• Commonwealth of Kentucky •

EDUCATIONAL BULLETIN

UNITS IN CONSERVATION OF WILDLIFE AND OTHER NATURAL RESOURCES

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Superintendent of Public Instruction

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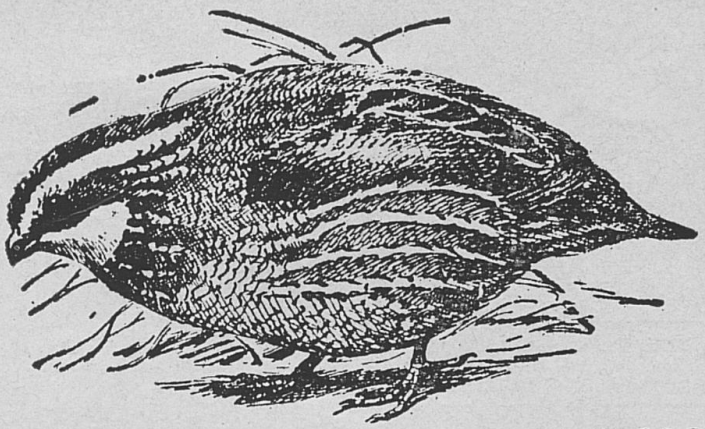
Our song and insectiverous birds are the farmer's best friends. They destroy countless millions of insects each year that could not be eliminated any other way and would cause serious damage to crops and vegetation.

KENTUCKY
UNITS IN CONSERVATION OF WILDLIFE AND OTHER NATURAL RESOURCES



ONE OF OUR MOST VALUABLE BIRDS, A DESTROYER OF INSECTS AND WEED SEEDS AS WELL AS A SONG AND GAME BIRD.

THE BOB WHITE QUAIL.

By JAMES J. GILPIN

NATURE'S CURIO SHOP

BY JOHNNY MOCK
and VERNON LIND



THE ANSWER: The bear is the animal with which the raccoon has much in common.

The raccoon is a busy and personable little dweller in the forests. Nuts, cherries, wild grapes and various kinds of berries and grains are acceptable in its diet. Insects, small reptiles, frogs, crayfish and clams are relished and like its larger relative, it will lie in wait for any fish which it may scoop from its habitat. Its curiosity seems to surpass that of all other animals, a weakness which often leads to its downfall. Common to most sections of the country, it is nocturnal in its habits; is almost three feet in length and reaches a weight of 25 lbs. and more. Four to six cubs are usually found in a litter. Its outstanding characteristic is that of carefully washing its food before eating it. In captivity, raccoons make interesting pets, as full of devilment as the most lively of youngsters.

UNITS IN CONSERVATION

for

KENTUCKY PUBLIC SCHOOLS

for

ELEMENTARY AND SECONDARY SCHOOLS



Prepared and distributed by cooperation of the

KENTUCKY DIVISION OF GAME AND FISH

LEAGUE OF KENTUCKY SPORTSMEN

KENTUCKY STATE DEPARTMENT OF EDUCATION

August 1941

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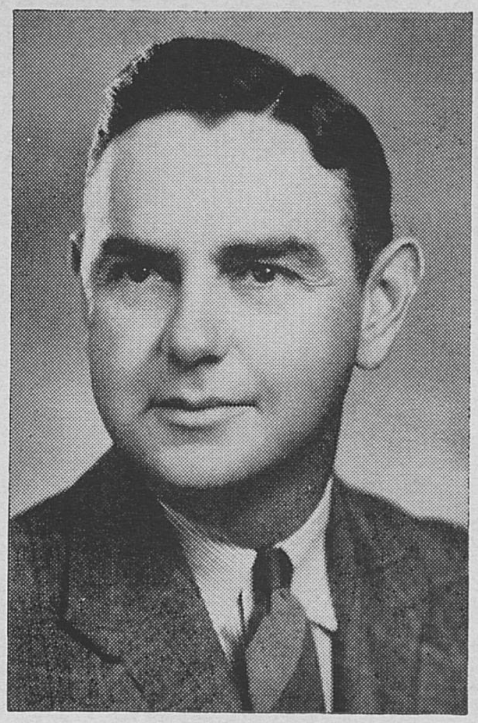
FOREWORD

As the result of a National emergency program an added drain has been placed on the natural resources of the nation and of the State of Kentucky.

Wise utilization of soil, water, vegetation, wildlife and minerals is very necessary at this particular time. In times like these it may not be possible to do all the conservation work we should like to do in Kentucky and in the nation but our endeavor should be to hold ground already gained, to continue all essential conservation services, and to avoid any wasteful exploitation of the wildlife and other natural resources that are of continuing benefit to the peoples of the Commonwealth.

There has been a great need for a more widespread educational program on conservation of the natural gifts presented us by a bountiful Mother Nature that will get such information as is available into the minds of those who will use it or be influenced by it. The hand book on conservation which is now being presented to the teachers of Kentucky should go a long way in answering this cry for conservation education and if rightly used should bring to the younger generations the realization that a great heritage has been handed down to them and upon their shoulders falls the responsibility of protecting it for all time.

KEEN JOHNSON
Governor of Kentucky



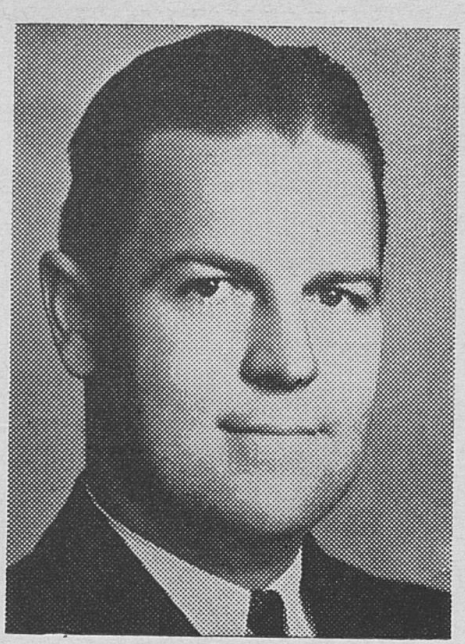
FOREWORD

Not so many years ago Kentucky could boast the finest population of wildlife of any state in the Union, due entirely to an almost perfect balance of the three essentials food, cover and water.

As our population increased our wildlife dwindled, some species even disappearing entirely. Not so much because the white man killed, for food and valuable furs, many more fish, birds, and animals than was necessary, but mainly because he destroyed the food and cover so essential to their welfare. Hundreds of thousands of acres of forests have been destroyed without the reforestation of a single acre. Modern farming has destroyed, utterly, vast sources of natural wildlife food. Siltation and pollution have made many miles of Kentucky's 12,000 miles of fishing streams untenable for fish.

In our efforts to conserve, restore and protect Kentucky's wildlife resources your Division of Game and Fish realizes the need of whole-hearted help and assistance of an enlightened and sympathetic public and I sincerely hope this book will be studied in every school in Kentucky and that the students will become sufficiently interested as to convince those with whom they associate as to the immediate need of a state wide practice of the Conservation of our forests, fields, and streams as the most logical way to restore our wildlife.

S. A. WAKEFIELD, *Director,*
Division of Game and Fish.



FOREWORD

This bulletin has been prepared by James J. Gilpin, Public Relations Representative of the State Division of Game and Fish.

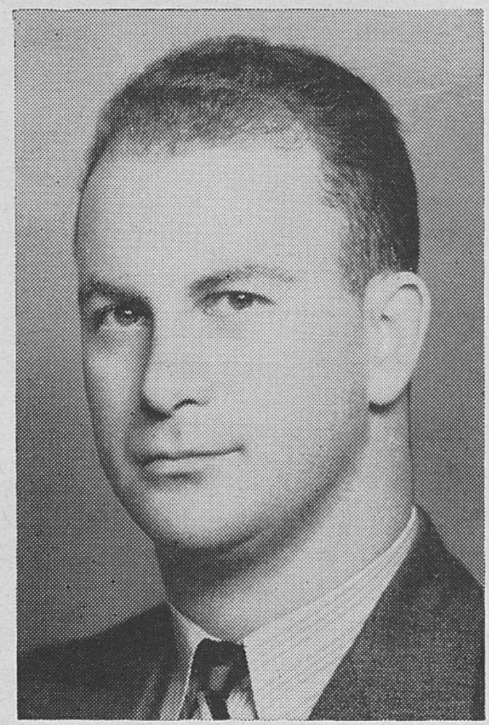
Doubtless Kentucky's greatest physical asset is the wealth represented in her natural resources—forests, minerals, land, wild life, and streams. Unfortunately, our forebears, feeling that they were under compulsion to secure a living from these resources, often exhausted and depleted them. Today we find this fact evident in mountains denuded of their forests, streams depleted of their life, and soil exhausted. Fortunately, now we realize the mistake that has been made and are seeking ways and means of preserving, conserving, and as far as possible restoring those resources that are capable of restoration. This we realize that we must do for our best economic and social well-being. Certainly we can make no better investment than work along these lines.

Working together, the State Department of Education, the State Division of Game and Fish and the League of Kentucky Sportsmen have made this course of study possible. As Superintendent of Public Instruction, I am happy in having a part in the introduction of the subject of conservation into the elementary and high schools of this state. I express the hope that this course of study will be used in all our schools and that it may be read and studied by all civic-minded citizens of the Commonwealth.

JOHN W. BROOKER
State Superintendent of Public Instruction.

PREFACE

In 1935 a League of Kentucky Sportsmen was organized and included sportsmen's organizations from a number of counties of the state. In 1938 the League had grown to such an extent that its membership took in practically every county of the state. With increased numbers of sportsmen backing the conservation program in the state and with the demand for education coming more and more to the front at League meetings, a plan was devised by the



League and the Division of Game and Fish whereby a state wildlife week was to be proclaimed some time in October each year by the Governor of Kentucky and during that week every school in the state was to be visited with the idea of bringing conservation of wildlife, water, soil, vegetation and minerals before teacher and pupil alike. This program also included an essay contest with cash prizes going to the winners. The Division of Game and Fish printed a large wildlife chart and a fish chart for distribution during this week and worked in every way possible to make the program a success.

In April 1938 the Division of Game and Fish, realizing the importance of keeping the public informed as to activities of that department, game and fish laws, changes thereof and the growing demand for conservation teaching in the schools expanded its personnel by setting up a public Relations Department. It was the duty of this agency to keep the public informed through the medium

of the daily and weekly newspapers, magazine articles, and through personal contact with the sportsmen's clubs, schools and civic organizations. Several moving pictures were made and these were shown before thousands of school children and teachers and sportsmen throughout the state. In the year 1940 a total of 55,000 persons, both old and young were contacted through lectures and moving pictures in Kentucky by the Division of Game and Fish.

This growing demand for educational information pertaining to the conservation and development of Kentucky's natural resources and the work that has been done by the Kentucky Department of Conservation and the sportmen of the state brought on a demand for a more definite and clearer method of conducting conservation education in the schools. The teacher had had very little actual conservation instruction in preparation for his or her job and as the result of this lack of training was not in position to carry such educational matter to the pupils. Personnel members of the Division of Game and Fish and the State Department of Education met and discussed the matter in detail and out of this discussion came plans for the Conservation handbook for Kentucky School Teachers.

A broad approach to conservation of our wildlife and other natural resources has been made, so as to build a solid foundation for the student in his knowledge and understanding of this program which is so essential to the welfare of the individual and of the state. It must be remembered that our wild birds, animals, and fish are dependent upon the forests, waters, and soil for their existence and well-being and that all the natural resources are renewable, and only wise use and intelligent conservation practices can make them fully productive; and only open-minded study, enriched by application to the four corner posts of the Course of Study can make such presentations useful in the school.

The changes in society, in industry, and in the demands on the curriculum reflect the growing realization that conservation of wildlife has become an essential factor. It is in an effort to guide the teacher who must necessarily respond to such changes in order to help in making this country and particularly the state of Kentucky the sort of place Americans have always idealized, that this informational unit has been compiled.

SUGGESTIONS ON USAGE OF MATERIAL

Teachers are urged to use the lessons on conservation to be found on their school grounds, to use the communities and the farms as "text books" and not to rely solely upon the printed word.

Teachers and pupils alike should study conservation problems of their own communities, find solutions to the problems and, where possible, take measures that actually demonstrate sound conservation practices.

In the primary grades attention has been turned entirely upon building understanding of a simple interrelationships through integration with all basic subjects, the study, made in more detail through the fourth, fifth, and sixth grades, follows the pattern of general integration. Starting with the seventh grade, however, integration becomes more closely identified with specific subjects which are strongly related to conservation and development activities and interests; and in the high school grades, integration is entirely by subjects, with stress upon biology, social problems and history.

ACKNOWLEDGMENTS

I wish to take this opportunity to thank the agencies and individuals helpful in making this book possible and who have contributed in one way or another to its text. First of all John Brooker, Superintendent of Public Instruction, for the state of Kentucky was greatly responsible for the publication of the hand-book and made many helpful suggestions as to the way in which the material should be arranged. Mark Godman, of the Department of Education, also put time and effort to the text.

S. A. Wakefield, Director of the Division of Game and Fish, was heartily in favor of putting such a book in the hands of the teachers of Kentucky and it was upon his recommendation that the book has been made possible. He helped in formulating the material and here I wish to thank him for his splendid cooperation in furthering the cause of Conservation Education in the schools of Kentucky.

The West Virginia Conservation Commission helped materially in the compilation of the text and I wish to thank them for their splendid assistance and hope that the Division of Game and Fish and the Conservation Department of Kentucky will be able to return the favor within the very near future. I also wish to thank them for the splendid plates which they so generously let us have to use in the book.

Contributions from others also have been noteworthy and they are: Minor E. Clark, Superintendent of Fisheries for the Division of Game and Fish, who compiled the up-to-date list of fishes in Kentucky; Burt L. Monroe, State Ornithologist, who compiled the list

of birds, both native and migratory; H. B. Newland, Assistant Director, Division of Forestry, for the list of trees; Dennie Gooch, former president of the League of Kentucky Sportsmen and Editor of the "Kentucky Sportsman", who gave many valuable suggestions and furnished many pictures for the hand-book; Mrs. Nell Vaughn, Director, Division of Parks, who furnished information on state parks and several pictures; K. G. McConnell, Director, Division of Forestry, who furnished information on state forestry problems and also several pictures for the book; Dr. Allen, University of Kentucky Biology Instructor, who furnished the list of mammals native to Kentucky.

Especially helpful was information furnished by the U. S. Forest Service, Washington, D. C., the Soil Conservation Service; and the Fish and Wildlife Service.

JAMES J. GILPIN,
Public Relations
Representative,
Div., of Game and Fish.

GENERAL PURPOSE AND AIM

To enlarge and expand the children's experiences with nature by surrounding them in the classroom with living things of nature such as pets from home, plants from home and in the wild, flowers, both cultured and wild, game birds, animals and fish, minerals, soil and water, and by encouraging them to see these things in their natural environments; and through these experiences to teach the pupils the value of vegetation, soil, water, wildlife and minerals and the need to protect them. The future of our nation will soon lie in the hands of the generation now in our schools. It is to the students of today, that this great country with its rich resources will be entrusted and in whose hands will be placed the destiny of our wildlife (birds, animals and fish). Future generations of citizens will judge how wisely these students have used their powers as citizens. Conservation is not a strange idea brought in from some foreign country, not a radical plan, but a plan of American democracy. The public lands are the richest inheritance ever bestowed by a bountiful Creator upon any national community. The wise use of these lands, and of all that lies above and below them, rests in the hands of the present younger generation. It is the highest form of patriotism for those students to do their part to ensure the wisest use of these resources "of the people, by the people, for the people."





GRADE ONE

Definition: Conservation is the preservation and development of our natural resources for economic and social use, so as to secure the greatest good to the largest number of persons for the longest period of time.

1. OUR ANIMAL FRIENDS

Specific Aims:

1. To observe the appearance of some animals found in the community.
2. To note where animals live: open fields, trees, water, air and underground.
3. To learn that there are wild and domestic animals.
4. To teach care, feeding and treatment of pets.
5. To foster kindness toward all animals.
6. To observe simple relationships between animals, plants, trees, birds and soil.
7. To teach that plants and animals are alive.
8. To observe how animals protect themselves.

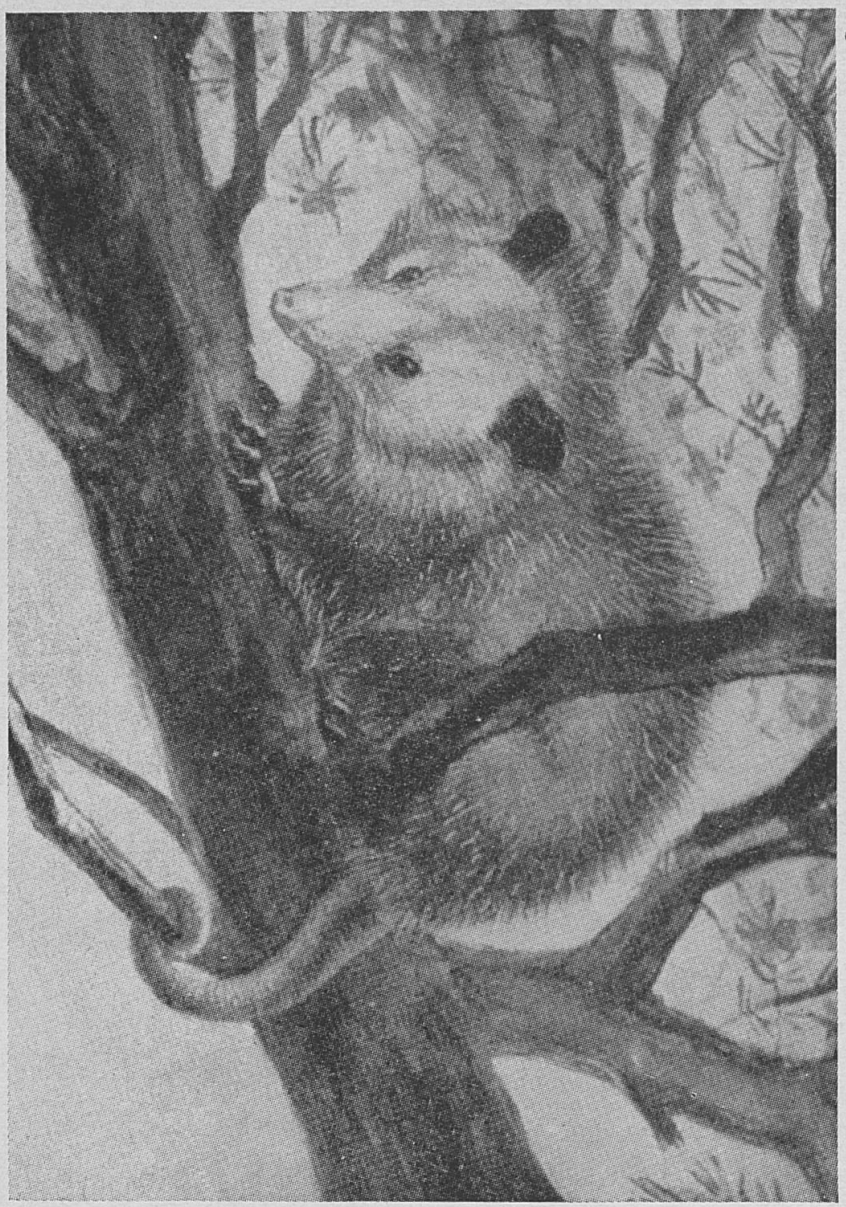
A Suggested Approach:

Questions asked about pets develops the fact that John has a pet rabbit named Bunny which he can bring to school for observation.

TYPE LESSONS

Lesson I.

1. Who fed and cared for you when you were a baby?
2. Who fed and cared for Bunny when he was a baby?
3. If some boy or dog had killed Bunny's mother, what would have happened to Bunny and his brothers and sisters?
4. Name some other animals that have babies.



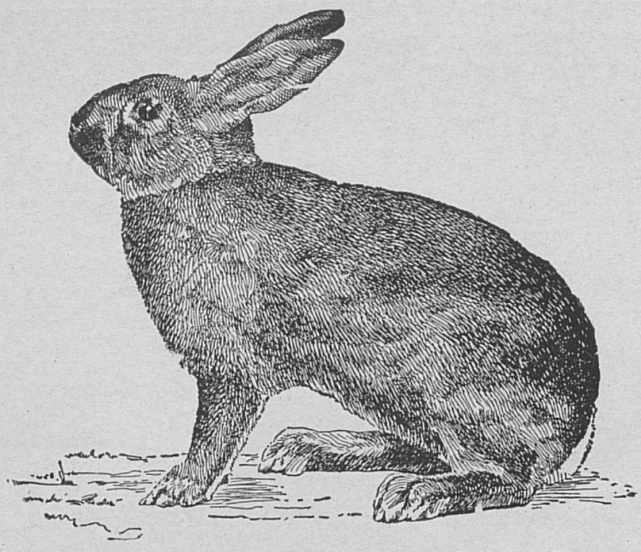
The Opossum barely qualifies as a game animal as both his meat and fur are inferior and he affords very little sport in being taken.

5. Who cares for and feeds these babies?
6. What happens to all animal babies when their mother is killed?
7. Would you like to live in a world that had no accidents?
8. If we are to have pets, what must we remember?

Reading Chart:

Bunny is a rabbit.

His mother fed him when he was a baby.



The Cotton-Tail Rabbit.—Leave brush piles and sink-holes for the rabbit and he will be a means of furnishing more sport to the hunters. Watch for him on the highways and drive carefully to prevent killing this little animal.

I must not hurt the mother rabbit.
Her babies would die if she were killed.
Soon there would be no rabbits.

Lesson II.

1. What does Bunny eat?
2. What was planted to make lettuce and carrots?
3. Where do we plant seeds?
4. Where did these seeds come from? (Show a pod such as sun-flower.)
5. What was the pod before the seed came?
6. If I destroy the flower, what will happen to seeds?

Reading Chart:

Bunny eats plants.
Plants grow in the ground.
Plants come from seeds.
Flowers make seed.
If I pick the flower there will be no seeds.
If there were no seeds, there would be no plants.
Animals must have plants to live.

Suggestions for Other Lessons:

1. From an apple that the children fed Bunny, you might bring in the idea that a tree is a plant and develop a lesson on the uses and protection of trees.



The Red Fox, a very gallant game animal, affords great sport to the lovers of the chase and is a valuable fur-bearer.

2. From knowledge gained about seed growing in the ground in Lesson II, we may develop a lesson on use of soil.
3. Give the rabbit water. From this develop a lesson on the importance of water in nature.

ACTIVITIES:

1. Pupils tell about animals with which they are acquainted: where they live, what they eat.
2. Bring pets to school. Observe and discuss them.
3. Conduct pet shows.
4. Bring to school magazines or books containing pictures of domestic and wild animals.
5. Make clay models of animals.
6. Make a journey to observe animals if they may be found within convenient distance of the school.
7. Bring snapshots of animals to class. Display these on a bulletin board.



Black Bear in wooded mountains of Harlan County. Once extinct, now protected and increasing.

8. Provide if possible homes in the classrooms for animals brought to school.
9. Describe a field where Bunny will live.

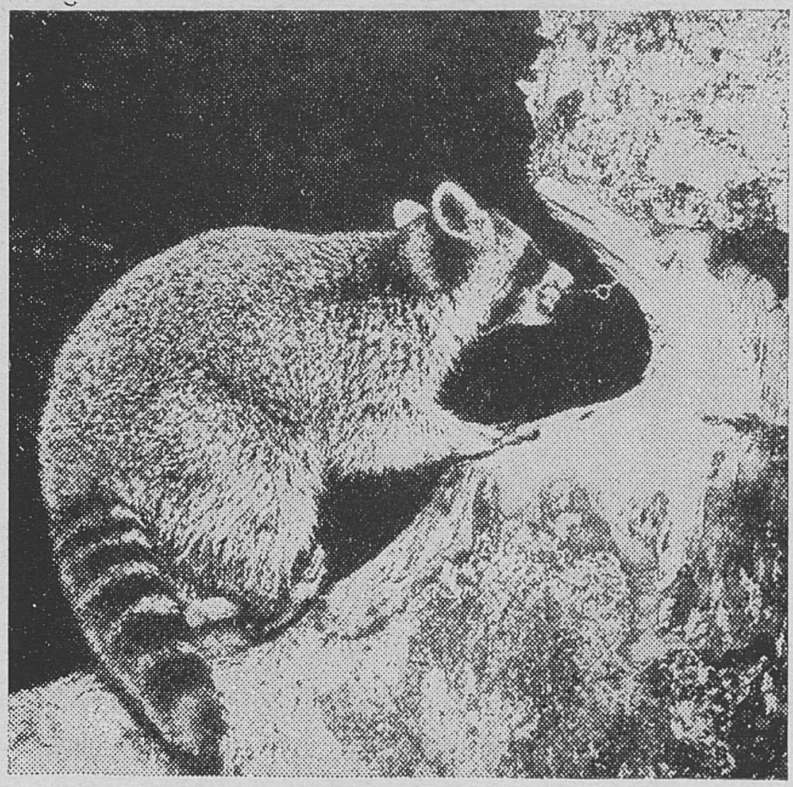
Suggestions for Integration.

A. Reading:
   1. Make reading charts. (See suggestions in Type Lessons.)
   2. Teacher reads appropriate stories and poems.
   3. Dramatization of stories about animals.

B. Language:
   1. Cooperative riddles such as: I have big ears. I have a little tail. I can hop. I like carrots. What am I?
   2. Conversation lessons stressing care, feeding and protection of animals.
   3. Picture study "A Boy With A Rabbit" (any picture that correlates with your unit).
   4. Cooperative stories as in a class booklet.

C. Writing:

   Write names of animals, cat, dog, rabbit, bird.



THE RACCOON.

D. Arithmetic:

1. Count animals. (Do not use more than ten in a group.)
2. Count groups of animals.
3. Compare groups of animals.

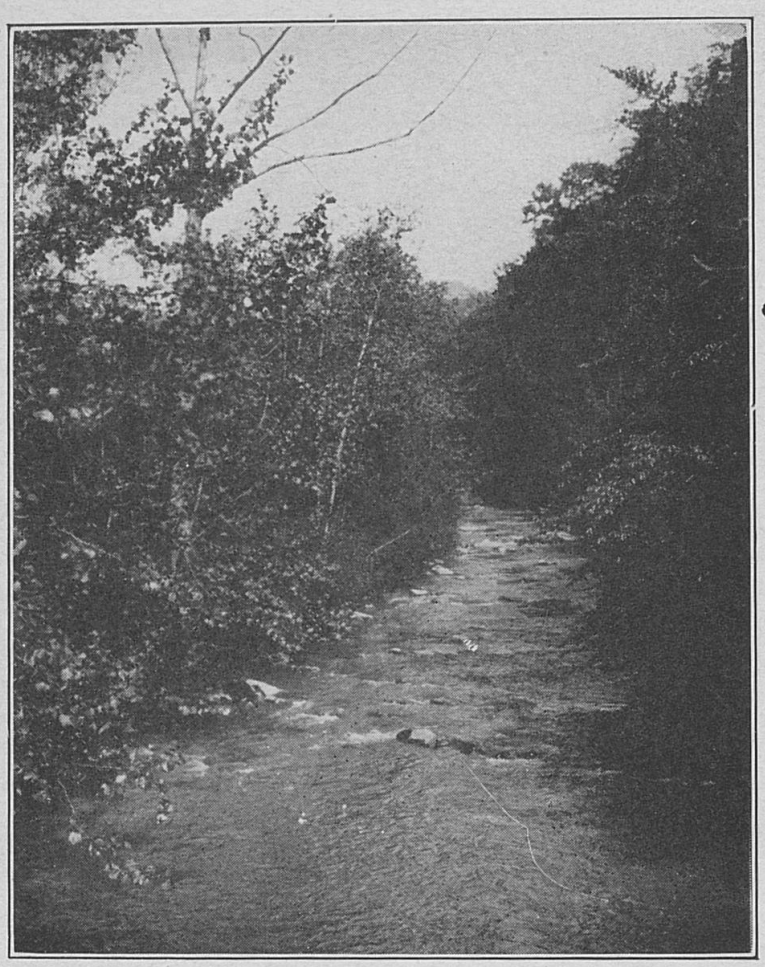
E. Health:

Animals must observe the rules of health and sanitation in order to thrive.

1. Each animals has its own way of keeping clean.
2. Each animals has its own way of keeping its home clean.
3. Animals must eat proper foods. (Pictures showing results or lack of vitamins.)
4. They must exercise in the sunshine and fresh air.
5. They must rest and sleep a great deal. From these we can develop our health rules.

F. Physical Education:

Play animal games. Suggested games: (See the Book of Games for Home, School and Playground—Forebush and Allen.)



Scene on Clear Creek, Pine Mountain State Park.

G. Social Studies:
Fathers and mothers work to have homes for their babies.
Show that animals work for their babies.
This relationship should develop an appreciation of animals' homes and give the child a desire to care for them.

H. Music: Songs based on unit you are teaching.
Suggested songs:
1. My Bunny—(Listen and Sing—The World of Music).
2. If You Were The Bunny—(Music Hour—First Book).
3. Little Bunny Rabbit—(Music Hour—Kindergarten and First Book).

I. Art:
1. Directed pictures of animals.
2. Free illustrations for booklets.
3. Cut-out animals.
4. Posters—Theme being Conservation.

EVALUATIONS:

Children should have learned:

1. The appearance, habits, and food of a few animals.
2. The values of these animals to them.
3. A few simple things they can do to protect animals such as putting food where they can get it in winter.
4. Simple relationships between animals, plants, trees, birds, and soil.
5. How nature protects animals.

●

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THE WHITE TAIL DEER.

The White Tail Deer, native to Kentucky, became practically extinct, but restocking by the Division of Game and Fish is bringing it back in large numbers.

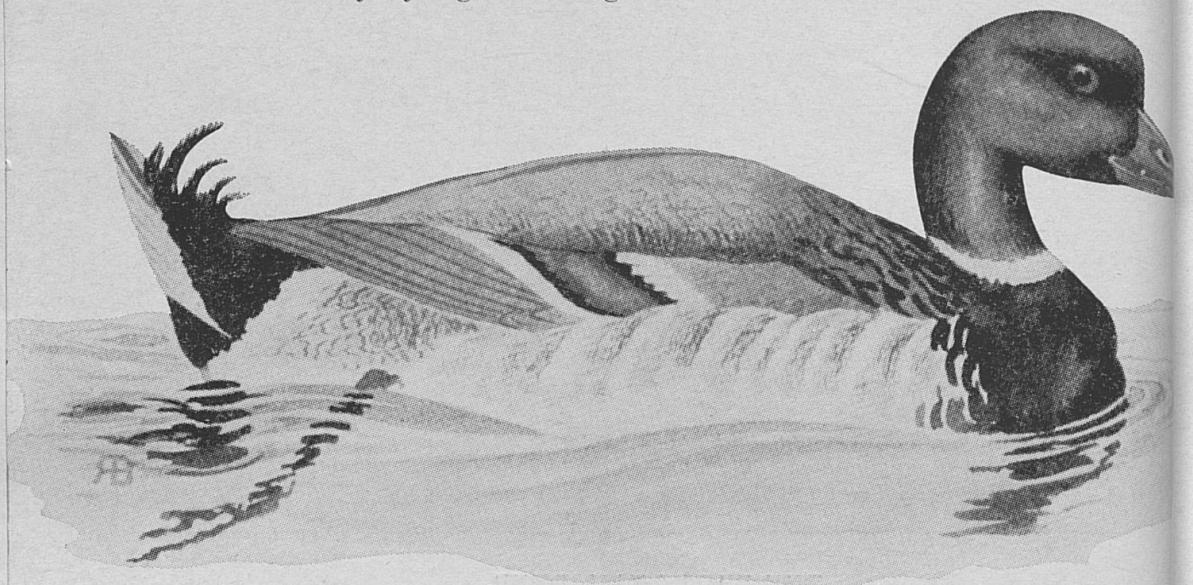


GRADE 2

OUR FEATHERED FRIENDS

SPECIFIC AIMS:

1. To train the child to abhor the killing of birds and robbing of nests.
2. To develop the idea of the interdependence of man, plants, and animals.
3. To show the need for protecting some birds, plants, and animals.
4. To show the child how he can protect birds.
5. To teach the child to be kind to birds.
6. To teach about some enemies of birds, such as the cat.
7. To teach children to recognize birds they see in the community by sight or song.



Wild Ducks and Geese are strickly migratory and only a few of them come through K tucky. Over the entire United States they are our greatest game birds.

APPROACH:

It is suggested that we build a bird sanctuary. Discussion and questioning precede actual building.

One question asked was, "What is a sanctuary?" The answer decided upon was, "A shelter or a place of safety." All through the work this idea was kept before the children. "We are building a place to shelter, protect and save the birds, plants, and animals we put in it."



QUAIL HOLDING PENS LOCATED IN SHELBY COUNTY.

Other discussions brought out these facts. The tree provides a home for the bird. The birds kill insects which destroy the tree. The tree provides food for the squirrel. The squirrel plants and distributes the seed which makes the tree. The tree provides wood to make homes for us. By these discussions we show the child the interdependence of plants, animals, and man, and the need of preserving one for the other.

Discussion of acorns led a boy to suggest that we put squirrels in our sanctuary.

As we worked, a pool, house, and rock garden were suggested.

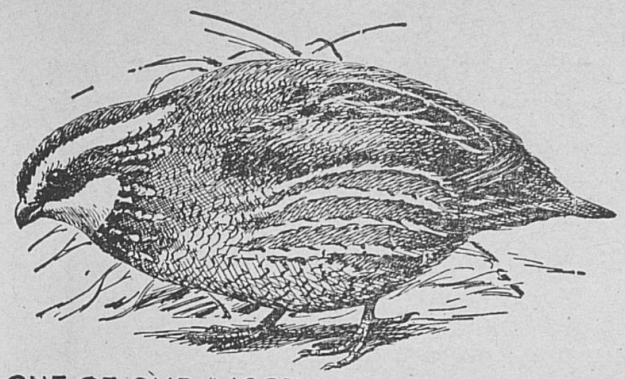
From these, growing enthusiasm led to construction of a real bird bath, a bird house, and feeding trays.

There are many approaches to such unit.

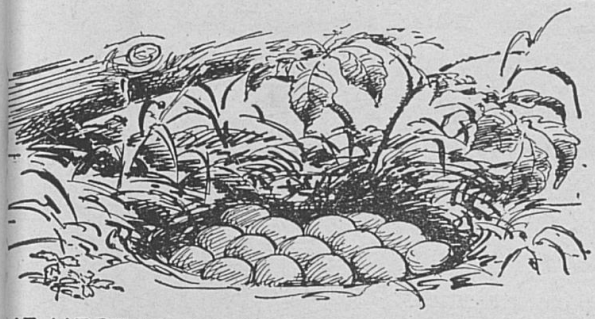
Suggestions: A bird's nest, a Christmas tree for birds, a bird seen in a tree.

ACTIVITIES:

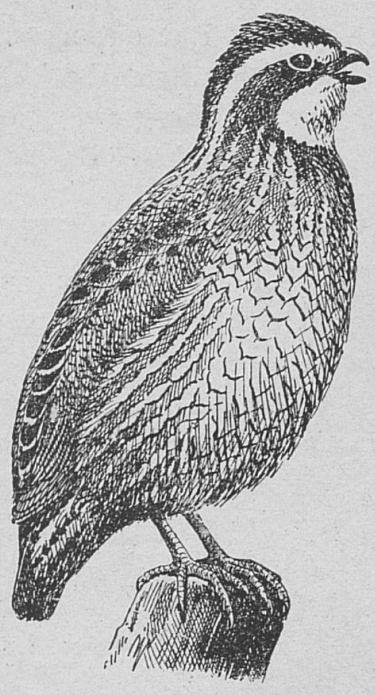
1. Collect old bird nests (Select last year's nests and explain why).
2. Gather branches to fasten nuts on. (Be sure they are dead, or result of pruning, or from tree which has been cut.) Gather some soil, flowers, and rocks for a rock garden around the pool. Gather sand and pebbles to make a road leading to the house. Gather acorns to put on trees.
3. Collect pictures of birds. Have children identify birds they see and don't know by these pictures.
4. Mount pictures of birds on the trees.
5. Enclose sactuary with a fence built with blocks.
6. Make a pool (pan filled with water).
7. Get fish, tadpoles and snails for the pool.
8. Plant grass for sactuary.
9. Build a house from blocks, boards and cereal box.
10. Make squirrels from clay.
11. Dress dolls for house.
12. Build bird bath (wooden salad bowl nailed to small post).
13. Build bird houses and put up in suitable places.
14. If possible, observe the building of a bird's nest (English Sparrow would probably be easiest to watch).
15. Watch young birds learning to fly.
16. Have pupils listen to calls and songs of birds.
17. Provide feeding trays for birds outside your schoolroom windows.



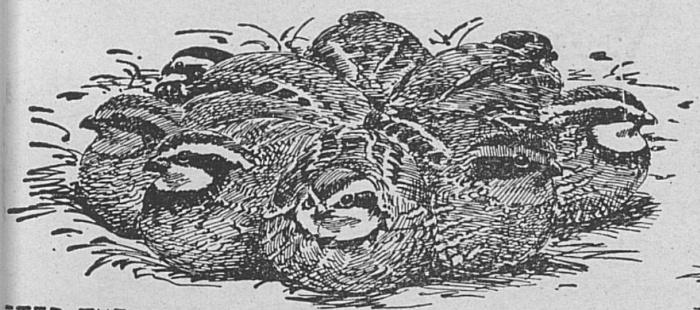
' IS ONE OF OUR MOST VALUABLE BIRDS,
DESTROYER OF INSECTS AND WEED SEEDS
S WELL AS A SONG AND GAME BIRD.



HE NEST IS PLACED IN SOME SHELTERED
POT, FENCE CORNER OR THICKET.
ROM 10 TO 40 EGGS ARE LAID, TWO OR MORE
ENS SOMETIMES SHARING A NEST.



ITS PLEASING CALL IS HEARD IN
GARDEN AND FARMLAND OVER
MOST OF THE UNITED STATES, EAST
OF THE ROCKY MOUNTAINS



ETER THE NESTING SEASON BOBWHITES
ATHER IN FLOCKS OR COVEYS, WHICH
LEEP IN CIRCLES, HEADS OUT, ON THE GROUND.



BABY BOBWHITES
RESEMBLE TINY
CHICKS AND
FOLLOW THE
MOTHER SOON
AFTER HATCHING



HEN DISTURBED IN
LEEPING FORMATION THE
OVEY "EXPLODES" WITH A GREAT
HIRRING OF WINGS, STARTLING TO
NY POSSIBLE ENEMY, ANIMAL OR HUMAN.

E.L. POOLE

THE BOBWHITE (by courtesy W. Va. Conservation Comm.).

18. Put out moss, twigs and small pieces of string in a place where the birds can easily get them. Watch to see birds carry away these nesting materials, and what kind each bird takes. Put out more material when supply becomes low.

SUGGESTIONS FOR INTEGRATION:

A. Language:

1. Make diary telling what we are doing.
   Ex.—Today Frank brought some acorns for our sanctuary.
2. Make simple oral paragraphs about the activities.
3. Write letters to parents asking them to see our exhibit.
4. Have a class make simple riddles about birds.
   Ex.—I have a rusty red vest.
   I come early in the spring.
   I build my nest of twigs and grass and line it with mud.
   I lay from three to six eggs.
   I am a .....
5. Visit other rooms and invite pupils and teacher to the exhibit.
6. Picture study—Feeding Her Birds—Millet; Feeding the Robins—Bvenhau.
7. Learn poems about birds.

