INTERMEDIATE UNITS

The Intermediate Units allow 4-H members to learn more about the management of specific groups of wildlife. A member must have completed all of the Beginning Unit before taking these.

There are actually five units, each with the same title as a publication: *California Big Game* (Leaflet 2223); *California Waterfowl* (Leaflet 2247); *California Upland Game* (Leaflet 2720); *California Furbearers* (Leaflet 2721); and *California Birds* (Leaflet 2707). Each is considered an Intermediate Unit, and members may complete as many as they wish. However, it is recommended that leaders cover only one unit at a time. The units may be taught in any order desired.

Leaders may obtain the necessary publications from their 4-H youth advisors. Page and figure numbers in each of the following outlines refer to the leaflet on which the unit is based.



BIG GAME

Meeting 1. *Introduction (pages 1 to 16)*

1. Descriptions and identification
   - Name and describe each species.
   - Discuss differences in subspecies.
   - Talk about distribution of each species.
2. Reproduction
   - Number of young per year
   - Age at first breeding
   - Time of breeding season
   - Gestation period
   - Time of birth
   - Promiscuous, monogamous, or polygamous
3. Movements
   - Migratory or nonmigratory
   - Home range size
4. Food habits
   - Foods eaten
   - Omnivorous, herbivorous, or carnivorous

Meeting 2. *Population Dynamics (pages 17 to 19)*

1. Populations
   - Rank species in order of total numbers.
   - Compared to the year 1900, are populations higher, lower, or about the same? Why?
2. Talk about carrying capacity.
3. Discuss population dynamics.
4. Have members draw a population curve for a deer population, including the carrying capacity (figure 6, page 19).
5. How can the carrying capacity be increased or decreased?
6. What happens to the health of the animals and their habitat if:
   - The animals are kept at or below the carrying capacity, and
   - The animals exceed the carrying capacity?

Meeting 3. *Big Game Management — Part I (pages 19 to 20)*

1. Why is management needed?
2. Talk about methods for maintaining and improving habitat.
3. Why is hunting a useful management tool?
4. To keep the animals and their habitat healthy, populations must be maintained at or below the carrying capacity.
   - ☐ Discuss a bucks-only harvest:

     Number of animals that can be harvested is low.

     Deer increase above the carrying capacity.

     Habitat and animal health deteriorate.

     Carrying capacity decreases.
   - ☐ Discuss a buck and doe harvest:

     Number of animals that can be harvested is high.

     Deer can be maintained at or below the carrying capacity.

     Habitat and animal health are kept at a high level.

     Carrying capacity remains stable.

Meeting 4. *Big Game Management — Part 2 (pages 21 to 22)*

1. Have members construct a table showing the harvest of bucks only, using the information in figure 9 (page 21).
2. Have members construct a table showing the harvest of bucks and does, using the information contained in figure 10 (page 21).
3. Discuss both harvest systems. Which system:

   Increases the number of bucks? (Bucks and does)

   Results in a higher total harvest? (Bucks and does)

   Results in a better sex ratio? (Bucks and does)

   Provides the greatest flexibility in management? (Bucks and does)

   Has a higher potential for buck harvest? (Bucks and does)

   Can be used to keep the animals at or below the carrying capacity? (Bucks and does)

   Is best for the animals and their habitat? (Bucks and does)

Meeting 5. *Guest Speaker*

Meeting 6. *Field Trip*

Meeting 7. *Review*

1. How does each of the 19 principles of wildlife management apply to big game management? Be specific and give examples.
2. Ask members to give a short review of what they accomplished in this unit. How will the knowledge they gained help wildlife?
3. Complete a *4-H Annual Project Report*, 4-H—1070, and fill in the appropriate categories of the *4-H Personal Development Report*, 4-H—1071.
4. Future plans:
   - ☐ Do another Intermediate Unit:

     California Waterfowl

     California Upland Game

     California Furbearers

     California Birds
   - ☐ Do the Advanced Unit.

WATERFOWL

Meeting 1. *Introduction (pages 1 to 22)*

1. Descriptions and identification

   Talk about the characteristics of waterfowl.

   Discuss waterfowl identification.

   Name the differences between swans, geese, and ducks:
   - ☐ Physical appearance
   - ☐ Reproduction

     Number of young per year

     Age at first breeding

     Incubation period

     Nest location

     Mating — for life or one season
   - ☐ Food habits

   Describe the differences between surface-feeding and diving ducks.

Meeting 2. *Management (pages 23 to 30)*

1. Why is management needed?
2. Discuss carrying capacity.
3. Discuss population dynamics.
4. Talk about the flyway concept and its importance in management.
5. Discuss California's importance to waterfowl populations:
   - Number of wintering waterfowl
   - Number of nesting waterfowl and location of nesting areas
   - Loss of waterfowl habitat and value of remaining habitat:
     - State and federal refuges
     - Duck clubs
     - Agricultural areas
6. Laws and regulations
   - Who is responsible for managing waterfowl?
   - How are surveys used to set hunting seasons?
7. Habitat management
   - What is the greatest threat to waterfowl?
   - Discuss methods for maintaining and improving habitat.

Meeting 3. *Guest Speaker*

Meeting 4. *Field Trip*

Meeting 5. *Review*

1. How does each of the 19 principles of wildlife management apply to waterfowl management? Be specific and give examples.
2. Ask members to give a short review of what they accomplished in this unit. How will the knowledge they gained help wildlife?
3. Complete a *4-H Annual Project Report*, 4-H—1070, and fill in the appropriate categories of the *4-H Personal Development Report*, 4-H—1071.
4. Future plans:
   - □ Do another Intermediate Unit:
     - California Big Game
     - California Upland Game
     - California Furbearers
     - California Birds
   - □ Do the Advanced Unit.

UPLAND GAME

Meeting 1. *Introduction (pages 1 to 26)*

1. Descriptions and identification
   - Name and describe one species from each of the nine major groups. (See "Contents" in leaflet.)
   - Talk about the habitat requirements and distribution of these species.
2. Reproduction
   - Number of young per year
   - Age at first breeding
   - Time of breeding season
   - Gestation period
   - Time of birth
   - Promiscuous, monogamous, or polygamous
3. Food habits
   - Foods eaten
   - Omnivorous, herbivorous, or carnivorous

Meeting 2. *Management (pages 27 to 28)*

1. Why is management needed?
2. Discuss carrying capacity.
3. Talk about population dynamics.
4. How does sport hunting affect upland game populations?
5. What is the greatest threat to upland game?
6. Which upland game species are found in your area? Where are they found and why?

7. Describe methods for maintaining and improving habitat.

Meeting 3. *Guest Speaker*

Meeting 4. *Field Trip*

Meeting 5. *Review*

1. How does each of the 19 principles of wildlife management apply to upland game management? Be specific and give examples.

2. Ask members to give a short review of what they accomplished in this unit. How will the knowledge they gained help wildlife?

3. Complete a *4-H Annual Project Report*, 4-H—1070, and fill in the appropriate categories of the *4-H Personal Development Report*, 4-H—1071.

4. Future plans:
   - ☐ Do another Intermediate Unit:
     - California Big Game
     - California Waterfowl
     - California Furbearers
     - California Birds
   - ☐ Do the Advanced Unit.

FURBEARERS

Meeting 1. *Introduction (pages 1 to 18)*

1. Descriptions and identification

   How are furbearers beneficial and detrimental to man? (Give examples.)

   Obtain a pelt and identify its parts and characteristics.

   Name and describe 10 or more species.

   What are the habitat requirements of these species?

2. Reproduction

   Number of young per year

   Age at first breeding

   Time of breeding season

   Gestation period

   Time of birth

   Promiscuous, monogamous, or polygamous

3. Food habits

   Foods eaten

   Omnivorous, herbivorous, or carnivorous

Meeting 2. *Management (pages 18 to 20)*

1. Why is management needed?

2. Discuss carrying capacity.

3. Talk about population dynamics.

4. Explain how management programs for furbearers with high populations differ from those for furbearers with low populations.

5. How do sport hunting and trapping affect furbearer populations?

6. What is the greatest threat to furbearers?

7. Which furbearers are found in your area? Where are they found and why?

8. Discuss methods for maintaining and improving habitat.

Meeting 3. *Guest Speaker*

Meeting 4. *Field Trip*

Meeting 5. *Review*

1. How does each of the 19 principles of wildlife management apply to furbearer management? Be specific and give examples.

2. Ask members to give a short review of what they accomplished in this unit. How will the knowledge they gained help wildlife?

3. Complete a *4-H Annual Project Report*, 4-H—1070, and fill in the appropriate categories of the *4-H Personal Development Report*, 4-H—1071.

4. Future plans:
   - ☐ Do another Intermediate Unit:
     - California Big Game
     - California Waterfowl
     - California Upland Game
     - California Birds
   - ☐ Do the Advanced Unit.

BIRDS

Meeting 1. *Introduction (pages 1 to 7)*

1. Description
   - What are the characteristics of birds?
   - How are birds beneficial and detrimental to man? (Give examples.)
   - Discuss migration.
2. Identification (pages 8 to 22)
   - What characteristics are used to identify birds?
   - Discuss the following:
     - ☐ Types and shapes of feathers
     - ☐ Size and topography
     - ☐ Shape of beaks and feet
     - ☐ Habitat requirements
     - ☐ Other characteristics used in identification

Meeting 2. *Classification (pages 8 to 22)*

1. What are the characteristics of each of the five major groups? (See "Contents" in leaflet.)
2. Within each group, which species are found in your area? Where are they found and why?
3. Take a short walk; identify and record all birds sighted.

Meeting 3. *Bird Feeders (pages 23 to 25)*

(Before the meeting, obtain materials and tools needed.)

1. Habitat
   - Review the habitat factors (food, cover, water, and space) and their importance to birds.
   - Discuss feeders and types of food needed.
   - Talk with each member about the type, design, and location for a bird feeder he or she wants to make.
2. Bird feeder construction
   - Have each member build a bird feeder.
   - Each member should place the feeder in an appropriate location and record its use.

Meeting 4. *Birdhouses (pages 26 to 28)*

(Before the meeting, obtain materials and tools needed.)

1. Discuss the construction and use of birdhouses.
2. Select a single species of bird that is most likely to use a birdhouse in your area.
3. Design a birdhouse for the bird selected.
4. Have each member build a birdhouse using that design.
5. Each member should place the birdhouse in an appropriate location and record its use.

Meeting 5. *Guest Speaker*

Meeting 6. *Field Trip*

Meeting 7. *Review*

1. How does each of the 19 principles of wildlife management apply to the management of birds? Be specific and give examples.
2. Ask members to give a short review of what they accomplished in this unit. How will the knowledge they gained help wildlife?
3. Complete a *4-H Annual Project Report*, 4-H—1070, and fill in the appropriate categories of the *4-H Personal Development Report*, 4-H—1071.
4. Future plans:
   - ☐ Do another Intermediate Unit:
     - California Big Game
     - California Waterfowl
     - California Upland Game
     - California Furbearers
   - ☐ Do the Advanced Unit.

ADVANCED UNIT

The Advanced Unit gives 4-H members an opportunity to learn more about wildlife management. A member must have completed the Beginning Unit and at least one of the Intermediate Units before taking this one.

In the Advanced Unit, the member has a greater degree of flexibility in undertaking projects. To complete this unit, a member must do one or more of the following:

- ☐ Design his or her own project (must be approved by the leader and 4-H youth advisor).
- ☐ Serve as a junior or teen leader.
- ☐ Serve as a project leader.

SOURCES OF ADDITIONAL INFORMATION

Many organizations deal with wildlife conservation. We mention only a few representative ones whose actions influence the management of wildlife. You are encouraged to contact these organizations for additional information. Keep in mind that many of them have local representatives who may serve as speakers at your meetings, help you arrange field trips, and so on. All but the last organization listed have offices in California.

California Department of Fish and Game has the basic responsibility of managing inland fisheries and marine and wildlife resources. It has many local representatives throughout the state.

Offices:

1416 Ninth, Sacramento, 95814

1001 Jedsmith Drive, Sacramento 95819

627 Cypress, Redding 96001

P.O. Box 47 (Yountville Facility), Yountville 94599

1234 East Shaw, Fresno 93710

350 Golden Shore, Long Beach 90802

U.S. Forest Service is responsible for ensuring the wise use of all natural resources on 19 million acres in California. It has many local representatives throughout the state.

Offices:

Main office — 630 Sansome, San Francisco 94111

Angeles National Forest — 150 South Los Robles, Room 300, Pasadena 91101

Cleveland National Forest — 880 Front, Room 6-S-5, San Diego 92188

Eldorado National Forest — 100 Forni Road, Placerville 95667

Inyo National Forest — 873 North Main, Bishop 93514

Klamath National Forest — 1215 South Main, Yreka 96097

Lassen National Forest — 707 Nevada, Susanville 96130

Los Padres National Forest — 42 Aero Camino, Goleta 93017

Mendocino National Forest — 420 East Laurel, Willows 95988

Modoc National Forest — 441 North Main, Alturas 96101

Plumas National Forest — 159 Lawrence, Quincy 95971

San Bernardino National Forest — 144 North Mountain View, San Bernardino 92408

Sequoia National Forest — 900 West Grand, Porterville 93257

Shasta-Trinity National Forest — 1615 Continental, Redding 96001

Sierra National Forest — 1130 "O" Street, Fresno 93721

Six Rivers National Forest — 710 "E" Street, Eureka 95501

Stanislaus National Forest — 175 South Fairview Lane, Sonora 95370

Tahoe National Forest — Highway 49, Nevada City 95959

U.S. Bureau of Land Management is charged with ensuring the wise use of all natural resources on more than 15 million acres in California. It has many local representatives throughout the state.

Offices:

Main office — 2800 Cottage Way, Room E-2841, Sacramento 95825

P.O. Box 149, Cedarville 96104

2460 Athens, Redding 96001

705 Hall, Susanville 96130

555 Leslie, Ukiah 95482

63 Natoma, Folsom 95630

Route 2, Box 26, Bishop 93514

342 Segundo, Ridgecrest 93555

800 Truxtun, Room 311, Bakersfield 93301

831 Barstow Road, Barstow 92311

1695 Spruce, Riverside 92507

1629 West Main, El Centro 92243

U.S. Soil Conservation Service provides technical assistance in land use and rural area programs dealing with wildlife, watersheds, recreation, and the like. It has many local representatives throughout the state.

Offices:

Main office — 2828 Chiles Road, Davis 95616

P.O. Box 668, Federal Building, Room 213, Red Bluff 96080

777 Sonoma, Room 3-17, Santa Rosa 95404

1130 "O" Street, Room 3116, Fresno 93721

650 Capitol Mall, Room 3062, Sacramento 95814

318 Union, Watsonville 95076

3619-A Canyon Crest Drive, Riverside 92507

U.S. Fish and Wildlife Service aids in the conservation of migratory birds and certain mammals. Its programs include research, law enforcement, refuge management, inventories, animal damage control, and exotic game bird introductions. It has many wildlife refuges and local representatives throughout the state.

Office:

2800 Cottage Way, Sacramento 95825

National Wildlife Federation is dedicated to arousing public awareness of the need for wise use, proper management, and conservation of the natural resources upon which all life depends: air, water, soils, minerals, forests, plant life, and wildlife. The federation undertakes a comprehensive conservation education program, distributes numerous periodicals and educational materials, sponsors outdoor education programs in conservation, and litigates environmental disputes.

Office:

2717 Cottage Way, Sacramento 95825

California Natural Resources Federation is a statewide organization affiliated with the National Wildlife Federation, primarily devoted to the wise use, preservation, aesthetic appreciation, and restoration of wildlife and other natural resources.

Office:

2775 Cottage Way, Suite 39, Sacramento 95825

National Audubon Society is dedicated to promoting the conservation of wildlife and the natural environment and to educating the public on its relationship with, and place within, the natural environment as an ecological system.

Office:

555 Audubon Place, Sacramento 95825

The Wildlife Society is an association for those professionally employed in the biological or related fields of wildlife conservation. The society aims to develop and promote sound stewardship of wildlife resources and the environments upon which wildlife and man depend, undertake an active role in preventing man-induced environmental degradation, increase awareness and appreciation of the values of wildlife, and seek the highest standards in all activities of the wildlife profession. It has many local representatives throughout the state.

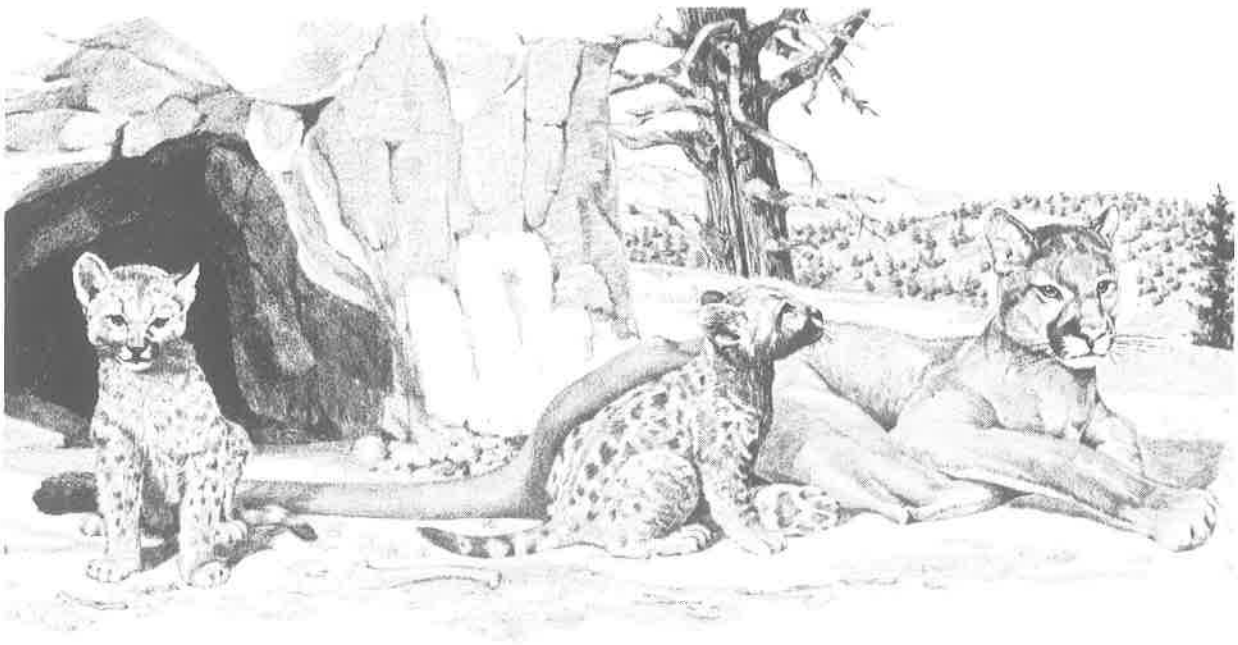
Office:

987 Jedsmith Drive, Sacramento 95819

Ducks Unlimited is dedicated to perpetuation of waterfowl and other wildlife on the North American continent, principally by development, preservation, restoration, management, and maintenance of wetland areas in the Canadian primary breeding grounds, which produce the majority of continental waterfowl, and in the wintering areas of Mexico. The organization establishes, promotes, assists, and contributes to conservation, restoration, and management of waterfowl habitat.