B. Reading:

1. Make reading primers with sentences obtained by discussing and demonstrating. Examples:
   (a) Birds build their nests in a tree. They lay eggs in the nest. Baby birds are hatched from the eggs. I will not harm the eggs or nest. If I do there will be no baby birds.
   (b) Birds are pretty. Birds are useful. They eat insects and seeds of weeds. They sing sweet songs. Cats eat birds. I'll keep my cat at home. I'll feed my cat so he will not eat the birds.
   (c) Flowers make seed. Seeds make plants. Plants give me food. I'll not destroy flowers.
   (d) Squirrels plant acorns. Acorns make a tree. Trees give me shade. They give me wood to build my house. I'll protect the squirrels and feed them nuts.



Wild house cats destroy valuable game birds and animals.

2. Silent reading charts mimeographed can bring out the value of birds, plants, and animals, and the need of protecting them.
3. Read stories about animals, birds, and flowers. Many of these stories may be found in magazines. They may be cut out and mounted on cardboard for children to read.

C. Art:

1. Cut birds from paper and color them.
2. Draw pictures of some common birds.
3. Make covers for primers. Use pictures of something in sanctuary. Some of the pupils will want birds, some squirrels, some flowers, and some frogs, etc.



The Dove is not insectivorous, but is a wonderful game bird, being extremely hard to kill and very good to eat. It is migratory and can be taken only in the fall as it moves South.

4. Make posters stressing protection of birds, animals, and plants.

D. Spelling:

Some of simple words used during the activity such as: bird, nest, egg, mother, eat, father, mud, winter, robin, cat, flower, seed, worm, kind, food, grass, and feed.

E. Writing:

Color bird outlines and paste them in a scrap book. Write the name of each bird under its picture. Write a short sentence under each picture stating some interesting fact about the bird.

F. Arithmetic:

1. Counting and comparing objects in sanctuary.
2. Measuring to build house and to make walk.

3. Combination of adding and subtracting numbers. (Use birds and other articles in sanctuary).
4. Arithmetical shapes from articles used in making the unit.
5. Ordinals. Draw an outline of a bird and number the parts, such as: No. 1—The bird's head. No. 2—The bird's back. No. 3—The bird's throat. No. 4—The bird's breast. No. 5—The bird's wing. No. 6—The bird's feet. No. 7—The bird's tail.

G. Elementary Science:
1. Migration of birds may be useful in teaching about seasons of the year. Through this we can teach the use of snow and ice.
2. Through the flowers around the rock garden we can study differences, and means of identifying flowers. Parts of plants can be studied here.
3. "Getting ready for winter" may be developed by showing that: a. birds migrate. b. frogs stay in ground. c. squirrels store nuts and sleep. d. mother cans fruit.
4. Take field trips. Look for birds. Identify those you don't know by pictures of birds mounted on paper to make a frieze around the room.

H. Social Studies:
1. Types of animal shelters contrasted with ours.
   a. Animals build their homes to have a safe place to rear their families. They love their homes as we love ours. Help them protect their homes.
2. A bird's nest is a nursery. Compare with nursery in your home.
3. Compare the way a mother bird feeds her babies with the way your mother feeds you.
4. Study what materials birds use to build their nests. Help them and the squirrels by putting string and hair where they can get it.
5. Discuss clothes of animals and birds.
   Birds wear feathers. Foxes wear fur. Compare with our clothes.

I. Health:

Teach cleanliness, correct diet, need for sleep, and need for air and sunshine by observing and caring for birds and animals.

J. Music:

1. Learn some songs about birds.

   Suggested songs:

   a. I Wish I Were A Bird—Music Hour—Second book.
   b. Robin's Rain Song—The Music Hour—Second book.
   c. The Woodpecker—The Music Hour—Second book.
   d. Feeding the Birds—Tuning Up.
   e. The Little Bird—The World of Music.

K. Physical Education:

1. Appoint a leader and let them take the birds South. Children follow leader and move their arms as a bird moves his wings.
2. Hop as our frog hops.
3. Play—Bird Catcher—(See, Book of Games for Homes, School and Playground—Borebush and Allen).

L. Objective Tests:

1. Cross out two words in each of the following sentences which do not belong there.
   a. Give birds (milk, water, coffee) to drink.
   b. The (tree, frog, cat) will eat birds.
   c. Birds like (seeds, candy, leaves) to eat.
   d. Birds (scare, hurt, help) the farmer.
   e. Children should (be kind to, hurt, kill) birds.
   f. Birds should be (fed, rocked, frightened) during the winter.
2. Fill in each with a word from the list below.
   a. The bluejay has a .....
   b. Almost all birds like to eat .....
   c. We should keep our ..... indoors in the early spring.
   d. We should never rob the nests of .....
   e. The cardinal is a beautiful ..... bird.
   f. The farmer should like the .....

   cats, birds, seeds, eggs, red, crest.

Suggestions for Other Lessons:

1. Soil—Discuss why it was necessary to look for suitable soil for our rock garden and why we could not use the sand and pebbles we used for the walk. In this way the child gets an idea of the value of soil and no child is too young to know that things of value should be properly used.

2. Flowers—In getting flowers for rock garden stress the idea of taking no wildflowers which are scarce.

EVALUATIONS:

Children should have learned:

1. The value of birds to them.
2. The appearance of some of most common birds.
3. To recognize songs of these birds.
4. How to help birds during the winter by feeding and giving them water.
5. How to protect birds from cats by feeding cats and keeping them at home at night.
6. To refrain from touching or destroying birds nests unless they are very old ones.
7. Simple relationships between animals, plants, trees, birds and soil.

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THE RACCOON.

The Raccoon is very valuable to the trapper and being very smart, gives the coon dog a good chase and affords the best of sport to the Coon Hunter.



GRADE 3

OUR PLANT FRIENDS

SPECIFIC AIMS:

1. To teach the children the value of plants and their importance to our wildlife.
2. To lead the children to see the beauty of flowers, and the need for protecting them.
3. To lead the children to see what our world would be without plants, animals, birds and fish.
4. To teach the interdependence of man, plants, and animals.
5. To create in the child such a love for trees that they will not want to bend, break, bruise, and destroy them, but preserve them for our fur and feathered friends.

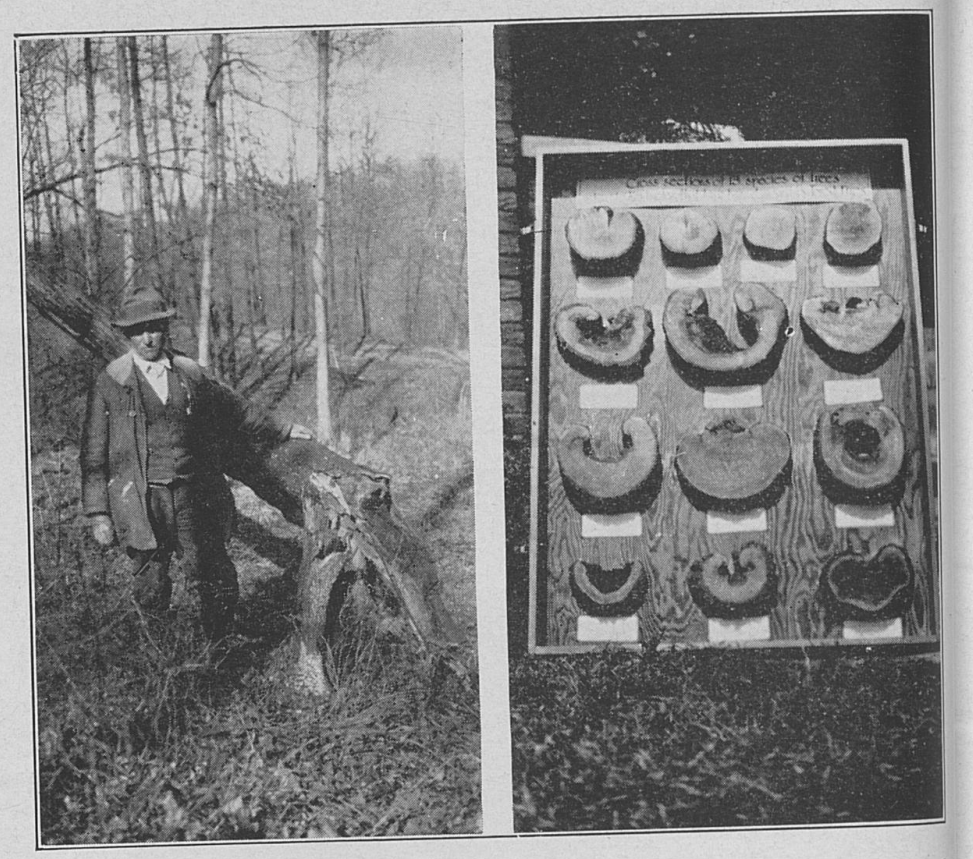
APPROACH:

Ragweed seed (as an example) scattered late in fall either by wind, birds or animals nestles down in the earth and sleeps through the winter. When spring comes Mother Nature sends the rains and the warm sunshine to awaken them. The seed sprouts grow through the summer to maturity, producing more seed. When autumn comes, bringing Jack Frost, the weed is killed, leaving the seed to be scattered again. This process goes on in all forms of plants and vegetation.

From the above and through observing and experimenting, these themes may be developed:

A. Why seeds need to be scattered.
   1. Plants would be too crowded to grow.
   2. Some places would have no plants.

B. How seeds are scattered.
   1. Birds eating fruit and dropping the seeds.
   2. Animals taking them from place to place and storing them.



On right is shown cuts of timber in which can be seen sound wood and wood that has been affected by blight and insects.
On left is shown defective timber which has been hollowed by decay and insect life until it has fallen over.

3. Wind blowing seed from one place to another.
4. Frost opening covers and releasing seed.
5. Man taking seeds from place to place to plant.
6. Running water carrying seeds that have dropped banks and streams.

C. Kinds of seed according to method of scattering.
1. Clinging.
2. Winged.
3. Those that fall to ground (Pods).

D. Use of Seeds.
1. Food for birds, man, and animals.
2. Clothes (Cotton and rayon).
3. Paper is made from cotton and wood.
4. Cork is made from bark.
5. Rubber is made from sap taken from rubber tree.
6. Shelter for man and animals (houses).

E. Seeds that children eat.
Wheat, corn, rye, rice, peanuts, wild nuts.

F. Seeds that children eat as vegetables.
Peas, corn, beans.

G. Soil: Use to seed. Use to us.

H. Interdependence.
1. Plants get their food from soil and air; animals including man, must depend upon plants for food.
2. Every seed contains a baby plant; we could not live if there were no plants.
3. Birds eat the insects that kill the plants, therefore, we protect the birds.
4. Trees protect birds. We protect trees.
5. Wild flowers give us pleasure, therefore, we protect the wild flowers.
6. We use some wild life faster than Nature can produce it, therefore, we must use less or produce more.

I. The Cycle of life from seed to seed should be explained in such a way that the children will see the need for protecting some flowers and plants in order that life may continue.

ACTIVITIES:

1. Field trips to gather seed including tree seed.
2. Make a chart showing: a. Seeds that fly. b. Seeds that cling. c. Seeds that fall to the ground.
3. Gather leaves—press and mount.
4. Learn to identify trees by leaves.
5. Make bags for seed exhibit.
6. Make posters showing the wild flowers that may be picked freely, those that should be picked sparingly, and those that must not be picked at all.
7. Organize Wild Flower Club—members pledge themselves to protect wild flowers.

SUGGESTIONS FOR INTEGRATION:

A. Art:
1. Draw a garden with a row of blue flowers, a row of red flowers, a row of yellow flowers. Draw a boy hoeing the garden. Draw a little girl with a watering can. Draw the sun shining on this garden.
2. Make a sheet for booklet showing cycle of life from seed to seed. To do this, divide paper into eight squares.



in square 1—Write at top of square, 'we first take our seed. Draw seed.
in square 2—Write, "Plant it in the ground," Draw picture of seed and soil at bottom of square.
in square 3—Write, "The rain comes down." Draw picture of seed, soil and rain.
in square 4—Write, "The sun shines on it." Draw picture of seed sprouting, soil and sunshine.
in square 5—Write, "Then a plant comes up." Draw picture of plant and soil.
in square 6—Write, "Buds and flowers come, too." Draw picture of plant with buds and flowers and soil.
in square 7—Write, "The flower turns into a pod." Draw picture of plant with a pod and soil.
in square 8—Write, "Once more we have seeds." Draw picture of three or four seeds.

3. Posters stressing protection of plants.

B. Arithmetic:

Written problems such as:

1. Richard has a garden plot. It has 7 short rows and 4 long rows. How many rows in all.
2. Ann had 11 roses. She gave 6 to her teacher. How many roses has she left?

C. Elementary Science:

Experiments:

1. Plant beans and watch plants develop.
2. Make simple study of soil. Compare clay with rich top soil. Put some clay into a pan. Pour water in it. Put top soil into pan. Pour water on it. See what becomes of water. Now put clay in the bottom of the pan with the top soil above. Lead the children to realize that both kinds of soil help when in the right place. The water can't reach the roots of plants through clay when it is on top of good soil. Clay holds the water and plant food to the roots when it is under good soil.
3. Put some soil in a pan and pour water on it. Watch what happens. Now put sod on the soil and pour water on it. The child will see from this experiment how roots hold soil. He sees, too, another need for conserving trees and plants as well as soil.

D.

E.

F.

G.

H.

4. Plant two plants of the same kind, one in clay and one in rich black soil. The children will learn from this that plants do not grow well in clay but must have rich soil.
5. They found that plants must have plenty of light and air to grow. This was illustrated by planting seeds in flower jars and placing one jar in window sill and the other in a dark closet.
6. Study weather vane. Keep weather chart and record direction of winds. Learn which winds are warm, which cold, which wet, and which dry. Show how these winds effect plant life.

D. Health:

1. Show how plants give us both fruits and vegetables.
2. Make health poster showing fruits and vegetables which give a balanced diet.
3. Compare our need for sunshine and water with plant's need for them.

E. Language:

1. Diaries. The children express for themselves the important happenings in our study and record of them.
2. Poems about seeds and flowers.
3. Letters to seed companies ordering seeds.
4. Going to other classrooms and telling about our work.

F. Music:

Learn songs about plants.
Suggested songs:

1. A Flower Song—The Music Hour—Book III.
2. Flowers and Birds—Rhythms and Rimes—The World of Music.

G. Physical Education:

Sugested games: See The Book of Games for School, Home and Playground—Forebush and Allen.

H. Reading:

1. Make booklets.
   a. Stories of seed as told by children.
   b. Stories of trips to gather seed.
   c. Group experience stories.
2. Read stories about seeds.
3. Reading Activity.

I. Social Studies:

1. Make butter and cottage cheese. Explain how plan give us both.
2. Make chart showing seeds and plants you eat.
3. List seed and plants that cows eat.
4. Show through pictures and conversation the relatio ship between eggs and plants.
5. Name some plants that we grow in our garden.
6. What animal gardeners help us? (It amuses childr to think of birds, earthworms, and animals gardeners).
7. When people work for us should we pay them? If s we should pay our animal gardeners by feeding a protecting them.
8. Show how plants give us shelter. Trace a tree from acorn to a house.
   a. Acorn makes tree.
   b. Tree makes wood for house.
9. Bring to school pieces of cotton cloth and rayon a silk. Show how plants have given us this cloth fr which we make our clothing. From these studies a experiments the child will see what he owes to the pla and animal world and he will want to protect them.

J. Spelling:

Words used during the activity such as: seed, pla garden, butter, cotton, rayon, soil, water, sun, air, flowe leaves.

K. Word Game:

How will you use each word?: soil, plant, weeds, birds, a food, wind.

1. Dandelion seeds travel with the .....
2. People do not like some plants and they call them .....
3. .....carry seeds all over the world.
4. Every seed contains a baby .....
5. Plants get their food from ..... and .....
6. Man and animals depend on plants for .....

EVALUATIONS:

Children should have learned:

1. Value of plants to them, birds and animals.
2. To save some flowers to make seeds.

3. To protect trees, birds and soil.
4. Part water and sunshine play in plant life.
5. Names, appearance, and use of common trees. Common flowers.
6. To name and know our state flower.

Birds and animals that are particularly affected by plant life are both Game and Song and Insectivorous species of birds and some game animals.

Game birds living on plant life are the Bob White Quail, Dove, Turkey, Ruffed Grouse and Wild Ducks and Wild Geese, Snipe and Woodcock.

Game animals living on plant life are the rabbit, ground hog and deer.

●

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The tree is man's friend and is the home of our wildlife.



GRADE FOUR

THE TREE, MAN'S FRIEND AND NECESSARY TO THE WILDLIFE

General Objective:

1. To show how man depends upon the tree. How wildlife depends upon it.
2. To show how the manner of living in Kentucky is related to the natural environment, of which the forest is an importnat part.

Specific Aims:

1. To show that trees provide shelter and fuel for the child.
2. To show that some food and clothing comes from trees.
3. To show the relationship of trees to various lines of work in Kentucky.
4. To teach some of the fundamental knowledges about a tree.
5. To show that trees provide food and shelter to birds and animals, many of which are valuable to man.
6. To show that a forest is a community of interdependent trees, plants and animals.
7. To create understanding of how man and fire are principal enemies of the forest.
8. To teach boys and girls that they can and should assist in conservation of forests.

Approach:

A. Reading of the story, "The Tinker Plants a Tree," from Elson-Gray Reader, Grade IV, by either teacher or children, can lead to discussion of this statement: "Only God makes trees, but sometime we can help."



Timber like that pictured above furnishes various kinds of materials for man, homes for our fur and feathered friends and also bears nuts and other foods for the wildlife.

Questions following:

1. How can we help?
2. Why did Tinker plant the tree?
3. Tell how Tinker made the whistle.
4. List ways in which trees are useful to us and to our fur and feathered friends.

B. Another approach may be made by reading the poem "Trees," by Joyce Kilmer. Use it as a memory lesson.

C. Discuss China as a land where forest conservation was not practiced. Mention that ages ago there were large forests there. The trees were cut down. Nobody thought to plant new ones. No laws were made to protect the forest. In time almost all trees were gone. Today China is a poor land. It is a land of flood and famine. Thousands of people have starved to death, and in great part because they did not protect forests, soil, water, game and fish. Why is this true? What lesson can we in Kentucky learn from this?

Suggested Outline for Study of a Tree:

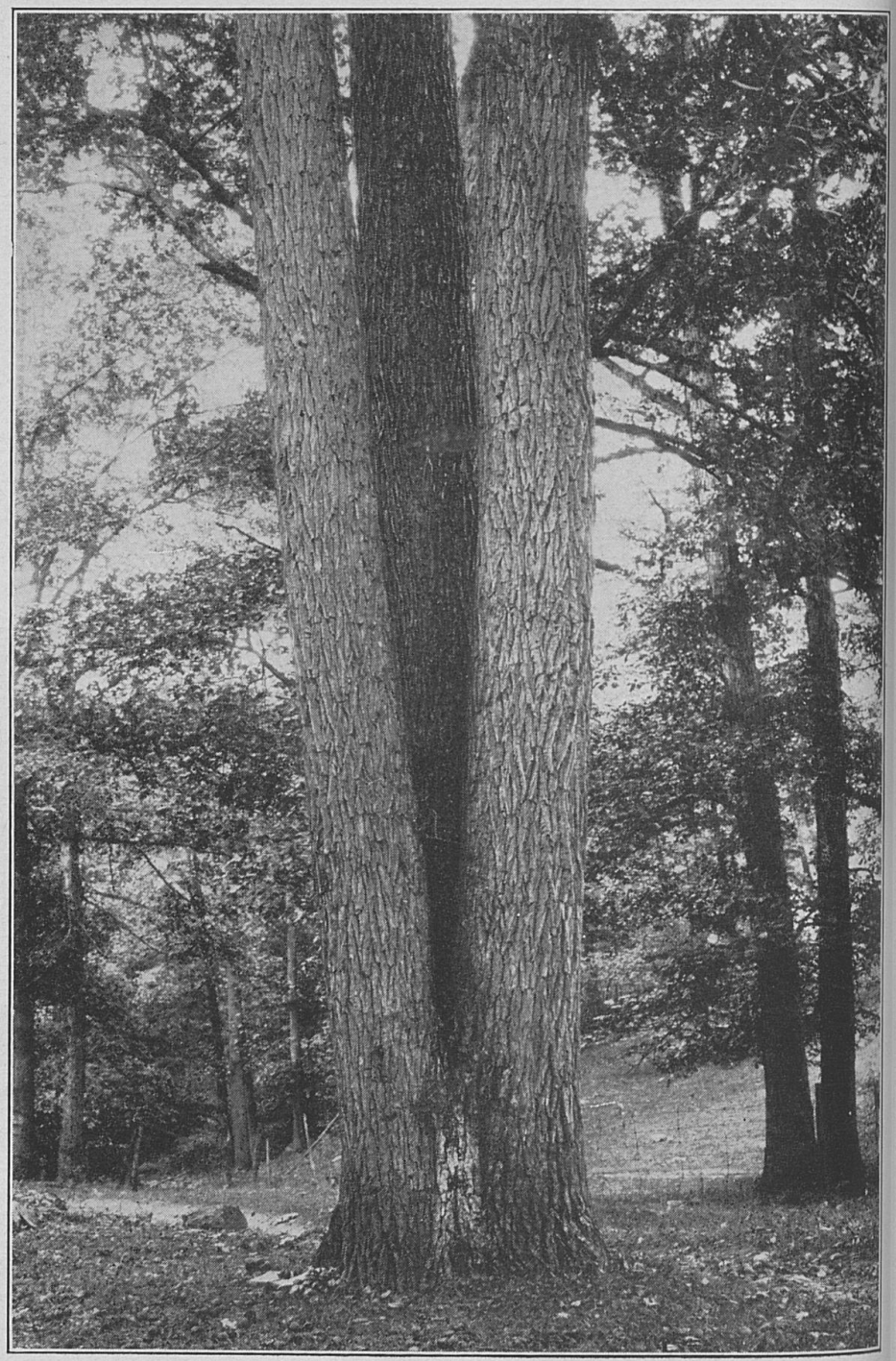
1. Parts—roots, trunk, branches, leaves, buds, flowers, fruit.
2. How trees grow—tips of branches, tips of roots, inside growth rings. How does a tree breathe, combat disease and decay, throw off waste material?
3. Seeds—how dispersed; sprouts from roots.
   a. Compare oak and pine.
4. Sources of food—air, water, soil.
5. How food is utilized—through leaves, roots, and aid of rain and sunshine.
6. Trees sleep in winter—why leaves change color, why tree loses leaves.
7. How to know trees—general appearance, bark, branch spray, winter buds, leaves, fruit and seed, wood.
8. Uses of trees:
   a. Homes and shelters for birds and animals.
   b. Source of lumber for buildings and homes, furniture, telegraph and telephone poles, mine props, rayon cloth, paper, and hundreds of other uses.
   c. Beauty and recreation:
      1. Scenery. 2. Parks. 3. Picnic grounds. 4. Hunting, fishing.
   d. Soil and water conservation—rain runoff, soil erosion.

Suggested Outline for Study of Forests:

1. What is a forest? A community of trees living together as a group of people living in a town.
2. Functions of the Forest:
   a. Forest crops:
   1. Timber—wood for construction, fuel, furniture, paper, mine props, etc.
      a. How crop is harvested—compare to corn, potatoes.
   2. Fruits, nuts, berries.
   b. Home for Wildlife:
      1. Animals, birds.
      2. Shrubs, vines, plants, grasses.
   c. Soil maker.
   d. Water control.
   e. Outdoor recreation.

The tree is man's friend and affords him many useful materials an at the same time the tree is necessary to the existence of our wildlife.

No. 1 shows a stand of virgin timber. No. 2 shows the same trees after t lumberjack has worked on them with the axe and cross-cut saw, and loaded them railroad cars to be carried to the mill. No. 3. Some of the saw logs are carri to the mill by water in the form of huge rafts while No. 4 shows logs stacked in t mill yard ready for sawing. No. 5. Shows a typical saw mill on the shores of o of our Kentucky streams. No. 6 is a view of smaller timber used for pulp wood a No. 7 shows cut timber stacked and ready for manufactured materials.



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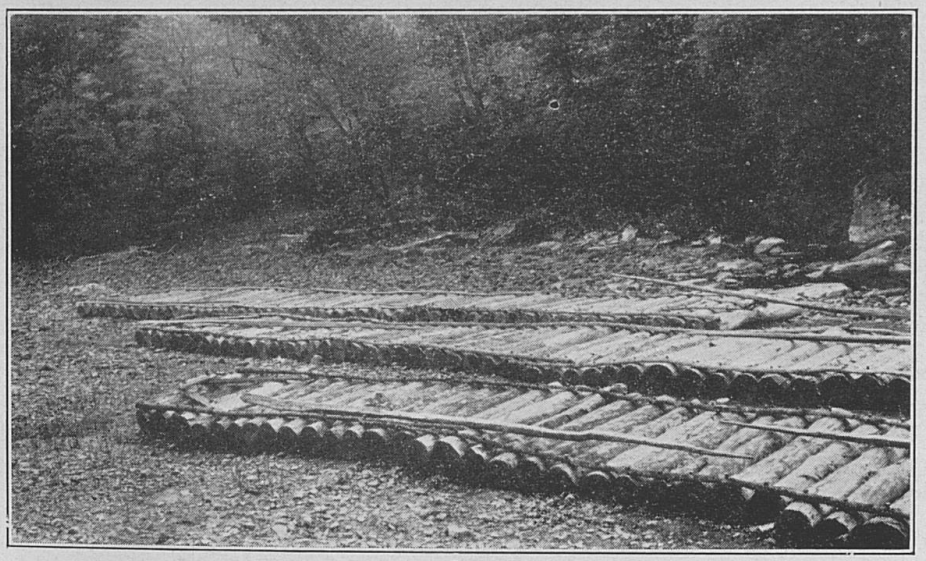

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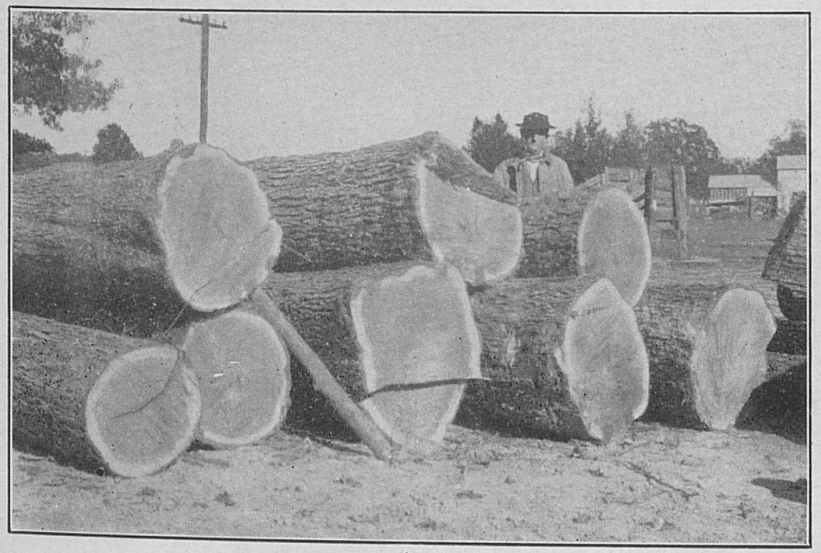

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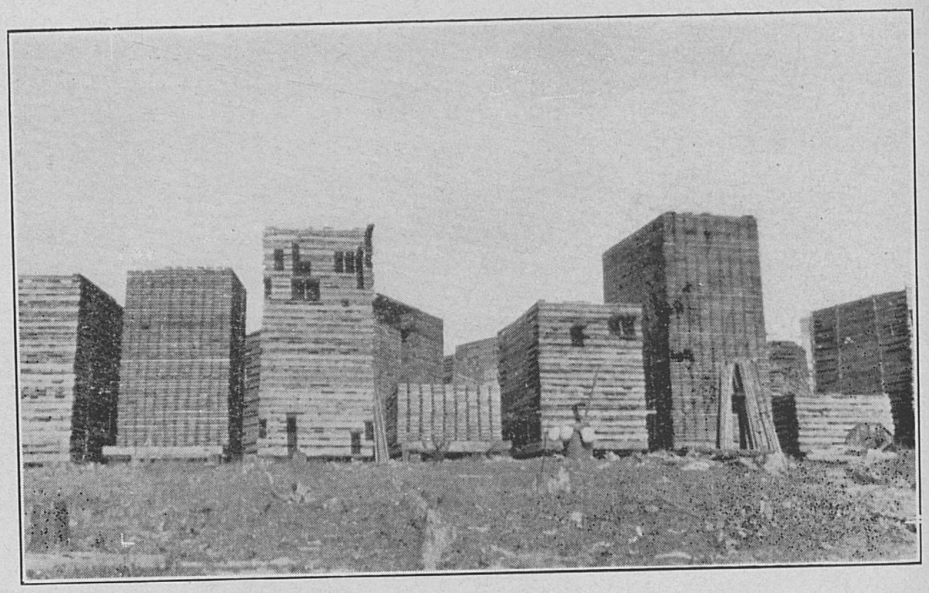

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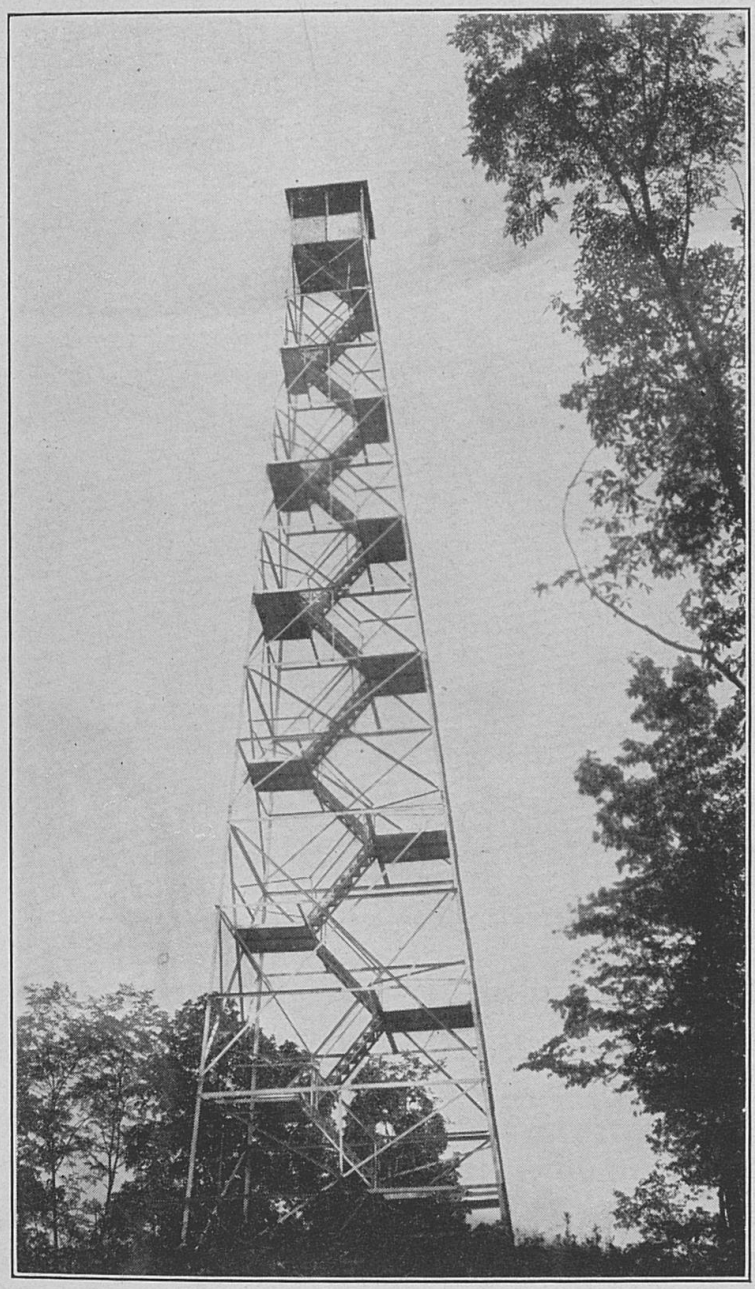
3. Enemies of the Forest:
   a. Man. b. Fire. c. Insects. d. Disease. e. Lightning and other natural elements.

4. How can we preserve our forests?
   a. Prevent forest fires. Safety rules for camp fires. Cigarets and matches, brush burning.
   b. Use forests carefully and wisely.
   c. Plant trees—Observe Arbor Day.
   d. Work of Kentucky Conservation Commission, including Division of Game and Fish; Division of Forestry, and Division of Parks.
   e. Work of CCC.

Suggested Activities:

1. Perform an experiment which shows the plant leaves need sunlight.
2. Read more about the greenleaf factory and make a drawing to show how the factory works.
3. Find new growths at the ends of branches.
4. Count the growth rings on a freshly sawed log.
5. Find out what kinds of trees grow on your lawn at home.
6. Watch a tree in your schoolyard or at home, as spring comes, and make a list of things you see happening to it.
7. Describe all the evergreen trees near your school or in the community.



Nineteen towers like this one at Putney help the Division of Forestry protect private timberland in Southeastern Kentucky from **Fire.**

8. Name two softwood and two hardwood trees.
9. Find out five trees which bear nuts. Name uses of nuts to man, wildlife, plant life.
10. Look for pictures of seeds of trees.
11. Draw a tree and show its parts.

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12. Write a story about a tree and what happens to it through the year.
13. Prove that branches of trees grow in length.
14. Find out how to care for a tree that has just been planted.
15. Visit a tree nursery if possible.
16. Make a list of all the things you have used today that are made of wood.



What living thing can survive on a burned waste like this?

17. Make a set of rules that would help prevent forest fires.
18. Look through the daily papers for accounts of forest fires.
19. Read how forest fires are fought and how prevented. (Information in written form may be had by writing the Division of Forestry, Frankfort, Ky.)
20. Make posters about trees, and forests, and fire prevention.
21. Make a chart on a large sheet of paper and try to show the following things about a tree:
    a. All the important parts of a tree.
    b. Where the food comes into the tree.
    c. Where the tree grows. (Color the places read.)
    d. What goes on inside the leaves.
    e. Where the food is stored. (Color places green.)
22. Learn to render first aid to persons injured on the playground. Then ask some Tree Surgeon to teach you to render first aid to an injured tree.

23. Visit a woodland and become acquainted with trees in your community.

24. Find where Kentucky's first forests were and where the forests are now. Learn what kind of forests there are—hardwoods, softwoods, mixed—and where the different kinds of trees like to grow as to elevation, climate, soil. What kinds grow together? What effect has the change in forests had on our wildlife resources?

SUGGESTIONS FOR INTEGRATION:

A. English Art:

Write a paragraph about a tree and illustrate with a drawing.
Draw trees such as pine, cedar, oak, maple, apple, etc.
Find and mount pictures of pretty trees found in our state.
Trace leaves of different kinds. (Compare.)
Learn a poem about a tree and say it to the class.

B. Spelling Suggestions:

Learn pronunciation and meaning: bark, branches, nests, annuals, community, moist, market, evaporation, survive, perennials, conserve, body, yule-log, furniture.

C. Science:

1. Look at the bark, leaf and height of the trees around you. Compare the tallest tree with the tallest boy you know. Are some trees short, fat, lean, pretty, ugly, good and bad?
2. When do plants grow—can you tell why you grow as fast in winter as you do in summer?
3. What three things do trees need to make them grow? What do you need? What three places do plants store their food? (Roots, stems, buds.)
4. Why do trees and bushes do most of their growing in the early summer?
5. Who takes care of the trees? Does the tree have a mother as you do?
6. Measure the trees near your school. Which tree is largest in circumference, in height?
7. Form an After-School Outdoor Club. Take walks or hikes. Exercise and knowledge of nature (trees) will result. Look for flowers of seasons. Describe all trees at time of year. Collect one fruit of as many trees as possible.

8. We eat good food to gain weight and height. How do trees gain in width and height?
9. List ways we can make it safe for trees to live. List safety rules for boys and girls.
10. Name some safety rules in climbing trees.
11. Make a list of things you will do when you build a campfire or any other kind of fire.
12. In Safety Club discuss trees and how their enemies are sometimes our enemies.
13. Find as many trees as you can with bark so different that you can tell them from other trees. How many of them were the ones you read about?
14. Discuss types of trees found in our state.

Questions for Study:

1. How could a squirrel plant a tree?
2. How are tree seeds scattered?
3. What is the oldest of living things?
4. How does a tree grow?
5. How many kinds of trees are there in Kentucky?
6. How is a tree a factory?
7. Why do trees shed their leaves? Do all trees shed their leaves? (Yes, discuss.)
8. What is a forest?
9. Do trees make soil? (Yes, discuss.)
10. What does a tree need in order to live? and grow? What do we need?
11. Why are outside leaves of the tree the prettiest?
12. What can boys and girls do to prevent forest fires?

Resolutions to Carry Out:

1. I will not knowingly do anything that will injure my body or weaken any of its organs. I will do the same with all growing things.
2. I will respect my body and keep it pure.
3. I will obey the laws of health and the laws of conservation as it has to do with things of nature—trees, plants, birds, animals, fish, soil and water.



Young rabbits destroyed by fire.