Office:

P.O. Box 66300, Chicago, Illinois 60666



4-H WILDLIFE PROJECT

Members' Guide

The objectives of the wildlife project are to help young people develop—

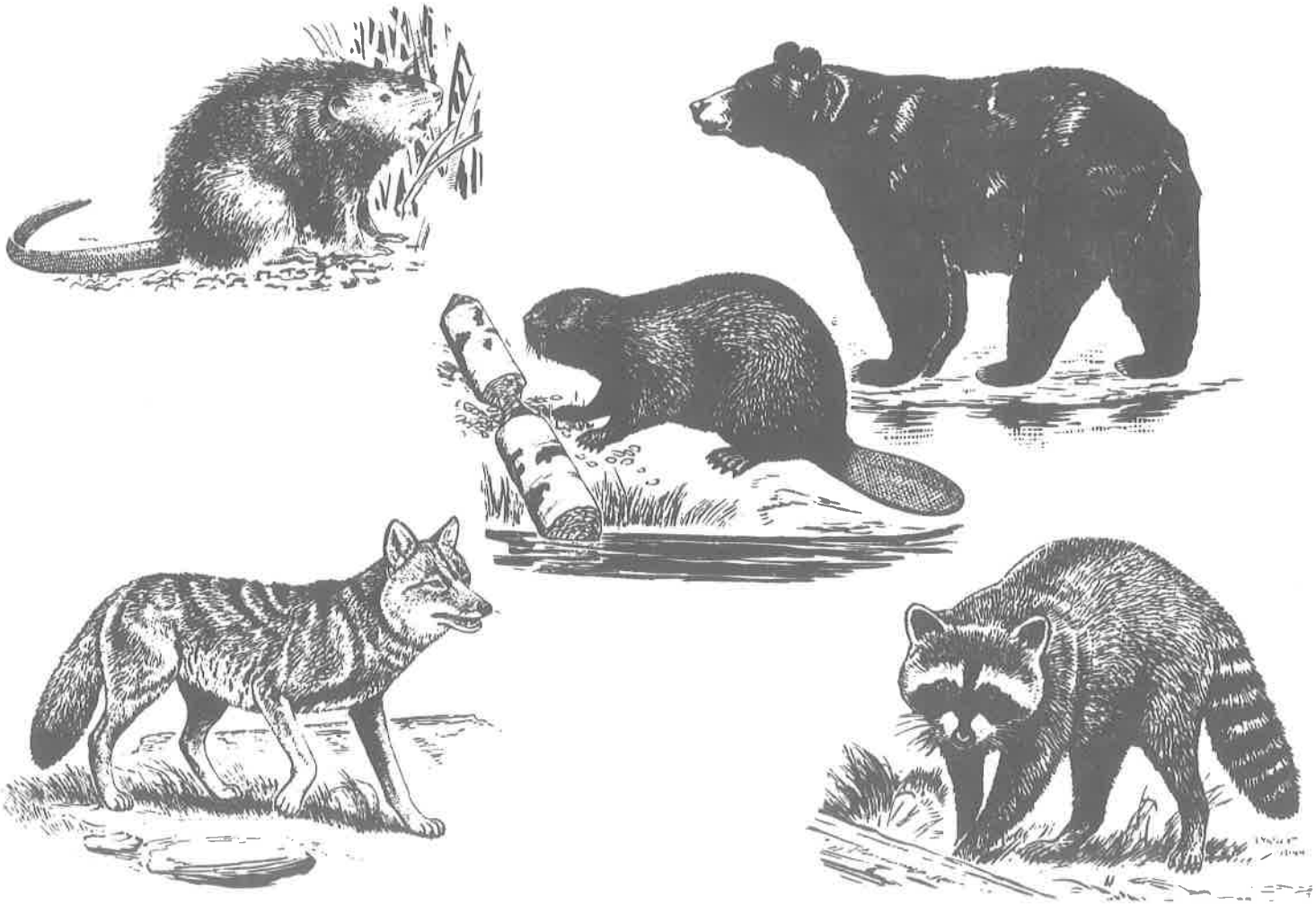
An understanding of the biological principles of wildlife management.

An appreciation of the esthetic values of wildlife.

An awareness that everyone has a responsibility to see that all species of wildlife are correctly managed.

The knowledge and skills necessary to successfully conduct a wildlife management project.

The 4-H wildlife project is organized into a Beginning Unit, five Intermediate Units, and an Advanced Unit. Each unit can be covered in five to eight meetings. The Beginning Unit **must be taken first.**



Cooperative Extension **University of California**
Division of Agriculture and Natural Resources

4-H–7006

BEGINNING UNIT

Principles of Wildlife Management

Learn:

- Importance of wildlife habitat
- Carrying capacity
- Factors affecting wildlife populations
- How wildlife is managed

Do:

- Identify wildlife
- Make a wildlife habitat map
- Evaluate the impact of habitat changes on wildlife
- Construct a population dynamics model
- Participate in field trips
- Solve a wildlife crossword puzzle

INTERMEDIATE UNITS

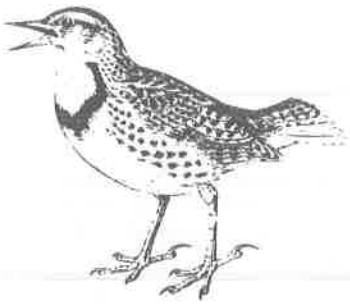
California Big Game, California Waterfowl, California Upland Game, California Furbearers, and *California Birds*
(one or more of these units may be taken)

Learn:

- Factors affecting reproduction
- Food habits
- How to improve wildlife habitat
- How wildlife is managed

Do:

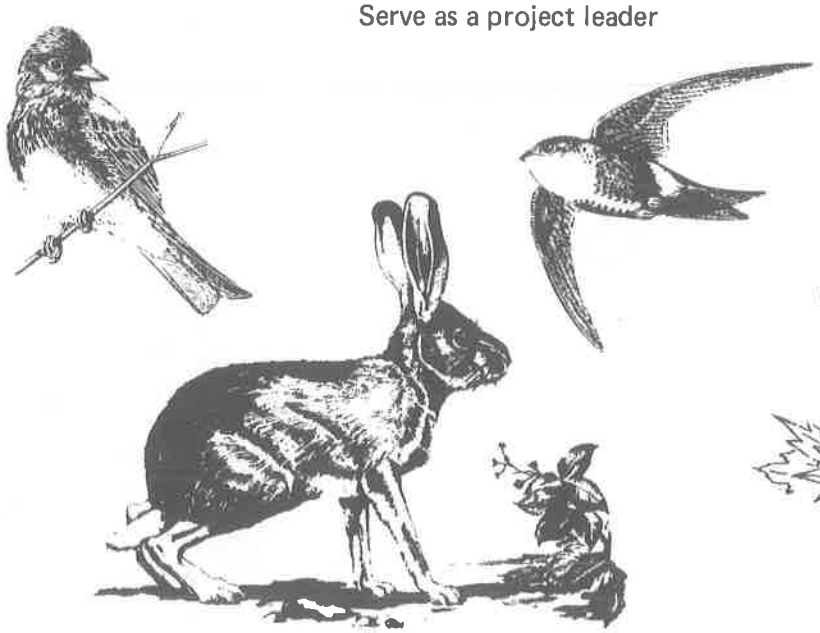
- Identify wildlife
- Develop population curves
- Improve wildlife habitat
- Make a bird feeder and bird house
- Participate in field trips



ADVANCED UNIT

Before taking this unit, you must first complete the Beginning Unit and one or more of the Intermediate Units. In the Advanced Unit, you can do one of the following—

- Design your own project
- Serve as a junior or teen leader
- Serve as a project leader



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1m-rep-10/90-CR/LAM

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 a.m.	cloudy	deer	1	near forest	eating	in forest
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							

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 a.m.	cloudy	deer	1	near forest	eating	in forest
1.							
2.							
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4.							
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6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							

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4-H WILDLIFE

PROJECT OUTLINE

ANIMAL SCIENCE

UNIVERSITY OF CALIFORNIA AGRICULTURAL EXTENSION SERVICE

WILDLIFE is a fascinating business. We hope that in the California 4-H Wildlife project you will discover some of the things that make it so fascinating.

The California 4-H Wildlife project is divided into three units, each designed so that the work can be covered in 1 year. However, leaders and members may wish to expand some of the units to a 2-year period.

4-H–Ag180

The objectives of the Wildlife project are to develop in young people —

- An understanding of biological principles in wildlife management.
- The knowledge and skills necessary to successfully conduct a wildlife management project.
- A realization of the potentials of wildlife as an economic resource in California.
- An appreciation of the esthetic values of wildlife.
- An understanding of the true meaning of multiple use and wise use of wildlife resources.
- An awareness of their responsibilities as citizens toward good wildlife management programs.
- An appreciation of the potentials of wildlife as a career.

Unit one (beginning) suggests the following:

DO (one or more)

- Construct and mount bird nests
- Construct and mount bird feeders
- Hatch some eggs
- Stock and observe fish in a home aquarium
- Raise angleworms and/or minnows
- Collect, identify, and properly label:
  1. three plants used by:
     game birds
     game animals
     nongame animals
     waterfowl
  2. three animal tracks in plaster
  3. three pictures of each of the following:
     mammals
     birds
     reptiles
     amphibians
     fish

LEARN

- To identify the five classes of vertebrate animal kingdom:
  1. mammals
  2. birds
  3. reptiles
  4. amphibians
  5. fish
- To identify seven wildlife species by common name
- To identify the home, food, and habits of any of the five classes:
  1. mammals
  2. birds
  3. reptiles
  4. amphibians
  5. fish

TAKE FIELD TRIPS — To facilities or areas such as:

- Hunting clubs
- Hatcheries
- Refuges and management areas
- Museums, zoos, aquariums
- Research labs

Unit two (intermediate) suggests these things to do:

- Raise game birds
- Collect and prepare a study skin of a ground squirrel, clean skull
- Collect scats to identify three animals
- Collect parts of animals or birds — feathers, hides, antlers, jaws, feet, teeth, bones
- Continue track collection
- Collect more food and cover plants or seeds
- Develop fence corner habitats
- Develop brush pile habitats for quail or rabbits
- Stream improvement
- Propagate plants for wildlife food
- First five of beginners unit (if not already done)

Unit three (advanced) provides opportunity for individual initiative, independent research, and stimulating study in these fields:

- Careers
- Habitat development
- Ecology
- Skin studies
- Management

Co-operative Extension work in Agriculture and Home Economics, College of Agriculture, University of California, and United States Department of Agriculture co-operating.
Distributed in furtherance of the Acts of Congress of May 8, and June 30, 1914.
George B. Alcorn, Director, California Agricultural Extension Service.

MARCH 1967

RAISING CATFISH IN CAGES

Supplement to 4-H Wildlife Project Idea Book, 4-H-Ag185

Although still in the experimental stage, catfish-raising in cages shows considerable promise since it provides close control of fish production in waters where, if fish were planted, they would be difficult to retrieve. Examples of such situations are large canals or ponds full of stumps and rocks that would prevent seining or, possibly, draining.

Growing catfish in wire cages has much the same purpose as that of growing cattle in a feedlot where animals are given balanced feed rations that will, with minimum investment, produce as much meat as possible in a small area.

Water

Almost any pond, lake, or canal is a good site if it is not polluted, has good dissolved oxygen, and is in the 65 to 85 F temperature range most of the summer. Depth should be at least 4 feet so that 1 foot or more of water is between bottom of the cage and pond bottom. Cages should not be placed in stagnant coves.

Cage Design

Rectangular cages ranging in size of 1 to 10 cubic yards are satisfactory (see design drawing). Large metal barrels are also satisfactory for floats if styrofoam blocks are not available.

Stocking Fish

In March or early April, stock cages at a rate of 150 fish per cubic yard. Yearling fish are used (size - 4 to 5 fish per pound) in order to produce edible size fish in one season. In areas with long growing seasons and warm water, fish as small as 10 fish per pound are satisfactory.

Food and Feeding

Fishes confined at high densities in cages depend entirely upon the artificial food so they must be fed a complete ration regularly.

The best presently available ration consists of floating trout pellets. Floating pellets remain inside the cage and cannot pass through the hardware cloth collar at the waterline. Catfish feed best at twilight and should be fed regularly after water temperatures reach 60 F. Daily consumption is about 2 to 3 percent of body weight of the fish. The use of floating feed enables you to judge whether or not fish are feeding.

Source of Fingerlings for Stocking Cages

The California Fish and Game Department and the Farm Advisor's Office have up-to-date lists of persons with fish for sale. California law requires a Domesticated Fish Breeder's License for raising fish.

Keep Records

Fish

- Source of fish and cost
- Date of purchase
- Weight average at planting
- Weight gain every two weeks
- Mortality and date during growing season
- Weight at harvest; total production

Feed

- Amount fed each day
- Brand of feed used
- Cost

Economics

- Cost to produce fish, including fish, cages, water, etc.
- Value received from fish
- Profit or loss

Additional Sources of Information

Lewis, William M. 1969. Progress report on the feasibility of feeding-out channel catfish in cages. Fish Research Lab., So. Ill, Univ., Carbondale, Ill.

Tiemeier, Otto W. and Charles W. Deyoe. 1968. Production of channel catfish. Kans. St. Univ., Agric. Exp. Sta. Bul. 508.

Gray, D. Leroy, 1969. The biology of channel catfish production. Agric. Ext. Serv., Univ. of Ark., Circ. No. 535.

Klussmann, Wallace, Channel catfish farming. Agric. Ext. Ser., Texas A & M Univ., Pub. B-1024.

Davis, James T. and Janis S. Hughes. Channel catfish farming in Louisiana. Louisiana Wildlife and Fisheries Comm., Wildlife Educ. Bul. No. 98.

SPECIFICATIONS FOR CAGE AND FLOAT SHOWN IN FIGURE 1

A. Frame for cage and float of 3/4-inch anodized electrical conduit.
B. Cage constructed of 16-gauge welded mesh galvanized 1/2 x 1-inch steel wire painted with tar compound such as Texaco Netcoat.* The joints are laced with wire.
C. Hardware cloth (1/8-inch mesh, 10 inches wide) installed with 2 inches above and 8 inches below waterline to prevent loss of feed.
D. Joints made by flattening end of conduit and brazing to other section.
E. Styrofoam floats, 22" x 10" x 4', held in place by a framework of conduit. Tarred barrels can be used instead of styrofoam.

* Trademark

To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products which are not mentioned.

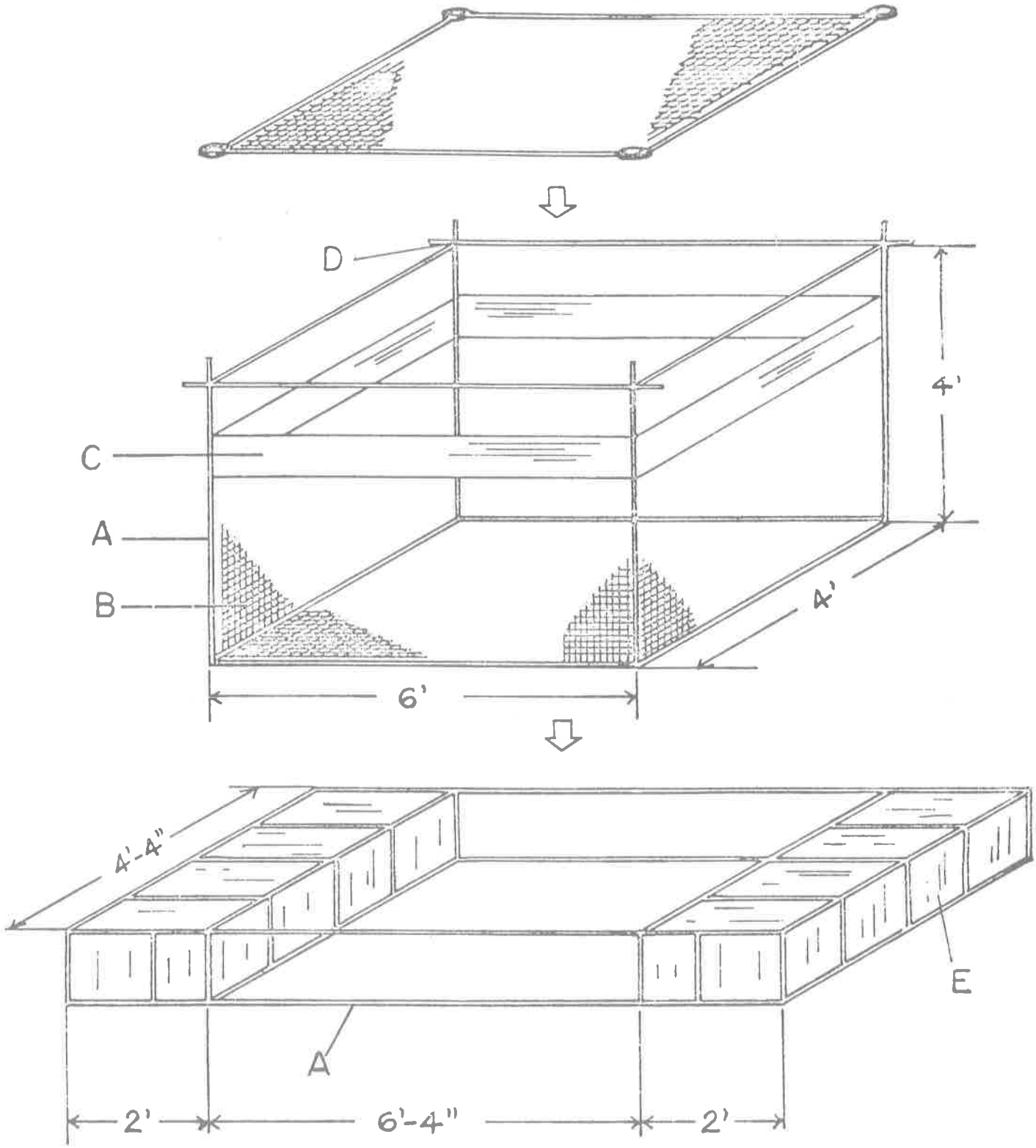

FIGURE 1. CAGE AND FLOAT FOR USE IN REARING CHANNEL CATFISH (SEE FACING PAGE FOR SPECIFICATIONS.)