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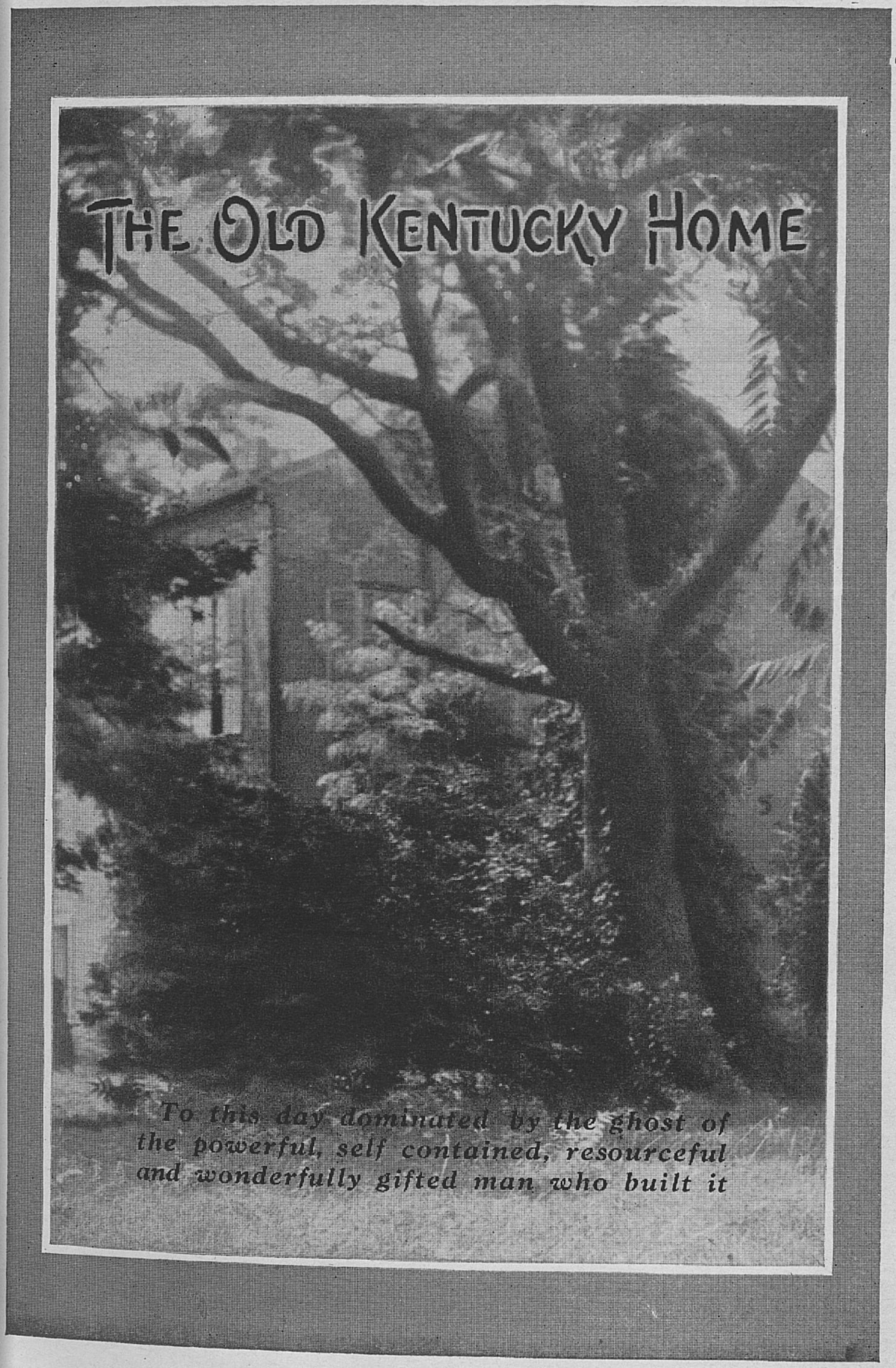
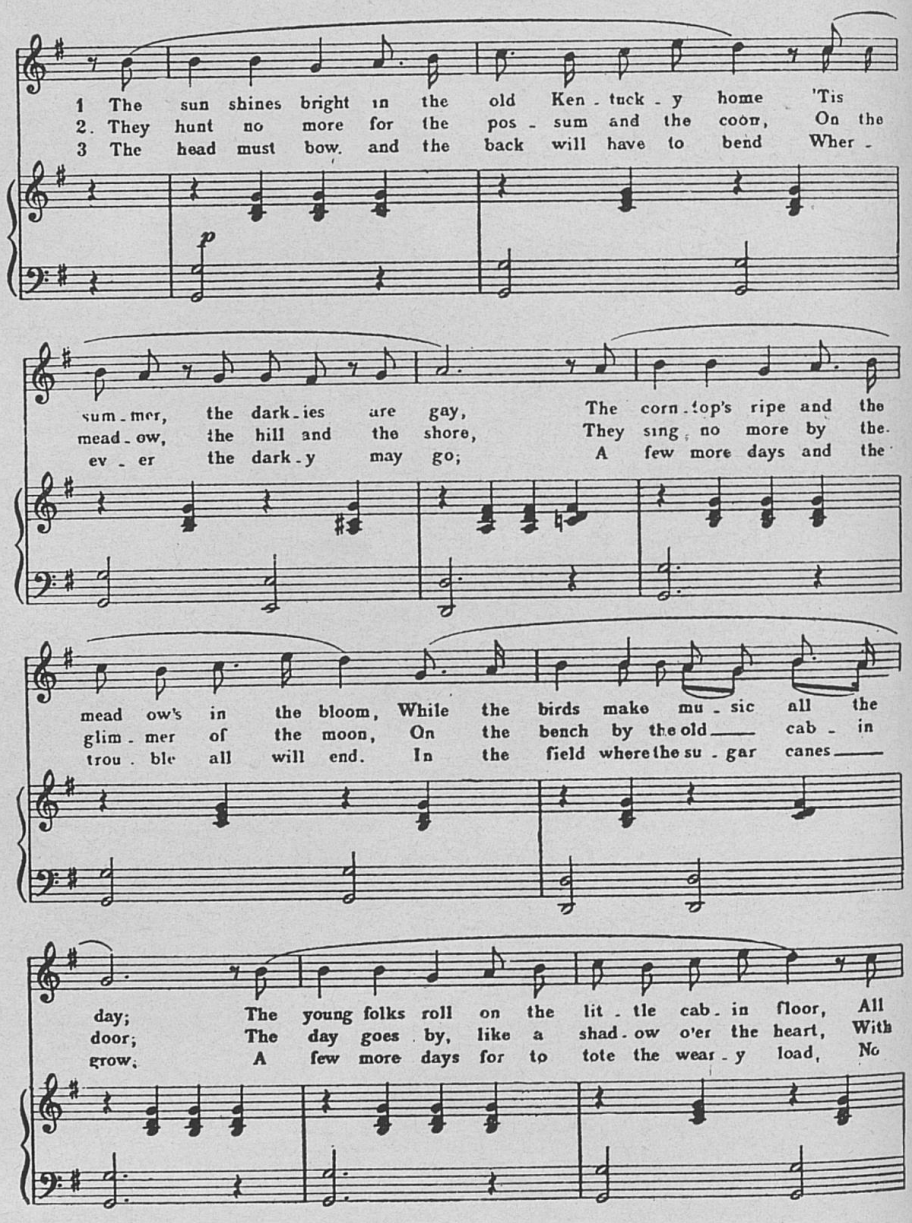
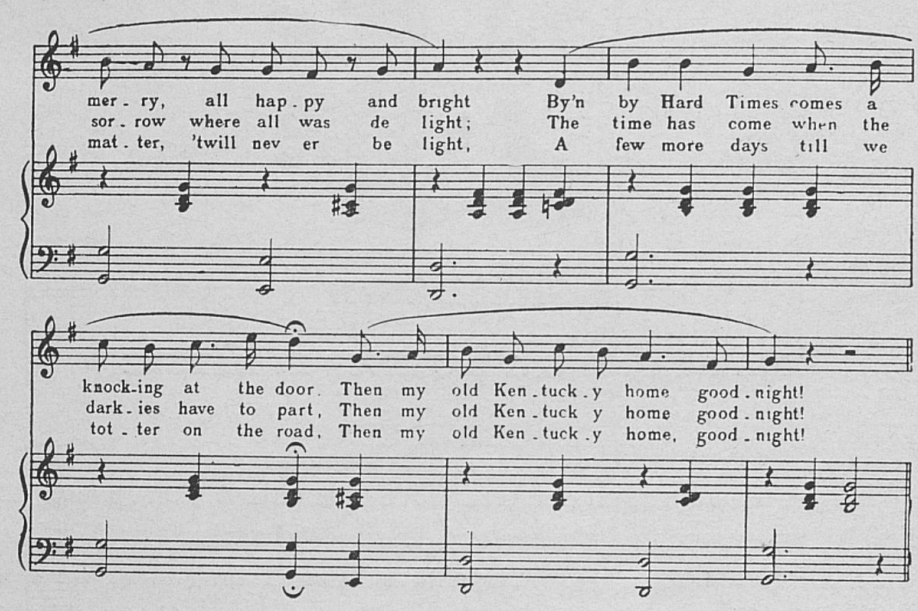
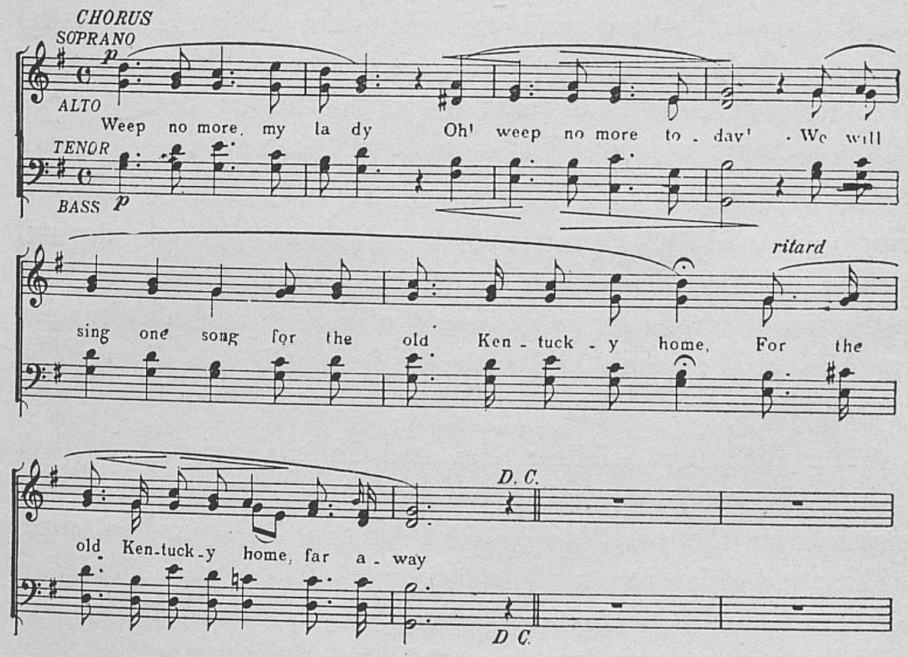

THE OLD KENTUCKY HOME
To this day dominated by the ghost of the powerful, self contained, resourceful and wonderfully gifted man who built it


1 The sun shines bright in the old Ken - tuck - y home 'Tis
2. They hunt no more for the pos - sum and the coon, On the
3 The head must bow, and the back will have to bend Wher -
p
sum - mer, the dark - ies are gay, The corn - top's ripe and the
mead - ow, the hill and the shore, They sing no more by the
ev - er the dark - y may go; A few more days and the
mead ow's in the bloom, While the birds make mu - sic all the
glim - mer of the moon, On the bench by the old cab - in
trou - ble all will end. In the field where the su - gar canes
day; The young folks roll on the lit - tle cab - in floor, All
door; The day goes by, like a shad - ow o'er the heart, With
grow; A few more days for to tote the wear - y load, No


mer - ry, all hap - py and bright By'n by Hard Times comes a
sor - row where all was de light; The time has come when the
mat - ter, 'twill nev er be light, A few more days till we
knock-ing at the door. Then my old Ken - tuck - y home good - night!
dark - ies have to part, Then my old Ken - tuck y home good - night!
tot - ter on the road, Then my old Ken - tuck - y home, good - night!


CHORUS
SOPRANO
p
ALTO
Weep no more, my la dy Oh! weep no more to - day! We will
TENOR
BASS
p
ritard
sing one song for the old Ken - tuck - y home, For the
D. C.
old Ken-tuck-y home, far a - way
D C.



GRADE FIVE

MAINTAINING A BALANCE IN NATURE

FOREWORD

In previous grades children have recognized that plants and animals live in many habitats and that certain plants and animals are found living together. They have learned that there are close relationships between plants and animals and that all are essential for the continued existence and prosperity of mankind.

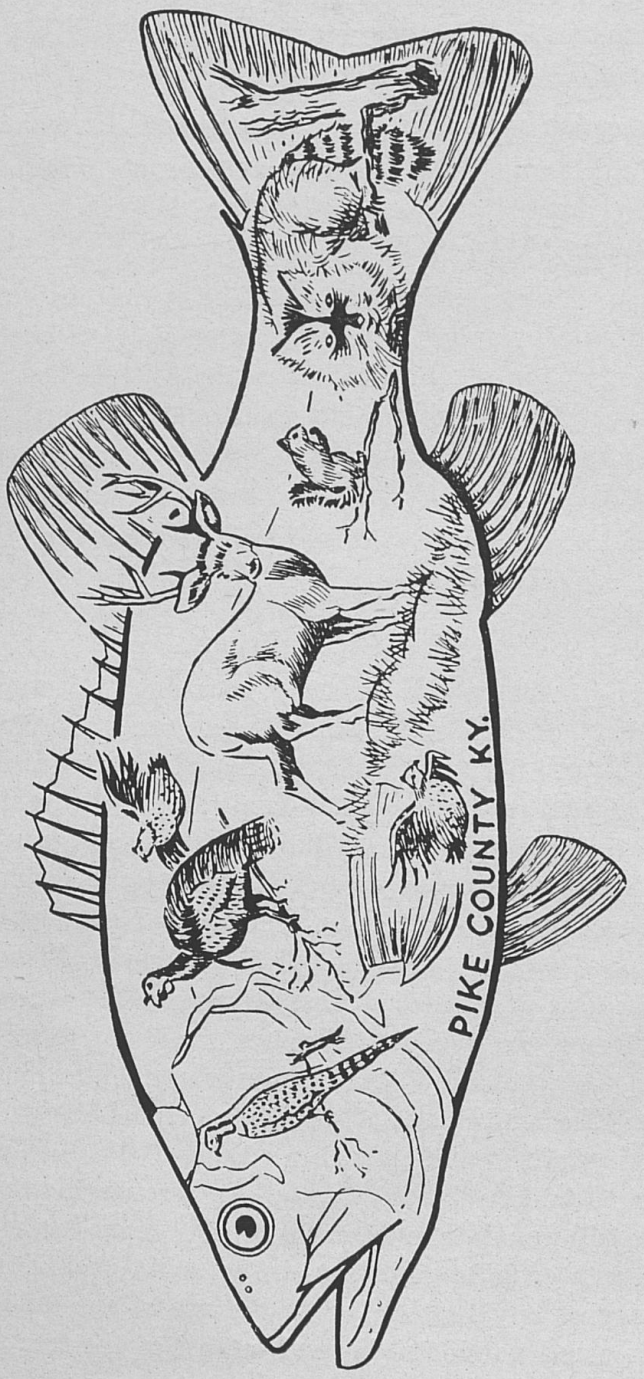
With the settling of Kentucky the balance of nature of that day was disturbed. Birds and animals were driven out or killed. With the number of birds reduced, insects feeding upon crops had an unusual opportunity to increase and so the farmer found it necessary to do something to protect his crops from the insects.

Many children have an opportunity to destroy or promote the growth of wildlife. Sometimes the opportunity comes during the summer vacation, sometimes at other seasons. It may be that the destroying of bird eggs, or the homes of mother animals, the unnecessary killing of animals and such; or it may be the discouraging of such practices.

The difficulty wildlife has had in maintaining its balance against the onset of civilization should be clearly presented with emphasis on the privilege humans have of safeguarding creatures needing protection. Many boys fish out of season, use a gun in killing any form of wildlife they see, employ cruel methods of trapping and participate in other undesirable practices. Such destructive practices should come to light naturally. If the children have a background of information, it may change their thinking.

General Objectives:

1. To learn that there is a natural balance in nature and what it means.
2. To show that man affects this balance.
3. To train boys and girls in some basic things which can be done to maintain this balance.



The Pike County Game and Fish Club is active in all phases of Wildlife Conservation.

SPECIFIC AIMS:

1. To show that interrelation of plants and animals.
2. To show that man has become the determining factor of environment for plants, animals, birds and fish.
3. To know the importance of obeying nature's laws.
4. To know the importance of using wild flowers and plants in the most economical manner.
5. To understand the importance of protection and careful use of wildlife and forests.
6. A question such as this should stimulate discussion:

   "If a little owl is killed, what will this do to red clover in the fields?" or "How does the little owl help the red clover fields to bloom?"

Discussion can gradually bring the following chain relationship which is a simple example of interdependence, or the balance in nature. Red clover is pollinated by the bumble bee. It cannot reproduce otherwise. The bumble bee deposits its larvae in the ground, from which the young bees emerge. Field mice eat the larvae. The owl eats the field mice. Now, if the owl should be killed in such quantity that the field mice will have no check upon their growth, there will soon be so many field mice that all the larvae of the bumble bee will be eaten, there will be no bees to pollinize the red clover, and the farmer soon will have a lost agricultural crop.

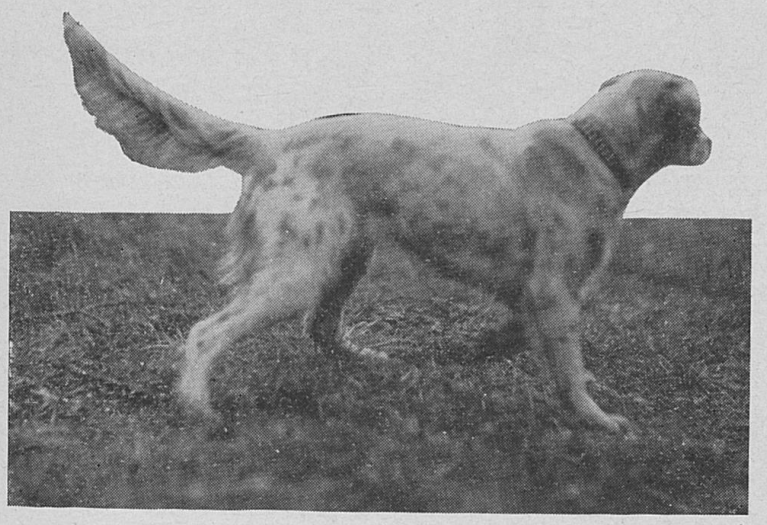
2. From an elementary survey of Kentucky's uses and development of natural resources, a composite picture of natural relationships can be built. Material from this description may be useful:

When the first settlers came to Kentucky they found the woods, fields and streams filled with wildlife. That was the reason the Indians called the Bluegrass state "The Happy Hunting Ground." These conditions represented nature in a balanced form. The first settlers depended largely on this wildlife for their existence.

An early user of Kentuky's usable renewable natural resources went his own way, dealing with his own particular phase of the outdoors, careless of the toll taken in the existing abundant resources and wildlife. The lumberman often was interested chiefly in "cutting out and getting out," and gave little thought to the future of the men working for him after all the timber would be exhausted. He knew that it would take from 80 to 100 years for the seeds and young sprouts to grow to sufficient size to again produce saw-logs, so he did not expect any further profitable use of the land during his lifetime. He cared not if fire burned out all of the tree seeds.

The fisherman and hunter had no worries, for the supply of all species seemed inexhaustible. Thus, though they killed grown squirrels prematurely, leaving the young, which could not get out of the nests, to starve, there were plenty of squirrels that hunters never sighted and the supply to all appearances was ever bountiful.

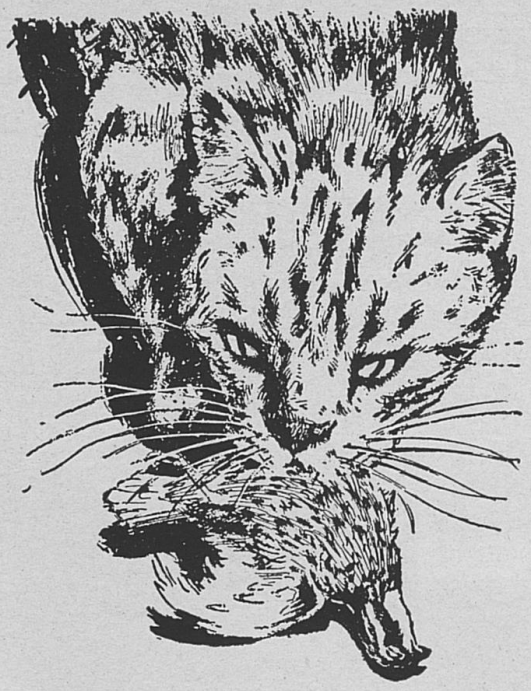
The first few made no great impression on the supply of these resources, but as more people came to these lands, many following the same course, natural forces renewing trees and wildlife could not keep up with him. The supply began to fall short of the demand.



A BIRD DOG ON POINT.

Gradually men came to realize that wildlife does not belong to the person who can kill the most, but to the people as a whole. They recognized the man who caught ten times as many fish as he could use was cheating someone else of a chance to catch fish; the man who killed squirrels too early in the year and thereby left baby squirrels to die in their nests not only robbed his neighbor of sport and food, but deprived his children of the sport they would naturally expect on reaching the age when they could take part. The person who formerly bragged about killing entire coveys of Bob White Quail while they huddled on the ground no longer goes around telling of such deeds as the citizens of today frown upon such actions taken by the so-called "sportsman."

Regulatory measures gained headway, but lovers of the outdoors found they were insufficient. Laws restricted the hunter and fisherman but did not prevent the supply from dwindling even faster. Then came the realization that the fate and the future of forests, which provide the homes and food for wildlife, must govern the fate



Public Enemy No. 1 of the game and song birds is "Old Tabby," the house cat. All game authorities agree the roaming house cat is a constant blood-thirsty killer of our smaller species of wildlife.

It is true that one, or possibly two cats around the farm, if properly controlled, may be considered useful in destroying rodents, but often the damage done by the destruction of birds by a single house cat far exceeds the little good they may do in catching mice.

Discourage the keeping of cats on farms and destroy everyone that you can conveniently. No bird lover will ever be convinced a cat is of any actual value.

of birds, fish and animals. A slow change in attitude and policy came during the early years of this century. The sportsman took more care to prevent forest fires, cooperated more with the landowner, and the forest owner took more interest in the requirements and desires of the sportsman. Today, the conservation policy of the state of Kentucky is based upon these two principles:

a. Game animals and birds belong to the people as a whole.

b. The welfare of forests, fish, game and outdoor recreation is interdependent.

A study of the operation of the field divisions of Game and Fish, Forestry and State Parks of the Conservation Department shows that while each Division has a definite sphere of activity, each contributes greatly to the attainment of objectives by the other.



QUAIL RELEASING IN KENTUCKY.

Thousands of quail are released in the fields of Kentucky each spring by the Division of Game and Fish and by the sportsmen of the state. Above is a picture story of this distribution.

The necessity of recognizing such principles is shown by the increased demands the greater population of today makes upon these resources. In the year 1912 only 40,000 persons purchased hunting and fishing licenses in the state of Kentucky while in the year 1939 200,000 persons secured their licenses to hunt in the woods and fields of the state and to fish in the public waters. In addition, many thousands of others find economic and aesthetic values in the outdoors.

Then, too, places where wildlife can find adequate food and shelter are considerably less in number and smaller in extent today than they were 75 years ago. Development of new farm land, expansion of industry and cutting of timber has reduced forest area suitable for wildlife.

This lack of regard by man for nature's inexorable laws has in many cases caused an upset in the original balance of nature. The present day problem is to learn what men, women, boys and girls can do to maintain the balance. This knowledge must be based upon understanding of primary relationships and effects in nature.

Outline of Study:

Although the term wildlife embraces wild plants and animal life including trees, shrubs, vines, grasses, weeds, wild flowers, mammals birds, fishes, reptiles and insects, the emphasis in this study has been made upon wild animal life. The role of plants in this inter dependence, or balance of nature, cannot be ignored. However, for this grade level, it is believed that an approach from animal life is most suitable.

A. Wildlife:
   1. Of fields and forest:
      a. Animals—fur bearers, game, rodents.
      b. Birds—song and insectivorous, game, scavenger predatory
      c. Reptiles—Lizards, turtles, snakes.
      d. Other forms—worms, insects.
   2. Of water:
      a. Fish—predatory, rough, game.
      b. Mollusks—snails, mussels.
      c. Crustaceans—crayfish and associated forms.
      d. Lower forms — invertebrates and microscopic organisms.

3. Of land and water:
   a. Amphibians—frogs, salamanders, newts.
   b. Reptiles—snakes, turtles.
   c. Birds—dabbling, diving, wading.
   d. Animals—mostly fur bearers.

B. Extinct or near extinct species in Kentucky. Examples: Passenger pigeon, buffalo, beaver, bear.

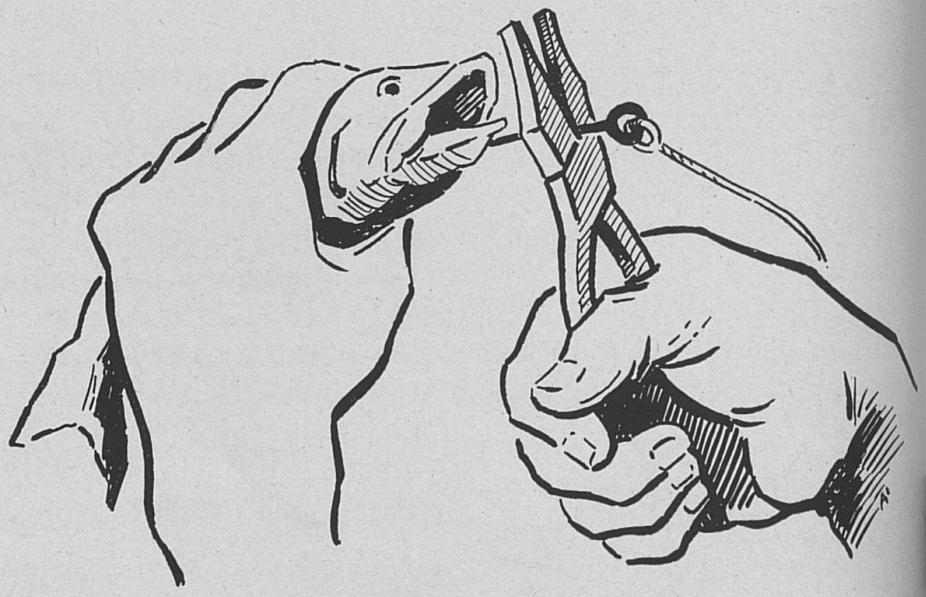
C. Things which helped to bring about unbalancing of nature:
   1. Natural occurrences:
      a. Disease. Examples: Rabbit fever and blights on trees.
      b. Loss of range and lack of food for wildlife.
      c. Parasitic invasions. Ex.: Dutch elm disease.
      d. Predatory influxes.
      e. Climatic variations. Ex.: Severe winter, drouth.
   2. Man-influenced factors:
      a. Uncontrolled hunting and fishing.
      b. Fluctuations of fur markets and prices.
      c. Forest fires and grass fires.
      d. Introduction of exotic species. Ex.: English sparrow, starling, Japanese beetle, Mediterranean fruit fly.
      e. Extermination of a predatory or game species.
      f. Stream pollution.
      g. Industrial and agricultural encroachments
      h. Concentration of human population.
      i. Unsound forestry practices.
      j. Soil Erosion.
      k. Introduction of unnatural predators by man (cat and dog).

D. Factors helping to restore and maintain a balance in nature.
   1. Natural factors:
      a. Plant succession. Bare ground, lichens, mosses, shallow weeds, larger weeds, trees using much sunlight, forest trees, underbrush and shrubs.
      b. Resistance of species to harmful influences, such as overcrowding, overshooting, disease.
      c. Wilderness areas, or remoteness of habitat from roads, agriculture and other encroachments of man.
      d. Adaptability of species to environment.

2. Man-influenced factors:

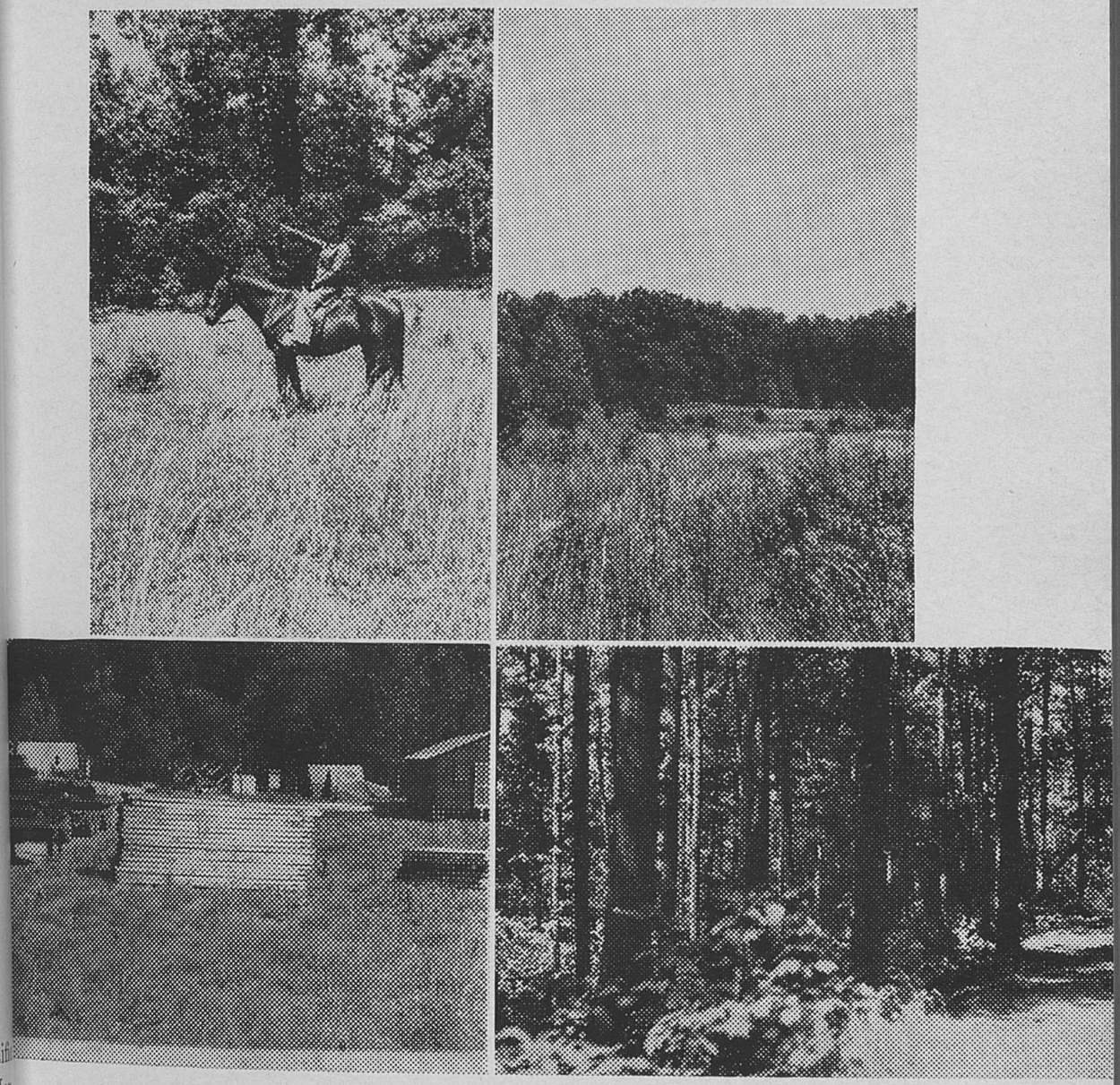
   a. Conservation laws.

      1. Bag and creel limits.
      2. Open and closed seasons.
      3. Forest fire protective laws.
      4. Penalties for violations, i.e., law enformecent.



   b. Conservation practices.

      1. Game and fish management.
         a. Refuges.
         b. Environment improvement.
         c. Spawning grounds and feeder streams.
      2. Good sportsmanship.
      3. Restocking and propagation.
      4. Recognition of native biotics, or specifi environment. Ex.: Dix Dam, forming Her rington Lake, while a factor in flood contr and water power, also transfers running strea to lake with a consequent change in habitat fo acquatic life. This creates a change in nativ biotics.
      5. Wise land use:
         a. Utilization on basis of suitability as dete mined by relief, contour (bottom land steep slopes, ravines) climate and soil.



Views of parts of 2,000-acre game restoration unit in Pike County operated by Division of Game and Fish through aid received from funds derived from Federal Government as result of Pittman-Robertson Act in Congress.

b. Scientific cropping.

c. Use of fertilizers.

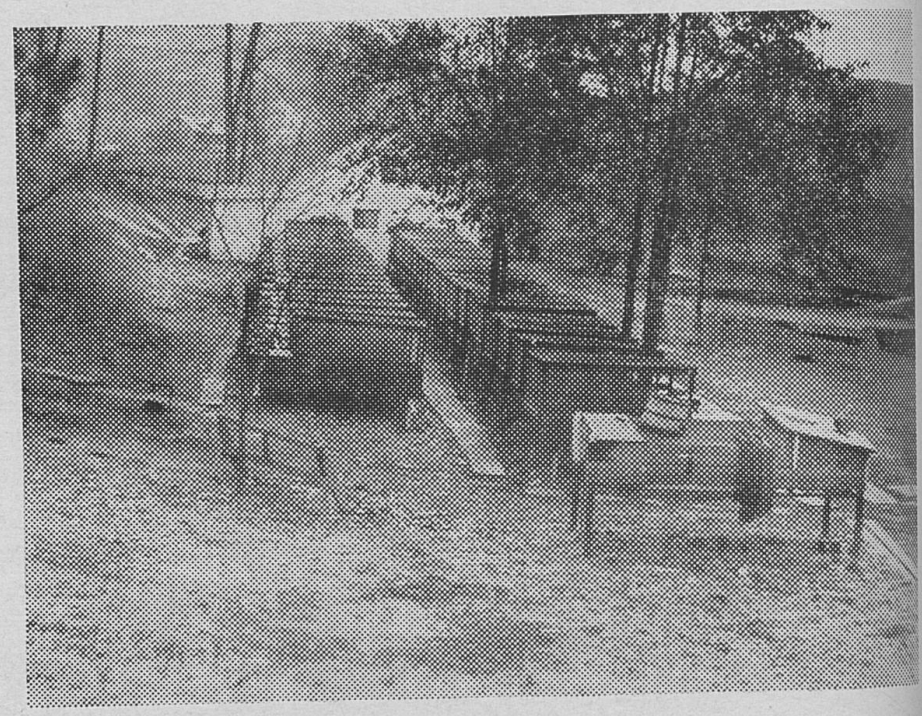
d. Prevention of erosion.

6. Sustained yield of forest products by wise forestry practices.

7. Control of predatory species.

E. Agencies helping to maintain a balance in nature.

1. Conservation Department of Kentucky, including Division of Game and Fish, Division of Forestry, Division of Parks.





Quail holding pens at Jones-Keeney game refuge near Dawson Springs, Ky., owned and operated by the Division of Game and Fish.

2. U. S. Forest Service, U. S. Department of Interior, Soil Conservation Service.
3. CCC.
4. Nature Societies.
5. League of Kentucky Sportsmen.
6. Sportsmen's Clubs.
7. Garden clubs.
8. 4-H Clubs.
9. Boy Scouts and Girl Scouts.
10. Wildlife leagues (federal).

SUGGESTED ACTIVITIES:

1. Each child may select an animal for study and find out what it feeds upon, what animals prey upon it, where it lives, whether it maintains its members by large families or by taking care of one or two young until they are able to protect themselves, what means of protection it has (protective coloring, escape or attack), whether it is disappearing or increasing before the advance of civilization, and what effect this may have upon the creatures it has served for food, and upon the plants or animals upon which it lives.
2. Make a wildlife survey of a farm. Use a map to spot all forms of wildlife in its habitat on the farm.



Fish rescue work being carried on by the seining crew of the Division of Game and Fish during the fall, winter and spring months. Transferring of fish from unsuited waters to suitable waters is an important phase of the conservation program in Kentucky.

3. Build and maintain a balanced aquarium, using native fish, aquatic plants, animals and insects. Minor Clark, Biologist for the Division of Game and Fish, Frankfort, Ky., can furnish information for this particular project.

4. As a class project improve a stream running through a near-by farm. This gives an opportunity for study of animal, plant, insect and fish life.

5. Establish a game refuge in cooperation with neighbors.

   a. Post land against trespassing and control all shooting rights.

   b. Study migration. (Note:) This gives one of the best possible opportunities for direct experience. Study and direct application of all the vital things learned about conservation. Children learn best by doing. Such work must be most carefully planned so that the results will be worthwhile. This also helps to build up desirable attitudes.

6. Learning and practicing the principles of good sportsmanship.

   a. Returning to the water all undersized fish and all fish not needed for food. (Always handle live fish with wet hands.) The body of a fish is covered with a protective skim and when the dry hand comes in contact with the fish's body, this protective skim is removed, thereby leaving the fish exposed to those diseases prevalent in the water.

   b. Obedience of closed seasons, bag and creel limits.

   c. Visiting a Fish hatchery or rearing pool.

   d. Carrying on fish rescue work, that is, returning to streams fish that have become landlocked in ponds resulting from floods or drouth.

   e. Feeding all birds in winter.

7. Determining which insects help to bring about the raising of abudant crops in the garden or field.

The above activities are suggested as a beginning in the study of various fields covered by this unit.

INTEGRATION SUGGESTIONS:

A. English:
   1. Write letters for material to be used in this work.
   2. Write letters asking prominent persons to speak to the class or community meetings on such topics as, "Vermin Control," "Game Laws," "Fish Propagation," or "How to Improve a Stream."
   3. Written or oral reports of things seen on a field trip.
   4. Written or oral reports on work done in a conservation project.
   5. Write a letter to a friend telling about some class activity in conservation, building an aquarium, study of of an animal, improving a stream, etc.
   6. Write a story about the life history of some animal, insect, weed, fish, or flower studied.
   7. Write a code for sportsmen.
   8. Write rules for protection of wildlife.
   9. Write a code for boys and girls to follow in practicing conservation.
   10. Write fables about certain animals showing their chief characteristics.

B. Reading:
   1. Part II—The Outdoor World—is rich in material which is very good for use with this unit. "The Little American Woodcutter" by Clarence Hawkes has some excellent suggestions for discussion. Other good selections include "Waste Land," "A Wild-Life Preserve" by Archibald Ruthledge, "Duncan's Bird Tenants" by Ernest Harold Baynes. Other good suggested selections are found at the end of these selections. Read, "Crooked Bill, the Story of a Quail."
   2. Children are very fond of dramatization and acting out stories or original skits often help.
      Vocabulary: balance, conservation, maintain, regulation, larvae, erosion, renewable, survival of the fittest, primitive, undesirables, adequate, artificial, pollution, vermin, pupae, propagation, hibernation, extinct, interdependence.

C. Mathematics:
   1. If five boys work five hours per day on improving a stream, find the total number of hours of work the boys do in one day.

2. Find the total number of hours worked by the boys in a week with six working days.
3. John works 62 hours on a project, Bill works 56 hours, Henry works 67 hours, and Steve works 59 hours. Find the total number of hours worked by the boys.
4. Find the average number of hours the boys worked.
5. Have pupils bring to class stocks showing legal minimum size of bass and newlights (crappie).

Social Studies:

1. Study insect life as related to farmers and crops in the various parts of the United States.
2. The effect of the lack or failure to practice conservation of wildlife and forests in various parts of the United States and in the state of Kentucky
3. Comparison of the ways our grandfathers practiced conservation with our modern methods.

Art:

1. Friezes on various phases of wildlife.
2. Posters for wildlife protection.
3. Life history stages of insect.
4. Pictures of the aquarium.

Music:

Songs suited to this unit.

From: Singing Days—Ginn and Co.,

1. The Unlucky Farmer—Page 140.
2. Chums—Page 142.
3. The Deer—Page 175.

And many others in same book.

From: The Music Hour—Book Four—Silver-Burdett.

1. Crickets—Page 6.
2. September—Page 7.

The Tree-Maker—Page 26, and many others.

Test on Attitudes (suggested):

Underline the group of words that best explain what you would do:

1. If I saw a black snake I would: a. Kill it. b. Let it get away. c. Follow it to its nest and destroy its young.
2. When I am squirrel hunting I: a. Kill as many squirrels as I can. b. Kill only two. c. Kill 10. d. Kill the bag limit.
3. When gathering wild flowers I: a. Pick all I can carry. b. Pick all I can find. c. Pick only a few.

4. When hunting the Bob White Quail I: a. Kill every bird in the covey. b. Kill the bag limit (12). c. Leave enough birds in the covey to reproduce the next season.
5. When fishing I keep: a. All bass I catch. b. All bass over five inches long. c. Only bass over 11 inches long. (The legal length limit is 11 inches.)

And other examples of like nature.

●

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GRADE SIX

SOIL, TREES, WATER

FOREWORD

It is suggested that soil-trees-water be taught together since they all bear upon each other.

GENERAL OBJECTIVES:

1. To show how soil, water and vegetation are interdependent and necessary for the existence of wildlife.
2. To have the pupils become conservation conscious.
3. To cultivate a greater appreciation of: a. Natural inheritance. b. Natural scenery. c. Economy of nature. d. Care and protection of streams, soil and forests.
4. To cultivate a greater appreciation of natural literature.

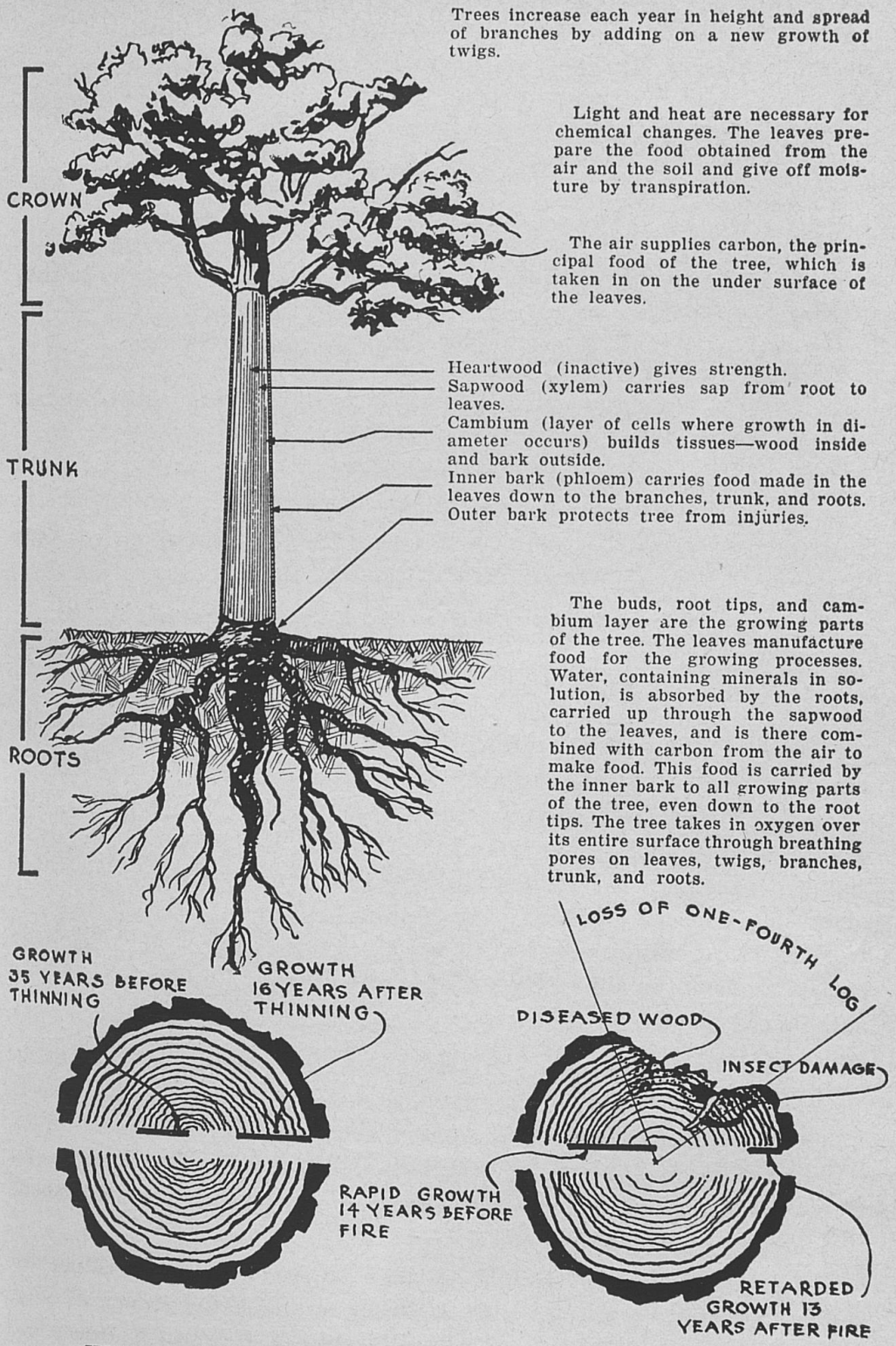
SPECIFIC AIMS:

1. A knowledge of the necessity for conservation of soil.
2. A knowledge of the interrelation of soil, water and forests.
3. A knowledge of the possibilities of water power in Kentucky.
4. A knowledge of the dependence of wildlife upon soil, water and forests.
5. A knowledge of conservation, its value and its purposes to man and wildlife.
6. A better appreciation of the uses of forests. A study of their classification according to their uses.

APPROACH:

The study of forests and leaves in autumn naturally leads to the study of soil and water. It might come from science discussions concerning the formation of soil or from a field trip where various formations and kinds of soil have been observed. A lead might easily come from the observation, somewhere in the community or near the school of erosion and its effects.

Another approach might be used in this unit by dividing the class into three sections with a strong student for leader of each group; group 1 to study soil, group 2, water, and group 3, forests and their products. Each group, assisted by the teacher, could work



Trees increase each year in height and spread of branches by adding on a new growth of twigs.

Light and heat are necessary for chemical changes. The leaves prepare the food obtained from the air and the soil and give off moisture by transpiration.

The air supplies carbon, the principal food of the tree, which is taken in on the under surface of the leaves.

Heartwood (inactive) gives strength.
Sapwood (xylem) carries sap from root to leaves.
Cambium (layer of cells where growth in diameter occurs) builds tissues—wood inside and bark outside.
Inner bark (phloem) carries food made in the leaves down to the branches, trunk, and roots.
Outer bark protects tree from injuries.

The buds, root tips, and cambium layer are the growing parts of the tree. The leaves manufacture food for the growing processes. Water, containing minerals in solution, is absorbed by the roots, carried up through the sapwood to the leaves, and is there combined with carbon from the air to make food. This food is carried by the inner bark to all growing parts of the tree, even down to the root tips. The tree takes in oxygen over its entire surface through breathing pores on leaves, twigs, branches, trunk, and roots.

HOW A TREE GROWS. (Courtesy W. Va. Conservation Comm.).

separately on its project for perhaps three weeks. At the end of that time reports could be compared, distinguishing features of each subject discussed before class, followed by a testing program. Each group include in the report importance of his subject to wildlife.



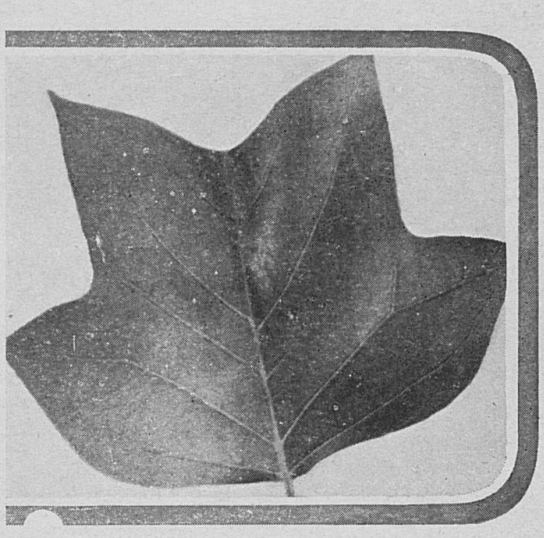
A view of the main square in Pineville, Ky., after flash flood in 1929. Floods like this are quite common today and one of the main reasons is the clearing off of timber and other vegetation, allowing rainfall to dash off the surface of the earth rather than to soak in and stay there until needed by vegetation.

Man's ability to use water power has had much influence in bringing about our present civilization. Water has been for countless ages, and still is, wearing away rock and thereby aiding in forming soil. The rounded stones found in the stream bed are one of the common evidences that water has done this work. The normal rate of erosion is about one foot every thousand years. Because of man's work it is eroding one foot every hundred years. Erosion has caused a change in the surface of the earth. It has filled the streams and caused floods and destruction of fish life. When water moves at two miles per hour it carries some soil, but at four miles it carries eight time as much.

The fine sediment may be carried many miles and when deposited it aids in forming fertile plains and deltas, sometimes causing the sources of streams to change, choking life in the streams, filling dams, and forming new locations for cities.

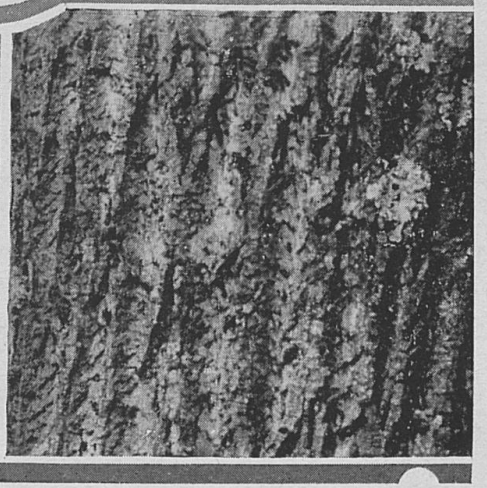
Water, to serve its greatest good, must be held in check at the place it contacts the soil, until as much of it as possible percolates the soil layers, thus providing an underground reservoir of moisture which feeds vegetation. The vegetation in turn, by its root systems





TULIP POPLAR, SHOWING LEAF, TREE, FLOWER, AND BARK.





below the ground and the stem, leaves and flowers above, serves as a resistant or barrier to the wearing away of the soil by water and wind.

Man, either because he did not care or did not know, in many cases destroyed nature's checks upon erosion.

Next to the earth itself, the forest is man's and wildlife's most useful servant. Not only does it preserve the earth's moisture, regulate the flow of streams, and moderate the winds; it also supplies him with wood and wood products, without which he would have made little progress in civilization. It furnishes homes and food for wild animals and birds. In their relation to climate the forests may be considered great natural reservoirs which accumulate the rainfall in the thick covering of decaying humus beneath the trees, while the heavy foilage, shutting out the sun, prevents evaporation.

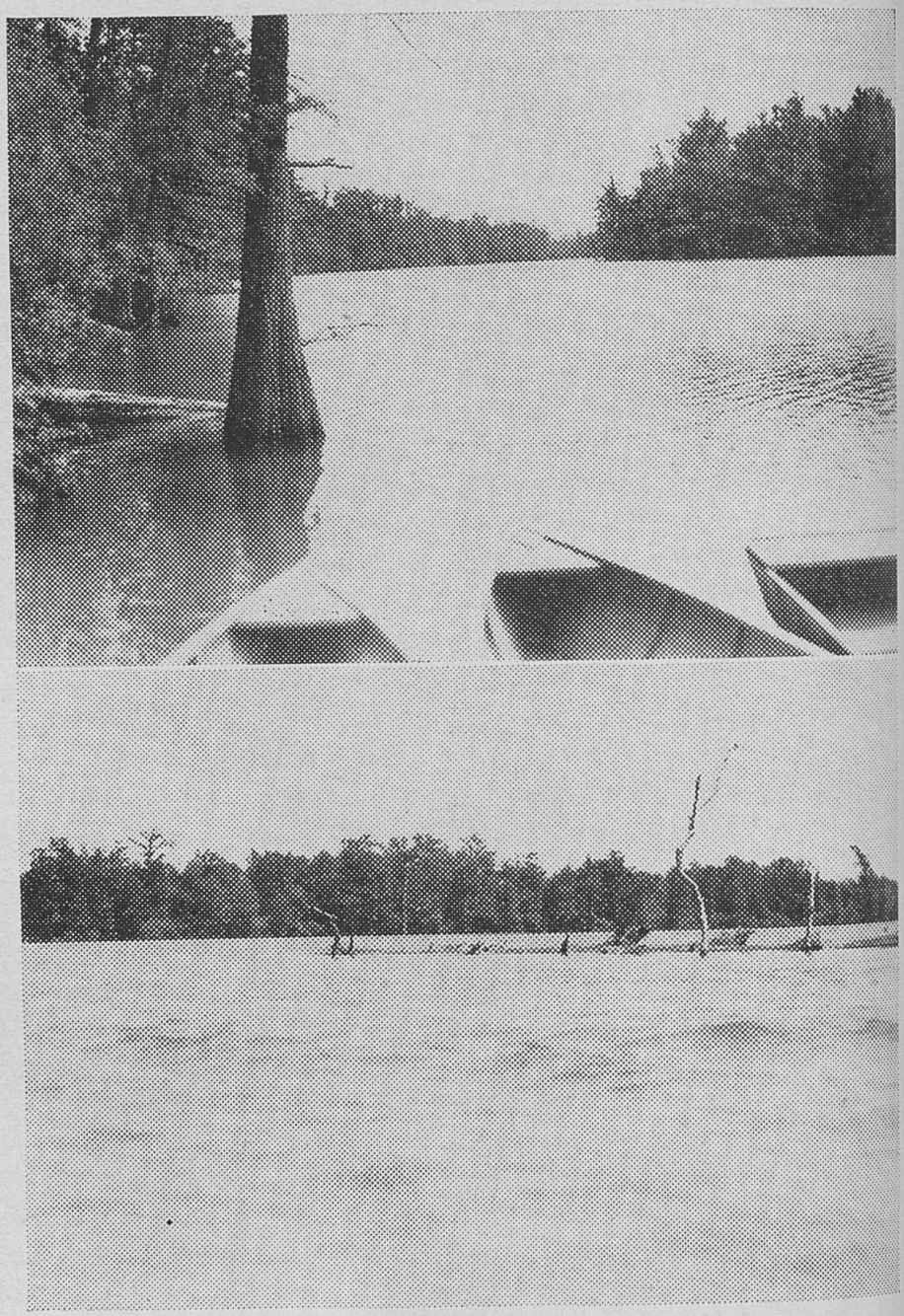
All children should be familiar with the soil, forest and water life of their community. Our purpose is to relate each form and creature to man's use: Economic, Social and Leisure.

Outline of Study

1. Soil, the mother of life:
   a. What is soil? 1. Pulverized rock. 2. Decayed vegetation.
   b. How is soil formed? 1. Mechanical agents, wind, water, air, changes of temperature. 2. Chemical agents, air, water. 3. Organic agents, plants and animals.
   c. Types of soil: 1. Glacial. 2. Lake (Lacustrine). 3. Alluvial. 4 Windborne (Aeolian). 5. Volcanic.
   d. Size of soil particles. 1. Clay. 2. Sand. 3. Loam. 4. Gravel.
   e. Importance of humus: 1. Sources: decayed leaves, manure, plowed under grasses and stubble.
   f. Cultivation of soil: 1. importance of cultivation: regulates distribution of moisture, permits circulation of air, and eradicates many weeds. 2. Methods: crop rotation, dry farming, and extensive farming vs. intensive farming.
2. The forest, protector of natural resources:
   a. Definition of the forest: A community of interdependent trees, plants, and animals living together as a group of people living in a town.
   b. Forest areas in Kentucky: 1. Extent of original forests. 2. Present status. 3. The farm woods. 4. State forests and state parks. 5. National forests.



Kentucky was once covered by virgin timber like that pictured above but that enormous timber supply has dwindled until now the state has approximately 100,000 acres of such trees left.



Lakes in Ballard County furnish recreation and good fishing.

c. Functions of the forest: 1. Forest crops—timber, fruits, nuts, berries. 2. Home for wildlife. 3. Uses of the standing forest—water absorbent, soil maker, outdoor recreation.

d. Nature of the forest: 1. Hardwoods—in relation to elevation, climate, soil, rainfall. 2. Softwoods—in relation to elevation, climate, soil, rainfall. 3. Mixed woods —in relation to elevation, climate, soil, rainfall. 4. The changing forest or transition going on within the forest. The forest is always changing just like the society within a city or community of people.

3. Water, the Giver of Life:

a. What is water? What is its source?

b. Water and water life: 1. Plant forms needing water, aquatic plants and semi-aquatic plants. 2. Animal forms living in or near water: muskrats, beavers, waterfowl, frogs, turtles, insects, mosquitoes. 3. Fish and fishing: fish in still and running water and fishing as a sport.

c. Other uses of water? 1. Water in industry and transportation. 2. Water in plants and animals.

d. Good and bad water—water and health.

e. Floods and soil erosion.

4. Soil-Forest-Water Conservation, Their Interrelation:

a. The natural circulation of water (Hydrologic cycle): 1. Atmosphere absorbs water from oceans, lakes, rivers, soil, trees, raindrops and other exposed surfaces. 2. Moisture-laden air, when cooled, drops this water in form of rain or snow. Fog, frost and dew are also forms of precipitation. 3. Precipitated water generally absorbed and held by surface soil. When water content of this soil has reached a certain point, the surplus penetrates by gravity to underground strata of soil or porous rocks where it is stored as ground water. 4. Surplus water, when precipitation is greater than rate of absorption and filtration, runs along surface of the ground directly into creeks and rivers and thence into lakes and oceans. 5. Water exposed on the surface of creeks, rivers, lakes, and oceans, including that transpired by vegetative cover, is again absorbed into the atmosphere and the natural circulation is continued.

b. Agencies in flood and soil erosion control: 1. dams: concrete, brush, earth and stone, other hindrances to retard too rapid runoff, beavers and their dams.

2. Forests and farm wood lots: functions of humus, functions of roots, functions of crown or canopy formed by tree tops, functions of undergrowth and brush. 3. Contour plowing (plowing around slopes instead of up and down). 4. Terracing (grading hillsides or slopes into more level sections). 5. Strip planting (planting the sloping areas around the contours in alternate strips of dense covers with tilled crops).

c. Study of dams constructed by man as means of flood control. Gilbertsville dam on the Tennessee River, Gilbertsville, Ky., example. 1. Problems of building. 2. How they have helped. 3. Effect of erosion and silt collections on these dams.

d. Study of forest depletion and conservation: 1. Depletion: clearing of land for farms, lumbering and methods used. 2. Status of cut over land: reduction of tax base, failure of agriculture, fire hazards, soil erosion and floods. 3. Significance of the farm wood lot: Source of fuel, post, poles, ties, lumber, nuts, home for birds, flowers, wild animals, erosion and flood control, raising the water table (underground water levels). 4. Enemies of the forest: man, fire, insects, disease. 5. Preservation of forests: prevent forest fires—camp fires, cigarettes and matches, brush burning, sawmills, railroads, use forests carefully and wisely, protect native wood lots and forests so as to preserve natural community of forest life, plant trees—observe Arbor Day, protect species of plants and birds in danger of extinction, control grazing, drainage, fire and clearing on farm wood lot, sponsoring by establishment of appropriation of existing forests for use as community, county or school forests and use of this forest as a school laboratory for recreation, science, economics, etc., and section devoted to evergreens for sale as Christmas trees, thus assuring revenue to school.

SUGGESTED ACTIVITIES AND PROBLEMS:

1. Have a group of Boy Scouts give a demonstration on fire building and extinguishing.
2. Plan an attractive tree booklet as follows: a. An attractive cover. b. introduction and table of contents. c. draw leaves (label properly). d. pictures of trees from magazines. e. pictures of famous trees of Kentucky.

f. poems and songs. g. drawings showing cross sections of trees to denote age. h. parts of tree—crown, trunk, roots.

3. Weigh a quart can of each of four kinds of soil: loam, sand, clay, and woods-dirt. Let each become saturated with water, then reweigh. Determine which holds the most water.
4. Set an open can or glass of each kind of soil in water and observe to what height in each the water rises.
6. Trace the various steps taken by the Division of forestry personnel from the time a forest fire is sighted until it is put out.
7. If possible, visit a firetower and observe the watchman at work. (Towers are usually manned from October 15 to December 15 and from March 15 to May 15 each year.)
8. Study the uses of a tree (Hickory for example): roots, trunk —lumber, paper, charcoal and nuts.
9. Locate on a map the principal surface waters of your county and state.
10. Discuss the elevations and drainage of your locality and note how this affects the surface water types and types of fish life therein.
11. Discuss the value of an artificial or natural dam to a community.
12. Develop an understanding of what is meant by a natural reservoir, an artificial reservoir.
13. Study the effects on surrounding land of swamps, ponds, reservoirs, lakes and rivers.
14. Are the river and creek channels wider and deeper? If so, why?
15. If possible, visit a farm or stream where reclamation or improvement projects have been carried out.
16. Collect different types of soil and display them in glass jars.
17. Field trips for the purpose of observing different types of soil and methods of cultivation.
18. Conduct an experiment showing the germination of seeds in clay, loam, sand and gravel. Place several beans in each of four containers of clay, loam, sand, and gravel, respectively. Water the seeds daily and keep them in a warm place. Do not disturb the soil. Watch the experiment closely and answer the following questions:
    a. In which container does the seed germinate first: last?
    b. Which soil holds the water longer?
    c. Which soil drains the quickest?



Wild Turkeys once were very plentiful in Kentucky and are such proud game birds that t
Division of Game and Fish is restocking them in all suitable territory, especially in the timbe
areas of the state.

d. In which container does the soil remain loose and porous?

e. Which soil packs most tightly?

f. Which soil proves itself to be the best for general agricultural purposes?

19. Mixing soils. Let the pupils experiment with mixing their own soils, using clay as a base, and adding sand, humus, fertilizers, etc. Test the productivity of each soil in the same way that the previous experiment was conducted. Several attempts are usually necessary before a good combination is found. The pupils become intensely interested in this activity and there is likely to be much friendly rivalry in seeing who can produce the best crops in the shortest time.

20. Place a twig of maple in ink and let it stand for a few days. Split the twig lengthwise and see the colored sap in the wood, showing how sap rises.

21. Name the wild fur-bearing animals in your county. The state. Ex. In your county should be found the skunk, opossum, red and gray foxes, muskrat, mink, raccoon and the ground-hog.

22. Name the wild game animals in your county and in the state that are fur-bearers but are hunted for sport and not for the hides. Ex. squirrel, rabbit.

23. Name the major game birds in your county and in the state at large. Ex. quail and dove.

24. Is there any big game (deer, bear, wild turkey) in your county. If so, have students name them and promote a discussion on possibility of their increasing in numbers in in the near future.

25. Name the more common song and insectivorous birds in your county. Ex. robin, bluebird, wren, flicker, meadowlark, red bird, blackbird. Bring out in a discussion the important part these little feathered friends play in the growing of vegetation which is necessary alike to man and to wildlife.

INTEGRATION SUGGESTIONS:

A. English:

1. Write and produce a play—theme, Conservation of the Wildlife.

2. Design scenery and costumes for playlet.

3. Write stories based upon children's experiences with trees.
4. Give oral description of trees, for guessing game.
5. Write observations of the experiments to show fertility and productivity of the soils which the pupils mix themselves.
6. Stories (written and oral) about seeds scattered by wind, by water or by birds and animals.
7. Letters written for material—books, booklets, samples, and exhibits.
8. Talks made on such subjects as: a. more forests should be planted. b. Kentucky trees. c. One tree can make a million matches, and one match can burn a million trees. d. Life work of a tree. e. The trees' gifts to us.
9. Articles telling of activities in connection with a tree study written and printed in the school newspaper.

B. Spelling:

1. Learn to spell words pertaining to trees and their products.
2. Learn to use many new words. A partial word list: taproot, trunk, crown, boughs, root hairs, bark, coniferous, deciduous anchorage, scientists forest, felling, flume, towing, interior, cork, olive, rubber, greenery, foilage, regions, collections, leaf prints calendar, vitamins, soil, mineral, erosion, wind break, acid, resin, turpentine, naval stores, medicine, magnolia, linden, eucalyptus, cypress, redwood, spruce, pulp, machine, annual rings, sapling, fertile, evergreen, blossom, fragrant, founder, products.

C. Science:

1. Make a collection of rocks worn by air, wind, and water.
2. List all ways rocks are broken up into soil.
3. What animals bring up under-soil and thereby create richer and deeper top soil?
4. Build a model dam on sandtable showing uses that may be made of the impounded water.
5. Study how the tree grows.
6. Study construction and use of: a. Bark. b. Leaves. c. Roots. d. Trunk. e. Crown.
7. Learn to tell age of a tree.
8. Study buds in spring.

9. Realize value of living Christmas trees.
10. Make seed and wood collections, labeling each variety.
11. Plant trees on school lot or along highway.
12. Trees as related to bird life. Animal life.

D. Arithmetic:

1. Learn to make maps to scale.
2. Make and work original problems connected with trees, lumbering, sugar, industry, etc. For example:
   a. A man planted 125 rows of pine trees. If he placed 20 trees in each row, how many trees did he plant in all.
   b. Mr. Crutcher got 140 quarts of sap from 20 maple trees. How many quarts did each tree average?
3. Learn board measure.
4. Estimate lumber in a standing tree, as woodsmen estimate it.
5. Make graphs showing amount of lumber cut from one acre of forest land in the U. S., and one acre in each of various European countries.

E. History:

1. Read stories of famous historical trees:
   a. Washington Elm at Cambridge.
   b. Charter Oak at Hartford, Conn.
   c. Weeping Willow from Napoleon's Grave.
   d. Treaty Elm at Philadelphia.
   e. Cornwallis Oak at Charlotte, N. C.
2. Study the oldest tree in the world, The General Sherman Tree in Sequoia Park; The Mingo Oak, Famous Virgin Forests, Petrified Forest.
3. Study forests in the Colonial days. Note abundance of Game and Fish.
4. Connection of forests with growth of American industry.

F. Geography:

1. Make map locating early American forests.
2. Make colections of various kinds of woods.
3. Collect seeds and sow them.
4. List tree products.
5. Make a map of Kentucky denoting tree gifts and the dependence of industry upon trees.

6. Locate regions in Kentucky producing fruits.
7. Locate national forests, locate state forests in Kentucky. Note wildlife in these forests.
8. Effect of climate on trees.
9. How trees control floods.
10. Trees as wind breaks.
11. Value of reforestation to man and to Game birds and animals.
12. Discuss the following topics: What lessons can we learn from Germany, France, Sweden and Czechoslovakia relative to the care of forests?
13. Maps of the U. S. showing areas having glacial, alluvial, lake, aeolin, and volcanic soils.

G. Art:

1. Cut out of magazines, etc., trees of all types.
2. Make pencil and crayon sketches of trees and leaves.
3. Make scenes of all seasons, showing characteristics of trees.
4. Make diagrams showing the way food and water are carried to trees.
5. Illustrate poems and stories about trees.
6. Make maps showing forest regions and tree gifts.

SURVEY OF A WOODLAND

1. See how many species of trees you can find.
2. Do these trees provide an abundance of food, such as fruit and nuts for birds and animals, berries and buds? Identify three.
3. Is there plenty of food for game animals? Locate and identify as many kinds as you can and learn what animals eat it in spring, in summer, in fall and in winter?
4. Are there young trees among the larger and older trees?
5. Are there some hollow trees and logs to serve as dens for animals and birds?
6. Do the dead trees show fungi which may destroy living trees?
7. Are the dead trees full of insects and are they breeding places for tree-destroying insects?
8. Is there any evidence that woodpeckers have kept the tree-destroying insects under control?

9. Is the ground of the forest covered with leaves, needles and twigs or with undergrowth such as ferns, trillium, and etc.?
10. What means are made to protect our forests from fire?
11. When is Kentucky Arbor Day? Make up an Arbor Day program for your room.

SURVEY OF A WATERSHED

1. Have you examined any of the streams to look for fish nest sites? Why should we endeavor to prevent the catching of these fish until the spawning season is over?
2. Are there any large springs available on this watershed that could produce sufficient water for a pond for fish rearing?
3. If any of the streams dry up in summer would it be practical to open up channels for escape of the fish or furnish additional fresh water?
4. Would it be a good idea to set aside certain areas of a stream, say a mile or two, for fish breeding and permit no fishing in this section of the stream?
5. If game fish seem to be dying under the ice, would ice holes be practical?
6. Make a list of all the different species of fish found in the streams of this watershed?
7. What is vermin? Name several in this watershed.
8. Make a note of what streams of this watershed carry down much silt and why?
9. Was more silt carried from the plowed ground or meadow and pasture land? why?
10. After a hard rain which streams are muddy and which clear?
11. How do you protect water from disease germs (bacteria)?
12. What does the state do to protect pollution of streams?
    What do we mean by sealing abandoned mines?
    What does the state do to replenish streams with fish?

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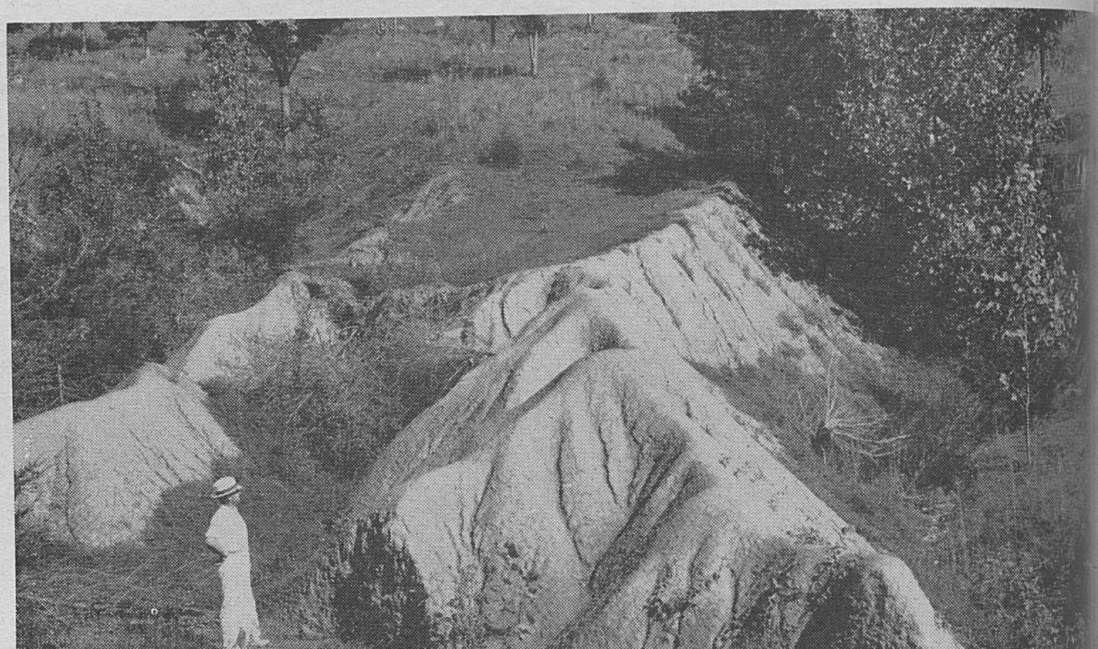
GRADES SEVEN AND EIGHT

WISE USE OF OUR WILDLIFE AND OTHER RENEWABLE NATURAL RESOURCES

FOREWORD

The teacher's attention is directed to the importance of keeping before the students the value to our wildlife of the surface areas, the watersheds, and the natural resource areas of our state. Map study will give more meaning to the conservation concepts presented. It should be kept in mind that conservation is the wise use of natural resources so as to provide for the greatest good to the greatest number of people, birds and animals, prevent waste and loss due to harmful forces, renew the living, growing things which can be replaced, and assure the future's share of these assets.

Three pictures or situations are given dealing with the use of natural resources in early Kentucky, in Kentucky in the early part of the twentieth century, and in present Kentucky. The pictures represent the stages in man's use of the renwable natural resources. In the first picture man is concerned with the development of these in order to make a living. Soon over-development without concern for waste leads to exploitation. This is the second picture or situation. Then man is faced with depletion, about which he must do something in order to maintain progress. This is the present situation. It is hoped that these word pictures will be suggestive in helping the teacher present and develop the problems of conservation that face our state. Using the word pictures given as suggestive material, students can be encouraged to write or tell their own word pictures. The suggested problems and activities that follow each picture can point the way but should not limit the teacher or student in bringing up phases of conservation in which they may be particularly interested due to local situations. Emphasis at all times should be



Clearing away of the vegetation has exposed this soil to wind and rain, resulting in which has completely destroyed the land for man and wildlife.

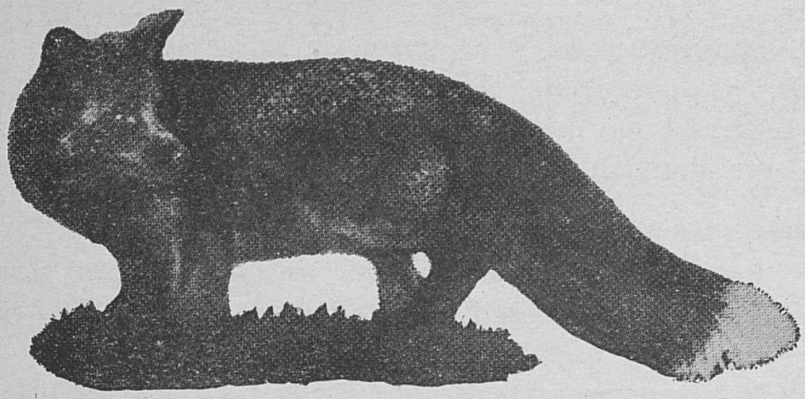
placed upon developing in the students proper attitudes on conservation.

General Objective:

To understand and appreciate the immediate necessity of making wise use of our wildlife and other renewable natural resources.

Specific Aims:

1. To appreciate the fact that the kind and slope of soil determine whether land should be used for agriculture or forests.
2. To appreciate to what extent the forests of Kentucky have been depleted and how wise land-use, reforestation, prevention of forest fires, and public control will meet this immediate problem.
3. To understand how government can help us to use our renewable natural resources wisely.
4. To appreciate that Kentucky has much potential wildlife area, land which can sustain deer, native pheasant, turkey,



THE FOX.

beaver, raccoon, fox, bear, quail, rabbit and other species—to learn how individuals may use them.

5. To appreciate the length of time it takes to produce good soil and the speed with which it can be lost by erosion processes.

SUGGESTED OUTLINE OF STUDY:

Let us see what the early pioneer found in this land now called Kentucky. Kentucky, South of the Ohio River was early known as the "Dark and Bloody Grounds." Here Indian tribes first met and fought for its possession. Later white men came and fought redmen and won it after a long and bloody conflict. The prize fought for by Indians so desperately, as histories tell, was chiefly the economic value to them of the wild animals, abundant in great quantity and variety, from birds to buffalo. Why this game supply was then found, apparently, so inexhaustible, was because of the food, shelter, and water the great forest gave to their native haunts. The virgin timber was a healthy, heavy growth, unbroken except as to "The Barrens," a small area of open country including what is now Barren county. It was then the finest forest known to the whites because of its superiority of soil and climate. The acreage of the state stands at 25,715,840 acres and when white man first discovered the "Dark and Bloody Grounds" 24/25 of it was in forests or approximately 24,000,000 acres. White man's destructive nature soon showed results and at the present Kentucky only has 10,500,00 acres of forest land, mostly in Eastern Kentucky. Of this forest acreage only 100,000 acres of merchantable virgin forest remain out of an original total of more than 24,000,000 acres, all once virgin timber. The true story of its great waste and threatened complete extinction of virgin forest along with most of the second-growth timber and its

wild life, is a very dark chapter in the history of Kentucky, hence, a present application of the amended title, "Dark and Floody Grounds," is appropriate. In the beginning, early Kentucky offered to her settlers resources, constantly renewing themselves and yielding an ever abundant supply of game, clothing, housing, and work.

Conservation lessons to be learned:

1. Renewable natural resources constantly renew themselves, and the process is faster and more efficient when resources are wisely used by man.
2. Wise use prevents waste. Pioneer farmers wasted because their problem was one of getting a living quickly out of the land, and resources were abundant.

PROBLEMS AND ACTIVITIES:

a. How did the natural resources especially wildlife of our state meet the needs of early pioneers?

b. Students could set aside one section of the classroom or the library for an exhibit on early Kentucky. For it they could collect or make pictures of trees and wildlife common to our state at that time. Different kinds of Kentucky woods could be put on exhibition. The students could present, as a program in connection with the exhibit, vivid word pictures of early Kentucky. Some students could be Indians and describe our state as the "happy hunting grounds" or "The Dark and Bloody Grounds" of their tribe. Others could be pioneer farmers, trappers like Daniel Boone, or lumberjacks. As a conclusion to the project, students could discuss this question: How can we restore to our state some of these extinct or almost extinct trees and wildlife?

c. Describe a day in the life of a lumberjack or trapper in an early Kentucky blockhouse.

d. As the timberman worked in the forests, how did the trees have room to fall in the thick forests of Kentucky? What happened to the standing young trees—the seedlings—the soil, when logs, chained together, were pulled through the forests or skidded down the mountains? Why is this contrary to conservation practices? What effect on wildlife?

e. What conditions led the pioneer farmers to be wasteful with the forests? How would they feel toward the trees after spending weeks in clearing the land? Some students may have had experience in clearing the land and could give their experiences at this time.

Second Picture or Situation

Let us make another imaginary tour of Kentucky in the years between 1900 and the World War. The virgin stands of timber were quickly disappearing. Much of the yellow popular had been cut away and the hardwoods were going fast. Here and there one could see abandoned sawmills, surrounded by stripped hills. The lumber companies, having cut off all the merchantable timber and having moved their camps and mills to new timber stands, abandoned the land to the ravages of fire.

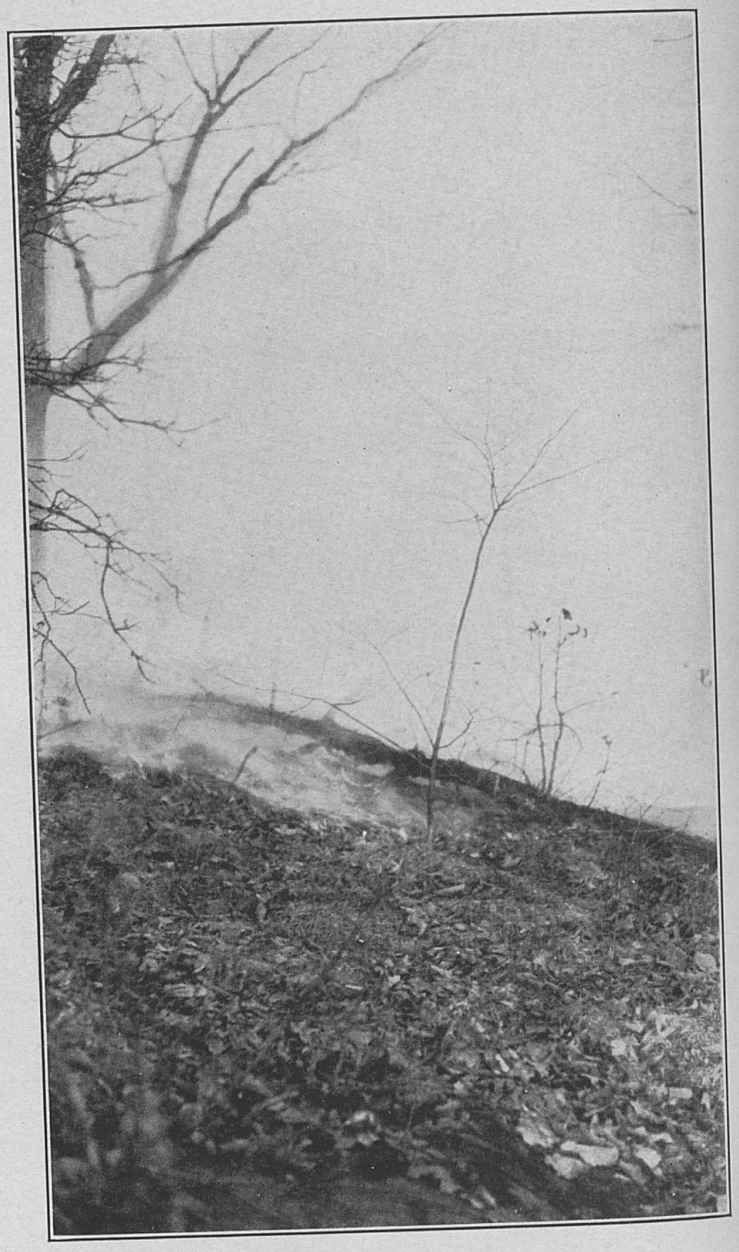


The Rabbit, our most popular and valuable game animal, affords both sport and food for thousands of Kentuckians.

Conservation lessons to be learned:

1. Game and Fish and other natural resources should be used, not exploited.
2. An overabundance of natural resources blinds men to conservation practices, especially when men are interested in developing these resourcees so as to make a living and create wealth.

FOREST FIRES DESTROY ALL FORMS OF VEGETATION AND ANIMAL LIFE AND EXPOSE THE SOIL TO EROSION.