4-H WILDLIFE PROJECT

UNIT 1

Members Manual

UNIVERSITY OF CALIFORNIA AGRICULTURAL EXTENSION SERVICE

4-H–Ag182

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Photographs courtesy California Department of Fish and Game.

Co-operative Extension work in Agriculture and Home Economics, College of Agriculture, University of California, and United States Department of Agriculture co-operating. Distributed in furtherance of the Acts of Congress of May 8, and June 30, 1914. George B. Alcorn, Director, California Agricultural Extension Service.

NOVEMBER 1966

UNIT 1 WILDLIFE PROJECT

PURPOSE

This manual will give you an opportunity to learn more about California's wildlife—its value to us today, and the principles of its management and life requirements. You will be introduced to the language used by professional wildlife people. In addition, you will come to know the many game animals of California. We hope you will apply this knowledge on your farm or in the field, and take an active part in the protection and wise use of this valuable resource.

PROJECT REQUIREMENTS

- Read all lessons
- Complete record book
- Complete at least three field activities
- Exhibit field specimens or other wildlife materials
- Give a demonstration talk

WILDLIFE MANAGEMENT

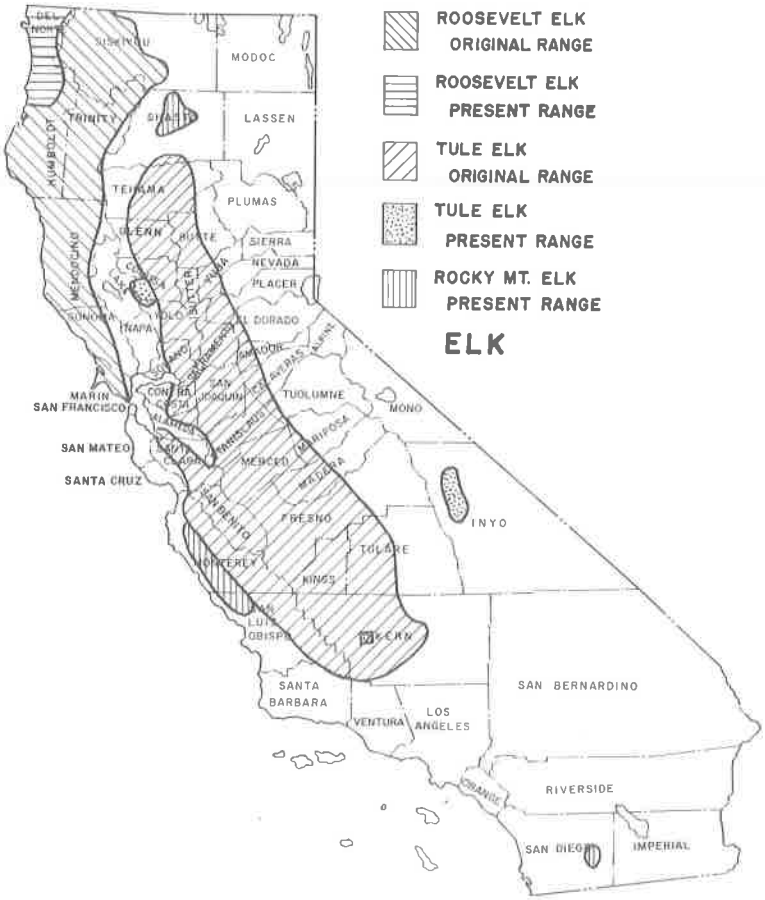
California's wildlife has undergone great changes during the last century, as a result of man's ability to alter the world of nature. These changes are still going on—some are helpful to wildlife, some are not. To help us understand these changes, let's go back some 200 years.

The first Spanish colonists were impressed with the variety and abundance of wildlife. They wrote about great herds of elk and antelope, and referred to "troops" of grizzly bears. The beaver was one of the first animals to feel man's presence in the West. The demand for beaver-fur hats, invention of the steel trap, and the use of the animal's own scent glands, or castors, brought beaver to near extinction in many areas. These early fur trappers and "mountain men" left good written records of the animal life, before and after gold was discovered in 1848 at Coloma, California.

Throughout the central valley, great herds of tule elk, antelope, and deer colored the landscape, much the same as the great herds of bison darkened the plains of the Midwest and eastern slope of the rockies. A somewhat larger elk roamed the forested coastal area north of San Francisco Bay. Bighorn sheep were scattered along the entire mountainous eastern portion of the state.

The grizzly bear was abundant and feared by most early settlers. The wolf was present in early California, mostly in the Sierras. The coyote was found everywhere. Mountain lions were locally abundant and attracted the attention of those who tried to raise domestic stock. The sea otter brought the Russian fur seekers. Timbered and mountainous areas of the state harbored the mink, marten, otter, wolverine, and fisher.


ORIGINAL RANGE
PRESENT RANGE
PRONGHORN ANTELOPE
DEL NORTE
TRINITY
SHASTA
LASSEN
MODOC
HUMBOLDT
TEHAMA
PLUMAS
MENDOCINO
GLENN
BUTTE
SIERRA
NEVADA
PLACER
SONOMA
NAPA
YOLO
EL DORADO
MARIN
SAN FRANCISCO
CONTRA COSTA
ALAMEDA
SAN JOAQUIN
AMADOR
TUOLUMNE
CALAVERAS
ALPINE
SAN MATEO
SANTA CLARA
STANISLAUS
MARIPOSA
MONO
SANTA CRUZ
MERCED
MADERA
SAN BENITO
FRESNO
INYO
MONTEREY
TULARE
KINGS
SAN LUIS OBISPO
KERN
SANTA BARBARA
VENTURA
LOS ANGELES
SAN BERNARDINO
ORANGE
RIVERSIDE
SAN DIEGO
IMPERIAL


ROOSEVELT ELK ORIGINAL RANGE
ROOSEVELT ELK PRESENT RANGE
TULE ELK ORIGINAL RANGE
TULE ELK PRESENT RANGE
ROCKY MT. ELK PRESENT RANGE
ELK
DEL NORTE
SISKIYOU
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SHASTA
LASSEN
HUMBOLDT
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KINGS
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KERN
SANTA BARBARA
VENTURA
LOS ANGELES
SAN BERNARDINO
ORANGE
RIVERSIDE
SAN DIEGO
IMPERIAL

Bird life in early California was so abundant and the kinds so numerous that we cannot adequately describe them here. Waterfowl darkened the sky of the great marshes of the central valley, coastal bays, deltas, and lagoons. Shore birds, such as the egrets, avocets, and herons, worked the shallow waters in quest of food. To add to the profusion of birdlife, sage grouse, sharp-tailed grouse, blue grouse, and ruffed grouse were found in areas where food and cover were to their liking. Old records spoke of flocks of thousands of mountain, valley, and desert quail in the fall of the year.

Most of California's lakes, streams, and bays teemed with salmon, sturgeon, steelhead, Dolly Varden trout, Piute trout, golden trout, and others. This was the general wildlife situation in 1849 when wagon trains rolled into California, laden with those looking for "gold to be found all over the ground on the banks of the Sacramento!" The forty-niners were meat hungry and soon ate most of the available domestic stock. Market hunters working for the gold camps made more money than most miners, hauling wagonloads of geese and pack strings of deer or antelope, for sale to the mining camps. The market

Pintail ducks stop at the Sacramento National Wildlife Refuge on their way south from their breeding grounds.

A herd of tule elk.

was flooded with sturgeon, largest fish in North America, ranging in length from 6 to 12 feet, and weighing hundreds of pounds. In addition to hunting, drainage of wetlands for crop production, land clearing, and competition for food with domestic stock all took their toll of wildlife populations. The grizzly bear, wolf, and sharp-tailed grouse were wiped out. Only the inconspicuous, the wily, the elusive animals survived.

Slowly the pioneers began to realize that their wild game supply was not inexhaustible. State laws were passed to give animals protection, game farms and fish hatcheries were built, refuges were established, exotic animals released, and predator control was emphasized. By the 1930's California's wildlife began to surge back, but a new complex of animals came forth.

Increased browse production had resulted from brushland and forest fires, clear cutting of timber, and livestock grazing. With a plentiful food supply, deer and quail populations began to soar. The introduction of the Chinese ring-necked pheasant into the rice lands of the central valley met with remarkable success, as living conditions were similar to those the pheasant was used to in his oriental home. The chukar partridge from India does well in the semiarid area east of the Sierra and in the dry hills of the west side of the San Joaquin Valley.

Some introductions were made accidentally or by well-meaning, but poorly informed persons. Outstanding examples of these animals that have spread and become nuisances are the muskrat, carp, and opossum.

Thus civilization has destroyed some species and at the same time increased others. We have learned that wildlife is a renewable resource if managed properly, and that this management must be based upon sound research and biological facts.

Buck antelope on the range.

WILDLIFE: A VALUABLE RESOURCE

Our wildlife is a renewable resource, that is, it is self-perpetuating if properly managed. In contrast, oil, gas, and mineral resources are nonrenewable. The fact that this renewable resource is in a wild state makes it difficult to fully evaluate. Just to observe wild animals in their natural habitat, to photograph them, or to hunt the many species means relaxation and improved physical and mental health to our citizens. Such values defy computation.

It has been estimated that at least $500 million are spent by sportsmen of this state

A herd of bighorn sheep.

Hunting Chinese ring-necked pheasant.

each year in pursuit of hunting and fishing. This is a substantial contribution to those businesses selling sporting goods, gasoline, groceries, hunting rights, clothing, camping facilities, dog food, lodging, outdoor literature, and many more. Wildlife plays an important role in the great and growing recreation industry.

Wildlife is of direct benefit to man, too. Many nesting birds eat more than their own weight in insects and weed seeds every day; and some of our wildlife species prey on rats and mice, saving our farmers millions of dollars each year. Game animals and game fish provide millions of pounds of food annually, while their feathers, fur, and hides are used to manufacture many items of clothing.

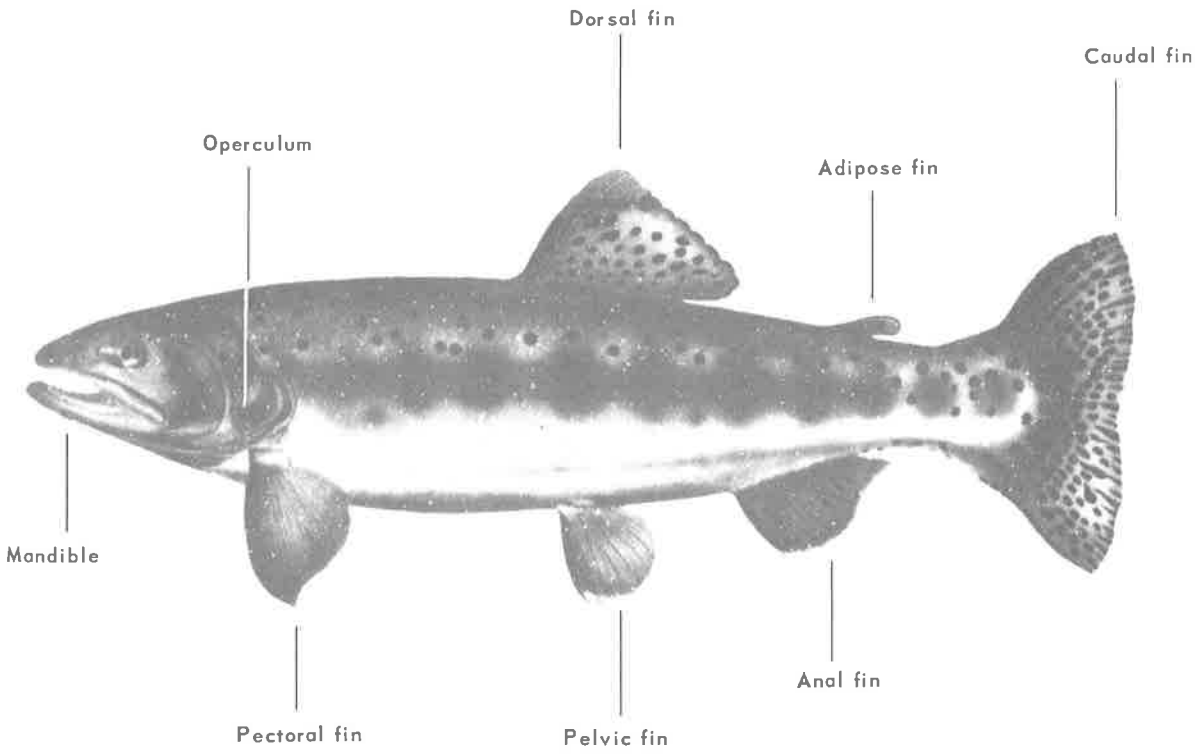
With the increased pressure on our recreation resources and the demand for more hunting and fishing, the problems of managing this valuable resource become more and more complex. Today, as in the past, much natural wildlife habitat is being altered by man. Farming methods are aimed at clean fencerows, clean irrigation ditches, and a minimum of harvest waste. These factors control the amount of food and cover for wild animals. Sprawling urban areas are swallowing up the natural haunts of some of our wildlife. New reservoirs are flooding critical deer feed supplies. It is the responsibility of everyone to see that wildlife gets serious consideration as we develop our other resources.

WHAT IS A FISH?

Fishes are backboned animals that have fins, live in water, and breathe through gills. They are "coldblooded" which means their body temperatures change with the water around them. Most fishes do not have scales when hatched, but usually develop scales the first year.

There are about 30,000 different kinds of fishes in the world. North America claims some 4,000 kinds. Some live only in salt water, some only in fresh water, some in brackish water where rivers mingle with the ocean. Others, like the salmon, spend part of their lives in all of these. Some fishes prefer cold water while some like warm waters.

The golden trout is a typical cold-water loving fish of our western lakes and streams. This beautiful fish was originally found only in the Kern River drainage of California. The golden trout is our state fish.



Golden trout, *Salmo aguabonita*

WHAT IS AN AMPHIBIAN?

The word "amphibian" is the combination of two Greek words: amphi meaning double, and bios meaning life. Amphibians lead double lives.

Most amphibians begin life in ponds or streams. The young breathe through their gills and look nothing like their parents. As they grow up, many species move onto land and become air breathers. Their gills are replaced with lungs and they change form and look like their parents. The tadpole that grows up to be a frog is a good example.

Amphibians are coldblooded animals with soft, moist skins. They do not have claws or nails on their toes. Animals of this class are the frogs, toads, salamanders, and newts.

WHAT IS A REPTILE?

Reptiles get their name from the Latin word reptilis, meaning creeping. What better way to describe the snakes, lizards, turtles, and crocodiles? The bodies of these cold-blooded animals are covered with scales, shields, or plates. If they have toes, they usually have claws.

Most reptiles lay eggs. However, some give birth to living young. Baby reptiles are "compact" models of their parents. Their shape is much the same as the adult, but their color may be different.

Most "snake stories" are false. They make good stories but just aren't true. For example, snakes don't sting with their tongue, nor do they charm their prey. They do not

suck milk from cows. There is no hoop snake with a stinger at the tip of its tail. Mother snakes do not swallow their young to protect them. Snakes do not avenge the death of their mates.

Diamondback rattlesnake

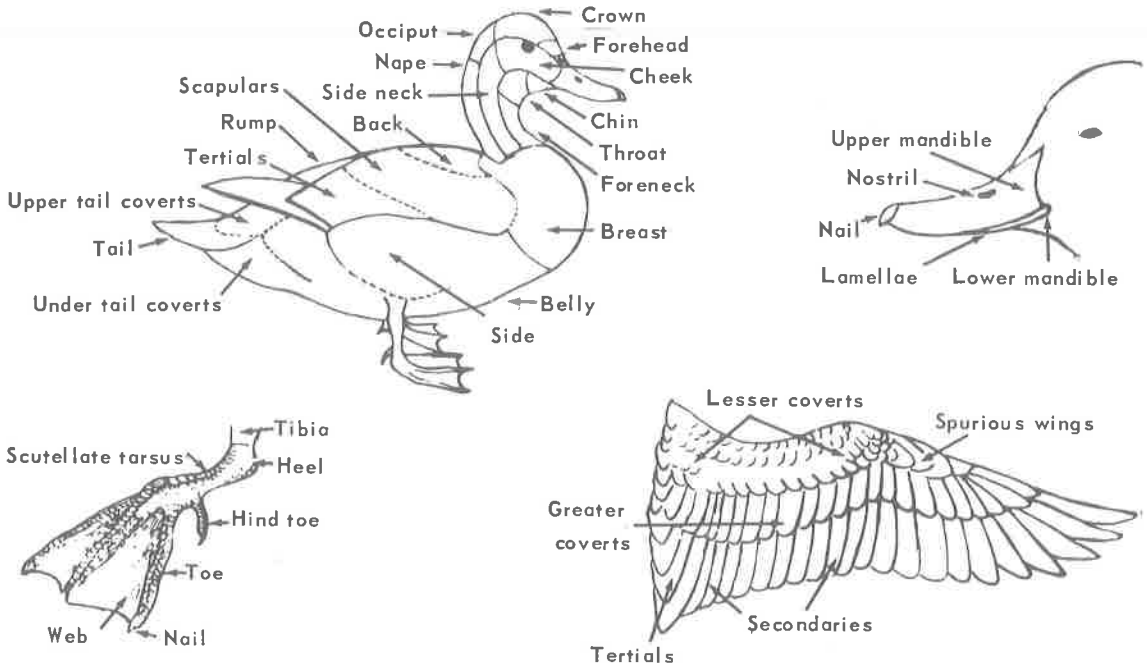
WHAT IS A BIRD?