A Forest Fire.

PROBLEMS AND ACTIVITIES:

a. Compare the virgin forests of Kentucky in 1775 with virgin forests of 1915. Why is there such a differen Show on a map.

b. Trace carefully with the above picture of fire-ravaged l the stories of at least five species of wildlife in Kentu



Timber, showing fire burns and man pointing to a scar on a tree left there by a forest fire.

that lost their homes during this time and have become extinct or almost extinct in Kentucky.

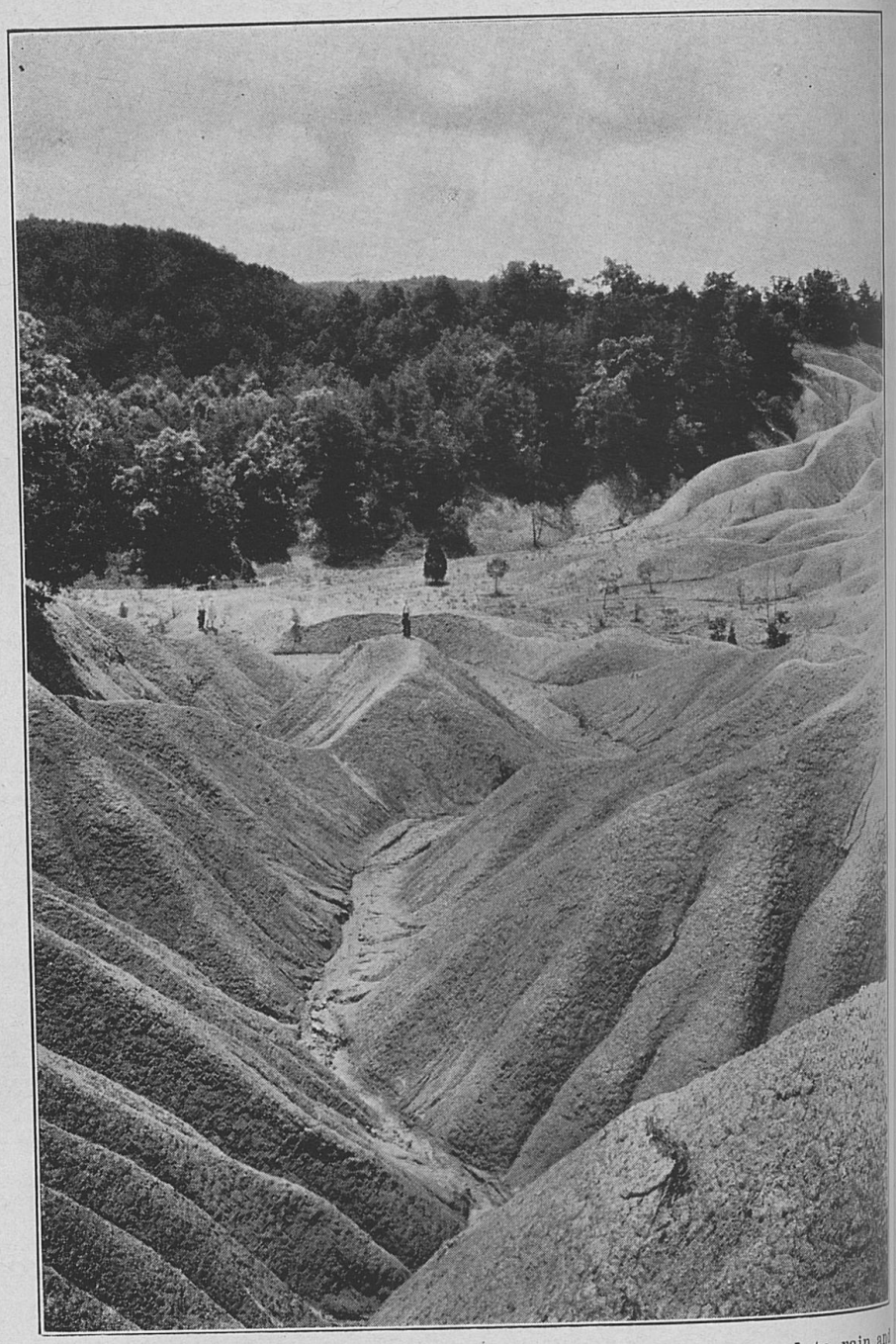
c. Find out and report to the class what has happended to timber lands in your county.

d. Show how the following affected the sawmill operator's use of a forest and led him to "cut out" and "get out."
   1. Trees grow large enough to make 12-inch saw logs in 80 to 100 years in Kentucky.
   2. Required size for fence posts, mine props, or railroad ties can be cut only once in 20 to 30 years.
   3. Risks of fire to forests.

e. In what ways do the coal industry and railroads in Kentucky depend upon our forests? Why should these companies be interested in conservation?

f. Why has some land in Kentucky been abandoned by the farmers? How can Kentucky use this soil?

g. What species of wildlife completely disappeared? Partly disappeared?



Once the timber is destroyed by fire and the soil is exposed to rain and wind, soil erosion sets in and the result is pictured above. This land is completely destroyed and is worthless, both to man and to wildlife and vegetation.

Third Picture or Situation

Let us see what our state faces today as the result of the p and present practices of our citizens in regard to the use of renewable natural resources. The virgin forests and much of

wildlife are gone. Streams have filled with silt and mud washed off the hillsides and slopes of our mountains where vegetation has been destroyed by man. Our minerals are being mined more and more as demands increase. The World War, calling for untold quantities of our natural resources for war materials quickened the disappearance of our timber, minerals and wildlife. And now that another World War is being waged across the great waters there comes again the demand by large manufacturing concerns for the raw natural resources from which the implements of war are to be made, and clothes and food for the soldiers to carry on this endless destruction of fellow man. A large part of the 12,000 miles of splendid fishing waters which enriched Kentucky's landscape have been ruined to angling because of pollution from the soil, mines, factories and city sewage.

Conservation lessons to be learned:

1. Wise use means not only to use now for social needs but to provide for renewal of living, growing things.
2. Wise use means not only satisfying immediate needs but long term planning for future needs.
3. Fire is the greatest enemy of conservation and of our animals and birds. Forest fires are preventable.

Problems and Activities:

a. Locate hills in your county that are stripped and burned over or areas in which reforestation is taking place. What are your duties as good citizens to these areas?
b. Plan a conservation program for Kentucky forests, fields and wildlife.
    1. What sections of Kentucky would you have forests growing on? Why? Why do the high areas in the Eastern Kentucky regions lend themselves to forest cultivation by the federal government?
    2. Who would grow these forests? Why would it be wise for coal companies and lumber companies to engage in forest production? Why is artificial planting becoming necessary in Kentucky? When would it be used? Where?
    3. How should trees be cut so as to provide future supplies?
    4. What measures should be taken for the prevention of forest fires? How are lumber and coal companies helping the program of fire protection? Why is cut-over

ENTRANCE ROAD AT LEVI JACKSON STATE PARK.

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land such a fire hazard? If you live in a forest community, visit a nearby forest fire tower to watch the observer at work.

5. How would you restore wildlife to Kentucky in greater abundance? How does the beaver work for conservation? What could the beaver do again for Kentucky? What areas are good for certain species of wildlife?

   a. There is excellent range area for deer in Kentucky. Why would it be wise land-use to use this area for deer? Locate and describe the game refuges in Kentucky.



Virginia White-Tail Deer on highway in Estill county near Irvine, Ky. Motorists should use caution on the highways to prevent wholesale slaughter of the wildlife which is unable to cope with the speed of our modern modes of transportation.

   b. Prepare arguments to convince the farmers that they should provide cover and food for wildlife. Check in catalogues for prices of skins and furs.

   c. Prepare a program for P.T.A. dealing with conservation of wildlife. Have members of class plan a practical community conservation program and present in talks to P.T.A.

   d. Prepare arguments to convince hunters and fishermen that they should observe bag and creel limits,

closed seasons, rights of farmers and landowners, and game habitat improvement programs.

e. Name the wild fur-bearing animals in your county. The state. Ex. In your county should be found the skunk, opossum, red and gray foxes, muskrat, mink, raccoon and the ground-hog.

f. Name the wild game animals in your county and in the state that are fur-bearers but are hunted for sport and not for the hides. Ex. squirrel and rabbit.

g. Name the major game birds in your county and in the state at large. Ex. quail and dove.

h. Is there any big game (deer, bear, wild turkey) in your county? If so, have students name them and promote a discussion on possibility of their increasing in numbers in the near future.

i. Name the more common song and insectivorous birds in your county. Ex. Robin, bluebird, wren, flicker, meadowlark, red bird, blackbird. Bring out in a discussion the important part these little feathered friends play in the growing of vegetation which is necessary alike to man and to wildlife.

j. Why are the people of Kentucky asked by law to protect game and fish during certain seasons and why are bag and size limits placed on the wildlife? (Increased population, increased numbers of hunters and fishermen, increased farming activities which decreases homes for wildlife, have been the principal reasons for the passage of such laws to prevent the complete extermination of the wildlife resources.

k. All persons are urged to refrain from molesting the young of wild animals and birds in their native habitat. They may appear lost and forsaken to the man, woman or child, but rest assured that the parents are close by, probably seeking out food and will look after their young just as does the human mother and father.

6. What recreational advantages would you offer Kentuckians in this program? How would these affect you personally? Prepare reports on the recreational advantages of the state parks.

d. Plan a mock radio program on forest fires, their causes and prevention. Children are ingenious in providing equipment. This program will offer an opportunity for exciting, interesting, tragic, and informational news on forest fires. Newspaper articles or smoke in the air can be capitalized on to arouse students' interest at the time these fires are occuring. It would be best if children planned their own program.

The following are just suggestive:

1. Informational talks on kinds and causes of forest fires with the seasons for most fires. This might be a question and answer dialogue or contest showing how campers, hunters, and picnickers may start fires, how burning brush is a dangerous practice, and how careless disposal of matches and cigarettes causes fires. Correct practices in regard to above could be given. True and false contests similar to ones heard over the radio could be worked out by students. Boy Scouts and Camp Fire Girls would enjoy preparing this part of the program.
2. A talk—"The emotions I have on seeing a person start a forest or brush fire."
3. Losses to Kentucky due to forest fires, both economic and social.
4. Proposals for a forest fire protection week in the state.
5. Announce a contest with a prize for the best fire prevention poster submitted by any student in the school.
6. Why do forest fires occur: List as many causes as possible.

e. Why are unavoidable wastes significant to a conservation program?

f. Locate and describe the state and national forests in our state.

Suggestions for Integration:

A. English:

1. Students can prepare talks or essays on such topics as:
   a. Forestry as a vocation.
   b. A good sportsman.
   c. How we can increase opportunities for fishing or hunting in our county.

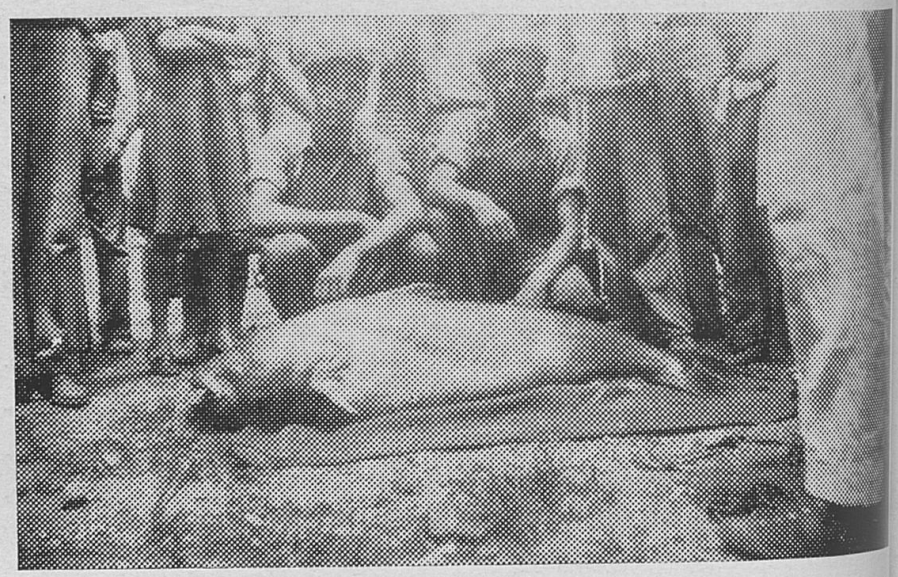
d. How CCC camps help in forest and soil management.

e. Trees I know in my county and their value to us.

f. The gains of a conservation program for Kentuckians.

2. Write a letter to convince this man that he is wrong when he says: "Maybe we don't need great forests. Maybe other products will replace those of the forest."

3. Students can be encouraged to add to their vocabulary and to use these words in talks, essays, etc.: erosion, conservation, prevention, renewable, utilization, suppression, pre-suppression, potential, abundance, resources, mature, bearing, tragedy, taxation, generation, enjoyable, employment, commission, barren, annually, and depletion.



110-pound catfish taken from Cumberland River near Eddyville by use of net.

B. Science:

1. To arouse interest in showing how soil is the "Mother of Life" have the students make a list of materials that do not come from the soil. Of course, students will have no list, but discussion on this will lead them to see how valuable soil is. Interest can also be created by such questions:

a. What do you think when you see streams of muddy water? What causes this?

b. Many students will have had enjoyable experiences with fresh waters. Have them discuss them. Why is a stream coming out of a forest clear? What does this tell you? Why do fishermen, steel companies, and navigation companies like this?

2. From reading in their science books have students fill in and discuss the following outline:
   a. The soil. 1. Two classes. 2. How made. 3. Time needed to create soil. 4. How soil is carried by wind and water. (Dust from the dust bowl traveled as far as the Mediterranean Sea. Why is Mississippi River always muddy?) 5. Uses of soil. Distribution of good and poor soils over Kentucky. Interest students in the soil of their county. Samples of soil could be studied.
   b. How soil is improved and conserved: 1. Fertilization. 2. How to get humus in soil. One hundred pounds of humus holds one hundred and ninety pounds of water. Compare with sand. 3. Reasons for working the soil. 4. Uses of vegetation and cover to prevent erosion. How do trees create soil and bind soil? Why should we have trees and grass bordering our highways? Oklahoma's experiments of the Soil Conservation Service show that 28 times as much rain and 10 times as much soil run off a burned forest floor as run off an adjacent forest floor which has not been burned. 5. Objections to burning over the land. 6. Work done by the federal government in its soil conservation program.
3. If possible visit areas where government is carrying on soil conservation projects, Students can contrast gullied hills with areas where forests, contour and strip planting and terracing have checked erosion.
4. Consult a county agricultural agent to find out how profitable a farm woodlot can be.
5. Show why this stream is a fisherman's delight:
   a. Flows through limestone areas with plenty of rocks.
   b. Has much vegetable life, green and brown algae, insects, decaying vegetable matter, diatoms.

c. Has crawfish, tadpoles, minnows, big fish.
d. There is no stream pollution.

The teacher can arouse interest by the question: What eat what? Then students can consult their science books so as to make a chain relationship showing how each species lives on some other species. The conservation lesson learned is: A proper balance of each species must be maintained to have good fishing. Show how a closed season on bass would help this balance. What rivers and creeks in Kentucky would be good for fishing.

C. Mathematics:

1. Remind the student that two hundred year ago, 24/25 of Kentucky was forest land. What percentage of our state today is in forests?
2. Compute the number of board feet in a log twelve feet long and twenty inches in diameter on the small end.

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GRADE NINE

CONSERVATION OF WILDLIFE AND THE LAW

General Objectives:

1. To acquire a knowledge of the laws and legal procedures underlying the Conservation program in Kentucky.
2. To develop in the pupil a sympathetic and cooperative attitude toward the administration of the conservation program.



Confiscated illegal devices used to take wildlife in Kentucky by those persons who have no regard for game and fish laws. These spot lights, gigs and fishing tackle were taken from violators by the Conservation Officers of the Division of Game and Fish.

SPECIFIC AIMS:

1. To teach the meaning of game laws in Kentucky.
2. To teach the set-up and program of the Conservation Department of Kentucky.
3. To show that laws have been made to meet the needs of changing times and conditions.

APPROACH:

1. Present Conservation Department established in 1936.
2. The Department of Conservation.
   a. Personnel: 1. Members. 2. Officers.
   b. Purposes: 1. to provide an organization for the protection, beautification, development and use of: a. land. b. forests. c. fish. d. game. e. water. f. plant and animal life. g. natural scenic resources.
   2. The use of forest land and other natural resources for projects to relieve unemployment.
   c. Functions: 1. Employs a protective police force. 2. Operates a state game farm. 3. Operates fish hatcheries. 4. Conducts research and scientific surveys through game and fish technicians. 5. Operates and maintains state parks. 6. Operates and maintains state forests. 7. Provides forest fire protection for a limited amount of timber land. 8. Carries on an educational program. 9. Operates two wildlife restoration units.
3. Game, Fish and Forestry laws.
   a. Provision for establishing the Department of Conservation.
   b. The Director of The Division of Game and Fish.
   c. Conservation Officers or Game Wardens.
      1. Number. 2. Duties. 3. Authority.
   d. Game and fur-bearing animals.
   e. Birds.
   f. Fish and Frogs.
   g. Licenses. 1. To whom issued. 2. How obtained. 3. Kinds.
   h. Game and fish restoration and propagation units.
   i. Cooperation with Federal Government.
   j. Forests.

ACTIVITIES:

1. Make a list of game animals found in Kentucky.
2. Make a similar list of birds and fishes.

3. Make a list of birds and animals that were once found in abundance in Kentucky that are now extinct or nearly so.
4. Make a list of rules you think every good citizen should follow in regard to:
   a. Removing flowers and shrubs.
   b. Building and putting out fires in the woods and fields.
   c. Observing seasons for hunting.
   d. Taking only your share of game and fish.
   e. Cooperation with landowners when hunting and fishing.
5. Plan and make a visit to the nearest state park or forest. Report to the class on what you saw. Get a copy of rules for managing the forest or park and discuss how wildlife is protected there.
6. Draw a cartoon of good sportsman and bad sportsmen.
7. Try to find the reasons for the enactment of our various game and fish laws.

QUESTIONS:

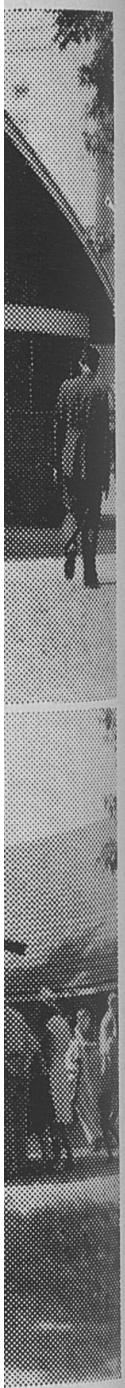
1. What are the purposes for which the Department of Conservation was created?
2. What part do you play in the enforcement of laws?
3. Should you report violations of the game and fish laws?
4. What changes have been made in the game laws in recent years.
5. What have been the reasons for these changes?
6. What is the difference between game fish and animals and non-game fish and animals?
7. Does the law define game fish and game animals?
8. Who owns the wildlife in Kentucky?
9. Is it lawful to hunt on Sunday?
10. How many rabbits can you lawfully take in one day? Quail? Squirrels?
11. How many kinds of fish are there in Kentucky?
12. What is a fish hatchery and explain its purpose in the program of the Division of Game and Fish in Kentucky.
13. Can you lawfully sell wild game in Kentucky? What species?
14. Are the farmers permitted to hunt on their own land without licenses?
15. Who may fish without a license?
16. What recent changes were made in the conservation laws of the state?



Wildlife Conservation Exhibit on display at Game and Fish Building, State Fair Grounds, Louisville, Ky.

17. Why is it compulsory to keep up the bird dogs during the summer months?

18. Why are quail released in the fields of Kentucky each spring by the Division of Game and Fish and the sportsmen of the



ish Building,

gs during the

y each spring
rtsmen of the

state? What would happen if this restocking and replenishing program should cease?

19. Why is there a length-limit on fish that may be kept?

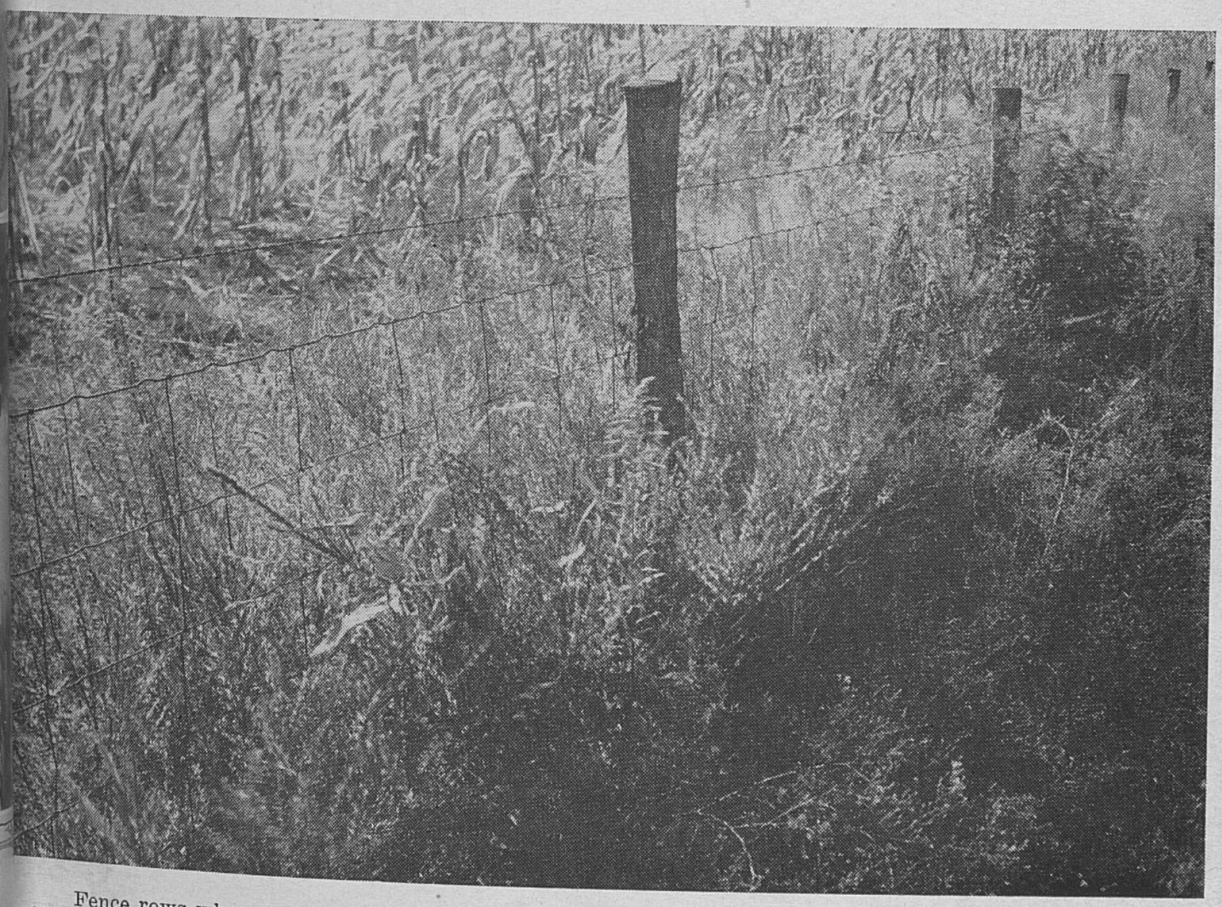
ATTITUDE TEST:

Part 1.—In the following statements or questions three reactions are given. Read carefully and then check the reaction that best expresses your feeling.

1. If you should see a hunter killing a squirrel out of season would you (1) say nothing to anyone about it? (2) reprimand the hunter for breaking the law? (3) report the matter to the Conservation officer?
2. The Conservation Department of Kentucky was created for the purpose of (1) providing employment for the unemployed, (2) protecting, beautifying and developing the natural resources of the state, (3) taking away from the citizen the right to hunt and fish.
3. The game laws of the state should be changed to (1) permit the killing of the red fox at any time, (2) permit the hunter to decide when he should be killed.
4. Birds, animals and fish are the property of (1) the persons owning the land on which they are found, (2) the wildlife organization, (3) the state.
5. The wildlife of Kentucky should be protected (1) to provide better hunting for city sportsmen, (2) to make possible a means of livelihood for our people by fishing and hunting, (3) in order that we, and all who may come after us, will have a wildlife to use and enjoy.
6. The responsibility for the enforcement of the game laws of the state rests (1) with the local courts, (2) with every citizen of the state (both children and adults), (3) entirely with the Conservation Officers.
7. The State Parks of Kentucky have been planned and developed primarily for (1) tourists from other states, (2) a work reservoir for the CCC boys, (3) the people of Kentucky to have, love, enjoy and use.
8. The forests of Kentucky should be restored in order that (1) the sportsmen may have good hunting grounds, (2) the lumber companies may continue to operate with profit, (3) they will become a great legacy that we may bequeath to our children.

Part II—True and False—Write (T) after statement if True and (F) after statement if False.

1. A four inch fish should be replaced in the water. ( ).
2. The Game laws of Kentucky are reasonable. ( ).
3. It is not necessary to have Conservation Officers in Kentucky. ( ).
4. Forest Fires do very little damage to soil, water, vegetation and Game and Fish. ( ).
5. The law should protect more game animals and game and insectivorous birds for a long period of time. ( ).
6. Bag limits on the Bob White Quail should be reduced. ( ) Why?
7. Propagation and restocking of the quail in the fields of Kentucky is not practicable. ( ).
8. The streams of Kentucky have very few game fish. ( )
9. The enforcement of the game laws depends to a large extent on the cooperation of private citizens. ( )



Fence rows where vegetation is permitted to grow up are ideal places for wild animals and birds, furnishing both food and protection for them.

10. It is impossible for Conservation Officers to enforce the game laws. ( )
11. The streams in Kentucky should not be protected against pollution. ( )
12. Bird dogs should be allowed to run at large from May 15 to August 15. ( ) Why Not?

In the past our fathers and forefathers hunted and fished when and where they pleased and they killed and caught as much game and fish as they desired, but this plenteous supply of wildlife has diminished from such wanton habits to such an extent that the citizenry of the state demanded that a Division of Game and Fish be created and demanded that certain laws be enacted to overcome this unbalance in nature's program which had been caused by man's ignorance and unconcern. As the result of having open and closed seasons, bag limits and other phases of law which protects and regulates the lives of the wildlife, restraining such hunting and fishing as was carried out in past years, the older inhabitants have become more or less prejudiced against the Department of Conservation and the program for which it stands. This feeling, however, is being gradually overcome by education, and cooperation between the Conservation agencies, sportsmen and landowners. The citizenry of Kentucky now realizes that the laws created for protection of wild animals, birds and fish is absolutely necessary if we hope for their existence in future years.

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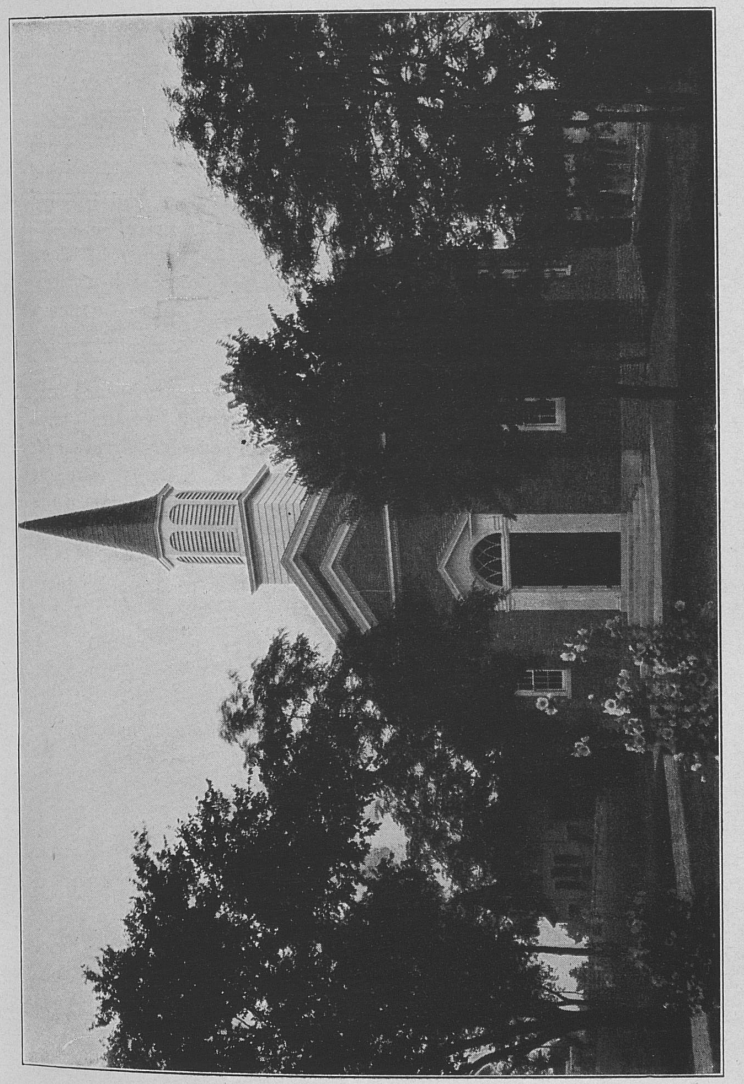

Lincoln Marriage Temple, Pioneer State Park.

GRADE TEN

BIOLOGICAL BASES OF CONSERVATION OF WILDLIFE

FOREWORD

Conservation of wildlife has its roots in biology and botany. Perhaps the outstanding opportunity for presentation of conservation concepts is found in these courses.

Conservation, briefly, means the use of living things in such a way that we do not disturb the balance of nature.

A program of conservation in Kentucky, to be effective, must have its base in this biological concept.

General Objective:

To show from study of biology that wise wildlife conservation is founded upon biological factors.

Specific Aims:

1. To show the biological reason for game, fish and forestry regulations.
2. To teach methods whereby conservation must be carried on in agreement with the fundamental principle of interdependence of living things.

Approach:

On the basis of subject matter at hand, ask questions such as these: Why would life on earth probably perish if:

1. All green plants were destroyed.
2. All nitrogen-fixing bacteria were destroyed.
3. All bacteria of decay were destroyed.
4. All enemies of particular organisms were destroyed.
5. All animals disappeared.

Would life on earth perish if all organisms were to stop dying? Is there a sound biological reason for hunting and fishing?

The answer to the last question most certainly is "yes." The biological points involved are:

1. Under all but emergency conditions (e.g., a widespread drouth) every species produces a surplus every year.

2. If the carrying capacity of the range (whether land or water) remains unchanged, a number of individuals equal to the yearly surplus must die during each twelve months. This is an inexorable law of nature that was operating long before man appeared on the scene.
3. Therefore, the only way to increase the number of survivors is to increase the carrying capacity of their range. If there is an unoccupied ecological niche (which seldom happens) restocking or new stocking may be useful. Otherwise these practices, though spectacular, are an outright waste unless there is a simultaneous and proportionate increase of food and cover; and under these circumstances restocking is likely to be superfluous.
4. If the carrying capacity is increased, more individuals live through the year, but also more die because there is a larger surplus.
5. There is no biological justification for a kill by man that takes more than the available surplus.
6. There is biological justification for a kill that takes only a safe fraction of the surplus, leaving some of it to the factors of natural mortality and preserving for the next year a breeding reserve that can fill the range before the next season of scarcity. The size of this fraction man may take has been worked out for some species. We know that it can never be the entire annual surplus, because some deaths from starvation, disease, predators and the elements will and always should occur. Ordinarily there is a safe fraction and there is no legitimate reason why man should not use it.
7. The reason for the last statement is that the surplus will be killed somehow. In the long run it makes no difference to the survival of the species over a large area how this is done. Among songbirds, nature takes the entire surplus each year; in the case of game, man takes part of it: but in both cases the surplus must die. This was forcast by Malthus and established by Darwin; it is part of the natural scheme that every biologist and informed conservationist knows.

The gist of the biological argument, then, is this: The killing of game, fish and furbearers by man is as legitimate as the killing of the same species by nature, provided always that the combined kill by man and nature does not reduce the breeding reserve below what is necessary to keep the range filled to its carrying capacity.

OUTLINE OF STUDY:

We have stressed the biological soundness of hunting and fishing. It is well to remember that the hunter who supports conservation is primarily and too often solely interested in tthe surplus of a select group referred to as game. It is necessary for such to recognize other species, because of the interdependence between game and non-game, predatory and non-predatory, animals and plants; and because of the influence, for good or bad, man's activities have in this balance and interependence.

Those among the non-hunters, whose interest in wildlife is economic, educational, aesthetic, or all three, who understand the principles of "balance" are not likely to criticize hunters who know when to stop. It is only ordinary good sense to urge complete protection for a species that is in danger of extermination or serious depletion.

Although the term wildlife embraces wild plant and animal life, including trees, shrubs, vines, grasses, weeds, wild flowers, mammals, birds, fishes, reptiles and insects, the emphasis in this study has been made upon wild animal life. The role of plants in this interdependence, or balance of nature, cannot be ignored. However, for this grade level, it is believed that an approach from animal life is most suitable.

A. Wildlife:
   1. Of field and forest:
      a. Animals—fur bearers, game, rodents.
      b. Birds—song and insectivorous, game, scavengers, predatory.
      c. Reptiles—lizards, turtles, snakes.
      d. Other forms—worms, insects.
   2. Of Water:
      a. Fish—predatory, rough, game.
      b. Mollusks—snails, mussels.
      c. Crustaceans—crayfish and associated forms.
      d. Lower forms — invertebrates and miscroscopic organisms.
   3. Of land and water:
      a. Amphibians—frogs, salamanders, newts.
      b. Reptilees—snakes, turtles.
      c. Birds—dabbling, diving, wading.
      d. Animals—Mostly fur bearers.





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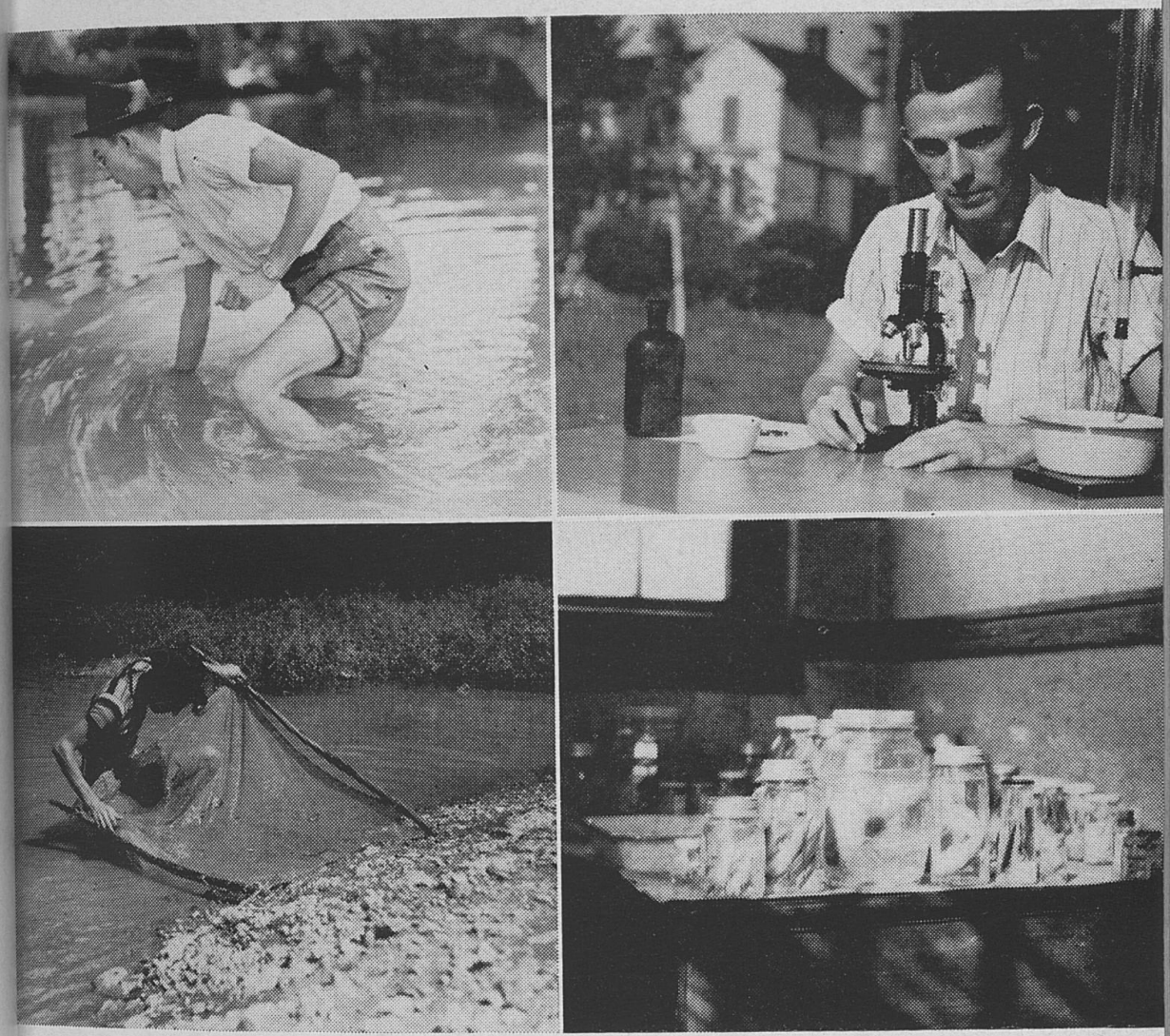


Minor Clark, Biologist for the Division of Game and Fish, studies samples of water taken from streams of Kentucky for pollution and food for fish. He also studies samples of fish themselves for size, growth, age, etc.

B. Extinct or near extinct species in Kentucky. Examples:
Passenger pigeon, beaver, otter, elk, white-tail deer, turkey, ruffled grouse and chestnut tree.

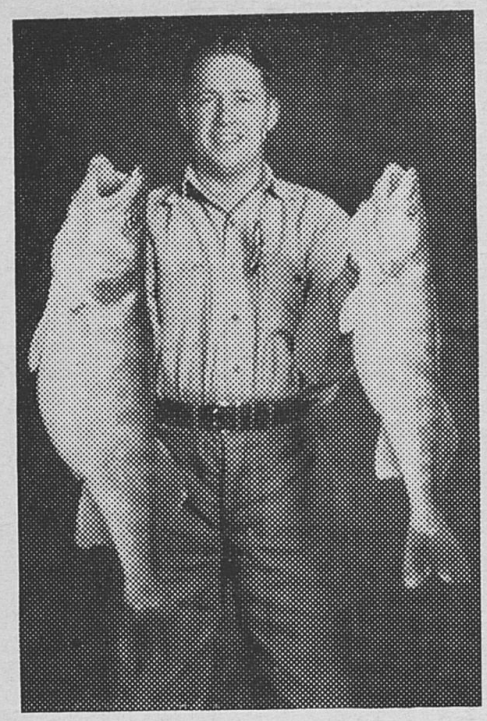
C. Things which helped to bring about unbalancing of nature:
1. Natural occurrences:
   a. Disease. Examples: Rabbit fever, chestnut blight.
   b. Loss of range and lack of food for wildlife.
   c. Parasitic invasions. Ex.: Dutch elm disease.
   d. Predatory influxes.
   e. Climatic variations. Ex.: Severe winter, drouth, floods.

2. Man-influenced factors:
   a. Uncontrolled hunting and fishing.
   b. Fluctuations of fur markets and prices.
   c. Forest fires and grass fires.
   d. Introduction of exotic species. Ex.: English sparrow, starling, Japanese Beetle, Mediterranean fruit fly.
   e. Extermination of predatory or game species.
   f. Stream pollution.
   g. Industrial and agricultural encroachments.
   h. Concentration of human population.
   i. Unsound forestry practices.
   j. Soil erosion.
   k. Introduction of unnatural predators by man (cat and dog).

D. Factors helping to restore and maintain a balance in nature.

1. Natural:
   a. Plant succession. Bare ground, lichens, mosses, shallow weeds, larger weeds, trees using much sunlight, forest trees, underbrush and shrubs.
   b. Resistance of species to harmful influences, such as overcrowding, overshooting, disease.
   c. Wilderness areas, or remoteness of habitat from roads, agriculture and other encroachments of man.
   d. Adaptability of species to environment.

2. Man-influenced factors:
   a. Conservation laws.
      1. Bag and creel limits.
      2. Open and closed seasons.
      3. Forest fire protective laws.
      4. Penalties for violations, i.e., law enforcement.
      5. Conservation education.
   b. Conservation practices.
      1. Game and fish management.
         Wdilife restoration units.
         Environmental improvement.
      2. Good sportsmanship.
      3. Restocking and propagation.
      4. Recognition of native biotics, or specific environment.



Fish like these come from clean unpolluted waters in Kentucky.

Example: Gilbertsville Dam, while a factor in control and water power, will also transfer running stream to lake with a consequent change in habitat for aquatic life. This creates a change in native biotics.

5. Wise land use:
   a. Utilization on basis of suitability as determined by relief, contour (bottom lands, steep slopes, ravines) climate and soil.
   b. Scientific cropping.
   c. Use of fertilizers.
   d. Prevention of erosion.
6. Sustained yield forestry practices.
7. Introduction of exotics, such as praying mantis.
8. Control of predatory species.

E. Agencies helping to maintain a balance in nature.
   1. Department of Conservation of Kentucky, including Division of Game and Fish, Division of Forestry and Division of Parks.

2. U. S. Forest Service, U. S. Department of Interior, Soil Conservation Service.
3. CCC.
4. Nature societies.
5. League of Kentucky Sportsmen (including sportsmen's clubs)
6. Garden clubs.
7. 4-H clubs.
8. Boy Scouts and Girl Scouts.

ACTIVITIES AND PROBLEMS:

1. Make a chart showing ten valuable wildlife species of Kentucky with the food they must find, the enemies they must escape, and the rate and time of reproduction. Then show how man upsets these activities of wildlife by:
   a. Hunting and fishing out of season, or during breeding spawning seasons.
   b. Cleaning off forest floors too much.
   c. Burning over areas of farms and forests.
   d. Keeping fences around farms too clean of bushes and brush.
   e. Exterminating entirely one species; either predatory or game.
   f. Pollution of streams.
2. Make a list of conservation lessons learned from the above.
3. Set up reasons why:
   a It is probably never justifiable to entirely exterminate one species.
      1. The passenger pigeon has been exterminated.
      2. The white-tail deer was practically extinct.
      3. Chestnut tree meant so much when killed by the blight.
   b. Large areas producing a single crop lead to serious epidemics.
   c. Forests and plant life conserve the soil and prevent floods.
   d. Prevention of stream pollution is a part of conservation.
   e. Over-cultivation leads to soil depletion.

4. From the Kentucky Game and Fish laws learn which animals and birds are protected and those that are unprotected. Study the habits of those birds and animals that are unprotected and speculate on what might happen if they were exterminated; what measure of control should be maintained.

5. Show how the Kentucky game and fish regulations are based on biological laws. Justify tthe recent extension of some of our closed seasons for hunting and changes in bag limits. Show how these laws will ultimately make better fishing and hunting.

    a. Why does the Division of Game and Fish close the public waters of Kentucky (with the exception of those navigable streams under lock and dam) to all kinds of fishing during the month of May?

6. Show how the desire of consumers for furs in summer as well as in winter creates a conservation problem.

7. Account for the fact that:

    a. Color of soil determines the richness. Why do your flower boxes have better blooms when rich wood soil is used in them?

    b. Some young trees in the forest must die.

    c. We have epidemics of Japanese beetles, crows, dandelions, and grasshoppers.

    d. Insect pests threaten our welfare.

    e. Proper hunting and fishing helps a conservation program and makes more fish and game.

8. One of the fundamental bases of a good conservation program is to maintain a balance of nature. In the activities suggested above, it is hoped students understood this concept. In order to check on this understanding, have students make lists of all the ways man upsets the balance of nature. Then they can make a list of the ways man can help preserve this balance. Much discussion no doubt will follow the presentation of the lists to the class because many of the ways suggested may be subject to challenge and proof.

9. Have students plan a program for the year for helping to maintain a balance of nature. All kinds of worthwhile activities will be suggested and reports can be made to the class on the success of such projects.

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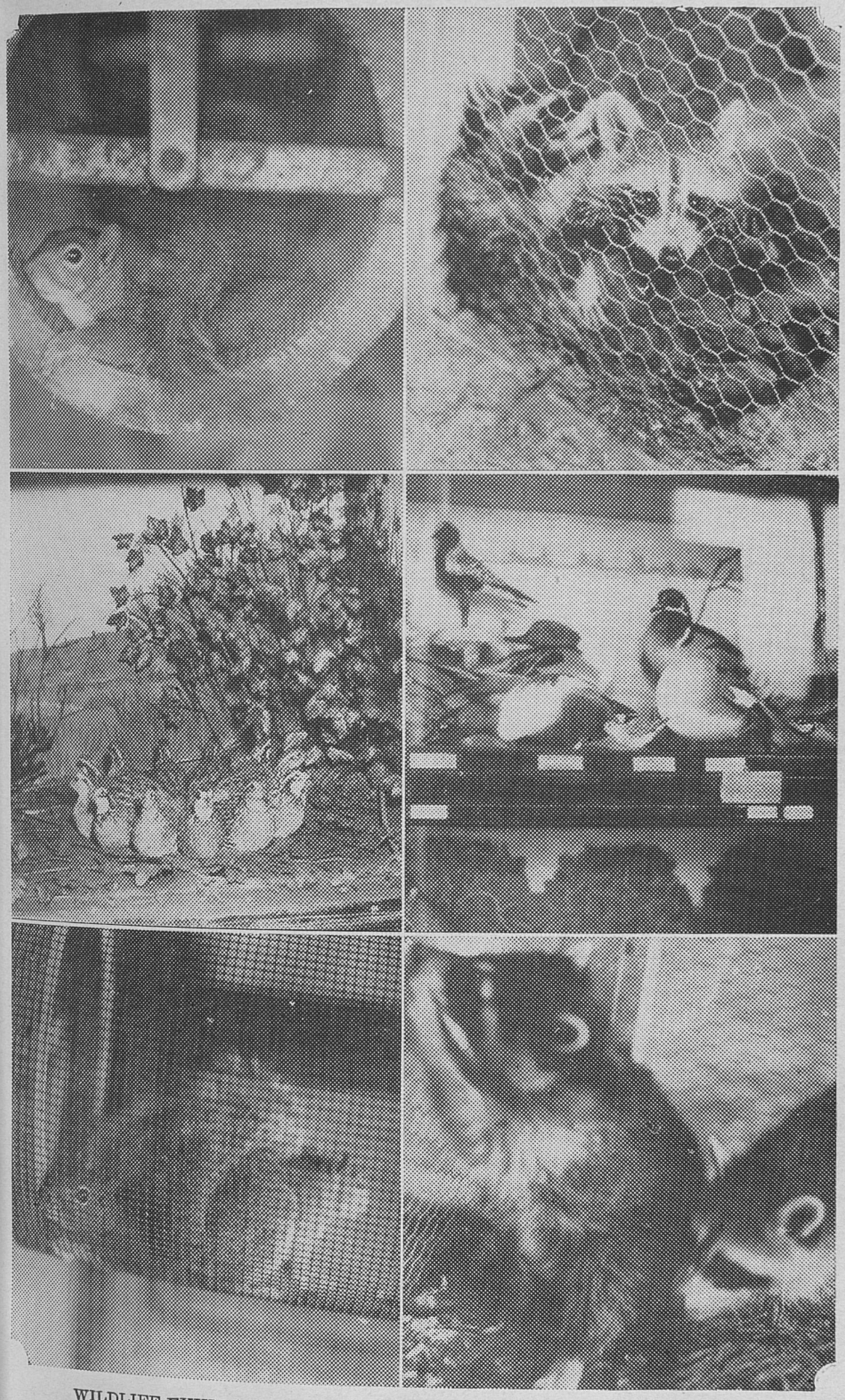


WILDLIFE EXHIBIT OPERATED BY THE DIVISION OF GAME AND FISH

GRADE ELEVEN

HISTORY OF CONSERVATION IN THE UNITED STATES AND KENTUCKY

GENERAL OBJECTIVE:

To understand and appreciate the early conditions in America and in our state that prevented conservation practices and the present conditions which necessitate a conservation program.

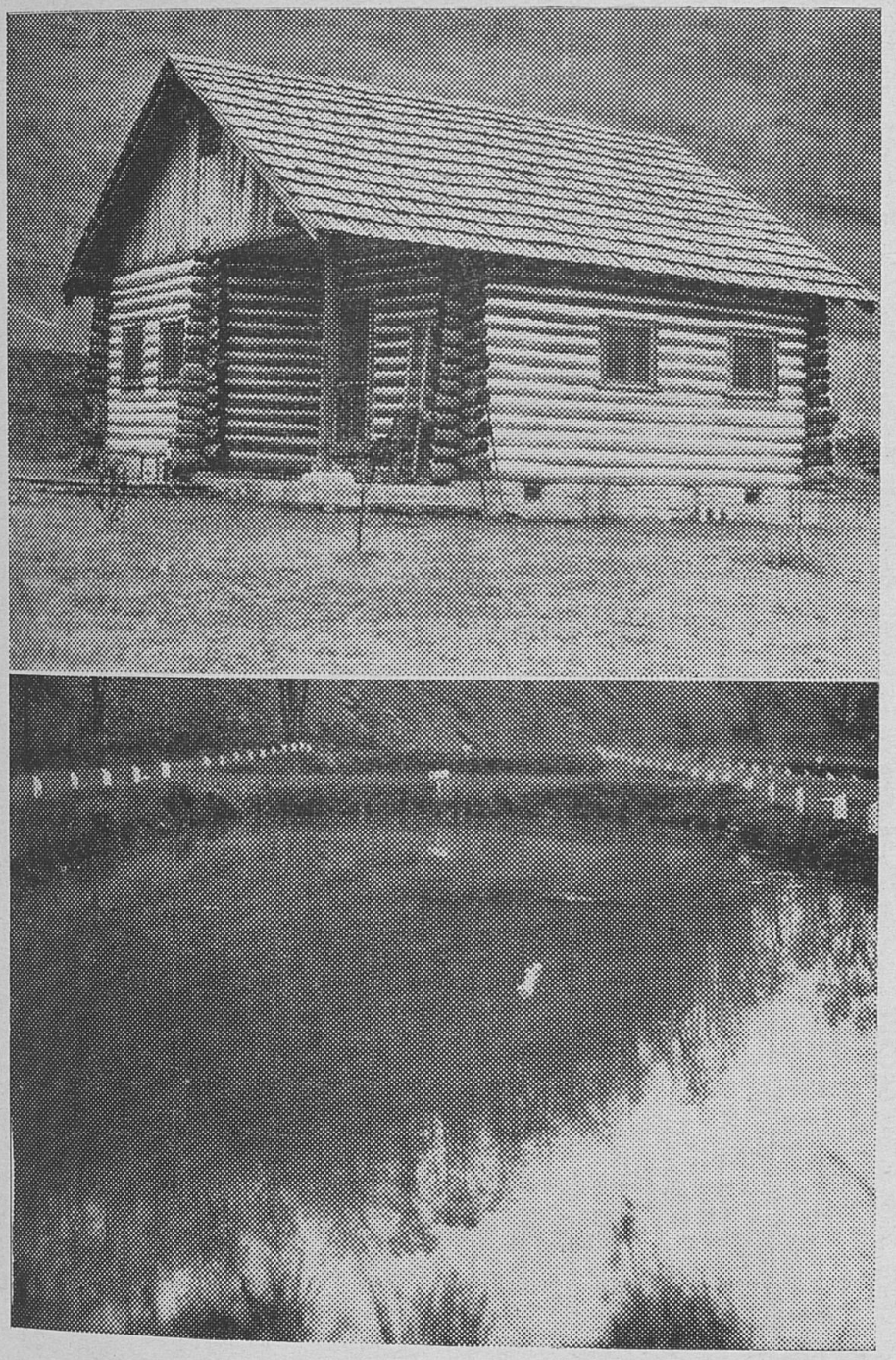
SPECIFIC AIMS:

1. To understand that the purposes for which the Indians, colonists, industrialists, farmers, and sportsmen used the natural resources tended to give these groups certain set attitudes, which must be considered in any conservation program.
2. To learn about outstanding national and state leaders in the conservation movement.
3. To understand the place of an enlightened public opinion in advancing a worth-while conservation program.
4. To appreciate the work being done by the Department of Conservation of Kentucky.

THE NATIONAL SITUATION

APPROACH:

Too often students think of Indians as wandering savages, rather than primitive farmers. Indians worked with the natural resources rather than against them, because their main concern was subsistence for the group and they placed no value on profits or comforts. They only took what they could use, being sure to leave enough for natural breeding purposes. Regular migrations by the Indians were made into what is now Kentucky, where excellent fishing and hunting grounds caused many battles between tribes of the red men and caused Kentucky to be known as the "Dark and Bloody Ground." As the first settlers pushed into this area, they, like the first settlers on American shores, cut, hewed, and burned sufficient area to grow crops. Trees were in their way and the pioneers can't be censored. The industrial development with its persistent idea that natural resources were inexhaustible at first choked all hope for conservation.



Harlan County fish rearing ponds built by Harlan County Game and Fish Club.

Always frontier states fought any attempts by the government to prevent the destruction of the forests in the public domain. Exploitation and waste of natural resources have been so far-reaching and complete that a vast program of conservation and restoration is

necessary. Kentucky is in this condition. Good roads and motor transportation have taken people into otherwise inaccessible areas and the effect on renewable natural resources has been great. It is important that the young people understand the agencies in the nation and in their state which are attempting to meet this problem.

PROBLEMS AND ACTIVITIES:

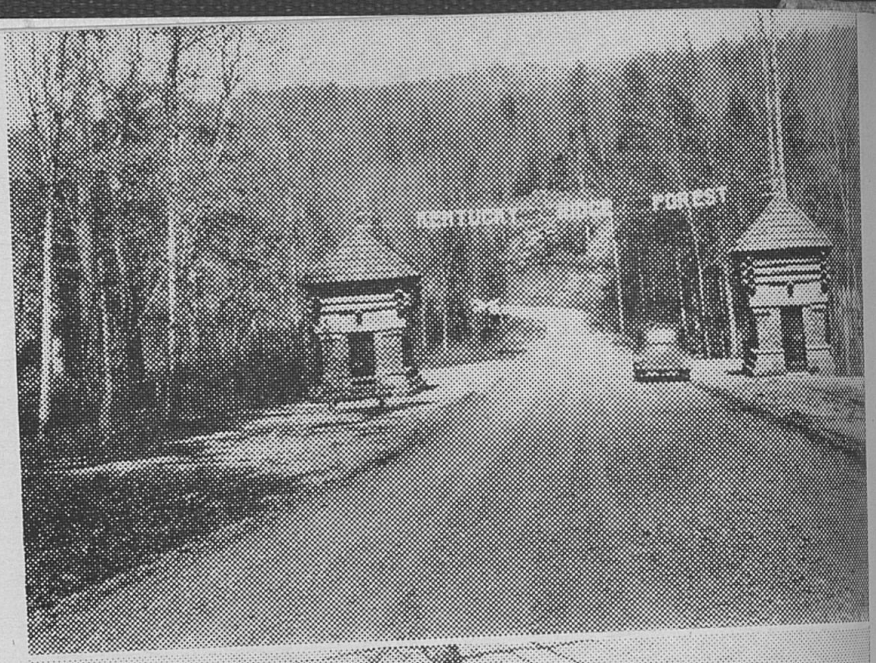
1. Find data to account for the fact that:
   a. Indians were unconscious conservationists of wildlife.
   b. Colonists suffered from a lack of fuel when they were surrounded by forests.
   c. It is an accepted legitimate practice by some farmers today to burn cleared areas annually in order to secure pasturage. Is this a good practice? What effect on our wildlife.
   d. Many of our great-grandfathers left so many acres for a wood-lot instead of clearing it for farming.
   e. Pioneers were most wasteful in the use of the land and its wildlife resources.
   f. Washington, Jefferson, and Patrick Henry feared soil erosion.
   g. The advance of the frontier toward the West was hard on the forests, wildlife, and soil.
2. Compare the amount of virgin forests in 1620 with that of 1930. Collect data so as to present to the class a vivid description of the causes and effects of such a national tragedy.
3. How did the industrial development during and following the Civil War depend on our natural resources? How did this development lead to exploitation and waste?
   a. Although railroads, mining companies and, later, power companies helped to develop our natural resources, yet they made great demands on our forests, our wildlife. Why?
   b. Railroads opened otherwise inaccessible forest areas which were developed and finally exploited.
   c. Huge grants of the public domain with valuable resources were given to the railroads. Was this a wise policy? Why did so much of the vast public domain pass into private ownerships? What were the results

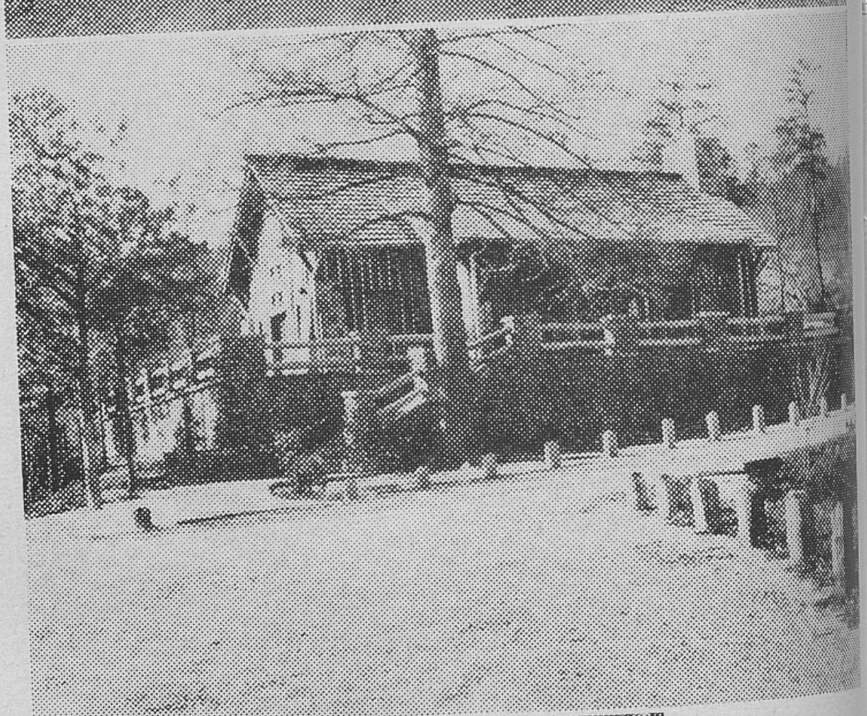


A "H
Brooklyn



A "Hell-Bender" or Salamander taken from the Kentucky River near Brooklyn Bridge.







SCENES IN KENTUCKY RIDGE FOREST IN BELL COUNTY.







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KY RIDGE
EST IN BELL
COUNTY.

d. Land in America was abundant and therefore cheap. When this is true, land use is usually ungoverned and great areas are laid to waste.

1. How did the machine age with its machinery and power affect our American soil? Find out the huge number of acres of land that have been ruined or are being ruined because of soil erosion. Where are these areas? What problems to wildlife arise from soil erosion?
2. In May, 1934, dust from our Western plains blew over the dome of the Capitol in Washington. How did the World War with its great demand for wheat and other grains help to cause the dust bowl?

e. What problems do we now face in the United States because of the waste and eploitations? Why do we need a conservation program?

4. Show how the following hurt or confused the cause of conservation. Evaluate each conception:
   a. Belief in the inexhaustibility of forests and wildlife by most people.
   b. Arbor Day Movement.
   c. Frontier attitude toward forests and game.
   d. Ideas by a few that forest reserves should be indefinitely "locked up" and maintained against some future time when all the rest of the timber would be cut.
   e. Attitude of miners, lumbermen, and stockmen in West.
5. Make a time chart showing the important steps in the national conservation movement from the first Colonial statute of Plymouth Colony in 1626 to acts passed during Franklin Delano Roosevelt's Administration to promote conservation.
6. Read about Gifford Pinchot, Theodore Roosevelt, John Muir, Carl Schurz, Dr. Bernard Fernow, Dr. F. M. Hough to find out their contributions to the conservation movement.

THE KENTUCKY SITUATION

It is relatively easy to branch off from the national conservation movement to the state. The conservation movement in our state was actually begun in 1912 when the first Commission was set up by the

Legislature for the directed control and protection of our wildlife and natural resources. The Department of Conservation was reorganized late in 1935 and now has a smooth functioning organization which is striving to bring back in a small way the splendid hunting and fishing for which Kentucky has been noted in the past and to stage a comeback in forest production and to control the soil erosion.

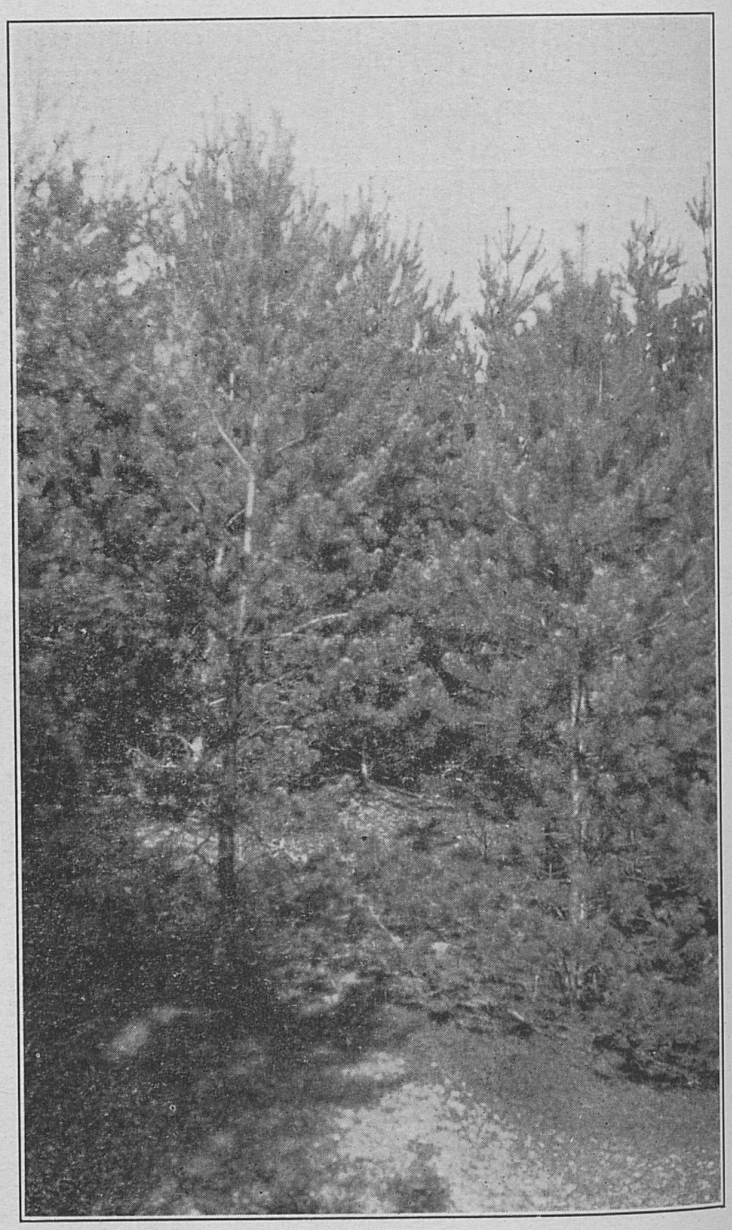
Activities or Problems:

1. Find out all you can about the organization, the duties, the powers, the tenure, the names of the members and chief administrative offices, and the work of our present Department of Conservation.



Fish-rearing ponds located in Pike County and built by sportsmen of that county. Now owned and operated by Division of Game and Fish.

2. Evaluate the work of the following in regard to conservation:
   a. The League of Kentucky Sportsmen.
   b. The Fox Hunters Association.
   c. The Aubudon Society.
   d. The Coon Hunters Association.
   e. The Garden Clubs.



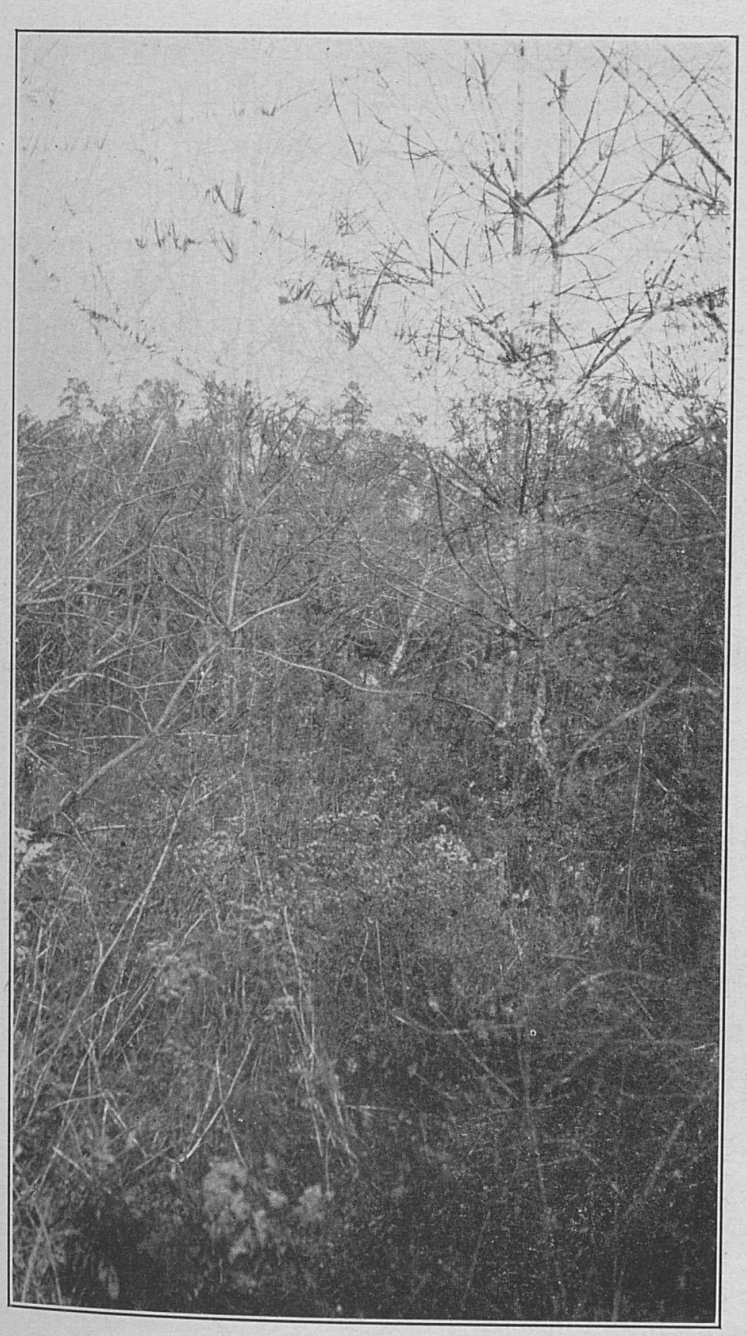
Young timber before a forest fire.

f. The local county Game and Fish Club.

g. Camp-Fire Girls, Boy and Girl Scouts, 4-H Clubs, etc.

3. Make a chart comparing:

   a. The old ideas of wildlife conservation with the present ideas. Why are protection and use the keynote of the modern trend?



Young timber after a forest fire.

4. Account for the fact that a better public opinion in regard to conservation is developing in our state.
   a. Why have some lumber companies and mining industries become "Conservation minded"?
   b. Are sportsmen realizing that many of the game laws mean more game and fish in the long run?
   c. Are farmers beginning to realize the value of wildlife to their farms? Are they losing the idea that they are being asked to conserve the wildlife so that the city sportsmen can have more to shoot?
   d. What are gains of a conservation program to you and me? To our descendants?

5. List the main accomplishments of our Department of Conservation. List some of the things which the Division of Game and Fish have undertaken to improve hunting and fishing in Kentucky.

6. Be able to discuss the Supreme Court Case that handed down the decision that all the wildlife belongs to the people as a whole.

7. Name the wild fur-bearing animals in your county. The State Ex. In your county should be found the skunk, opossum, red and gray foxes, muskrat, mink, raccoon and the ground-hog.

8. Name the wild game animals in your county and in the state that are fur-bearers but are hunted for sport and not for the hides. Ex. Squirrel and rabbit.

9. Name the major game birds in your county and in the state at large. Ex. Quail and dove.

10. Is there any big game (deer, bear, wild turkey) in your county? If so, have students name them and promote a discussion on possibility of their increasing in numbers in the near future.

11. Name the more common song and insectivorous birds in your county. Ex. robin, bluebird, wren, flicker, meadowlark, red bird, blackbird. Bring out in a discussion the important part these little feathered friends play in the growing of vegetation which is necessary alike to man and to wildlife. What happens to our wildlife when there is no vegetation?

12. By all means impress upon the students the importance of leaving the young and old wild animals and birds alone in their native habitat. They may appear lost and forsaken to man, woman or child, but rest assured that the parents of young are always close by, probably seeking out food, and will look after their young just as does the human mother and father. It is unlawful to keep wild animals and birds in captivity and at the same time, it was not intended by nature for these wildlife children to live cooped up.

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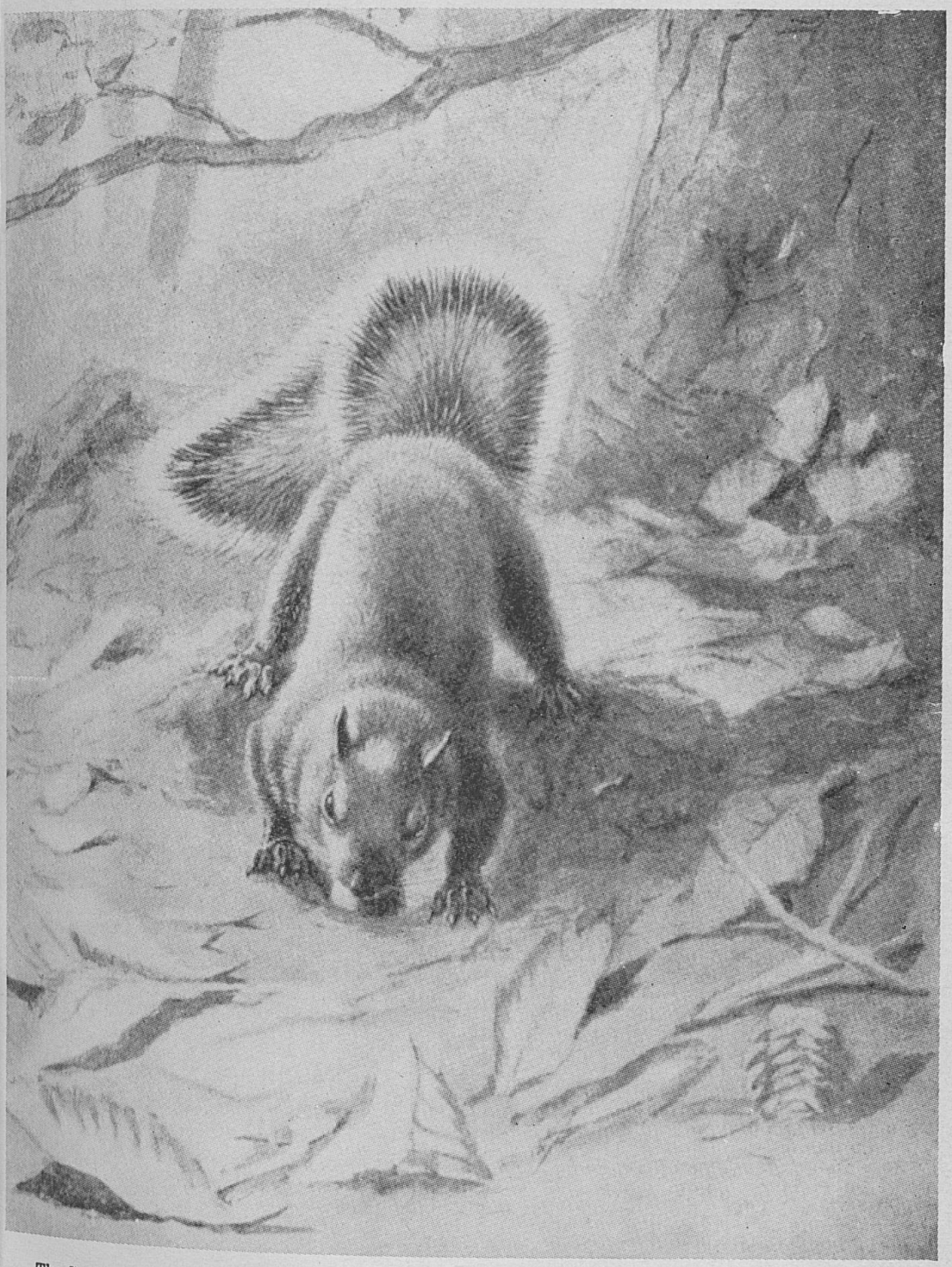
The Squirrel, both for food and



The Squirrel, next to the rabbit, is our most valuable and popular game animal, being hunted both for food and sport.

GRADE TWELVE

WILDLIFE CONSERVATION AND SOCIAL WELFARE

FOREWORD

Kentucky faces some serious immediate problems in wildlife conservation. The welfare of all wild animals, birds and fish depends upon the solution of these problems. The teacher by an over-view can show the results when conservation is not practiced. He or she can point to many localities in our state that are suffering or that will suffer because of forest depletion, soil erosion or depletion, floods, polluted streams, and a decreased tax base due to unwise land use. Unwise use of our natural resources leads to an inevitable chain of relationships, all of which are detrimental to our wildlife, the source of our greatest of all out-of-door sports—hunting and fishing.

Poor land—poor people.

Poor people—poor communities.

Poor communities—poor schools, churches, roads, depleted wildlife resources, etc.

As a result of this over-view, no doubt students will raise such questions as:

1. Upon what industries do Kentuckians depend for a livelihood?
2. What industries depend upon conservation of wildlife and other renewable natural resources to survive?
3. How shall our state's base of wildlife and other natural resources be maintained? How shall its levels of living be raised?
4. What services rendered by our state will be limited if our resources are depleted?
5. What are the standards of Good Citizenship with respect to Conservation?

GENERAL OBJECTIVE:

To understand and appreciate that conservation of the wildlife and other natural resources and the social welfare of our people

depends upon a sane, practical conservation program based upon proper land-use, and to develop a clear understanding of the relationship between Good Citizenship and Conservation.

Specific Aims:

1. To understand the necessity of for the well-being of our wildlife; the coal industry; the soil, and the streams.
2. To appreciate the significance of continuous long term returns instead of large immediate temporary returns in the social welfare of people. Speaking in terms of our wildlife resources, it is better to protect the game and fish by observing laws and bag limits, by killing or taking a small amount of game on each trip out rather than to kill it out all at once and leave nothing for the future. Conservation, in a true sense, means to leave, year in and year out, as much or more game than is taken. That policy insures a continuation of balance in nature and promotes the social welfare of our people to a higher level.
3. To appreciate how some of our people are being pushed into the sub-marginal group by unwise land use and that this unwise land use is also crowding out the game birds and animals and a means of destroying our once-clear streams with their abundance of fish life.
4. To understand and appreciate that protection of wildlife and other natural resources is not an end in itself; it is a means to increase and sustain the resources of our state and the industries dependent upon them with the end in view of making people better off.
5. To evaluate the methods now used by the government to meet the problems of Conservation. What agencies in your own county promote conservation of wildlife, soil, water, and vegetation?

Approach:

The present and future welfare of Wildlife in Kentucky depends upon how we use and conserve our renewable natural resources. Kentucky is so located that she has mountains in the eastern section, suitable for big game, timber and coal; limestone formations in the central section produces "bluegrass" which in turn produces fine cattle and great racehorses. This section has rich soil and is a prosperous farming district. Some portions of the bluegrass have been cleaned up to the point that wildlife has no place to live.



The hunter proudly displays the results of his efforts.

This condition must be overcome before we can expect a more abundant game population and the only solution to it is the growing of vegetation for food and cover in greater areas, the leaving of fence rows to grow up in grass, vines and bushes, refraining from the burning of fields and leaving of brush piles and sink holes as homes and safety retreats for wildlife. In the western section of Kentucky the land is more of the sandstone formation and is suitable to farming and makes a fine home for smaller forms of wildlife, such a raccoon, opossum, mink, muskrat, rabbit, squirrel, foxes, wild turkey, quail, dove and wild duck and geese populations. One of the flyways chosen by migratory waterfowl goes through the western section of the state and it is here that some excellent duck and goose hunting is found.

Nature in her most efficient set-up, has instituted over all wild birds and animals a system of very prolific propagation and in order to control over-production has placed several very effective curbs that tend to hold every specie of wildlife to a normal number. This is particularly true with our Bob White. Each pair of birds under normal conditions in the wild will produce a covey of from twelve to twenty-five. And under ideal conditions this family will require a range of from twenty-five to fifty acres and should several pairs nest and produce coveys on a smaller area than this the normal procedure is for the coveys to move away from one another to such a distance

that the density of population will not exceed one bird to about every two acres of ground. Nature's most efficient method of checking too prolific propagation is disease to which the Bob White Quail is most susceptible. The two diseases so deadly to quail are Coccidosis and Unclerative Interitis and these diseases are mainly caused by an unsanitary condition that occurs when more birds than nature intended attempt to use a given area. In order for a quail to live on two acres of ground there must be food, cover, water and protection for him. If this is not present the quail must seek other possible homes. All ground may look ideal for quail habitats but it may lack one of the essentials mentioned above and if that is true the quail cannot possibly live under such conditions and will leave for other parts. That is the biggest problem which the Division of Game and Fish and the sportsmen have to confront today. Cover for quail and other wildlife. That cover plays several important roles besides being essential for wild animals and birds. It protects the soil, runs the water into the ground and affords man a living.

While practically all other species of wildlife started immediately to decrease with the advent of the white man this did not hold true with the Bob White. In Daniel Boone's day there was a decided overbalance in the favor of cover over food as practically the only food available for quail then were grapes, berries, a few varieties of wild grain and half masticated mast dropped in the woods. Therefore, having plenty of cover with which to protect themselves, they had to do a considerable bit of hustling to find sufficient food. From that day on the cultivation practiced by the white man with the attendant clearing of land has tended to more evenly produce food and cover, increasing the area which quail would normally use, resulting in a very favorable increase in the total number of birds. Consequently, it would be safe to say that the farmer, in the practice of his trade—the cultivation of land—is responsible for the spread of the quail over the entire southern half of the United States. But so versatile is he in his benefits to mankind that he has more than repaid the farmer insomuch as each year he, being one of our most vigorous insect eaters, destroys countless millions of harmful insects that possibly could not be destroyed in any other manner.

Land-use problems face many of our counties. The counties with little tillable land are for the most part excellent potential forests areas. Agricultural counties must see to it that their productivity does not diminish. Some of the marginal land in Kentucky has become sub-marginal and has discharged its tennants. Over-grazing with its concomitant, soil erosion, presents a problem.