Everyone recognizes a bird; but do you know some of the things that all birds have in common? They are warmblooded animals with lungs, wings, beaks, and some form of feathers. Did you know that feathers are just modified scales?

There are many kinds of birds with adaptations for various jobs. Some have feet designed for wading, others for perching, some for scratching in search of food. Birds of prey have feet with long, sharp claws for grasping their victims.

Some birds have short, narrow, pointed wings for swift flight. Some birds of prey, such as the owls, have special fluffy feathers for noiseless flight. The large soaring hawks and vultures have wings designed to take advantage of the air currents.

Beaks may be shaped for cracking seeds or they may be long and narrow for picking insects out of trees or catching fish. Night-



Parts of a duck.

hawks, for example, have very wide mouths designed to catch insects while in flight. Birds of prey have strong, sharp-hooked beaks for tearing flesh.

Birds benefit man in many ways. They help control some insect and weed pests, but they also can spread weeds. They provide us with hunting sport and food as well as the joy of just watching them. However, some are serious agricultural and household pests, for example, the blackbirds, starlings, and sparrows.

WHAT IS A MAMMAL?

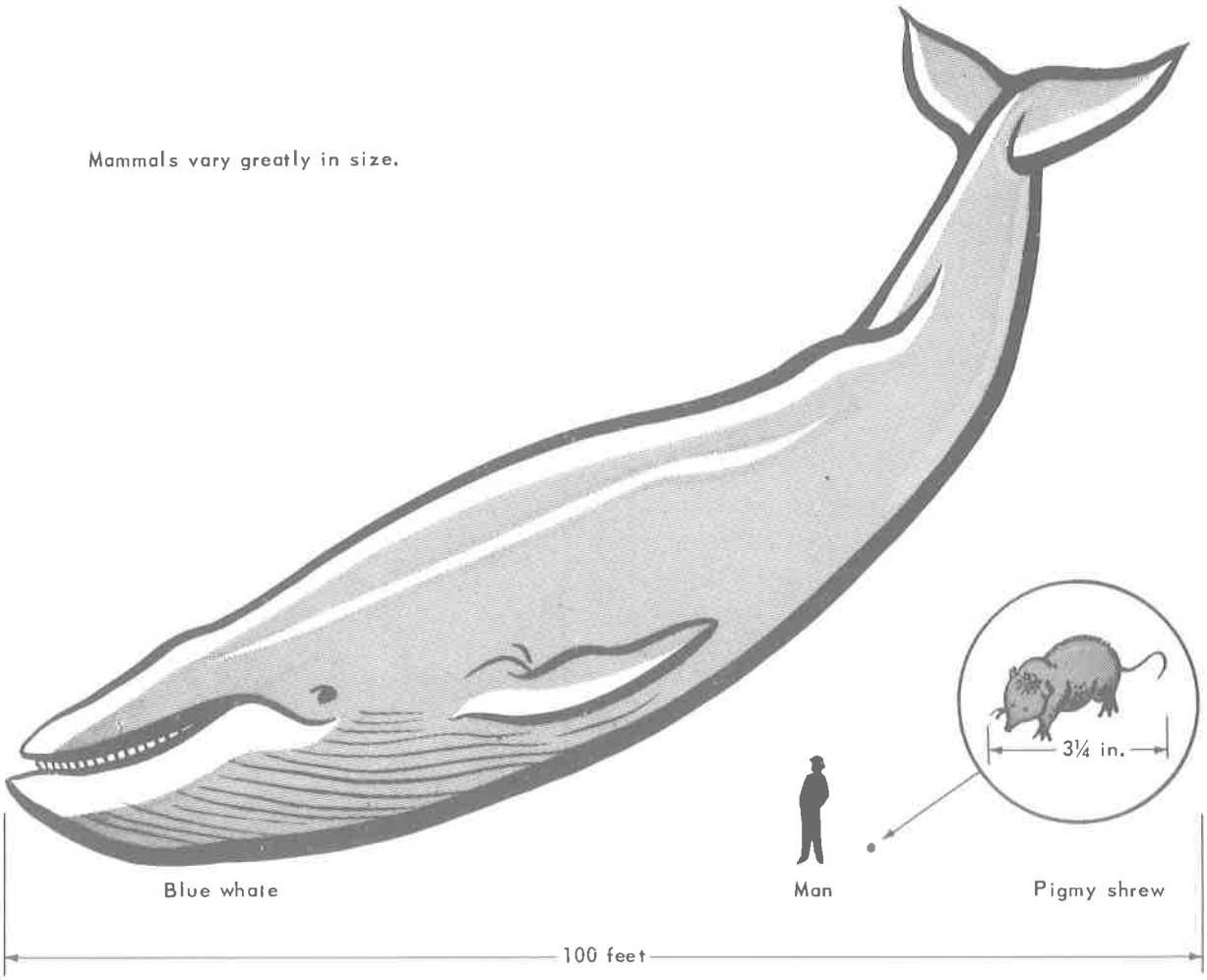
Mammal comes from the Latin word mamma meaning "breast." Mammals are warm-blooded and suckle their young. They all have hair, nails, claws, or hoofs on their digits (toes or fingers).

The smallest mammal is the pigmy shrew which weighs about as much as a dime. The largest mammal is the blue whale, about 100 feet long and weighing around 150 tons.

Some mammals spend their lives in water, others in trees. Some eat meat, others only plants. Some have horns, some have tails. Some walk on four legs, some on two, some fly (bats).

We are more familiar with mammals than any other group of animals, because we have tamed and domesticated them. We are mammals, too.

Mammals vary greatly in size.



WILDLIFE TERMS

Perhaps the first step in studying wildlife conservation is to understand certain basic terms.

GENERAL:

Aesthetic value – The enjoyment and appreciation of something beautiful.

Amphibian – Coldblooded animal capable of living both on land and in water (frogs, salamanders, etc.).

Animal – Any living thing that is not a plant. Usually characterized by being able to move of their own will.

Balance of nature – Theoretical equilibrium between living things in a natural state.

Bird – Warmblooded animal with feathers and wings.

Brow tine – Eye guard or small point often occurring just above the burr.

Buffer – Usually an animal with a high breeding potential that is alternate food for predators. Buffer species divert predators from game animals (for example, some rodents divert the coyote from the game birds as food).

Burr – Enlarged rough base of an antler.

Cannibal – Animal that eats its own kind.

Carnivorous – Flesh eating (coyote).

Carrion – Dead, decaying animal matter.

Coldblooded – Having a body temperature that becomes the same as the surrounding air or water (snake or trout).

Diurnal – Feeding or active during the day.

Estivate – To spend the summer in dormancy.

Exotic species – Animal or plant brought from a foreign land.

Feral – Wild, untamed, or escaped from domestication.

Fish – Coldblooded animal that lives in water. It has a skull, a backbone, and usually fins and scales.

Galliformes – An order of birds with legs adapted for scratching, including the common fowls and such game birds as quail, pheasant, turkey, grouse, and partridge.

Game – An animal (mammal, bird, amphibian, or fish) hunted for recreation or food.

Hare – Differs from true rabbit, as young are born with hair, and eyes open.

Herbivorous – Eating or living on plants (deer).

Hibernate – To pass the winter in dormancy.

Mammal – A warmblooded animal with hair for a body covering. The females have milk-secreting glands for feeding their young (deer, mouse, seal, cat, and human).

Nocturnal – Feeding or active at night.

Omnivorous – Eating both animal and vegetable food (bear).

Pelage – Coat of a mammal, as hair or fur.

Predator – An animal that lives by killing and eating other animals.

Prey – An animal killed by another for food.

Reptile – Coldblooded animal with scaly skin. Some crawl on their bellies (snakes); others walk on short, stubby legs (lizards).

Scat – Feces or bowel waste of animals.

Sign – Evidence of presence of an animal in a habitat.

Warmblooded – Having a relatively constant body temperature.

Wildlife – Any wild animal, or all wild animals collectively.

ENVIRONMENTAL TERMS:

Aquatic – Growing or living in water.

Arboreal – Living in or among trees.

Carrying capacity – The highest number of animals an area can support; usually determined by the amount of food available.

Cover – Shelter or protection for an animal (trees, thickets, weeds, stubble, etc.).

Ecology – Relations between a plant or animal and its environment.

Edge effect – The result of the presence of two adjoining plant communities on the numbers and kinds of animals present in the area.

Environment – All of the external conditions that influence the life and development of a plant or animal.

Environmental resistance – Anything in the environment of an animal that keeps the population down. For example, severe weather, disease, lack of food.

Habitat – The home and "cruising radius" of an animal (good habitat includes all of life's requirements — escape cover, food, water, nesting, etc.).

Terrestrial – Land-dwelling animal.

MANAGEMENT TERMS:

Bounty – A reward offered for killing or capturing certain predatory or nuisance animals. (Not considered an effective management tool.)

Multiple use – Management of our natural resources to achieve the greatest benefits for all.

Success ratio – The take of fish or game per angler or hunter.

Trend count – Sampling of the same area at the same time each year for animal numbers or animal use, to give the trend of the animal population.

Wildlife management – The science of making land produce sustained annual crops of wild game for recreational use. The goal is to keep the animal populations as large as possible, keeping in mind other uses of the land.

MOVEMENT TERMS:

Cruising radius – The distance from home base that an animal covers in its quest for food, water, etc. It may be a few yards for a field mouse, or nearly 100 miles for a mountain lion.

Emigration – Departure from a location to live elsewhere.

Immigration – Moving into a location for permanent residence.

Migration – Seasonal movements from one area to another. (Example – a pintail duck may nest in Alaska and winter in the ricefields of California.)

POPULATION TERMS:

Band – A herd or flock of animals sharing the same existence.

Brood or Litter – Young animals born or cared for at the same time.

Clutch – A nest of eggs or a brood of chicks.

Covey – A small flock, brood, or hatch of birds (quail).

Cycles – Regular periodic increases and decreases in wildlife populations.

Density – Number of animals or birds per unit area (40 quail per section).

Flight – A group of birds flying together (usually migratory birds, such as ducks).

Flock – A number of animals or birds living together.

Herd – A number of large animals assembled together.

Saturation point – Maximum number of a species that can be sustained in a given territory.

PRODUCTIVITY TERMS:

Breeding potential – The maximum at which a species can increase if none die.

Gestation – Period of pregnancy.

P = BP – ER – Formula indicating productivity (P) equals breeding potential (BP) minus environmental resistance (ER).

Productivity – Actual animal increase.

SEX TERMS:

Monogamy – Having only one mate for an extended period of time (eagles mate for life).

Polygamy – Mating with more than one animal (deer, elk, rodents).

Sex ratio – The number of males to females in a population. For example, a sex ratio of 73:100 would indicate 73 males for each 100 females.

♂ – Symbol for male ♀ – Symbol for female.

FISH TERMS:

Adipose fin – The small, fleshy fin on the back between the dorsal and tail fins (particularly on trout and catfish).

Alevins – (See fry.)

Anadromous – Ascending streams from the ocean or lakes, for spawning.

Anal fin – The fin on the underside of the fish between the vent and the tail.

Annuli – Ring-shaped lines in fish scales used to determine the age of fish.

Anterior – In front of, or toward the head.

Caudal fin – Tail fin.

Caudal peduncle – The slender portion of the body just ahead of the tail fin.

Char – Fish of genus *Salvelinus* (Dolly Varden and Eastern Brook Trout).

Dorsal fin – The large fin on the back.

Fingerling – A fish which has absorbed its yolk sac but is less than 1 year old, or not yet of catchable size.

Fry – A young trout, recently hatched, but still carrying its yolk sac.

Gill arch – The bony arch to which the gill filaments and gill rakers are attached.

Lateral line – A series of pores along the side of the fish. These are sensory organs connected to a nerve beneath the skin.

Mandible – The lower jaw.

Maxillary – The upper jawbone extending back to the eye.

Opercle – The gill cover.

Ovaries – The female reproductive organs which produce the eggs.

Parr mark – The dark marks lying in a row along the sides of young trout and occasionally of older trout.

Pectoral fin – Either of the fins attached just behind the head.

Ray – A supporting element in any of the fins (none in the adipose fin). In trout, the rays are segmented and flexible.

Spawn – The eggs of fish or the act of laying and fertilizing these eggs.

Steelhead – Trout (rainbow or cutthroat) that have become anadromous.

Testes – The male reproductive organs which produce the sperm.

Ventral fin – Either of the fins attached to the belly directly beneath the dorsal fin.

Vomer – The bone in the roof of the mouth toward the front.

Yolk sac – A sac containing food yolk, attached to the belly of newly hatched trout. This is used as food and is finally absorbed.

FISH AND WILDLIFE CHECKLIST

For handy reference, here is a list of game birds, mammals, fur bearers, predators, and fresh-water game fish found in California. An animal may have many common names, but only one scientific name. For example, in some parts of our country the mountain lion is known as the "puma," in other localities he is called "cougar," and in some areas "catamount." But if we use his scientific name, Felis concolor, everyone knows what animal we mean.

Every species of animal is given a scientific name of two Latin words: the first is the genus (such as Felis), the second tells us the species (such as concolor).

Mammal Checklist (Grinnell, 1933)

GENUS	SPECIES	COMMON NAME
Antilocapra (BG)	*americana*	Prong-horned antelope
Aplodontia (P)	*rufa*	Mountain beaver
Bassariscus (F)	*astutus*	Ring-tailed cat
*Bison**	*bison*	Bison
Canis (PR)(F)	*latrans*	Coyote
Canis	*lupus*	Plains wolf (extinct)
*Capra** (P)	*hircus*	Wild goat
Castor (P).(F)	*canadensis*	Beaver
Cervus (BG)	*nannodes*	Dwarf (tule) elk
Cervus (BG)	*roosevelti*	Roosevelt elk
*Didelphis**	*marsupialis*	Opossum
Enhydra (F)	*lutris*	Sea otter
*Equus** (P)	*assinus*	Wild burro
Erethizon (P)	*dorsatum*	Porcupine
Felis (BG) (P)	*concolor*	Mountain lion
Felis	*onca*	Jaguar (extinct)
Gulo (F)	*luscus*	Wolverine (possibly extinct)
Lepus (SG)	*americanus*	Snowshoe hare
Lepus (SG) (P)	*californicus*	Black-tailed jackrabbit
Lepus (SG) (P)	*townsendi*	White-tailed jackrabbit
Lutra (F)	*canadensis*	River otter
Lynx (P)	*rufus*	Bobcat
Martes (F)	*americana*	Marten
Martes (F)	*pennanti*	Fisher
Mephitis (PR) (P) (F)	*mephitis*	Striped skunk
Mustela (F)	*erminea*	Ermine
Odocoileus (P) (BG)	*hemionus*	Mule deer
Odocoileus (BG)	*virginianus*	White-tailed deer (possibly extinct)
Ondatra (P) (F)	*zibethica*	Muskrat
Ovis (BG)	*canadensis*	Mountain sheep

Mammal Checklist (continued)

GENUS	SPECIES	COMMON NAME
*Procyon**	*lotor*	Raccoon
Sciurus (SG)	*griseus*	Western gray squirrel
*Sciurus** (P) (SG)	*niger*	Eastern fox squirrel
Spilogale (PR) (P) (F)	*gracilis*	Spotted skunk
*Sus** (BG) (P)	*scrofa*	Wild boar
Sylvilagus (SG)	*audubonii*	Audubon cottontail
Sylvilagus (SG)	*bachmani*	Brush rabbit
Sylvilagus (SG)	*idahoensis*	Pigmy rabbit
Sylvilagus (SG)	*nuttalli*	Nuttall cottontail
Tamiasciurus (SG)	*douglasi*	Douglas squirrel
Taxidea (PR) (F)	*taxus*	Badger
Urocyon (PR) (F)	*cinereoargenteus*	Gray fox
Urocyon (PR) (F)	*littoralis*	Island fox
Ursus (BG) (PR)	*americanus*	Black bear
Ursus	*californicus*	California grizzly bear (extinct)
Vulpes (PR) (F)	*fulva*	Red fox
Vulpes (PR) (F)	*macrotis*	Kit fox

Upland Game Bird Checklist

*Alectoris**	*gracea*	Chukar partridge
Bonasa	*umbellus*	Ruffed grouse
Centrocercus	*urophasianus*	Sage grouse
Columba (M)	*fasciata*	Band-tailed pigeon
Dendragapus	*fuliginosus*	Sooty grouse
Lophortyx	*californica*	California quail
Lophortyx	*gambelii*	Gambel quail
*Meleagris**	*gallopavo*	Wild turkey
Oreortyx	*picta*	Mountain quail
Pedioecetes	*phasianellus*	Columbian sharp-tailed grouse (extinct)
*Perdix**	*perdix*	Hungarian partridge (probably extinct)
*Phasianus**	*colchicus*	Ring-necked pheasant
*Spilopelia**	*chinensis*	Chinese spotted dove
*Streptopelia**	*risoria*	Ringed turtle dove
Zenaida (M)	*asiatica*	Western white-winged dove
Zenaidura (M)	*macroura*	Mourning dove