We should be conscious of the place of proper land-use in promoting the welfare of our citizenry and in the well-being of our wildlife and other natural resources. If we are to have stability of employment and income and if our state government is to have an assured tax income so as to render fine services to its people, then we must meet the problem of conservation of our wildlife and other renewable natural resources.

The economic importance of wildlife frequently is overlooked. Birds destroy insect pests that injure human beings and prey upon their crops. The U. S. Biological Survey estimates that birds save farmers $350,000,000 a year by destroying insect pests. Other living creatures provide food and furs. At a conservative estimate, returns from this (lower life) of the nation's wilderness are reckoned at a billion dollars a year. In Kentucky alone the income to farmers and trappers from sale of furs is estimated at approximately one million dollars a year.

The aesthetic and recreational value of wildlife cannot be estimated. More than 25,000,000 persons in the U. S. hunt and fish. This large group spends millions of dollars annually for equipment, gasoline, automobiles, hotel accommodations, and etc. The recreational and social benefits cannot even be thought of they are so great.

Conservation, the wise use of land, wildlife and natural resources for the social welfare are duties imposed upon all citizens. A good citizen is a conservationist. A good citizen obeys all laws, he accepts responsibility for his own and the community welfare; he considers himself a guardian of the wild birds, animals, fish and other gifts of nature, to protect, to manage and to share; and he will plan and work for the perpetuation of the best in his physical, social and governmental estate.

PROBLEMS AND ACTIVITIES:

1. Land is one of the most important factors in production.
   a. Is Kentucky's land rich in the economic sense? How valuable is her wildlife resources?
   b. List all her natural gifts. Can she offer rich opportunities to her people for economic and social security?
   c. What is happening to these natural gifts? Which of these natural gifts can be replaced? Name ways in which wildlife can be brought back to Kentucky in greater abundance?



The home of Major Butler, Butler Memorial State Park.

Below: Rustic Stone Wall.

Shelter House, Butler Memorial State Park.

Lagoon.

2. Kentucky is fortunate in its possession of an ample water supply. 12,000 miles of running streams in Kentucky.

   a. Locate on a map of the state the watersheds.

   b. What recreational opportunities do our streams offer our citizens?

   c. How can stream pollution ruin our water resources? What are the laws in regard to it? What effect does pollution have on fish?

   d. How can floods be prevented? How do they affect fish life?

3. How does proper forest management stabilize industry, employment, community life and wildlife?

   a. Trees are for the use of man and wildlife. What is the best use?

      "A tree crop should be harvested when ripe even as a corn crop. Unlike the corn, however, trees do not all ripen at the same time. A proper harvesting selects mature crop and allows the immature a chance to grow and ripen in its turn. Then the forests go on forever and yield forever. The forest service cuts millions of acres of government land on this basis. Only the ripe trees are taken. Seed pines are carefully left. Trees are felled to do the least damage to the younger growth. The slash is piled and burned in wet weather. The forest is as healthy as it was before, sometimes healthier. This is the way trees are harvested in Sweden, Germany, and other European countries. In Denmark there are now twice as many trees as there were seventy-five years ago." Rich Land, Poor Land, Stuart Chase, page 119-120.

   b. When should a conservation program start?

      1. When resources are yielding a profit?
      2. When resources have become unprofitable?

   c. How do the following affect the lumberman's management of his forest?

      1. It takes 80 to 100 years in Kentucky for hardwood saw log timber to mature.
      2. It takes 18 to 30 years for harvests of mine props, fence posts and railroad ties.

3. Payment of taxes and interest while crops are maturing.
4. Risks of fires and other destructive forces.

d. Have students assume that they are to manage a forest so as to make money and yet take out no more lumber than the annual growth so that returns will be continuous.

1. How many years does it require a hardwood tree to grow big enough to make fence posts, mine props, saw logs?
2. If a forest is logged when you are sixteen years old, how old will you be before you can expect timber from this area for fence posts, mine props?
3. Be able to explain by a chalk talk diagram how you would so cut the timber as to maintain continuous returns. Illustrate the practice of selective logging which sets diameter limits for particular products governed by the rates of growth of age.
4. When would you use artificial planting? Why?
5. Convince the class that "cropping" a forest is better than "cutting out and getting out" and that there will be even greater demands for forests because of the many new uses of cellulose.

4. Make a survey of your county, showing the industries that the people depend upon to make their living, the natural resources that these industries depend upon, then the things that could happen to the natural resources that would bring unemployment and poverty to your community. Gather data from the Chambers of Commerce, the labor organizations, the civic clubs, and county agents in the rural areas.

a. Students could be motivated to list and discuss all the the uses of land such as:

1. Cultivated. 2. Meadow. 3. Forests. 4. Industrial use. 5. Fallow land.

From this discussion, have students consider any wrong uses of land in their county that are evident from their study. The danger of their county becoming a ghost area because of forest depletion, soil depletion and erosion, floods, etcetera, can be discussed if such prob-

lems present themselves. How can wildlife contribute to value of the various types of land?

b. As a result of the above introduction, interest students in developing a county plan of land use. For example, students in Franklin county would have excellent opportunity to attack their problem and offer solutions. Some counties offer excellent areas for wildlife. Each county would have land problems peculiar to it. Farming has declined in some counties. Students could enjoy a variety of experiences gathering data for their plan. Field trips, speeches by county agents and other officials, the writing of letters for information, panel discussions by the students on their findings, all these and many more could be capitalized on. In many counties can be seen soil conservation projects, water projects, etc.

5. Many newspapers and publications carry articles suggesting a back-to-the-land movement as a treatment for economic ills. Let's evaluate the movement from Kentucky's set-up.

   a. What areas in Kentucky would you choose for this purpose? Why?

   b. How would the land be obtained?

   c. What conservation measures would have to be used with some of the land in order to make it the least marginal lands? How would our relief problem become more complicated by putting people on land that is or would soon be sub-marginal? Bring out the tragedies during the recent depression when people went back to land that was eroded and conditions that were insurmountable.

   d. What people would be chosen for this activity? What inducements could be made by the government to get these people back to the land. What would these people need to have besides the land?

   e. Compare your program with that of the federal government in regard to share croppers of the South and the Alaskan Colonists.

6. Compare the capital of all the banks of Kentucky with the capital in our natural resources. Which is of greater significance to social welfare? Why?

7. Find out the difference between a cash income and a real income. Show how the Kentucky Department of Conservation contributes to your real income by:
   a. State Parks.
   b. Prevention of forest fires.
   c. Restocking and reclaiming programs.
   d. Employing game and fish technicians for research work.
   e. Carrying on an educational program.

8. Have students evaluate in light of social goals the following agencies in their use of land and its resources:
   a. Civilian Conservation Corps.
   b. Tennessee Valley Authority.
   c. Fish and Wildlife Service.

9. Interest can be aroused and thought provoked by debates, panel discussions, or informal discussions on controversial subjects:
   a. Private ownership versus public ownership of natural resourcees. Here is opportunity to bring out that conservation of natural recources does not depend so much on who owns the resources but on how they are used. Use by private individuals and corporations can be compared with use by the government.
   b. Shall we use our labor to build up natural resources or to build factories?
   c. All private waste lands not suitable for crops must be planted to forests.
   d. Relief versus income from a conservation program.
   e. Cooperative organization versus government ownership.
   f. Natural resources should be publicly controlled in the interests of social welfare.
   g. Neither the state nor the national government should sell any public lands that have coal, mineral resources, or forest resources.

10. Have students estimate value of wildlife to their county. Classify according to use to farmers, sportsmen, business, industry, hotels, gasoline stations, restaurants, etc. List methods by which county can be improved from wildlife standpoint to foster greater recreational opportunities. Does wildlife contribute to social welfare?

SUGGESTIONS FOR INTEGRATION:

A. English:

1. Book reports on:
   a. The Yearling, Marjorie K. Rawlings (Scribner, 1938).
   b. The Good Earth, Pearl Buck (Reynal).
   c. Robber Barons, Mathew Josephson (Harcourt-Brace).
   d. Rich Land, Poor Land, Stuart Chase (McGraw, 1936).
   e. Behold Our Land, Russell Lord (Houghton-Mifflin, 1938).
   f. Rich Man, Poor Man, Goslin and Goslin (Harper).
   g. Giants in the Earth, O. E. Rolvaag (Harper).
   h. History of Great Fortunes, Gustavus Myers (Modern Library).
   i. America's Sixty Families, Ferdinand Lundberg (Vanguard Press).

2. Essays can be written on:
   a. Kentucky's Renewable Natural Resources: What is happening to them?
   b. Wise use of natural resources—wise use of leisure time.
   c. A Flood Control Program.
   d. A County Land-Use Program.
   e. What constitutes a wildlife food and habitat improvement program? Why?

B. Mathematics:

1. Make graphs showing:
   a. Ratio of the acreage of forests to population in 1700, 1800, 1900 and in 1940.
   b. Ratio between the timber used per ton or carload of coal to the amount of coal produced.
   c. Ratio of the amount of taxes collected from our public utilities and coal industries to the amount collected from the sale of hunting and fishing licenses.

a. Ratio of the amount of taxes collected to the amount taxes spent on education.

e. Ratio of the fines imposed for violations of game laws to amount received from sale of hunting and fishing licenses.

Observe carefully the people of your school and community. Make a list of acts of good citizenship that you observed. Check those activities that are in some way connected with conservation.

●

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CONSERVATION OF WILDLIFE IN KENTUCKY

NO. 1.

STATE REGULATION OF GAME AND FISH.

Years ago when the white man first came upon the fine forests and rich bluegrass fields of what is now known as the state of Kentucky, this area was then known to the Indians as the "Happy Hunting Ground." Today that phrase, like the Indian, has almost become a thing of the past, but within the last five years the people of Kentucky have awakened to the fact that their game and fish have almost become depleted and that it was up to them to restore and conserve it immediately or else lose it once and for all time.



HUNTERS PROUDLY DISPLAY GAME TAKEN BY THEM IN KENTUCKY.

This realization, having taken root in the minds of a few sportsmen throughout the state, caused the formation of several fish and game clubs, which resulted in the formation of these clubs in to the League of Kentucky Sportsmen. Through the efforts of this League, fish and game clubs have now been formed in practically every county of the state.

This widespread interest and the resulting cooperation of the state officials resulted in the Game and Fish Department being removed from the Department of Agriculture and set up as the Division of Game and Fish in the Department of Conservation. The Division of Game and Fish is now headed by a Director, who, with the help of an advisory commission of seven members, are in complete charge of the activities of the Division.

The activities of the Division are the enforcement of the Fish and Game laws by our Conservation Officers, under the Direction of the Superintendent of Wardens; the operation of our fish hatcheries for the propagation of fish which are planted in open waters in our state; the operation of the seining crew, whose chief duties are the salvaging of fish from overstocked ponds, from streams rendered unfit for fish by seasonal droughts and the transferring of fish from the hatcheries to the streams where they are planted under the direction of a superintendent of hatcheries; the biological department, which at the present time is making a complete survey of all the streams, and water-shed of our state under the supervision of a graduate biologist; and a scientific study of quail over a 5-year period by a graduate biologist; the publicity department under the supervision of our public relations director who keeps before the public, through the medium of both the weekly and daily newspapers, the activities of the Division as a whole, and the propagation and planting of quail, raccoon, deer, wild turkey, foxes, and all other birds and animals included in the restocking program under the personal supervision of the director.

Quite often the Conservation Officers (our law enforcement agency) receive reports of some person or persons setting off a charge of dynamite in a favorite fishing hole and of destroying all life in that particular body of water. These men then select a few choice fish for their own use and leave the rest to ruin and at the same time completely destroying a fine fishing spot. Again the officers will receive reports of illegal netting, gigging, fishing and hunting without licenses, killing birds and animals out of season and many many other such deeds and yet these same officers have in the past received very little cooperation from the sportsmen and citizens of this state in their efforts to curb this violence and have even been looked upon as some sort of terrible monster and mothers would frighten their children by telling them that if they were not good little boys and girls, "the game warden would get them." But this feeling is also becoming a thing of the past and now the officer is looked upon with respect and as one



Black Bear and Virginia White Tail Deer staging comeback in Kentucky.

who is trying to protect the game and fish and who is attempting to educate the people to the social and economic value of the wildlife.

Another example of the widespread interest in the conservation program of this Division and obedience to its laws is that of license

sales. In 1919 Kentucky sold 43,000 fishing and hunting licenses and in 1939 more than 190,000 persons purchased hunting and fishing licenses.

The figures just mentioned will give an idea as to just what effect the work of the Conservation Officers and the influence the League of Kentucky Sportsmen are bringing to bear on the general public, but at the same time it can readily be noted just what added work and responsibility this increase in fishing and hunting license sales has in replenishing the fields and streams with game and fish. On the top of this more and more land is being tilled each year, eliminating shelter and food for the wildlife and more and more streams are being polluted which means added destruction to the fish life. These are the major problems with which the sportsmen and the Division must cope and it is only through cooperation with the public, who benefits from better hunting and fishing, that we can expect to overcome these obstacles.



A nice string of fish taken from Herrington Lake.

The Division has only three fish hatcheries in the state that are in operation. It is hoped that money will be available shortly to set up at least two more hatcheries which, with the ones we have at present, will be adequate to stock the waters of Kentucky.

The superintendent of hatcheries sees to it that the thousands of small bass which are hatched off in the spring are fed and cared for during the summer and early fall months and then they are released in public waters of the state where they will furnish the anglers plenty of sport in the future. The superintendent also has under his direction a seining crew which aids in the fish stocking program.

The biological department of the Division, which was created for the purpose of making a scientific study of the streams and watersheds in the state in regard to food materials for fish, pollution, and what streams are most suited to certain species of fish, was created after the Game and Fish Division became a part of the Conservation Department. These reports will make for a better understanding of the public waters in regards to stocking them with fish and this research should prove of great value in improving propagation of fish that are already in the streams.

The creation of this biological research department of the Division is one of the several steps towards advancement of Conservation in Kentucky that has been made through the creation of the new Conservation Department. Many states have had this scientific biological research study going on for years and it has proven very successful and beneficial wherever tried.

In those states that have made their conservation programs a success, education of the public has proven to be the main factor by which this success was attained. In 1938 a publicity director for the Division was appointed and he is working towards the goal of educating the people of Kentucky to the value of conserving the wildlife.

NO. 2

INFORMING THE PUBLIC

One of the most important factors in the successful outcome of the program of conservation in Kentucky is that of informing the public as to just what has been done; what is being done, and what is to be done in the future for the betterment of wild animals, birds and fish. Publicizing is the medium by which the people of this state must be informed and educated in the drive for better fishing and hunting. When I make this statement, I am not only citing the importance of publicity to Kentucky alone, but have records of its inestimable value

to the conservation programs of other states that have been benefited by its use far longer than we have here in Kentucky. These same states are top ranking in the preservation of their wildlife and these same states are putting out the most publicity and doing the most towards education of the public to the social and economic value of wildlife.

The slogan "It pays to advertise" certainly holds true in the work of this Division as we operate solely from income derived from sale of fishing and hunting licenses, which the general public purchases, and, to satisfy them, we must produce more fish and game. In order to do that, we must let the public know that we are stocking the streams with fish and that we are attempting to clear up public waters of pollution and that we are stocking the fields with more quail, giving added protection to the doves and the migratory waterfowl and at the same time enlisting the cooperation of the public in the protection of our song and insectivorous birds. The forests are being stocked with red foxes, raccoon, wild turkey and deer to give this same public more sport and more for the money which they spend for their licenses. In return for this stocking program, the Division must sell more fishing and hunting licenses to take care of the added cost.

The whole program of conservation in Kentucky of our wild animals and birds and our fish depends almost entirely upon public sentiment and it is the important work of the publicity department of this Division to keep this public sentiment at the highest favorable pitch at all times.

In the first place this is done by writing articles each week and sending them out to the more than 200 daily and weekly newspapers in the state. At the same time copies of these news articles go to all national sportsmen's magazines, to the conservation departments of the adjoining states and to the officers and directors of the League of Kentucky Sportsmen. These articles—which contain news facts about our fish hatcheries, quail raising; quail releasing; operations of the seining crew; the whereabouts of the wildlife exhibit of the Division, and numerous other informational facts which the public should know about—are then printed in the papers and read by countless thousands of people over the entire state. The daily papers of course will reach the larger percentage of people in the bigger cities and towns, while the weekly papers cater more to the smaller towns and to the rural sections. These small weekly papers, which are read mostly by the farming population, are one of the most important factors in reaching this particular group of people with our educational program. The farmer reads his paper carefully and—being the

man or woman who owns the land upon which our game is to be found —his cooperation in the protection and propagation of our wildlife must be secured before we may expect any degree of success.

Articles are printed in the newspapers which urge the respecting of rights of the farmers and landowners by those who enter upon their land either in the pursuit of fish or game and if the farmer's rights are respected, the sportsmen may rest assured that they will be met more than half way. But where the difficulty comes in is when a so-called hunter goes on the farmer's property without permission, leaves the gates open, shoots all the game—leaving none for the farmer to enjoy—maybe killing or injuring the farmer's stock, and departing without even a word of thanks. It is natural that the landowner should and does resent this sort of treatment and it is this strained condition between the sportsman and the farmer that we are trying to overcome and replace with better understanding and cooperation between the two for betterment of conservation in Kentucky.

Urging the sportsman to respect the farmer's rights and to be more considerate of those rights, we also ask the farmer, through our newspaper releases, to help us conserve and propagate the game and fish. There are several ways in which he may aid the wildlife and at the same time receive dividends in return.

Wildlife must have plenty of food and cover in order to exist and in this the farmer plays a very important part. We urge him to leave small patches of grain standing at the edges of his fields to furnish food for wild animals and birds and we ask him to let bushes and vines grow along the fence rows to furnish cover for the game. This vegetation is used as a passage way from one field to another and from one source of food to another. Without this passage-way of brush and bushes, wildlife would be helpless and would have to take to the open where it would fall easy prey for predators. The farmer is also urged to leave sink-holes filled with brush and to place piles of brush on spots of ground that is unsuitable for cultivation. If at all possible, every farmer should have a patch of woods on his farm to furnish food, cover, and homes for various species of wildlife. In return for these few favors, the landowner will have plenty of game to hunt and at the same time, large numbers of song and insectivorous birds will make his farm their home and will feed on destructive insects, helping to protect his crops from their advances. Examples of the terrible destruction which can be wrought by insects are the grass-hopper plagues of the west which destroyed millions of dollars worth of crops each year. Millions of dollars have been spent by our governments,

endeavoring to find means for checking this terrible destruction. Most of our song and insectivorous birds feed almost entirely upon insects of this sort and, due to their huge appetite and to the large number of bugs they eat each day, their value to the farmer and to his crops is inestimable.

Wildlife is beginning to receive benefits from the publicity we are sending out to the sportsmen and to the farmers in the form of better protection during the closed seasons; leaving of sufficient numbers of old game at the end of the hunting seasons to furnish ample brood stock for the next year, and mere food and cover to care for any increase in the animal and bird populations.

Another phase of the educational program which the Division is bringing to the people of this state now is the moving picture shows of fishing on Herrington Lake; operation of the state fish hatcheries; seining crew transferring fish from over-stocked ponds to public waters that are understocked; bird dog hunting the Bob White Quail in Southern Kentucky; rounding up and transferring of Virginia white tail deer from western Kentucky to the mountains of eastern Kentucky; and quail raising both by private hatcheries and our own hatchery at Ashland, Ky., and some of the conservation work being done by Game and Fish Clubs throughout the state.

Judging by the large attendance at every showing of the wild-life pictures and also by the increased demand for this show at the sportsmen's meetings; at luncheon club meetings, and in the schools, the people are more eagerly seeking educational information in regards to providing themselves with better hunting and fishing.

Observation within the past two years has certainly proven that the citizens of this state are in a receptive mood for presentation of a progressive and constructive educational program which will bring closer cooperation and a better understanding between the sportsman and the farmer and which will bring better preservation and propagation of our wildlife.

It seems rather difficult to bring to the entire public a general understanding of our fish and game laws as we have hundreds of requests during the year asking for information in regard to this law or that law. Arguments over the laws, in which one man will say that he can kill as many rabbits in one day as he wishes, while another man says that there is a bag limit of 8 in any one day, in a lot of instances causes bets to be made—so sure are both parties that their argument is the right one. To settle such questions they will write or phone in to the Division headquarters at Frankfort or seek out their local conservation officer to get the correct interpretation of the law.

Such incidents more than prove that the people need to be taught the fish and game laws and need it badly. The saying "ignorance of the law does not excuse" means that a state-wide drive for law instruction must be carried out in order to get the best possible results in our conservation program.

At the same time we have this law changed or that law added to the already large list and this constant change keeps the public confused and in order to overcome this condition, they must be constantly contacted and informed as to such changes.

As I have stated earlier in this pamphlet, the newspapers are one source of informing this public in regard to the frequent change in our laws, to the opening and closing of the various hunting and fishing seasons. Distribution of over 300,000 game and fish law books by the 120 county clerks; by members of the League of Kentucky Sportsmen; by the county fish and game clubs and by the entire personnel of the Division of Game and Fish is another method of informing the public on the laws governing fishing and hunting. Still another method employed in this informational drive is the printing of large placards on which have been stamped all the open and closed seasons; bag limits, and other information.

And still another form of information which we distribute to all schools, fish and game clubs; country stores and sporting goods houses and numerous other such places, is a large placard on which is found a series of printed pictures of the cardinal bird which represents the song and insectivorous birds; the mallard duck which represents the migratory waterfowl family; the wild turkey; the red fox; the bob white quail; the opossum; the cotton-tail rabbit; the raccoon the squirrel, and the deer. Under each is printed the name of the particular specie and a short sentence description of the laws governing this particular bird or animal during open and closed seasons. These placards have been widely distributed to every section of the state and are proving of great benefit in the program of informing the public about game and fish. A large chart showing 26 species of fishes has been completed and is distributed to schools and other organizations interested in the conservation of our wildlife.

A map, showing every stream in the state and in what section located, is also completed and is made available to the sportsman and the teacher.

Recognition of a wildlife week in Kentucky during the month of October causes a combination of efforts on the part of the Division and the sportsmen of the state in redoubling the efforts of bringing wildlife education and the value of conservation into practically every

school in the state public school system. Placards are distributed of the type I have just mentioned above and prizes are offered for the best essays written by school children. Those essays must be written about various subjects of the Fish and Game program—subjects being furnished by the Division and the League of Kentucky Sportsmen. Clubs of every description are addressed by conservation-minded men and women during this week and every citizen, both old and young, is made to feel the value and necessity of protecting and conserving our game and fish.

With the various means of bringing before the public the program of conservation of wild animals, birds and fish by the publicity department of the Division, it is easy to realize the importance of "informing the public" of our activities and too, the value of educating the people to the importance of obeying the laws pertaining to our fish and game, the great good they can do by cooperating with us to the fullest extent and last, but not least, the greater sport derived from a plenteous supply of game and fish and the increased value to all types of business concerns in every section of the state from revenue derived from out-of-state men and women who will come here to Kentucky to pay well for good hunting and fishing.

NO. 3.

YOUR FRIEND THE GAME WARDEN

There is one group of men working for the Division, namely, the game wardens, who in the past, have not received the proper cooperation from the fishermen and hunters in their efforts to conserve and protect the wildlife of Kentucky and to make for better hunting and fishing in the Commonwealth. This lack of cooperation made the work of the warden doubly hard and because of the antagonistic attitude taken by some of the people the warden was not given the due respect which he deserved in his efforts to help the farmers and sportsmen to put back on their land and in their streams game and fish as it was years ago when the Indians roamed the bluegrass state. In the past there have been some conservation officers who did not live up to their oath of office to do their duty and their misconduct caused many misunderstandings among the sportsmen and landowners which have been rather difficult to straighten out, up to the present.

In the past the more arrests the warden made, regardless of how or under what circumstances, the better warden he was considered by his superiors and a certain number of arrests were considered necessary to hold the job. This condition has not led to good law enforcement or a heathly respect of the game laws. The warden could get

little or no support or cooperation from the sportsmen or others in the conservation of our wildlife.

But now the status of the game warden is rapidly changing and instead of making a record each month for number of arrests and convictions, he is schooled to preach education from one end of his district to the other and to use kidness and good will in the program of conservation and propagation of the wildlife in Kentucky. When the warden takes his job he must take an oath to enforce the Fish and Game laws to the utmost.

Today the warden has two major objectives which he is instructed to carry out and which are the foundation for the Program of conservation of wildlife in Kentucky. They are game management and education. The warden of the present is a Conservation Officer—a man who educates the people to the value of conserving the game and fish. He not only enforces the game laws, but he takes an active part in increasing the game and fish. He not only protects the existing wildlife, but he educates and directs the sportsmen, the farmers, and the interested public in the ways and means of increasing the existing game and fish through improving natural conditions.

This improving of natural conditions so that game and fish will increase and spread by natural reproduction in the wild, is called game management. The warden must work more and more as an educational officer. He must work more closely with the sportsmen and with the farmers and must act as a go-between in building up better farmer-sportsman relations and bringing the two groups together for common benefit of wildlife.

In order to give the best service, both to the Division and to the sportsmen, the warden must know the habits of the game in his district and must also be well posted as to game conditions over his entire territory. He must also be well versed in the best methods of game management for the various species existing within his district and he must also be well posted on all phases of wildlife growth and conservation. He should know just a little more about game and fish than the best informed sportsmen and farmers in his district. In short, the game warden should be the leader in conservation in his territory.

Since wildlife joins closely with land use and farm practice, the farmer must necessarily be the key man in such a conservation program. Often the warden finds some of the farmers in his territory somewhat antagonistic and finds it difficult to approach them on the restocking of wildlife program.

The first thing the warden does is to build up the confidence of the farmers. This is done by getting out and talking with a few of them while doing the regular patrol work. The warden does not talk game and fish to them at first, but talks about the crops and the farmer's problems, gets his ideas and attitudes toward game on his farm and helps the farmer with any problems he may have when it is convenient to do so. He also lets the farmer know that he is there to work with him and to help him in any way possible. The warden, as a representative of the Division, works to protect the farmer's land from trespassers who tear down fences, kill livestock and violate all the ethics of a true sportsman. The restocking program is approached from the standpoint of suggesting that the farmers do or do not do certain things to provide more cover or more feed for the game, and conveys the idea that the Division does not tell the farmer he must do this or that. The land belongs to the farmer and is his to do with as he pleases, so that the Division cannot step in and tell him how to run his farm. The best results are obtained, however, without antagonizing him by merely suggesting that he do certain things if he would like to have more game on his farm.

Each of these salaried conservation officers is allotted a territory and he must cover this section thoroughly; learn the streams; the type of fish in each; study methods for improving them and seeing to it that they are kept free from pollution; getting familiar with the hunting prospects and types of game to be found in his particular district; getting acquainted with those people who are inclined to break the game and fish laws rather frequently and then watching their every move to see that such violations are stopped; becoming acquainted with each and every farmer in the territory and helping him in every way to increase bird, animal, and fish life on his farm as much as possible.

In order to give the best service both to the Division and to the people in his district, it takes at least a year for the warden to familiarize himself with the above mentioned conditions. At the end of a year he will know just what his wildlife set-up is; who his chief offenders are; what work is to be done with the farmers, and last, but not least, just how the local courts feel toward the protection of the game and fish and towards those who violate the game and fish laws.

In the past our fathers and forefathers hunted and fished when they pleased and killed and caught as much game and fish as they desired, but this plenteous supply of wildlife has diminished from such wanton habits and a Division of Game and Fish was created and laws were made to overcome this unbalance in nature's program.

As the result of having open and closed seasons and bag limits and other phases of law which protects and regulates the lives of the wildlife, restraining such hunting and fishing as was carried out in past years, the older people and officials have become prejudiced against the Division and the program for which it stands. This feeling is being gradually overcome by education, friendliness and good will of representativees of the Division—namely the game warden—now known as the conservation officer—and the citizenry now realizes that the laws created for protection of wild animals, birds and fish is absolutely necessary if we hope for their existence in future years.

In some counties the violaters have gotten the upper hand and do as they please but when the sportsmen are contacted by the local warden and when it is pointed out to them the necessity of seeing that the game supply is conserved, they take the reins in their own hands and acquire the respect of court officials and violaters, and the Division then does all in its power to see that the laws are obeyed and that the county receives its share of game and fish for the fields and streams. Without the aid the sportsmen the warden, as representative of the Division, is helpless to aid the wildlife.

The Director of Publicity for the Division reaches the public as a whole with information concerning the conservation program which we now have in operation, but the game warden—now known as the Conservation Officer—carries this same educational and informational program to the individuals of his territory and does much towards futhering the wildlife cause in his particular county and section of the state.

The Conservation Officer goes into the field and meets the farmer at work with his crops. He talks with the landowner and learns all about his farm; where the sink-holes are; about how many squirrels, rabbits and birds are to be found on the land, and the amount of food and cover these wild animals and birds have available. In talking with the farmer he points out the value of leaving the brush-filled sink-holes as they are; letting the fence rows grow up in vines and bushes for cover and food for the wildlife; the planting of a small patch of grain near some thicket to furnish food for the game when it is needed most, and many other suggestions which will not only be helpful to the game but to the farmer, the sportsman, and to the Division itself.

You can see from this the importance of the educational work of the Conservation Officer in his first-handed work with the sportsman and the farmer. He is not only able to educate them to the great good they can render wildlife in their own particular way but can also get the two groups (sportsmen and farmers) linked together in the

common cause of conservation of their game and fish. He also preaches conservation education to the 4-H club groups, to the boy scouts and similar other organizations which are of great help in furthering the cause of wildlife conservation.

For an example of the work of the officers and the type of violations which they have to contend with, the following is submitted:

The Conservation Officers of the Division of Game and Fish made 197 arrests for violation of the game and fish laws during the month of May, 1939. A total of 1,256 licenses were checked by the officers which was a small number compared to 7,075 in April, this being due to closed fishing season in May. The seizure of contraband for the month of May was probably the largest in the history of the Division.

The officers seized 67 illegal nets; 43 fish baskets; one gun; 431 trot lines; 116 poles and lines; 93 fish traps; 15 gigs; one fall trap; 47 throw lines; 8 row boats; one 3-cylinder motor boat and 3 inboard motors and boats; 560 pounds of fish; 2 spears; 9 fish boxes; one snatch line; 3 seines; 12 mussel brails; 500 pounds of mussel shells; 2 red foxes; one steel trap; 2 owls; one grab hook, two gallons of gasoline, and destroyed one fish dam.

It can readily be seen from the list of contraband what the sportsmen of Kentucky and the Division must put up with month after month in the way of violation and an idea can be formed as to the great drain on our wildlife resources which these illegal contraptions make.

The officer is indeed a friend of the sportsman and the farmer and all others who are interested in the program of seeing our wildlife on the increase and for that reason he should be the leader in conservation in his district. But such a policy has been difficult at first. There was a great deal of old prejudices against the game wardens, which have existed in the minds of many farmers for years and these prejudices have been overcome, though the work has been discouraging at times, but continued efforts have produced results, slowly at first, then faster as the farmers have gained confidence in the wardens and what they are trying to do and the code for which they stand.

The wardens are now contacting the county and city officials in their territory in such a way as to win their support and cooperation. They are also winning the support of the newspapers which are doing much towards the education of the people in the work of the wardens.

All contact work of the Conservation officers is carried on along with the regular patrol work and aids rather than handicaps the

enforcement end, for the farmers and sportsmen contacted often give valuable information which, in a lot of instances, leads to the arrest and conviction of a violator. Above all this contact work places the Officer in a position of respect in his community and makes him looked up to as a leader in conservation thought.

NO. 4.

REPLENISHING THE FISH SUPPLIES

The sport of angling in the state of Kentucky has reached such proportions as to make the stocking of the streams with fish enough to take care of this added increase in the number of fishermen, who, each year seek out the out-of-way streams and ponds in their efforts to catch larger and scrappier fish, a major problem of the Division of Game and Fish. Added to this increase in the number of fishermen we also have the problem of stream pollution which destroys millions of fish each year in the public waters of Kentucky and also makes additional waters unsuitable for fish habitats each year.

In order to take care of the additional fishermen who place an increased drain on our fish supplies, we must meet this problem by construction of fish hatcheries which artifically propagate several hundred thousands of game fish—namely the large and small mouth bass—each year to be placed in the streams to take care of the depleted fish numbers.



The seining crew of the Division of Game and Fish transferring fish.

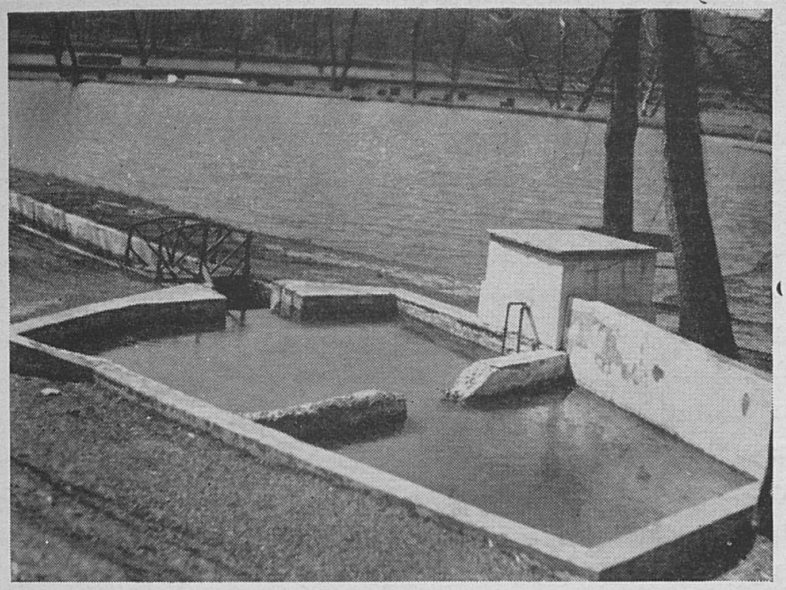
Besides the hatcheries, we have a number of men known as the "seining crew" which transfers fish from overstocked ponds and streams to public waters that are understocked. This crew of men transfers between two and three hundred thousands of fish each year in an effort to balance the over-abundance in one section and the depletion in another of the fish species. The Division also has three state fish hatcheries located at Williamsburg, Ashland, and Glasgow, Kentucky. The Division also has a fish hatchery located in Lewis County, near Vanceburg, Ky., but this fish rearing station has been abandoned as being impractical for the artificial raising of fish due to the lack of sufficient water supply.

There are in Kentucky more miles of running streams than in any other state of the union. With this large mileage of running streams, it is readily seen the added work that would be involved in keeping down pollution, protecting and patrolling this large water mileage in the enforcement of the fish laws and the restocking of those streams with artifically propagated fish.

At the Gatliff hatchery near Williamsburg we have seven large pools that are used for the hatching of large mouth and small mouth black bass. At Glasgow, we have the Trigg State Fish Hatchery, having six pools and being well adapted for bass rearing.

At the Ashland Hatchery we have four large hatching pools which supply 19 rearing pools, also at the hatchery, with fry and fingerling bass. The fish, which hatch out around the middle of May, are taken from the hatching pools and transferred to the rearing pools where they are fed and cared for during the summer and early fall months and by that time they have attained a growth of approximately three to seven inches in length and are then able to take care of themselves when released in the fall.

Rearing ponds are to be found at Pikeville, Harlan, Williamsburg, Somerset, Glasgow, Frankfort, Greenup, Elizabethtown, Bowling Green, Louisville, Hopkinsville and Monticello. These pools have been built by the local fish and game clubs who are cooperating with the Division of Game and Fish to replenish the fish supplies in the state of Kentucky. They furnish the labor and money for the construction of these pools and then the Division furnishes them with fry which they are to look after during the summer and fall months. At the end of this time the fry which have attained fingerling size are removed from the rearing pools and liberated in public waters in that particular section of the state. In order to make for a constructive and progressive conservation program in the state, the local fishermen must get together and in this way help the Division. Where this is done, the







The Trigg State Fish Hatchery in Barren County near Glasgow, Ky., where large and small-mouth black bass are propagated to replenish the streams of the state with more fish. Upper view of spring which furnishes hatchery with water supply. Middle is view of one pool of hatchery with caretaker's buildings in background, and lower photo shows pool drained down with artificial bass nests placed in readiness for spawning season.

Division, in turn, helps them. But where there is no effort on the part of the sportsmen to aid the wildlife in their vicinity, then the Division takes for granted that they either do not want good fishing or do not realize how much their help is needed and apprecited by us.

In the past it was the custom to release the fish in the "fry" stage. By "Fry" we mean fish which have just been hatched off and are less than an inch in length and only several days old. When thousands of these tiny fish were dumped in the streams they were not old enough or large enough to protect themselves and therefore, they only furnished food for the larger fish which were already to be found in the streams. After study we found that it was more practical to hold these small fish in rearing pools and help them to get some size and age on themselves before turning them into the public waters. In order to do this, we transferred the fish from the hatcheries, when only a few days old, to the rearing ponds and fed them through the summer and fall and about the time the fishing season was over and at the time when the normal consuption of food by the larger fish has ceased, these fish are placed in the streams to adapt themselves to a normal fish life and prepare themselves for the angler's hook without much danger and loss of numbers by the larger members of the finny tribes. The majority of fish which we will release in the fall of one year will be large enough to keep by the next July.

One of the most destructive things to fish life with which we have to contend at present is that of the pollution of our public streams. This contamination is caused by many things such as copperas water flowing from our coal mines; oil waste dumped into the streams from our oil wells, and refineries; sawdust from our saw mills and waste from the thousands of factories located along the banks of our streams. But probably the most common and one of the most destructive is that of the common sewage from our cities and towns. This sewage does not directly kill the fish but as it deteriorates it uses the oxygen up in the water and throws off carbon-dioxide, resulting in the total destruction of the fish or the driving of them away from their homes.

The great Ohio river, which forms one of the boundaries of our state, has been practically depleted of all marine life as far down as Maysville, Kentucky. Because of offenders above our state boundaries, such as the great steel corporations of Pittsburgh and other large cities of the eastern section, we have lost one of our best fishing streams, namely the Ohio river. This pollution of the Ohio is beyond the control of the state of Kentucky and must be dealt with by the Federal Government. It has been estimated that the pollution is moving down the Ohio River, killing all marine life as it goes, at the rate of eight

miles a year. That means that our fishing waters are being destroyed at the same rate and that there is nothing we can do about it until this pollution is stopped. Restocking of these polluted streams with additional fish is merely a waste of time and money and for that reason we are helpless to stock these streams.

The Division now has a man in the field who is studying the conditions of the streams as to pollution, food, oxygen content of the water, and amount of silt deposited in the beds of the streams.

This biological stream study has proven very successful in other states and it firmly is believed that it is one of the important factors in solving our own fish restocking problems in Kentucky.

The state, has for years, stocked numerous private ponds with all species of fish and to this day we receive a large number of applications from owners of private ponds to have these bodies of water stocked. But it is now the policy of the Division that all the fish avaliable for restocking purposes be placed in our open streams where the general public who fish according to our laws will have access to them. You can readily see the reason for this change because the only money we receive in our Division is from the sale of fishing and hunting licenses and upon this revenue we must operate solely. Therefore it is up to us to give those who purchase these licenses, the most we can for the money which we have available.

But there is one thing which we do at the request of farmers who own private ponds and that is the seining of these ponds to remove surplus fish which will accumulate in a period of three years. This accumulation is due to the fact that the ponds have no outlets and with the rapid multiplication of the fish, will soon reach the point where there will be enough food in the ponds for maintenance but not enough for growth. Consequently you will have in your pond an inferior fish, due to the lack of sufficient food supply and this condition will continue to grow worse unless this surplus number of fish are removed. It has been our policy and it will continue to be our policy to seine these private ponds for the farmer and landowner who has the desire for a better fishing pond.