Waterfowl checklist (all migratory)

GENUS	SPECIES	COMMON NAME
Aix	*sponsa*	Wood duck
Anas	*acuta*	Pintail
Anas	*carolinensis*	Green-winged teal
Anas	*crecca*	European teal
Anas	*cyanoptera*	Cinnamon teal
Anas	*diazi*	New Mexican duck
Anas	*discors*	Blue-winged teal
Anas	*platyrhynchos*	Mallard
Anas	*strepera*	Gadwall
Anser	*albifrons*	White-fronted goose
Aythya	*affinis*	Lesser scaup
Aythya	*americana*	Redhead
Aythya	*collaris*	Ring-necked duck
Aythya	*marila*	Greater scaup
Aythya	*valisineria*	Canvasback
Branta	*bernicla*	American brant
Branta	*canadensis*	Canada goose
Branta	*nigricans*	Black brant
Bucephala	*albeola*	Buffle-head
Bucephala	*clangula*	American golden-eye
Bucephala	*islandica*	Barrow's golden-eye
Chen	*caerulescens*	Blue goose
Chen	*hyperborea*	Snow goose
Chen	*rossii*	Ross's goose
Clangula	*hyemalis*	Old squaw
Dendrocygna	*autumnalis*	Black-bellied tree duck
Dendrocygna	*bicolor*	Fulvous tree duck
Histrionicus	*histrionicus*	Western harlequin duck
Lampronetta	*fisheri*	Spectacled eider
Lophodytes	*cucullatus*	Hooded merganser
Mareca	*americana*	Baldpate
Mareca	*penelope*	European widgeon
Melanitta	*deglandi*	White-winged scoter
Melanitta	*perspicillata*	Surf scoter
Mergus	*merganser*	American merganser
Mergus	*serrator*	Red-breasted merganser
Oxyura	*jamaicensis*	Ruddy duck
Philacte	*canagica*	Emperor goose
Somateria	*spectabilis*	King eider
Spatula	*clypeata*	Shoveler

Game Fishes Checklist

GENUS	SPECIES	COMMON NAME
Acipenser	*medirostris*	Green sturgeon
Acipenser	*transmontanus*	White sturgeon
Archoplites	*interruptus*	Sacramento perch
*Chaenobryttus**	*gulosus*	Warmouth
*Ictalurus**	*catus*	White catfish
*Ictalurus**	*melas*	Black bullhead
*Ictalurus**	*natalis*	Yellow bullhead
*Ictalurus**	*nebulosus*	Brown bullhead
*Ictalurus**	*punctatus*	Channel catfish
*Lepomis**	*cyanellus*	Green sunfish
*Lepomis**	*gibbosus*	Pumpkinseed
*Lepomis**	*macrochirus*	Bluegill
*Lepomis**	*microlophus*	Redear sunfish
*Micropterus**	*dolomieu*	Smallmouth bass
*Micropterus**	*punctulatus*	Spotted bass
*Micropterus**	*salmoides*	Largemouth bass
Oncorhynchus	*gorbuscha*	Pink salmon
Oncorhynchus	*keta*	Chum salmon
Oncorhynchus	*kisutch*	Silver salmon
*Oncorhynchus**	*nerka*	Sockeye salmon (anadromous form) or Kokanee salmon (fresh water)
Oncorhynchus	*tshawytscha*	King salmon
*Perca**	*flavescens*	Yellow perch
*Percina**	*caprodes*	Log perch
*Pomoxis**	*annularis*	White crappie
*Pomoxis**	*nigromaculatus*	Black crappie
*Roccus**	*saxatilis*	Striped bass
Salmo	*aguabonita*	Golden trout
Salmo	*clarkii*	Cutthroat trout
Salmo	*gairdnerii*	Rainbow trout
*Salmo**	*trutta*	Brown trout
*Salvelinus**	*fontinalis*	Eastern brook trout
Salvelinus	*malma*	Dolly Varden trout
*Salvelinus**	*namaycush*	Lake trout
Stizostedion	*vitreum*	Walleye

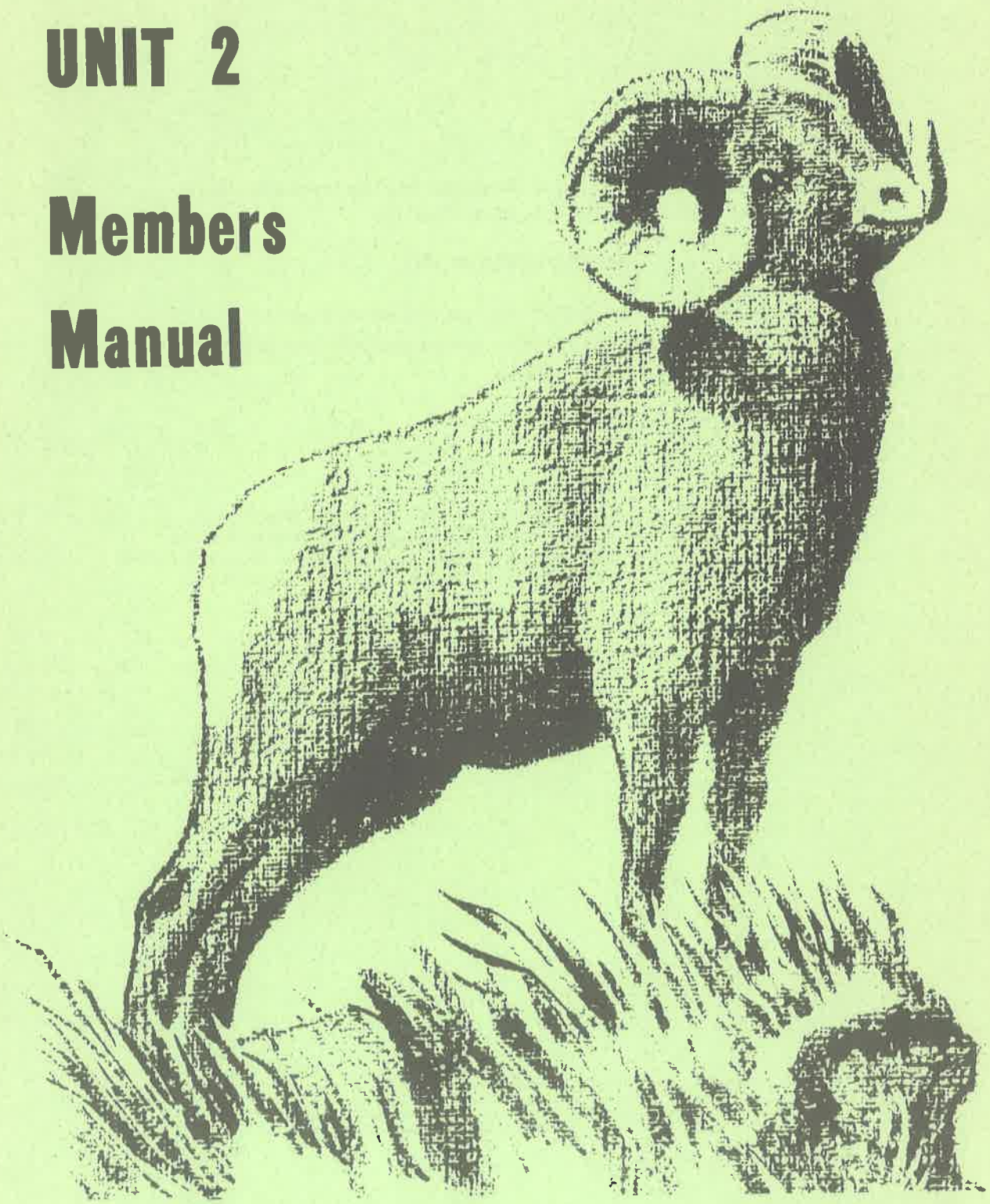
KEY for fish and wildlife checklist.

BG – Big game
F – Fur
PR – Predator
* introduced species
P – Pest
M – Migratory
SG – Small game

4-H WILDLIFE PROJECT

UNIT 2

Members Manual



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4-H WILDLIFE PROJECT UNIT 2
Members Manual

PRINCIPLES of Wildlife Management

GAME MANAGEMENT

Wildlife management is one of the youngest natural sciences, yet many of its principles have been used for hundreds of years by gamekeepers of Asia and Europe. Science and research have improved old methods and developed new techniques of wildlife management.

The first thing we must know about game management is the nature of the habitat—or natural home—of the wild animal.

Life Zones

A life zone is a climatic belt in which a community of plants and animals live. These zones change with altitude, but are not subject to hard and fast rules; plants and animals usually are found in more than one zone. The coyote, for example, is found from the desert to above timberline.

Life zones are useful in identifying an animal, and must be considered when transplanting animals, especially from one country to another. An animal's needs must be studied carefully before he is transferred to a new home. Without proper research, the transfer may be a complete waste of time and money.

What Is a Good Habitat?

Wildlife is a product or crop of the land the same as sheep or cattle. Habitat must be maintained or improved to encourage it to top production. Barren fields, naked fence rows, and overgrazed streambanks will not maintain or produce a crop of game. Here's what is needed in every good wildlife habitat.

Cover is required for roosting, loafing, getting winter protection, relief from summer heat, and concealment from enemies.

Food must be the right type in the right amount and easily available all year round.

Water requirements vary with different animals and by seasons. This is a most important link in the chain of life.

Space is needed for animals to survive.

Arrangement of cover, food, water, and space requires knowledge of an animal's needs.

CALIFORNIA LIFE ZONES CHART

Primarily for the Sierras

Life Forms		Zones and Their Elevations		
Animals	**Plants**	**Alpine**		**Artic (above timberline)**
Fox Weasel Pica Coyote Mountain sheep	Grasses Sedges Alpine flowers	9,000 f	to	14,500 feet
		Sub-Alpine		**Hudsonian**
Mule deer Mountain sheep Fox Coyote Marten Weasel Beaver	White-barked pine Sierra juniper	7,000 feet	to	9,000 feet
		Montane		**Canadian**
Mule deer Beaver Marten Weasel Black bear Otter Mountain lion Skunk Snowshoe hare Sooty grouse	Red fir Lodgepole pine Silver pine	5,000 feet	to	7,000 feet
		Foothills		**Transition**
Mule deer Tree squirrel Fox Coyote Bobcat Turkey Bandtails Sage grouse Rabbits Quail	Black oak White fir Redwood Tan oak Yellow pine Sugar pine Douglas fir Incense cedar	2,000 feet	to	5,000 feet

California Life Zones Chart – continued

Life Forms		Zones and Their Elevations		
Animals	**Plants**	**Upper Sonoran**		
Mule deer Coyote Pheasants Chukar Quail Jackrabbit Muskrat Fox Raccoon Dove Antelope	Redbud Manzanita Blue oak Digger pine Live oak Chamise Sagebrush Ceanothus Yerba santa	1,000 feet	to	4,000 feet
		Lower Sonoran		
Tule elk Blacktail deer Desert quail Chukar Valley quail Coyote Raccoon White wing dove Desert bighorn	Arrowweed Palo verde Yucca Valley oak Sycamore Fremont cottonwood Tamarisk Cacti Quail bush	Sea Level	to	1,000 feet

Carrying Capacity

We all know that no matter how long you hold a gallon bucket under a faucet you can only put 1 gallon of water in it. The bucket has a carrying capacity of 1 gallon—all extra water poured in the bucket will be spilled and lost.

The carrying capacity of every wildlife habitat depends on the amount of available food, water, cover, and space. People often try to increase game populations by stocking more game in an area or by closed hunting seasons.

When we stock an area beyond its carrying capacity it is like trying to put 2 gallons of water in a 1-gallon bucket. The surplus game is spilled over and lost to starvation, disease, predators, and accidents. In many winter deer ranges, for example, the shrubs are used so heavily by deer that the carrying capacity is lowered and the plants may require many years to recover.

Usually, a wildlife species produces more young each year than the carrying capacity of the land. These surplus animals need to be cropped.

The habitat can hold more animals if it is improved by planting food patches, providing cover and water (like putting a higher rim on the bucket).

Figure 1.

Edge Effect

Have you ever noticed how much more wildlife is found along the edges of a field than in the center? If we want to increase the numbers of game, we will arrange the area so that cover, food, water, and space are close together. The figure 2a shows a section of unmanaged brush and grassland in the California foothills. Let's suppose we want to manage this land for quail. We see only one spot where nature has provided cover to hide and roost, spring water, food, and space within the daily cruising radius of quail. This section of land can support only one covey of quail.

Figure 2b shows the same section of land with the large area of chamise brush broken into smaller sections. Water and roosting cover have been installed. We have increased the carrying capacity of the section. It now will support six coveys of quail.

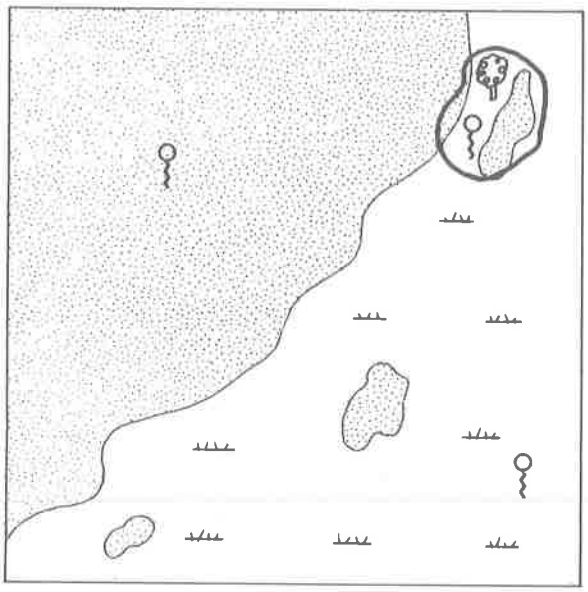


Figure 2a. Limited edge-effect and habitat needs. (1 covey)

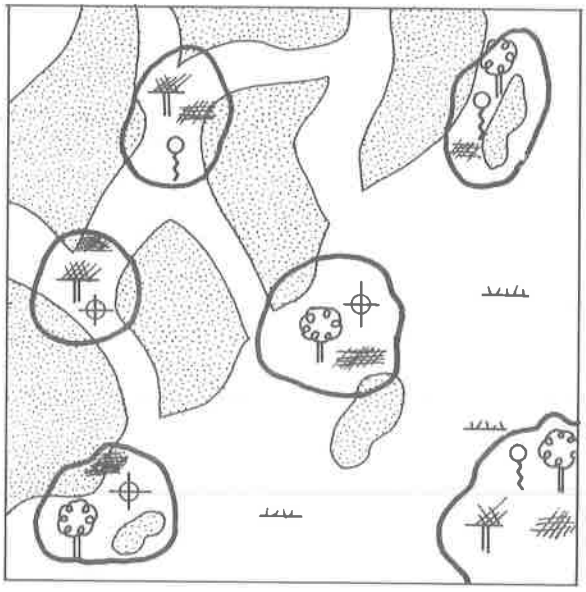
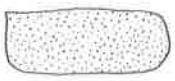


Figure 2b. Good edge-effect and habitat improvement. (6 coveys)



Chamise

Brush piles

Natural spring

Roost tree

Artificial roost

Covey boundary

Water device (artificial)

Grassland

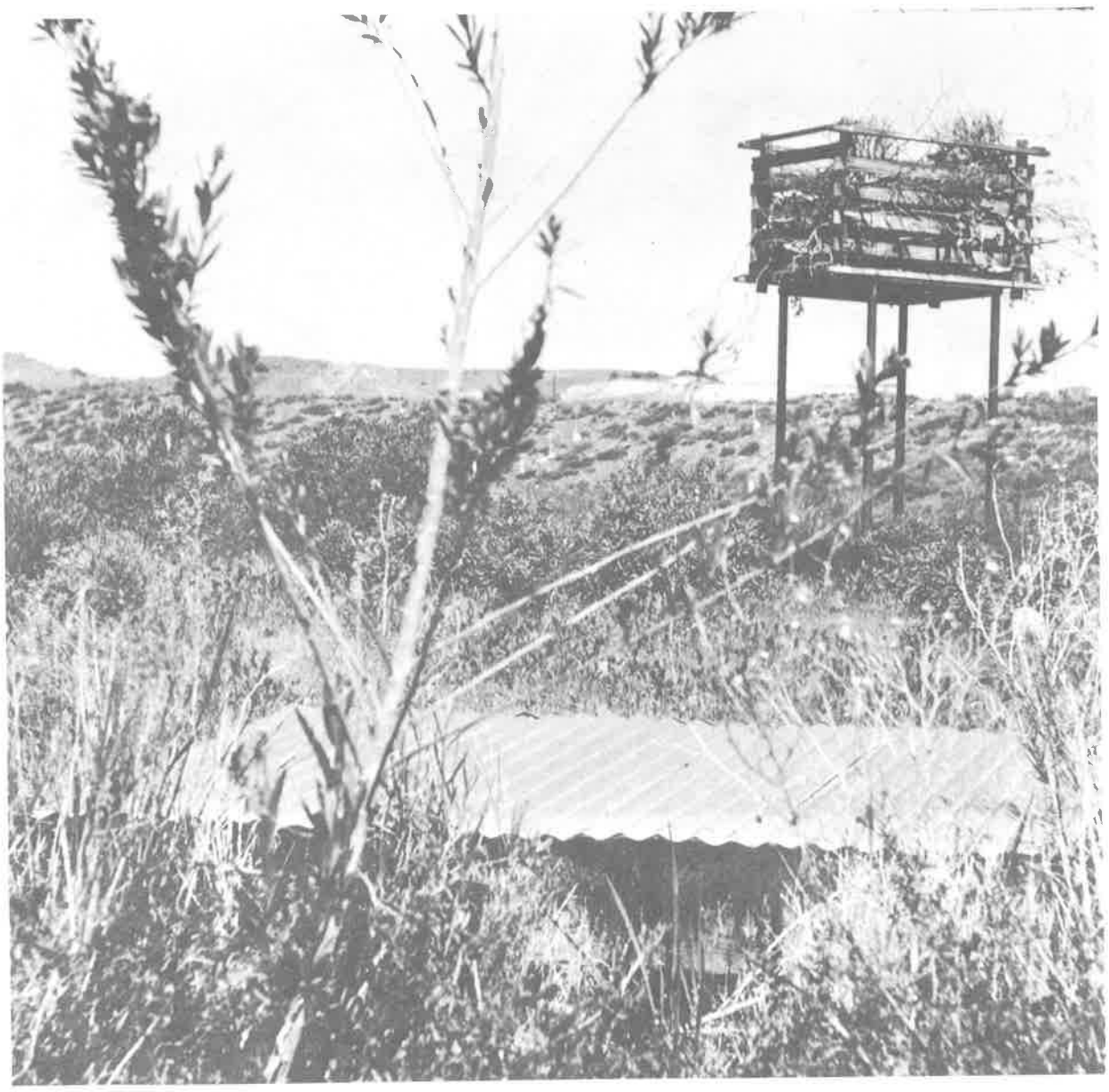


Figure 3. Artificial roost.

The same type of quail habitat improvement work can be done in farming areas by providing water ponds that can be used by both quail and livestock, and planting trees and shrubs along fence rows and in unused corners.

Farmers and ranchers must make the final decisions regarding wildlife production on their land. Most of our upland game crop is grown and harvested on land used mainly for cultivated crops and livestock. The choice between abundance or scarcity of wildlife is largely the landowners.

The future of wildlife is the responsibility of everyone.

Figure 4. Watering devices, brush piles, cover plantings.

How Does Burning Affect Wildlife?

Burning has a proper place and use, just as pesticides do, but misuse can do great harm to wildlife. It's often necessary to burn to clear an irrigation ditch of weeds that would obstruct water flow, or to burn a dense growth of weeds before plowing. Safe controlled burning around buildings is a practical fire safety measure. Burning heavy stands of old brush is a good way to create more deer food, if the browse plant is one that sends up tender new sprouts from the root crown after the main plant has been burned. Seeding burned areas also provides more feed for livestock and wildlife.

The burning of fence rows, exterior ditch-banks, or uncultivated corners simply to remove unsightly weeds can be harmful. Spring burning can destroy nests and decrease wildlife. Annual burning does not reduce the weed problem, as many weed seeds are resistant to fire.

Burning can get out of hand and destroy valuable property; it shortens the life of fences and utility lines. Eggs of grasshoppers and other insects buried in the soil usually are not harmed by fire.

Preserving Cover

For good pheasant management, the best thing a landowner can do to increase birds is to avoid burning, discing, or spraying with

herbicides in waste areas from mid-April to mid-June. This is the critical nesting season. If cover is destroyed at this time, hens will abandon their nests, or renest in areas such as hayfields where mowing will destroy young chicks. With fewer hiding places, birds are easier prey for predators.

If at all possible, weeds should be controlled after the nesting season and before they mature and produce seed. Fall or winter treatment is best to remove or prevent weed growth.

Seeding ditchbanks and fence rows with perennial grasses or legumes will cut down weed problems, prevent bank erosion, and provide good nesting cover for pheasants and quail.

Planting Cover

Small areas that are of no value for farming or grazing can be planted to provide needed food and cover and at the same time reduce the weed problem. Such areas include fence corners, sumps, old corrals, rocky spots, barrow pits, abandoned roads, and land isolated by ditches, streams, and gullies. These areas should be protected from grazing and fire. They can be sprayed if necessary to control undesirable weeds and still retain the desirable plants.

Although California has many climates and soil types, most habitat plantings would be made in the lower elevations to benefit quail, rabbits, doves, and pheasants. Many recommended plants also provide edible fruits for humans.

Figure 5. Brush burn.

The plants should not become pests, be injurious to livestock, or host undesirable insects and diseases. Plants that are suitable for habitat plantings in California are:

acacia (T)	multiflora rose *(S)
alderleaf mahogany (S)	oak trees (T)
Arizona cypress (T)	olive (T)
berberis (S)	Oregon grape (S)
black locust (T)	pampas grass *(G)
buckwheat (S)	pistachio (T)
Catalina cherry (S) (T)	pyracantha (S)
citrus trees (T)	saltbrush (S)
cotoneaster (S)	strawberry tree (T)
elderberry (S)	sudangrass (G)
fig (T)	tamarix (T)
hollyleaf cherry (S) (T)	toyon (S)
honey locust (T)	various legumes
junipers (T)	white currant (S)
Monterey pine (T)	willow (S) (T)

(G) Grass (S) Shrub (T) Tree

*Can become pests under certain conditions.

Harvesting Wildlife

Harvesting is perhaps the most important part of wildlife management, just as with any other crop.

Hunting is the orderly harvest by man of the surpluses of game animals each year. We mentioned that all game animals usually produce more young than the habitat will support. It is better for man to use these surpluses than for them to be lost to starvation, disease, and predators. About 80 percent of a covey of quail will not live to be a year old, whether hunted or not. In the following quail population graph, all birds above the horizontal dotted line are surplus. The earlier in the fall they are hunted, the more there will be to hunt.

Big game animals also need to be hunted until their numbers fit the carrying capacities of their habitats. The basic objective of hunting big game is to keep herds in balance with their food supply. Overpopulations of big game animals will use all shrubs and other plants. This destroys the vegetation and the animals starve.

When game populations decrease, it may be that they have lowered the carrying capacity of the habitat. A closed season may not be the answer. A harvestable surplus exists in low populations as well as high ones.

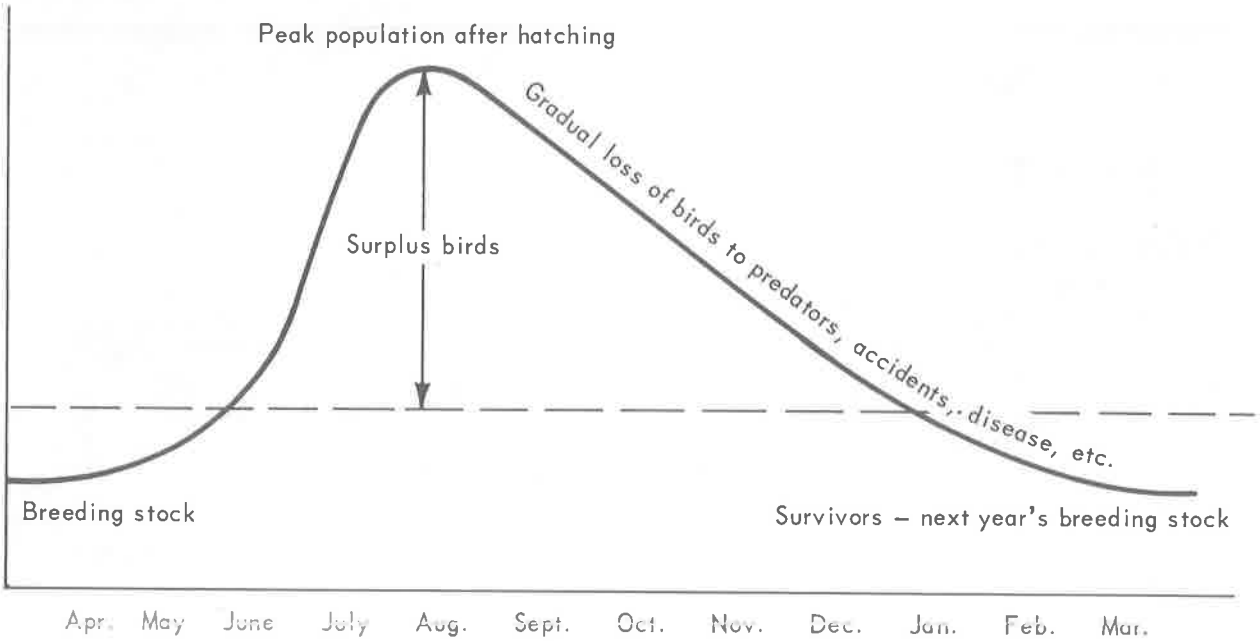


Figure 6. Quail population curve.

FISH MANAGEMENT

Fish management is the science of making bodies of water produce the maximum pounds or numbers of sport fish for recreational use. We use the same biological principles as for game management. Water has a carrying capacity much the same as land. A surface acre of water will produce a certain number of pounds of fish, just as an acre of land will produce only a certain number of game animals. The science of producing fish requires knowledge of water temperatures and fertility, water weeds, and oxygen content of the water.

The Farm Pond

Water temperatures influence your selection of fish.

Warm water ponds have spring temperatures of 50 to 70 F and summer temperatures of 80 to 90 F or higher near the water surface. Game fish best adapted to warm water are the spiny-rayed black bass, crappie, bluegill, red-eared sunfish, and various soft-rayed catfish.

Cold water ponds have summer temperatures that seldom exceed 70 F. Trout usually are managed in these waters.

Water fertility is important in producing fish. Fishing waters need enough nitrogen, phosphate, and potash to grow vast numbers of microscopic plants (plankton). These plankton are eaten by many small water animals such as insect larvae and worms. The bass-bluegill cycle shows how man benefits from application of scientific knowledge.

Water weeds found in California ponds must be controlled for good fishing. They use up the pond's fertility, interfere with fishing, and may give fish an unpleasant flavor. As

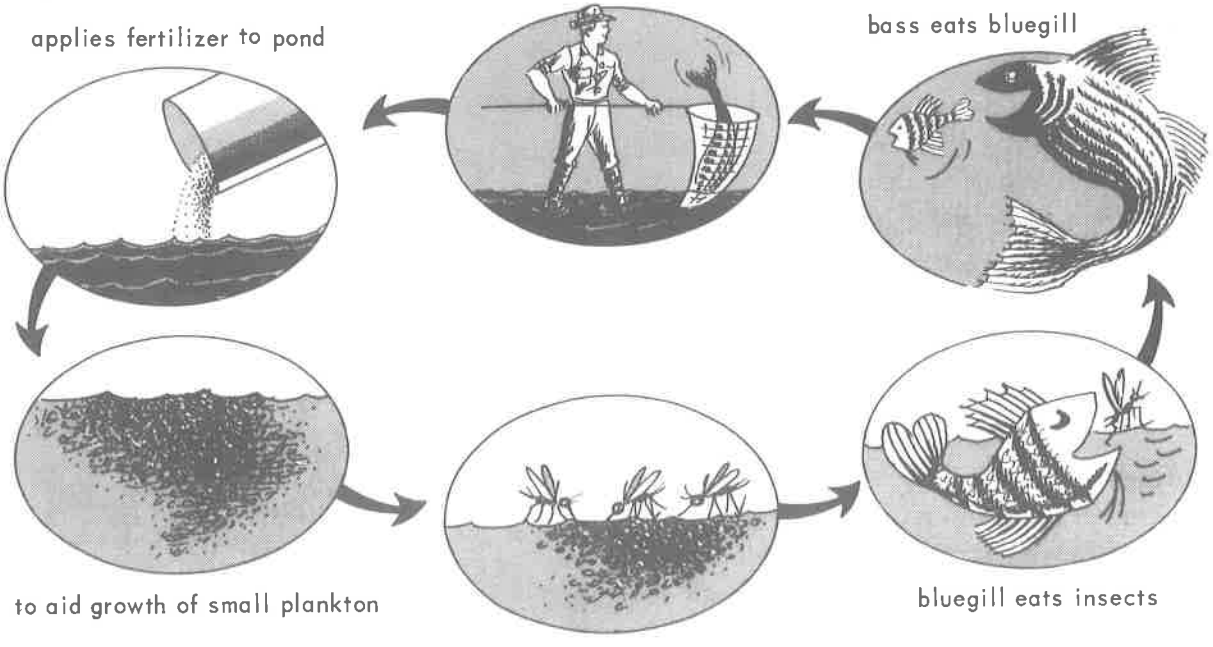


Figure 7. Bass – Bluegill cycle.

the weeds die and decay, they use up the oxygen in the water and may cause the fish to die. Water weeds can be controlled by a number of methods, including various chemicals.

Oxygen is needed 24 hours a day by all animal life in a pond—fish, insects, and worms. Oxygen is replaced by running fresh water into a pond, absorbed by surface water from the air, released by the microscopic plants during the sunny hours.

Reproduction of Game Fish

Fish usually lay enormous numbers of eggs—one carp produces more than 1 million. The female of most fresh-water fish lays her eggs in nests or in gravel where the male fertilizes the eggs. Trout lay their eggs in shallow depressions in the gravel, cover the eggs with gravel, and then let the eggs shift for themselves. Sunfish and catfish are nest builders; the male guards the nest.

Hatcheries

To keep up with the growing demand for fishing, 18 state fish hatcheries in California produce 9 million catchable (7-inch) trout and about the same number of fingerlings each year.

Fish culture is underwater farming of a most fascinating sort. Eggs are stripped from "ripe" females into containers of cold water, and fertilized by the milt from the male trout. The eggs hatch in wire-meshed baskets in troughs of cold, running water. Newly hatched fry spend several days absorbing the egg-yolk sac, their only food during this period. As soon as they begin to swim and eat, they are fed fine dry food especially prepared to provide proper growth

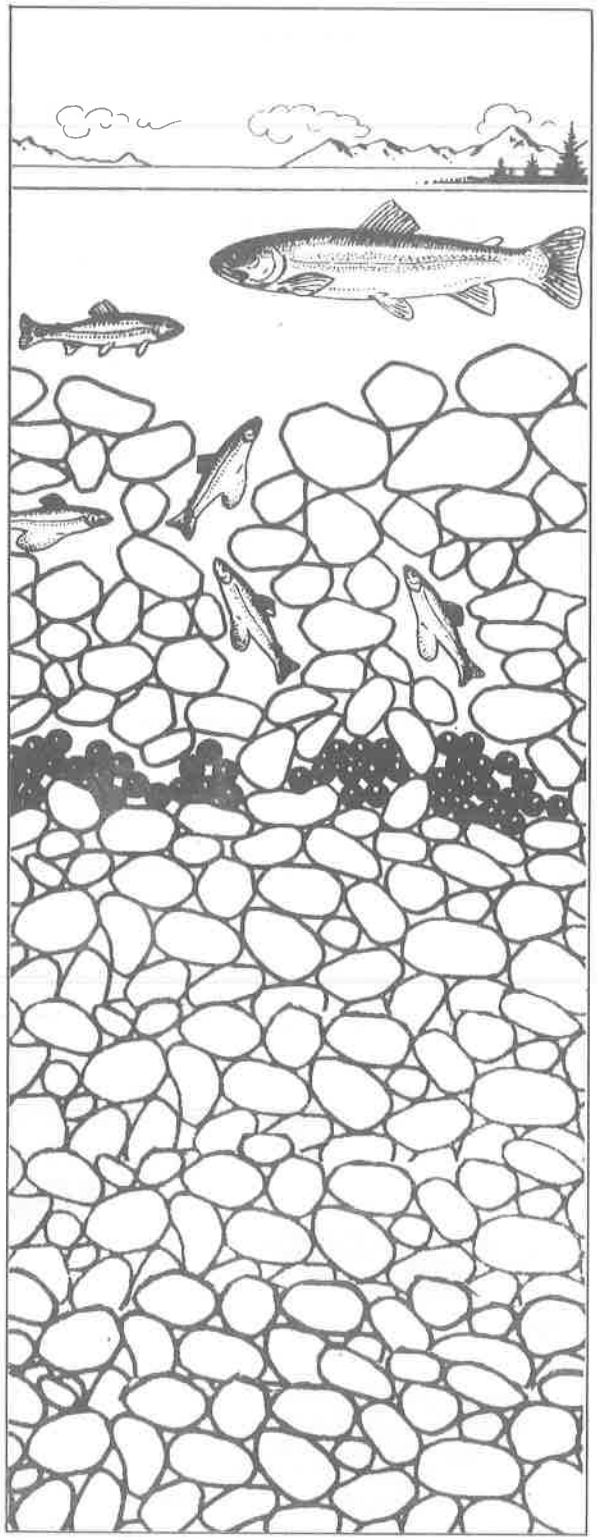


Figure 8. Trout eggs are buried in the gravel of a stream bed, usually lying several inches beneath the surface. When they hatch, the fry (or alevins) remain in the spaces between the gravel until the yolk sac is absorbed. At that time they work their way up to the surface and escape.

Trout eggs spawned naturally in gravel of clean, suitable streams survive as well as those reared in a hatchery. In spite of the millions of catchable trout planted each year, wild trout still make up about 80 percent of the state catch. The real value of hatcheries is in stocking selected waters where natural reproduction does not take place.

Rough-Fish Control

A rough fish is an undesirable species that has found its way into a pond or stream of game fish. Carp and suckers are examples of rough fish. They sometimes are called weed fish or nuisance fish. They take up valuable space and compete for food much the same as weeds compete for nutrients in a field of tomatoes or corn.

Many rough fish eat the eggs of the desirable game fish, and often stir up the bottom and muddy the water so that the food cycle is destroyed. Muddy water does not allow sunlight into the water and prevents growth of the very small plants and animals.

Often it may be necessary to kill all the fish in a pond and restock with desirable fish species. To do this, the manager may use a chemical compound from the roots of plants of the bean family called rotenone, derris, or cube root. Rotenone kills fish by acting on their gills causing suffocation, but does not make fish unfit to eat. For centuries this chemical has been used by natives of South America, the East Indies, and South Asia to capture food fish.

State law requires a permit to chemically treat private waters. Further information is available from the State Fish and Game Department.

WATER POLLUTION, PESTICIDES, AND WILDLIFE

Pollution

Maintaining an adequate supply of clean, fresh water is considered the nation's greatest resource problem. Our growing population needs more places to hunt and fish.

The United States Congress in recent months has discussed ways to handle the pollution problems of our waterways. Pollution is caused by any harmful substance added to natural waters. Since 1900 the volume of city wastes discharged into our streams and rivers has increased over 200 percent—industrial pollution has risen almost 3000 percent!

The U.S. Public Health Service reports an estimated 18.4 million fish died in 1964 as a result of water pollution. In past years, thousands of fish and wild game have died from poisonous substances or lack of oxygen in polluted waters. Oil discharges from refineries and large machinery have killed many fish, fur bearers, and water birds. Pollution that kills fish has come from uranium mills, starch factories, sugar factories, sawmills, chemical manufacturing plants, and many others. Improperly used agricultural chemicals can find their way into our watercourses and cause trouble.

Pollution occurs slowly and may not be noticed until it has become serious.

When vegetation is removed, serious soil erosion occurs, causing silt to form in rivers, streams, and lakes. Soil may be left unprotected by construction projects, fire, or heavy foraging by livestock or big game animals.

Figure 9. Overbrowsed game range.

Pesticides

Pesticides are chemicals used to kill undesirable plants and animals. If properly used, they are a great benefit to man. Without wise use of farm chemicals, our food bill would be $13 billion more each year—or $288 more for each family. In California, the use of these chemicals is controlled by law. The University of California Agricultural Extension Service has a safety program to teach the proper use of these chemicals.

When improperly used, pesticides can cause severe damage to fish and wildlife populations. DDT, for example, can lower hatching success and chick survival of pheasants, grouse, quail, ducks, and turkeys.

Use pesticides with care.

- Do not use unless definitely needed.
- Be sure the chemical is registered and has clear directions for use.
- Be sure you understand and follow the directions for use.
- If possible, do not use chemicals during nesting season of song and game birds.
- Do not allow materials to get into any lakes, streams, rivers, or other waters.
- Store pesticides in their original labeled containers out of reach of children.
- Destroy all empty pesticide containers.

CAREERS IN WILDLIFE

Perhaps you, like many others, dream of a future in the great outdoors—in forested mountains, on the prairies, or around the lakes and streams. Or perhaps you'd like to help preserve our natural resources.

What Are the Personal Requirements?

Wildlife conservation provides many opportunities for a satisfying life, but also makes many demands. The wildlife biologist may spend much time roughing it alone. A mere love for the outdoors is not enough, however knowledge of hunting and fishing may be helpful.

You should like people and understand their views and prejudices. You should have the ability to assume responsibilities and carry them out on your own. A sincere interest in science and a sensitive philosophy on the esthetic values of resources as a whole will be valuable basic assets.

Professional work in natural resources conservation is a great life but it takes serious preparation. It can be a satisfying career if you plan your future carefully and work steadily toward your goals.

What Education Will You Need?

In general, a college education is required to prepare you for one of these occupations. Speaking and writing experience is a vital part of your training.

Most wildlife-conservation problems relate to people. Therefore, in addition to a thorough education in physical and biological sciences, you need training in such liberal arts subjects as English language, history, culture, religion, geography, and the economics of food and fiber production. You can help yourself along by taking some of these subjects in high school.

Most universities and colleges offer courses in biological sciences, and many have courses in the conservation of wildlife resources. A bachelor's degree in wildlife conservation

will qualify you for many positions involving surveys, land and water management, habitat improvement work, assistance to experienced personnel in research, and many other activities. Schools not offering specialization in wildlife may give suitable groundwork for advanced training through basic science courses such as botany, zoology, chemistry, bacteriology, physics, and mathematics.

Graduate work is recommended, and almost essential, if you wish to go into research or into some of the management and administrative work or teaching. Master's and doctor's degrees in wildlife conservation may be earned in a number of universities, many of which accept students with undergraduate majors in biology. To do the most good with your advanced education, it is best to include some practical experience. Most students acquire experience during the summer months of undergraduate and graduate years. Many graduate students are financed by scholarships and teaching or research fellowships. Applications for these usually are submitted in February. Some agencies also provide on-the-job training. Advanced degrees do not guarantee success, but you are better prepared for your opportunities.

A list of universities and colleges offering curricula in wildlife conservation and management may be obtained from The Wildlife Society, 3900 Wisconsin Avenue, N.W., Suite 2-176, Washington, D.C. 20016.

What Kind of Work Is There?

Careers in scientific wildlife conservation include a wide variety of occupations for workers with many skills and interests. Let's look at some of these.

Public Agencies – The majority of wildlife-conservation positions are with the many state, provincial, and federal agencies. Such positions usually are under civil service, requiring entrance examinations and at least a bachelor's degree for positions such as wildlife biologist, fishery biologist, game manager, park naturalist, research biologist, and conservation officer.

State or provincial agencies include your own departments of conservation, fish and game, forestry, or parks and recreation. Federal agencies include, in the United States, the Fish and Wildlife Service, Forest Service, National Park Service, Bureau of Land Management, Soil Conservation Service, Armed Forces Branches, Public Health Service, and the recently formed Bureau of Outdoor Recreation; and in Canada, the Wildlife Service, Park Service, and the Department of Fisheries.

Management – With a well-balanced technical background you may work directly with wild animals and with changing their environments, including soil, water, and plants. You may become a specialist in upland game, waterfowl, big game, fur animals, or fish. You might manage a wildlife refuge or public game area, make surveys, restore marshes, or improve lakes and streams. This work could lead to a position at the administrative level.

Research – Good wildlife management is based on scientific research. Wildlife biologists do basic research in taxonomy, physiology, genetics, ecology, behavior, disease, nutrition, population dynamics, chemistry, and biocides. A research scientist must have patience and persistence, and be able to collect, analyze, and interpret facts and report them clearly. You will need a good technical education to do this.

Information – Often the facts derived from research are useless, and good management practices cannot be carried out because the public is not ready to accept new ideas. In the information field, the conservationist explains research facts to the public so that management practices will be accepted. He writes articles or pamphlets, takes pictures, gives speeches, or works in radio or television. Other excellent opportunities include specialty writing for newspapers, magazines, radio, and television. There is an increasing need for new wildlife illustrative material for training and educational purposes. If you have unusual abilities in photography or art, these could be valuable in a conservation information and education career. For this job, you need talent, imagination, and effective communication skills, combined with a technical wildlife background and a deep understanding of people.

Education – As college and high school attendance grows, so does the need for good teachers. Your opportunity to teach wildlife conservation would be greatest in the colleges. Universities and colleges offering a wildlife curriculum need personnel for their teaching staffs and research laboratories. For this work you must have college training and, normally, advanced degrees plus experience.

College professors often have an opportunity to do research along with their teaching, and they need a broad academic background in sciences, humanities, and technical subjects in the wildlife field. They especially should have an understanding of the practical principles of ecology and management. Conservation teaching also can be done in elementary and high schools.

Extension work is another arm of education where you would offer technical assistance in wildlife-conservation practices to individuals, industry, or citizen groups. Effective extension work requires ample understanding of farm, forest, and industrial land uses and economics, and practical experience in wildlife conservation.

Enforcement – Wildlife conservation also requires enforcement of laws and regulations to protect and harvest wildlife on a scientific basis. The modern enforcement or conservation officer is no longer just a game warden. He is a year-round educator as well, for he works continually with the public, explaining conservation laws and principles.

Recreation – The field of outdoor recreation is expanding to catch up with the increase of humans. It offers many opportunities for persons having a broad background of training and experience in wildlife conservation. The large land-management agencies of state and federal governments are looking for people who can handle the challenge of a public with wheels, guns, and cameras.

Private – You may manage your own shooting preserve, hunting club, or private fishing waters; or you may want to be a photographer, artist, or writer specializing in this field.

An increasing number of well-qualified persons work for themselves as specialists or consultants in this profession. You might work for an industrial forestry firm, oil company, large ranch, duck-hunting club, public utility, farm- or fish-products firm, or many others, any of whom may have need for such a specialist in their operation.

Other opportunities are in private research laboratories, numerous scientific foundations, and a growing number of private and public conservation agencies throughout the world.

What About Compensation?

Compensation for most wildlife workers is guided by the civil service schedules. Salaries are adequate, but not high in comparison to some occupations. If you have a bachelor's degree, your starting pay should be between $4,700 and $6,000. You may reach $10,000 to $13,000 a year, depending on your education, ability, and experience. A very few positions pay from $15,000 to $20,000 annually. Most of these positions also offer the usual benefits for civil service employees.

Those who work in the wildlife conservation field usually find their rewards are much more than the salary. A major compensation to a dedicated worker is the personal satisfaction, the close kinship with the outdoors, and the knowledge that he is playing a vital part in the wise custodianship of our heritage of natural resources.

What Further Help Is There?

A number of publications may interest you and your counselor. Some of the following may be in your local library.

- "Training and Employment of Wildlife Biologists and Fisheries Biologists." Journal of Wildlife Management, Vol 25, No. 2, pp. 190-199, April, 1961.
- Careers in Conservation, edited by Henry Clepper, sponsored by Natural Resources Council of America, 112 pp. Ronald Press, New York, 1963.
- Wildlife Law Enforcement. William F. Sigler, 342 pp. Wm. C. Brown Co., Dubuque, Iowa, 1956.
- Nature's Guardians — Your Career in Conservation. Harry Neal, 192 pp. Messner Inc., New York, 1956.
- Forestry as a Profession. Arthur B. Meyer, 16 pp. Society of American Forestry, Washington, D.C., 1963.
- Our Wildlife Legacy. Durward L. Allen, 422 pp. Funk and Wagnalls, New York, 1954.
- Fisheries as a Profession. American Fisheries Society, Washington, D.C.
- Employment Opportunities in The Bureau of Sports Fisheries and Wildlife. National Wildlife Federation, Washington, D.C.
- Conservation Directory (for current year). National Wildlife Federation, Washington, D.C.
- Career Opportunities in Biology. Russell B. Stevens, National Academy of Sciences, Washington, D.C.
- Source List for Careers in The Biological Sciences. American Institute of Biological Sciences, Washington, D.C.
- Occupational Outlook Handbook. Bureau of Labor Statistics, U.S. Department of Labor, Washington, D.C.
- Universities and Colleges with Wildlife Management and Conservation Curricula in North America. The Wildlife Society.
- Careers in Wildlife Conservation. John Madson and Ed Kozicky, Conservation Department, Olin Mathieson Chemical Corp., East Alton, Illinois.

4-H Bluebird Nestbox Project

Western Bluebird

UNIVERSITY OF CALIFORNIA
COOPERATIVE EXTENSION

Division of Agricultural and Natural Resources

4-H Bluebird Nest Box Project

- *Build a nest box as part of a 4-H wood-working project.*
- *Make a 4-H bluebird nest box project part of a larger wildlife project.*
- *Use nest boxes as part of a community pride project.*
- *Use a bluebird project to earn money for your club.*

With a little time, you may be able to add several other reasons for a bluebird nest box project.

What is a bluebird?

A bluebird is a member of the thrush family. Other birds in this family include robins, solitares and several thrushes. Members of this family are mostly **insectivores**—they eat only insects and bugs.

Western Bluebird
(*Sialia mexicana*)

Bluebirds are small. They are slightly larger than a sparrow with slender bodies and bills. They are easily recognized by their bright blue color. In California there are two kinds of bluebirds—the western bluebird and the mountain bluebird. The western bluebird is common in oak woodlands. The mountain bluebird is common above 5,000' elevation. Both are bright blue but the western bluebird has a reddish-orange breast, almost like a robin. The males are much more brightly colored than the females. Female bluebirds are also blue, but their color is not as bright as the males. They are usually a grayish color on their chest.

How do bluebirds nest?

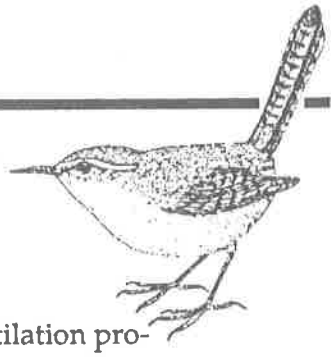
Bluebirds are **cavity nesters**. They construct their nests inside a hollow branch or trunk of a tree or in a nest box. Their nest looks like that of many other birds. It is cup-shaped and constructed of grasses, small twigs, feathers, string and other materials that can be shaped and molded.

Bluebirds begin to build their nests in early spring (March-April). The exact time may differ depending where you live in the state. Once they have built their nest the female will lay between 3 to 6 bluish-white eggs. The eggs are small, about the size of a large jelly bean. The female will **incubate** the eggs for about 14 days.

The young bluebirds

The young are born in an **altricial** state—they are born with their eyes closed and completely helpless to feed themselves. Once hatched both parents will share the responsibility of raising the young. The young bluebirds are fed a variety of insects and bugs. Their diet may include butterflies, grasshoppers, beetles, caterpillars, worms, and a variety of other items.

When hatched the young are nearly naked and must be brooded, or kept warm by their mother. In about one week, feathers begin to grow and their flight feathers begin to develop. They are fully feathered in about two weeks. Once feathered, they begin to flap their wings to strengthen their muscles. In about 18 to 22 days they



Bewick's Wren
(*Thryomanes bewickii*)

fledge. After that, they will remain with their parents to learn the important skills of finding their own food.The female may then start a second or sometimes even a third nest in the same or in a different box.

Constructing the nest box

Design and Construction

Nest boxes are designed to imitate natural **nest cavities**. These natural cavities are often found in trees with broken limbs or in dead trees called **snags**. It is most important that certain elements of the box are considered during construction.

Design Elements

Entrance. The size of the entrance hole is the most important dimension in nest box design. The entrance hole will determine which species of bird will use your box. The entry hole should be no larger than is needed to allow the bird you want to enter. If the hole is too big, species like house sparrows and starlings will take over the box and not let smaller species like bluebirds nest.

The entrance hole for a mountain bluebird nest should be 1-9/16" to 1-5/8" in diameter. It should be round and positioned near the top of the front panel.

Floor. A floor dimension of 4x4" or 5x5" is acceptable for bluebirds. If you live in an area where mountain bluebirds are present, use the larger dimension.

Sides. The sides of the nest box should enclose the floor. This will prevent rain from seeping into the box and will delay deterioration from weathering.

Vent and drainage holes. Ventilation protects against overheating and a few well placed drainage holes allow water to escape. To provide adequate ventilation, narrow spaces may be left between the top and the sides, or 1/4" holes may be drilled in each side of the box. Drainage holes can be drilled into the bottom of the box or cutting away approximately 3/8" from each corner of the floor.

Perch. **Do not add a perch by the entrance hole**. This will encourage use by house sparrows.

Box opening. It is essential to provide a hinged top for inspection and box maintenance. To prevent raccoons or other predators from opening the top, you should include a latch to secure it. Materials such as a wood screw, or wing nut can all be used.

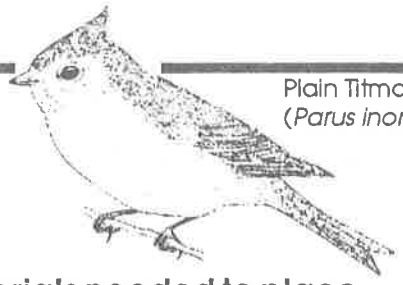
Materials needed for construction

The selection of durable materials will help your box last for serveral years. Wood is the best material to use. Birds are used to wood and it's easy to work with.

Lumber. The most durable wood is redwood. However, other woods that work in nest construction are red cedar and pine. Exterior plywood is a good material for the roof because it does not warp. It is best to use lumber that has not been treated with any type of wood preservative. It may be harmful to the young birds.

Paint. It is not necessary to paint your nest boxes if you use quality wood.

Hardware. Choose hardware that will not rust or corrode. Well made boxes last for



Plain Titmouse
(*Parus inornatus*)

10 to 15 years. Galvanized nails, siding nails, or concrete- coated or ring shank nails are recommended, particularly if you're using cedar or redwood, to prevent the boards from becoming loose over time.

List of Materials

wood glue
drill bits (1/8", 3/16")
1-1/2" hole saw
1-1/2" wood screw with washer
3/16" x 2-1/2" bolts, nuts, washers
1-3/4" galvanized siding nails, #6
3/4" exterior plywood
brass hinge

Design

See page 5 for design details of a box with floor dimensions of 5"x5". See page 6 for plans to make many boxes from one 4'x8' sheet of plywood.

Placing the nest box

Once you have constructed the box(es) you are ready to put them out into the field so that the birds can begin using them for nesting.

When to put them out?

Though the birds will use the boxes for nesting in the spring, you should try and get them out into the field in late fall or early winter. This will give the birds time to discover them and get used to their presence. Bluebirds and other cavity nesting species will use the boxes as night **roosts** or during times of extreme cold. If they use them during the winter months as roosts, they will be more likely to use them for nest boxes in spring.

Materials needed to place nest boxes

Nest boxes should be placed at least 4 feet from the ground. This will help prevent **predation** and keep them at a height that makes it easier to observe the young birds. Existing fence posts or trees are good places to mount nest boxes. If neither exist, you can put up 5 or 6-foot steel fence posts. Use hex bolts and nuts to secure the box to the post, approximately 4 feet from the ground.

When securing the boxes to trees, fence posts, etc., be sure to use bolts and nuts that are strong enough to withstand several seasons of exposure to the elements. This will reduce the overall amount of maintenance needed to keep the boxes functional.

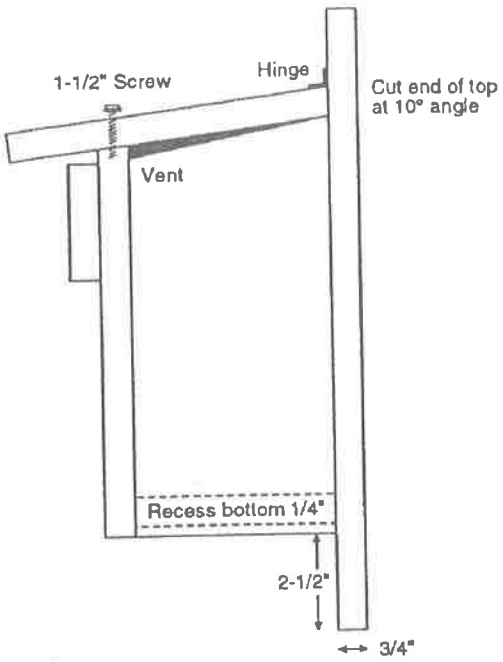
Placing the boxes

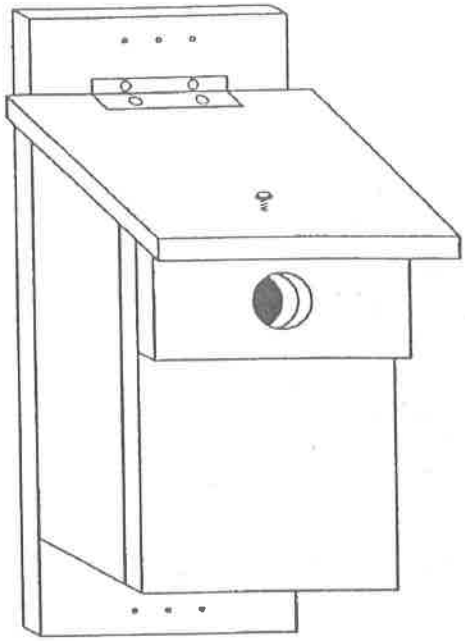
Boxes should be placed in the right habitat for the birds and areas where they are least likely to be vandalized. Though parks, school yards, and other public places would be excellent opportunities for educational demonstrations, they would also require a great deal of maintenance. Furthermore, the chance that the nest would be disturbed or destroyed during nesting is also greatly increased.

If parks or schools are the *only* feasible location, you should work with the maintenance or grounds supervisor to secure the best site for box location.

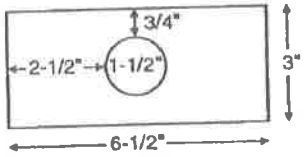
A good location for boxes is on private lands (ranches, farms, nature conservancy lands, land trust areas, etc.). These locations ensure that the boxes will least likely be vandalized.

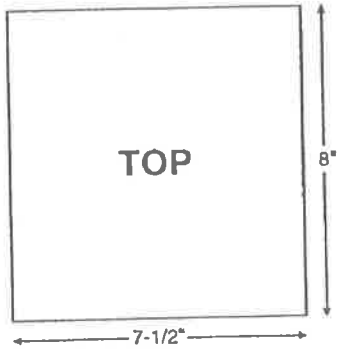
Plans for Top Opening Bluebird Nestbox

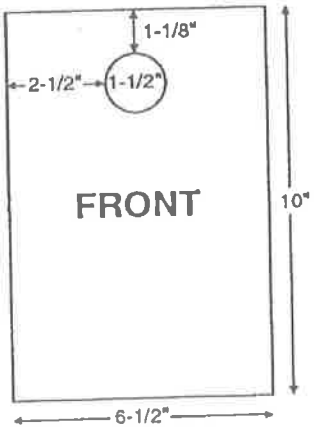


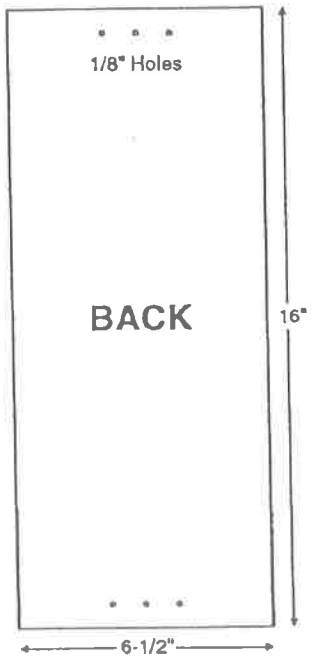


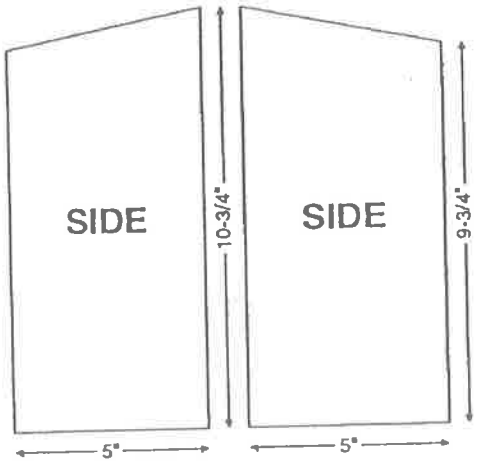
PREDATOR GUARD

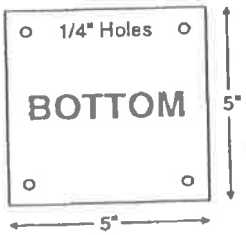








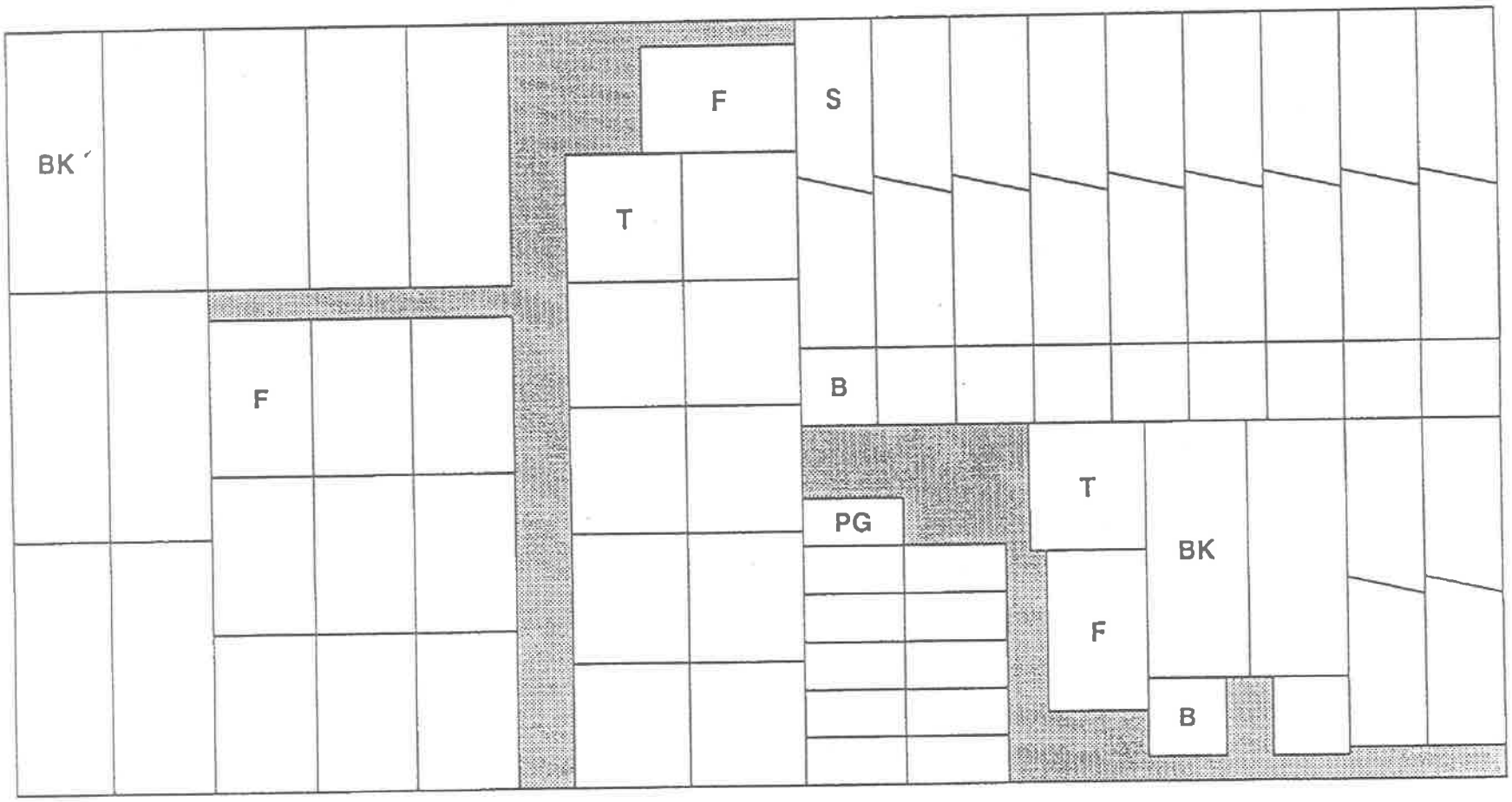




Instructions for Cutting 4'x8' Sheet of Plywood

Songbird Nest Box Cuts

(makes 11 boxes)



Extra wood or wood needed to make up for width of saw blade cuts.

When placing the nest boxes, a general rule of thumb is to place the box away from dense brush or woods so that the opening is facing east. This helps ensure that storms and winds will not create a draft inside the box.

If possible, mount the boxes in a location where they will have the benefit of some shade. The shade protects the young during extreme summer temperatures.

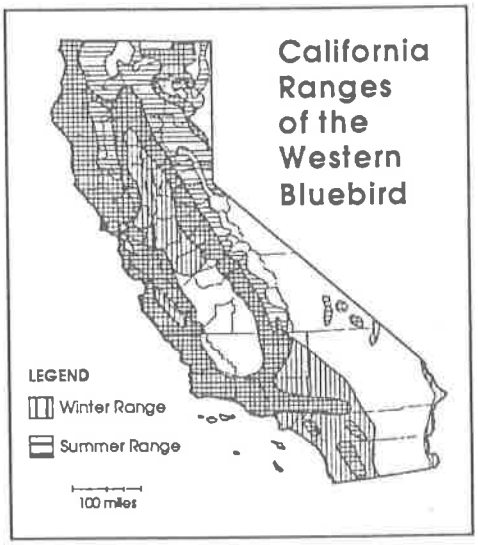
Nest box maintenance

Once the boxes are put up they will require some maintenance. At the beginning of the nesting season (when the birds are beginning to build their nests), you will have to make periodic checks to ensure that wasps have not taken over the nest box. If this happens, the wasps will prevent the bluebirds (as well as other species) from using the box. If wasps are found in the box, use a **pyrethrin**-based insecticide to kill them. The pyrethrin is very effective against insects but has very little effect on birds and their young. Though pyrethrins are considered a *safe* pesticide, you should follow all label instructions prior to and during its use.

Try to clean out each box immediately after each nesting season. This will reduce the potential for spreading diseases and **parasites**. If a new nest is started before this is done, then wait until after the nesting season to clean out the old nests and any debris that may be inside the boxes.

Checking the young

Once the birds have built their nest, check the box once a week until eggs are discovered. Once you have observed eggs in the nest, lock the box and do not disturb the nest for two weeks. This will ensure that the female does not abandon the nest. After two weeks have gone by, visit the box, carefully open the lid and observe any young. ***DO NOT HANDLE THE YOUNG!!*** They are fragile and can be easily injured. The young can be observed during the following two weeks to **monitor** their growth.



Once hatched you will probably see both parents making frequent visits to the box. They will need to bring insects to feed the young to insure their survival. ***Do not feed or care for the young. That is a job for the bluebird parents.***

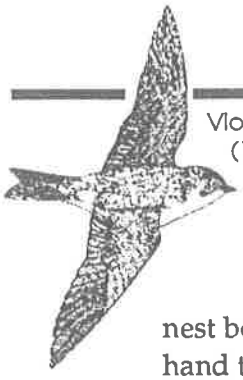
Other nest box species

Though bluebirds are the species you are trying to attract there are several other species that may use your nest boxes. Some of those species include:

- *Violet-Green Swallow*
- *Tree Swallow*
- *Ash-throated Flycatcher*
- *Plain Titmouse*

Other 4-H projects — wood working

It should now be easily seen how this project could be incorporated into a 4-H woodworking project. Constructing the



Violet-green Tree Swallow
(*Tachycineta thalassina*)

nest box requires the ability to use various hand tools, precision, and reading a blueprint. Once built the nest boxes can then be used by 4-H members involved in wildlife projects. They can also be marketed and sold by the members who built them as a source of project or club funds.

Local conservation groups such as the Audubon Society, Nature Conservancy or the California Native Plant Society or others may be interested in working with 4-H members to purchase some of the boxes and help secure locations where they can be placed.

Community pride projects

Various service organizations may be interested in working with 4-H members and leaders to select sites where the boxes may be placed. Once a site is selected, 4-H representatives could work together with these organizations to develop **bluebird trails** with local officials. These trails are usually located in areas with easy access for public viewing of the bluebird activities. If done with the help of local park and recreation officials, it may be possible to develop an agreement that ensures maintenance by municipal employees.

Bluebird trails are an excellent way to get local groups, elected officials, and interested individuals involved in supporting the project. It would also be a means to help 4-H activities by promoting the acceptance of a "bluebird appreciation day" in a local community.

Fund raising

Selling the nest boxes is one obvious way to raise 4-H funds. Another way may be to obtain local sponsorships from conservation organizations, service clubs or individuals for the building and distribution of the nest boxes. An "adopt a bluebird trail" may be a way to secure long term support for the project.

Another fund raising activity that involves community support would be a "bluebird count-a-thon." Similar to a walk-a-thon, 4-H members could have sponsors commit to an amount of money donated per bluebird counted on a particular day. The 4-H members and leaders could work in cooperation with local Audubon Society members to ensure proper identification of the species. The sponsors would then pay on the basis of the number of bluebirds or other cavity nesting birds counted.

There are undoubtedly a number of other community pride and fund raising ideas that could be developed from community participation and support. These are merely some ideas to help get you started.

Appendix 1 - Glossary of Terms

altricial: When young are born in a helpless state (eyes closed, unable to walk or feed themselves) and must be cared for by the parents, e.g. bluebirds, sparrows, puppies, kittens and humans.

bluebird trail: Nest boxes are placed along a route, e.g. county road, bicycle trail, for public viewing.

cavity nesters: Animals that require a hole in a tree trunk or limb in which they construct a nest, e.g. most woodpeckers, bluebirds, starlings.

fledge: When young birds leave the nest and learn to fly.

incubate: The process of sitting on eggs to generate enough heat to allow embryo development.

insecticide: A product designed to kill insects.

insectivore: Animal that eats insects.

monitor: To observe and record actions of something over a period of time.

nest cavity: A hole in a tree that is used as a nesting place by birds or mammals.

parasite: A plant or animal that requires another plant or animal for its nutrition, e.g. fleas, ticks, lice.

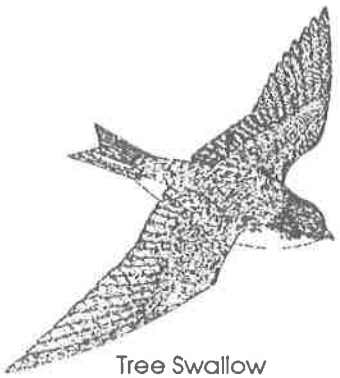
predation: When an animal attacks and kills another animal.

pyrethrin: An insecticide derived from plants called Chrysanthemums.

roost: A resting place.

snag: Usually refers to a dead tree, or portion of a tree.

species: A term used to distinguish two different kinds of plants or animals, e.g. western bluebird vs. mountain bluebird, an apple tree vs. peach tree.



Tree Swallow
(*Tachycineta bicolor*)

Appendix 2 — California species that use nest cavities

The following is a partial list of those California species of birds and mammals use nest cavities. Some of these species may use the appropriate size nest box if available.

SONGBIRDS

Bluebirds
- Western bluebird (*Sialia mexicanus*)
- Mountain bluebird (*Sialia currucoides*)

Brown Creeper (*Certhia americana*)

Chickadees and Titmice
- Mountain chickadee (*Parus gambeli*)
- Chestnut-backed chickadee (*Parus rufescens*)
- Plain titmouse (*Parus inornatus*)

European starling (*Sturnus vulgaris*)

Flycatchers
- Ash-throated flycatcher (*Myriarchus cinerascens*)

House finch (*Carpodacus mexicanus*)

House sparrow (*Passer domesticus*)

Nuthatches
- Red-breasted nuthatch (*Sitta canadensis*)
- White-breasted nuthatch (*Sitta carolinensis*)
- Pygmy nuthatch (*Sitta pygmaea*)

Swallows
- Tree swallow (*Tachycineta bicolor*)
- Violet-green swallow (*Tachycineta thalassina*)
- Purple martin (*Progne subis*)

Woodpeckers
- Downy woodpecker (*Picoides pubescens*)
- Hairy woodpecker (*Picoides villosus*)
- Lewis' woodpecker (*Melanerpers lewis*)
- Northern flicker (*Colaptes auratus*)
- Pileated woodpecker (*Dryocopus pileatus*)
- Yellow-bellied sapsucker (*Sphyrapicus varius*)

Wrens
- Bewick's wren (*Thryomanes bewickii*)
- House wren (*Troglodytes aedon*)

RAPTORS

Amercian kestrel (*Falco sparverius*)

Owls
- Spotted owl (*Strix occidentalis*)
- Barn owl (*Tyto alba*)
- Screech owl (*Otus asio*)
- Saw-whet owl (*Aegolius acadicus*)

WATERFOWL

Wood duck (*Aix sponsa*)

MAMMALS

Bats- several species use nest cavities and may use nest boxes

Mice
- Deer mice (*Peromyscus spp.*)
- Woodrats (*Neotoma spp.*)

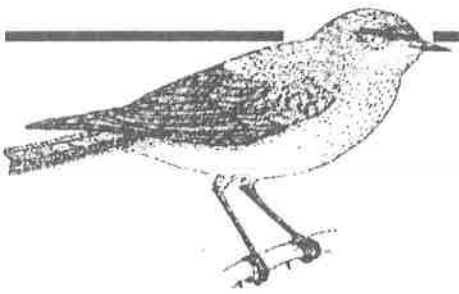
Ringtail (*Bassariscus astutus*)

Squirrels
- Flying squirrel (*Glaucomys sabrinus*)

Opossum (*Didelphis virginiana*)

Date	Box ID. Number	No. of eggs	Incubation (Yes or No)	No. of young	Comments

FIELD NOTES



Mountain Bluebird
(*Sialia currucoides*)

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