Where we seine a private pond at the request of a landowner the only compensation we ask for this work is to take the surplus number of fish and to distribute them in the public waters of the state where the fishermen, who buy their fishing licenses, will have access to them and also where the fish will have a chance to mature to a normal size.

When the landowner and farmer gives us his permission to remove fish from an overstocked pond, he is not only doing himself a

favor by improving the fish and fishing conditions in his own pond, but he is helping to stock depleted waters and is also helping the fish propagation program in the state.

NO. 5
QUAIL FOR SPORTSMEN

Of the many responsibilities connected with our job the propagation and planting of game is of major importance. Our program includes the propagation of Virginia White Tail and Wild Turkey, which we plant in our mountainous and other heavily wooded areas. Also the purchase and planting in suitable areas of numerous red foxes, raccoon and many other furbearers, but by far the greatest advancement has been made in our method of propagating, handling and planting the grandest and gamest of all our game birds, the Bob White Quail.

Nature in her most efficient set-up, has instituted over all wild birds and animals a system of very prolific propagation and in order to control over-production has placed several very effective curbs that tend to hold every specie of wildlife to a normal number. This is particularly true with our Bob White. Each pair of birds under normal conditions in the wild will produce a covey of from twelve to twenty-five. And under ideal conditions this family will require a range of from twenty-five to fifty acres and should several pairs nest and produce coveys on a smaller area than this the normal procedure is for the coveys to move away from one another to such a distance that the density of population will not exceed one bird to about every two acres of ground. Nature's most efficient method of checking too prolific propagation is disease to which the Bob White Quail is most susceptible. The two diseases so deadly to quail are Coccidosis and unclerative interitis and these diseases are mainly caused by an unsanitary condition that occurs when more birds than nature intended attempt to use a given area.

So you can readily see that when man attempts to propagate quail in such numbers as to make a profitable and efficient business out of it he must, of necessity, crowd birds into pens that greatly exceed the number nature intended for so small an area. Thus making sanitation the most important factor connected with quail raising. This element and the lack of a balanced diet have caused quail raisers their many headaches in the past.

Today we are able to buy from several different food manufacturers a food that has been as nearly as possible, balanced to give the quail the same vitamins and etc., that they would get in a normal

day's feeding in the wild. This has taken years of experimenting and many many hours of tedious observation of the feeding methods of the birds in their natural habitat.

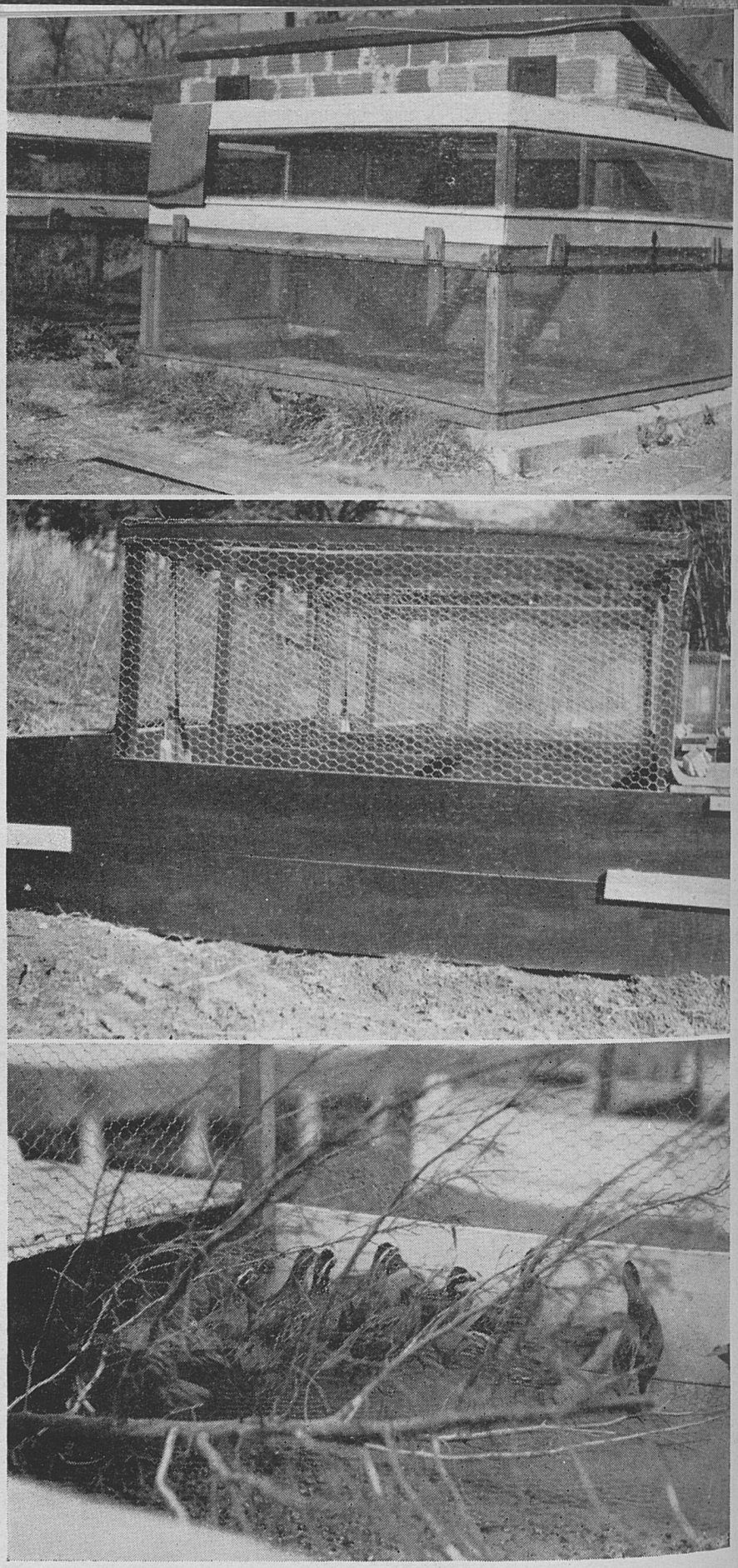
Several years ago, realizing the importance of learning more about this wonderful bird, the Congress of the United States appointed a committee of scientists, naturalists, quail hunters and farmers, who spent five years of research work in three of our most important southern quail states.

The work of this committee, of which Mr. Herbert Stoddard of Thomasville, Ga., was an important member, resulted in Mr. Stoddard publishing a book, giving the complete report of the work of this committee together with his and other authorities opinions on the many phases of the interesting life that these birds live in the wild. From this book all of us, interested in the propagation of quail, have been able to learn the cure for a lot of ills and to perfect different methods of propagation and handling.

And we, of the Division of Game and Fish in Kentucky, have gone a step farther than any of our sister states in succeeding in instituting a system of quail handling that allows us to hold the birds, that are propagated this spring, in pens at several holding stations in the state through their first fall and winter. This affords us the opportunity of planting fully matured birds, capable of reproduction. And planting them between the first of April and the fifteenth of May, which is the time when our wild quail are breaking up coveys and beginning to mate.

So successful have we been in our sanitation methods, used at our holding stations, that over a three-year trial of this system, we have in no one year, suffered a loss of over ten per cent of the birds carried through the winter. Had these same birds been released in the wild at the time when most every state releases birds, they would have been somewhere between six and tewlve weeks old, would be forced to shift for themselves, find their own food, dodge the many predators that are continually seeking them, survive, what in Kentucky is usually a severe winter, and in some manner, keep themselves out of the game bag of the hunters that first season.

It is estimated that out of a given number of birds, released in the summer and fall, that only a very small percentage live, become fully matured and get to enjoy even one mating season. While under the system we are now using, out of that same number of birds, ninety percent or better are released under ideal conditions at the exact time of the year when all nature is busy reproducing its kind. So that the



Quail hatching and holding unit at state hatchery near Ashland, Ky., used in the work of replenishing the fields of the state with the Bob White quail. Upper photo shows a brooder house where the baby quail are held. Middle photo is view of holding pen where quail are held through fall and winter months until ready for liberation around first of April. Bottom is view of quail in holding pen. Usually 25 birds to a pen.

sportsman, instead of killing a lonely pair of inmature birds, will find in their place that same pair of birds with a full covey of their own making.

So valuable are these birds and so vital are they to our wildlife setup in Kentucky that we are exerting every effort to have an ample supply of these birds for liberation every spring. So that we may not be found wanting, the Division is keeping alive three sources of supply of young birds. The most important source are the several successful quail raisers, located in Kentucky, whose entire output we purchase each year at the prevailing market price. The second is our own quail hatchery at Ashland, Ky., which we are operating now on a small scale, more as an experiment project, but which, on very short notice could be expanded to produce the number of quail needed, should other sources fail. And third, is the importation of the Texas Bob White Quail from Mexico. This last mentioned bird is not the Mexican quail which has caused so much argument among sportsmen and so much grief even to our best trained and efficient bird dogs. It is a little lighter in color and a fraction smaller than our own stock, but when planted at the proper time of year in Kentucky it is extremely prolific, producing coveys containing in extreme cases as high as twenty-six and twenty-seven birds which offspring, when reaching maturity, have acquired the more brilliant plumage, normal size, and other general characteristics of our Native Bob White Quail.

While practically all other species of wildlife started immediately to decrease with the advent of the white man this did not hold true with the Bob White. In Daniel Boone's day there was a decided overbalance in the favor of cover over food as practically the only food available for quail then were grapes, berries, a few varieties of wild grain and half masticated mast dropped from the mouths of wild deer, hogs, and other large species feeding in the woods. Therefore, having plenty of cover with which to protect themselves, they had to do a considerable bit of hustling to find sufficient food. From that day on the cultivation practiced by the white man with the attendant clearing of land has tended to more proportion food and cover, increasing the area which quail would normally use, resulting in a very favorable increase in the total number of birds. Consequently, it would be safe to say that the farmer, in the practice of his trade—the cultivation of land—is responsible for the spread of the quail over the entire southern half of the United States. But so versatile is he in his benefits to mankind that he has more than repaid the farmer insomuch as each year he, being one of our most vigorous insect eaters,

destroys countless millions of harmful insects that possibly could not be destroyed in any other manner.

His every habit is beneficial to mankind and there is nothing anyone can say to his discredit. His cheerful disposition, his beauty, and his cheery call of Bob White, make him welcome on any farm. And it would be hard to find a farmer who would fail to feed his quail during a severe spell of weather. And as an added protection, we of the Division of Game and Fish, are urging that all farmers cooperate with us insomuch as to notify the local game warden of any out-of-season or other illegal hunting, do not grant permission to anyone to hunt during the open season unless that person has a hunting license, and do not refuse to let the sportsmen, who ask your permission, to hunt, as long as they conduct themselves in a courteous and sportsmanlike manner. For after all, it is with the money they pay for hunting and fishing licenses that we are able to purchase the many thousands of quail that we liberate each year on the farm. For with the landowner's cooperation and the cooperation of the organized sportsmen of the State we feel confident that we can maintain a supply of quail sufficient to satisfy the needs of three groups, namely, the farmer, the sportsman, and the Division.

The Sportsmen of the State are responding to our program and in practically every county they have organized a conservation club which is of material aid to us, particularly in the planting of game and fish.

GRADES NINE, TEN, ELEVEN, TWELVE

VOCATIONAL AGRICULTURE

Practical Applications of Conservation

INTRODUCTION

The material included in this outline is written from the point of view of the practical farmer as it affects his actual farming practices and his pocketbook.

Activities are listed as suggestions. Each teacher must plan his method of using the activity and select questions appropriate to the situation, or encourage reading and development of attitude.

Each job plan or unit is composed of three parts.

1. An outline prepared by the teacher including the references.
2. A list of questions that should be raised by the students.
3. A plan which is made up by each student after the questions have been answered in class.

OUTLINE OF SUBJECT MATERIAL

1. Soil Conservation:
   - Job 1. To reduce erosion.
2. Forest Conservation:
   - Job 1. To set forest trees.
   - Job 2. To control forest and grass fires.
   - Job 3. To promote forests and farm woodlands.
3. Game Conservation:
   - Job 1. To provide shelter for upland game.
   - Job 2. To provide food for upland game.
4. Fish Conservation:
   - Job 1. To propagate and restock fish.
   - Job 2. To study stream pollution.
   - Job 3. Stream improvement.

SOIL CONSERVATION

JOB: TO REDUCE SOIL EROSION:

(Teacher outline)	(Student questions)
1. Importance (Bul. 186 Ohio State University page 40. USDA SCS Lesson II, page 407)	1. (a) What part of the United States is affected? (Two-thirds.) (b) What part of the United States has lost 75% of its top soil? (200 million acres.) (c) What part of the United States has been destroyed by gullies? (4,000,000 acres.) (d) How does the government regard erosion?
2. Kinds or types	2. (a) What types of erosion may be found?
3. Factors affecting	3. (a) What factors affect erosion?
4. Effects	4. (a) What are the beneficial effects of soil erosion? (b) What are the harmful effects of erosion? (c) Which is greater, the harmful or beneficial efforts of erosion?
5. Control methods	5. (a) What methods may be used to control erosion?
6. Methods of reclaiming	6. (a) How may eroded land be reclaimed? (b) How may gullies be stopped? (c) How may gullies be healed? (d) Of what value are forest trees in reclaiming eroded land? (e) How many years are required to build an inch of top soil by natural processes?
7. Government activities	7. (a) Why is the government interested in erosion? (b) What governmental agencies are working on erosion?

MATERIAL FOR THE INSTRUCTOR

The vast importance of soil erosion is little realized by the ordinary farmer because it does not take place within a few days. The effect of soil erosion is seen after each rain, but its importance still goes without attention. Some facts are presented in the next paragraph to cause one to think a little more about the seriousness of the whole problem.

Two-thirds of the land in the United States is affected.

Seventy-five percent of the top soil has been washed from 200,000,000 acres in this country.

Four million acres have been destroyed by gullies.

Three billion tons of earth are lost from the United States each year.

Sixty million freight cars, each with a capacity of 100,000 pounds, (50 tons) would be required to haul this earth back to the place from whence it came.

The loaded cars required to replace the eroded soil of one year would encircle the earth 240 times at the equator, if the cars could be joined end to end, allowing 50 feet per car. It would require about six years to drive an automobile from one end of the train to the other, traveling ten hours per day, averaging 30 miles per hour, 365 days per year.

One of the most ruinous of all known gullies is found in Stewart County, Georgia. It is now called Providence Cave. About 50 years ago the water dripping from the eaves of a barn started a little rill which flowed down a long slope to a creek. The water has followed for 50 years. It has cut away greater and greater amounts of soil and subsoil each year. It has a chasm of raw dirt more then 100 feet deep as its course. It has tumbled a school house, a barn, a tenant house, and part of an important roadway down into its depths and has destroyed the farm on which it started.

The above facts together with many others have caused the government officials to take notice of the seriousness of soil erosion. It is known that a farmer can be no better than the soil upon which he lives. If his soil is destroyed, the farmer can no longer thrive. Civilization perishes because the farmer lost his soil. Therefore it has been deemed advisable that the United States Government should institute ways and means of protecting our heritage and natural resources, the soil.

Although George Washington was an ardent conservationist, and though Patrick Henry developed the theme that "He who stops the most gullies is the greatest patriot," it was almost a hundred years later before any national effort at conservation appeared.

In 1872 the National Park System was inaugurated. In 1891 the National Forest System was established. In 1911 and 1913 treaties providing for the conservation of migrating birds, fish, and fur seals were developed between the United States and Russia, Japan, and Canada. Around 1900 the conservation of water resources in the west was started under the Reclamation Service of the Department of Interior. In 1917 the Flood Control Act applying to navigable streams was passed, and the War Department designated to administer these developments. In 1928 Congress passed an act providing for the establishment of twelve erosion control experiment stations located in different sections of the United States.

In 1935 the Soil Conservation Act was passed by Congress, and the Soil Conservation Service was established as a Bureau of the U. S. Department of Agriculture. Under the authority of the Soil Conservation Act, small watershed demonstration areas in each of the states

were selected in which practices were established demonstrating the conservation of soil and water, and the control of erosion. Three of these project areas, located near Falmouth, Madisonville, and Paducah, were developed in Kentucky.

Through twelve CCC camps assigned to the Soil Conservation Service in Kentucky, additional erosion control demonstration areas have been developed. Land use demonstration projects in which submarginal agricultural lands have been purchased with Federal funds and developed for wildlife, forestry, and recreational purposes, have also been developed near Pineville, Dawson Springs, and Eddyville, Kentucky.

In the spring of 1940 the Kentucky General Assembly passed the Soil Conservation Districts Act permitting farmers to organize legal cooperatives for carrying out soil and water conservation programs on both public and privately owned lands. Similar acts have been passed in 41 other states.

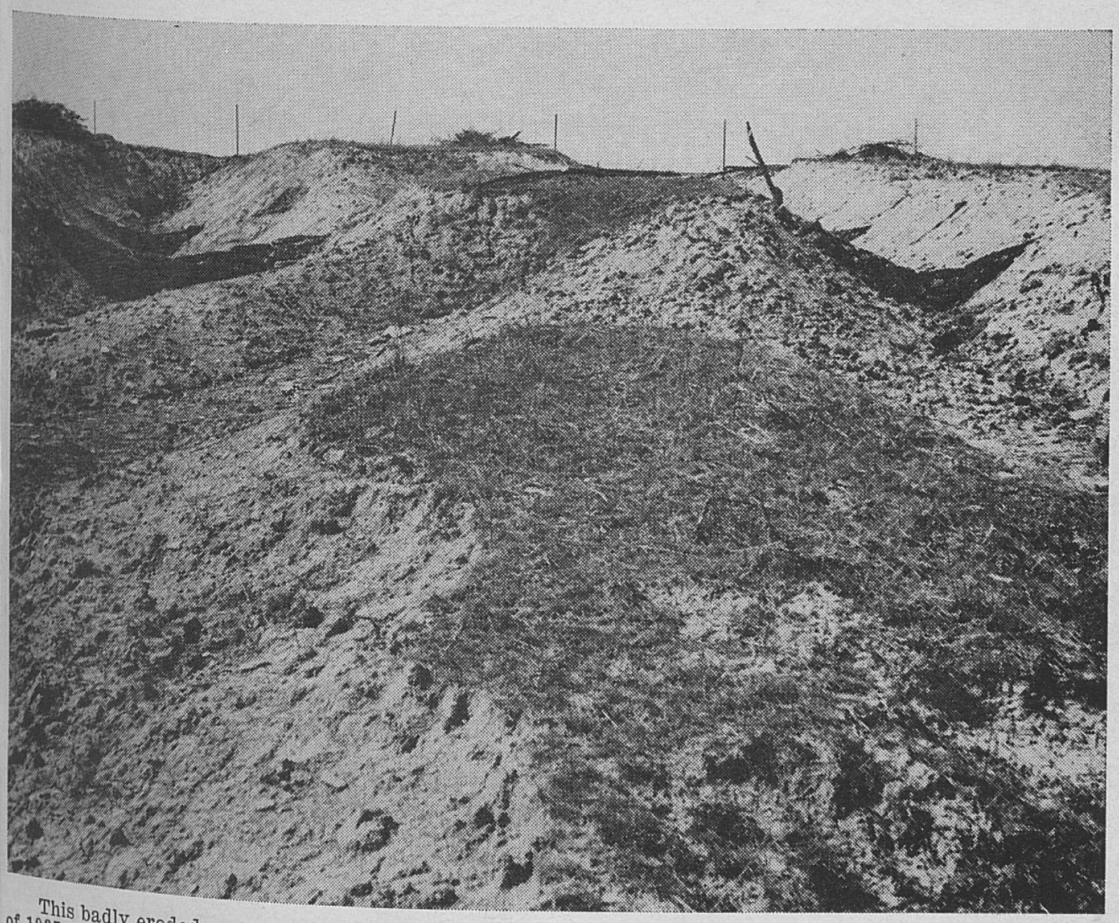
Under the districts program the U. S. Department of Agriculture and state agencies such as the Department of Conservation are now concentrating assistance to locally governed soil conservation districts in applying measures for the conservation of soil and water resources, the control of erosion, wildlife protection, farm forestry development, and upstream flood control.

TYPES OF EROSION

Sheet erosion is the uniform removal of surface soil by wind or water. It is by far the most common form, and also does the greatest damage. Because it is so gradual and so uniform, even the land owner does not usually notice it until some barren subsoil areas are exposed on knolls or ridges in the fields, or even until some of the bedrock which underlies most subsoils is exposed. It is then far too late to preserve the soil which has already been carried away, and the producing capacity of that area is greatly reduced or even destroyed. One evidence of sheet erosion is the so-called "galded spots." Another evidence is the gradual change in color of the soil in the plow layer.

Gullies. A gully is a channel cut into the soil by water to such a depth that it cannot be filled by ordinary cultivation or plowing. Gully erosion is the final stage of land destruction by erosion. While gullies are most evident and are generally thought of as the serious part of erosion, they are of little importance compared to sheet erosion.





This badly eroded area near Dry Ridge, Ky., which was planted in black locust in the spring of 1937, illustrates the ability of an area to revegetate itself and become reinhabited by wildlife. By the summer of 1939, the gullies were completely healed as shown by top photo, and 15 occupied nests of six different species of birds were found. In addition, rabbits were observed throughout the area.

Slips or land slides. Slips are caused by a hard pan or rock which holds the water in the soil until the soil becomes saturated to the point where it will flow. Slips usually occur on clay hillsides. Perhaps their greatest danger is that of trapping livestock in the soft mud.

Silt deposits are the result of eroded soils being piled or washed over good soil. Many acres of farm land are spoiled each year by such deposits. This damage may be offset by the beneficial effect of a thin silt deposit on many of the fields along the river.

Stream channel damage. At times of heavy rainfall the stream channels are eroded severely and sometimes made entirely new.

Agencies causing erosion are ice, glaciers, wind and water. Man is an important agency in accelerating erosion by tilling the soil or by cutting the forests.

FACTORS AFFECTING SOIL EROSION

The climate plays an important part in the rapidity with which erosion takes place. As rainfall increases so does erosion, other things being equal. Strong winds erode more rapidly than mild breezes. High temperatures cause a more rapid decay of vegetable matter which lessens the water holding capacity of soils and increases erosion.

The nature of the soil affects erosion. Sandy soils erode more rapidly then clay.

The topography of the soil is an important factor in the erosion of soils. A steep slope will lose its soil much more rapidly than will level land.

Cover is an important element in the protection of soils from erosion. Fields remaining idle during winter lose a great portion of soil. Pasture fields lose less soil and forest land loses very little soil.

The importance of cover crops can be seen in the following experimental data. Land in corn on a gentle slope will lose 26 per cent or about one third of the water which falls on it, and 60 tons of soil each year from each acre. If the same land were in sod, only 3 per cent of the water and .4 ton of soil would be lost from each acre each year.

The effects of erosion are both beneficial and harmful. Erosion is beneficial as an agency for wearing down and leveling soils, where crop land is not affected. On the other hand erosion is quite harmful where farm lands are affected.

CONTROL METHODS

Strip cropping is a method of erosion control commonly practiced in farming gentle slopes. Such cropping consists of alternating narrow strips of cultivated land with strips of sod land. The sod land prevents the soil from washing a great distance at one time.

Terrace farming is followed in some countries, particularly in Europe. The great cost of construction discourages wide use of such practices in the U. S.

Contour farming consists of working the land with the contour lines so as to prevent washing. Many of the farmers of Southeastern U. S. follow such practices.

Check dams may be built to prevent gullies from forming.

The steeper slopes may be put in pasture or sod to prevent washing. This must be done before the top soil washes away.

Reforestation. The stony waste land and steepest slopes should be reforested. This not only checks erosion but frequently transforms unprofitable land into valuable timber and wildlife resources.

Reclaiming of eroded lands is sometimes desirable. Sheet eroded land may be helped by the use of green manure and fertilizer. Gullies may be reclaimed by the use of dams or planting of trees and shrubs. The land can then be set to grass or trees.

Because Government officials have observed the importance of erosion and desire to conserve a natural resource which individuals do not care so much about, many government agencies have been set up to aid in the work. Some of these agencies in operation at the present time are the Soil Conservation Service, Civilian Conservation Corps. The County Extension Service and Departments of vocational agriculture are also doing much work in this field at the present time.

ACTIVITIES

The class may visit a farm where contour furrowing has been done.

Visit a farm where strip cropping is done.

Visit a CCC camp or an area that has been managed by CCC workers.

Visit a river bottom soon after a flood has receded. Note the large deposit of new soil. Where was this soil before the flood? How does its changed position affect farming, fishing, engineering, river transportation?

Get a teacher of vocational agriculture, a County Agent, CCC camp advisor and a member of the State Department of Conservation to tell what each does in erosion control.

Get film slides or motion pictures of erosion to show before the classes.

Tell story of the journey of a soil particle from hill to lower valley.

ENTERPRISE—SOIL EROSION:

A vo-ag student may carry an enterprise in soil building and receive credit for such in his required work.

INTEGRATION:

English, Geography, or Science:

Tell the autobiography of a drop of water from ocean back to ocean.

Journalism or English teachers write news items about soil conservation.

Mathematics classes could calculate the amount of soil that washes from the school ground annually.

Literature classes could make book reports on soil erosion.

●

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Productive Soils—Weir—283.
The Soil and Its Management—Miller—132-135.

Free Material: Strip Cropping—USDA leaflet No. 85.
Erosion Control in Ohio Farming—Bul. 186 Ohio State University.
Soil Erosion in Ohio—Bul. 589 Ohio Ag. Exp. Station.
What is Erosion?—USDA Misc. Pub. No. 286.
Soil Defense in the Piedmont—FB 1767.
Soil & Water Conservation in Northwest—FB 1773.
Conserving Corn Belt Soils—FB 1795.
Conservation Farming Practices—USDA SCS Misc. Pub. 253.
Wild Life Conservation—USDA—FB 1788.
Stop Gullies, Save your Farm—FB 1737.

For a more complete list of available material write the United States Department of Agriculture, Soil Conservation Service for bibliographies of soil conservation. A list of motion pictures and film strips pertaining to soil conservation work also is available by writing to the USDA Soil Conservation Service.

FOREST CONSERVATION

JOB No. 1: To PLANT FOREST TREES

(Teacher outline)	(Student questions)
1. Time	1. (a) At what season of the year should seedlings be planted?
2. Varieties	2. (a) What varieties are available? (b) For what purpose do I want trees?
3. Cost	3. (a) What is the cost of the trees? (b) How much labor is required to set 1,000 trees?
4. Method	4. (a) How are forest seedlings planted?
5. Benefits	5. (a) Why should I as a farmer plant forest trees? (b) Of what value is a windbreak? (c) Of what value is a shade tree? (d) Of what value is a woodlot? (1) timber, fence posts, lumber, mine props, Christmas trees (2) fuel (3) nuts and fruits (4) for livestock and poultry

MATERIAL FOR THE TEACHER

Forest seedlings may be planted either in the spring or in the fall. These seedlings will be small in size ranging in height from a few inches to one or two feet.

The purpose for which trees are to be used will determine largely the varieties to be planted. For posts one would in all probability use locust. Spruce might be used for Christmas trees. Oak, maple, poplar, and walnut may be planted for timber trees. Other species also nurture wildlife.

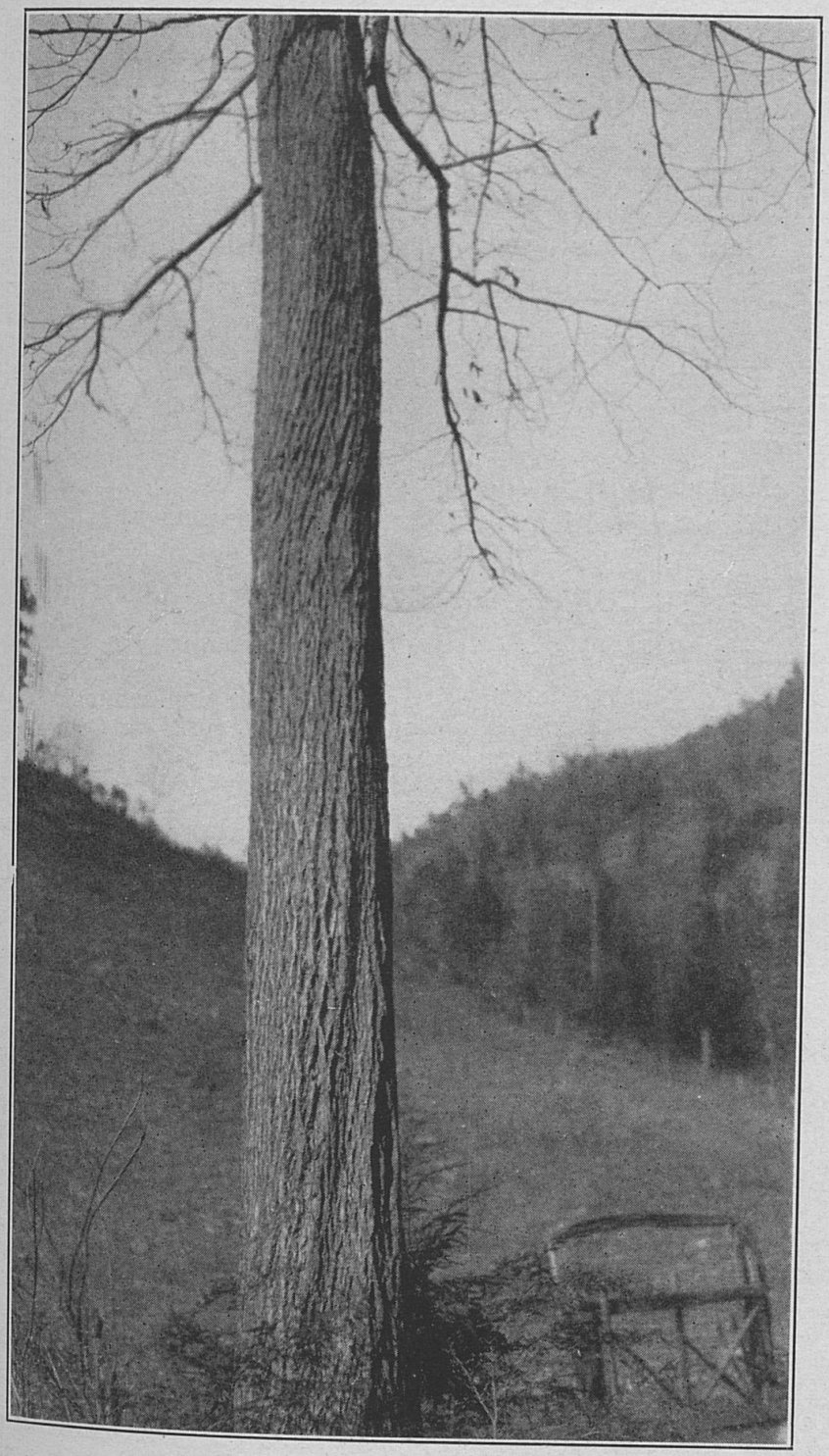
The state maintains a forest tree nursery from which seedlings can be obtained for reforestation work. These seedlings are furnished at less than cost of production. A thousand seedlings will cost two or three dollars. Two or three men can set them out in a day. If these seedlings are planted 6′ x 6′, 1,200 of them will cover about one acre of land.

Two people make a very good planting crew. One digs the hole with a pick, spud or mattock while the other places the seedling and packs the ground. Care must be taken to keep the seedlings in a bucket of water while planting so the roots will not become dry.

Steep rough land is almost worthless unless it is planted to good trees. A crop of Christmas trees can be harvested in 5 to 10 years.

View of seedling trees being raised at Division of Forestry Nursery.

View of seedling trees being raised at Division of Forestry Nursery.



Land covered with trees like that pictured above will always be practically free of soil erosion and the person owning such land can consider himself rich because of the value of the timber.

A crop of fence posts might be harvested in 10 to 20 years. Windbreak or shade tree plantings usually repay many times in comparison to the amount of labor and money required to make them.

ACTIVITIES

1. Plant a shade tree in honor or in memory of a person or group.
2. Plant hilly and eroded land with trees and shrubs.
3. Make a collection of twigs and lumber.
4. Collect seed in woodlots and propagate some seedlings.

INTEGRATION:

Science:

Make a collection of forest leaves.

Make a collection of different kinds of lumber.

JOB No. 2: TO CONTROL FOREST AND GRASS FIRES

(Teacher outline)	(Student questions)
1. Effects	1. (a) How does fire affect little trees? (b) How does fire affect humus? (c) How does destruction of humus affect forests? (d) How does fire affect the trunks of large trees? (e) How does fire affect the nests of birds? (f) Who loses in a forest fire? (g) Who gains in a forest fire? (h) How much time is required for a forest to grow back after it has been ravaged by fire? (i) What becomes of buildings when an area is burned over? (j) What becomes of the inhabitants where an area is burned over? (k) What becomes of the wild animal and bird life in a burned area? (l) What portion of the forest fires are caused by man? (m) Why would men be so careless?
2. Prevention	2. (a) How can forest fires be prevented? (b) How may schools help prevent forest fires? (c) How does the government help control forest and grass fires? (d) How do foresters fight fire? (e) Why must the government help prevent fire? (f) What is meant by a "fire line"? (g) Should one burn grazing land to improve it?



STOP! DON'T MAKE ANOTHER CONSERVATION BLUNDER.

This cruel and evil practice of spring burnings takes place when the birds are either building their homes, or at a time when they are nesting. A fire once started is too often never put out until irreparable damage is done to the fertility of the soil.

You should do your part and endeavor to preserve nesting and feeding areas. Unless this is done the good work of feeding our feathered friends in the winter is wasted and their food and natural habitations are destroyed by fire in the spring.

The gain to the farmer in keeping upland birds near at hand to fight the insects and grasshoppers which destroy his crops is of inestimable value.

MATERIAL FOR THE TEACHER

"Fire is the greatest enemy of the tree. It is said that 'loss to forest growth caused by fire exceeds the combined effects of all other injurious agencies.' Plowing furrows (called fire lanes) around plantations or woods establishes a barrier, which, if kept free from vegetation, is of assistance in keeping fire from running into a woodland area. Keeping close watch, especially during the fire season, will help reduce the number of woods fires.

"Fire harms and kills trees by scarring and destroying the tissue of roots, bark, and leaves, drying up the sap, and weakening the vitality so that insects and fungi attack them. Young growth is burned back or killed; seedlings are entirely destroyed, and weakened saplings fail to grow. Even small fires commonly kill seedlings up to one inch in diameter, while severe fires kill larger trees outright by burning through the cambium layer under the bark and destroying surface roots. Fire reduces the value of butt logs and affords insects and diseases an opportunity to work. The sale value of timber is always reduced by fire. Burning also destroys the 'forest carpet' or mulch of accumulated leaves and litter under the trees, with which soil is enriched in soluble minerals and natural nitrogen fertilizer. When soil is exposed, evaporation is more rapid and much of the rain or melted snow runs off the surface instead of seeping into the ground. A forest mulch retains soil moisture and fertility and allows the tree to grow even in dry weather. It contains literally millions of forest seeds, which are destroyed by fire, thus retarding reforestation.

"Burning woods to improve grass growth for grazing purposes is a mistaken idea because, although some grass may appear a couple of weeks earlier in the spring, the rich annual grasses and many other of the better forage plants are exterminated, leaving bunchy and coarse perennial grasses."

Fire destroys the coverts and nests of game animals and birds and sometimes makes the streams uninhabitable for fish. Buildings in the area are destroyed. Much of the animal and bird life is burned and oft times people are trapped and burned to death in a forest fire. Yet it has been estimated that man is responsible for nine out of every ten fires in the nation. In actuality nearly all our forest fires are man caused. Carelessness with matches and burning tobacco and burning brush and debris cause many of the man-made fires. The one who sets the fire thus makes a job for himself and neighbors, but in most cases is punished by law.

In general, forest fires, whether large or small, mean loss not only to the owner of the land but in some measure to everyone. They mean

that so much more of our forest land will not be working for us; that there will be fewer trees to supply the wood necessary to build our houses, run our railroads and mines, and make our furniture, and numerous other things that give us comfort: that watershed protection has been impaired; and that just so many more acres of wildlife homes and forest playgrounds have been taken from us. Is it not therefore the duty of every good citizen to be careful of fire when in the woods?

Because of the many years required to grow a tree, individual citizens cannot be expected to be interested in growing trees. From one to one hundred years would be required to replace the damage done by one forest fire. The slow return from trees makes it necessary for the government to interest itself in forestry to conserve our natural resources. The governments, both state and national, are buying waste land from time to time and employing foresters to manage these woodlands to prevent the waste and exhaustion of our timber resources. Many nurseries have been established and trees are furnished to farmers or others at a very low cost, provided these people will plant and care for the seedlings.

Schools may be a very vital influence in the control of forest and grass fires by developing the proper attitude toward fire prevention. The following rules might well be memorized (if you believe in such teaching) and practiced while on hikes and picnics: They are taken from USDA Misc. Pub. No. 162.

1. Matches—Be sure your match is out. Break it in two before you throw it away.
2. Tobbacco—Be sure that pipe ashes and cigar and cigarette stubs are dead before throwing them away. Never throw them into brush, leaves, or needles.
3. Making A Camp Fire—Before building a camp fire scrape away all inflammable material from a spot 5 feet in diameter. Dig a hole in the center and in it build your fire. Keep your fire small. Never build it against trees or logs, or near brush.
4. Breaking Camp—Never break camp until your fire is out—deadout—cold.
5. How to Put Out a Camp Fire—Stir the coals while soaking them with water. Turn charred sticks and drench both sides. Wet the ground around the fire. If you cannot get water, stir in earth and tread it down until it is packed tightly over and around the fire. Be sure that the last spark is dead.

6. Brush Burning—Never burn slash or brush in windy weather or while there is the slightest danger that the fire will get away.

Integration Activities:

English:

Read a story of a disastrous fire. Tell or write the story.

Art:

Make a forest fire poster.

Shop:

Make a model of a lookout tower.

Science:

Show motion pictures of forest fires.

Have a student who has seen a forest fire tell about it.

Visit a burned over sea area if one is nearby.

JOB NO. 3: TO PROMOTE FORESTS AND FARM WOODLANDS

(Teacher outline)	(Subject questions)
1. Fire	1. See: Job No. 2 on fire
2. Grazing	2. (a) How does grazing affect old trees? (b) How does grazing affect young trees? (c) How should grazing be controlled?
3. Insects	3. (a) What class of trees is most often damaged by insects? (b) What insects do you know that injure trees? (c) How may these insects be controlled?
4. Diseases	4. (a) Name some diseases of trees. (b) How may these be controlled:
5. Tree Crops	5. (a) How can tree crops assist and improve pasture? What kinds of trees furnish food for cattle? (b) How can tree crops assist in chicken feeding? What species of trees help feed chickens? (c) What species of trees would you plant to feed hogs?

MATERIAL FOR THE TEACHER

Grazing or pasturing is next to fire in causing deterioration in woodlands. The extent of the damage done depends on the number of head of stock and size of the woods, but in heavily pastured woods practically no young tree growth can get started, and at best it will be only in scrubby, ragged patches. Cattle, horses, sheep, and goats eat young seedlings, especially hardwoods; they trample out, browse, and break over young trees. Cattle and hogs in hardwoods and hogs in the

pines prevent the trees from restocking. Hogs eat seeds and root out seedlings, thus retarding reproduction. Trampling compacts the soil so that it becomes impervious to water much needed by the trees and sometimes damages their roots close to the surface.

Soil is easily compacted during the early spring when the frost is coming out of the ground or during the rainy season. For this reason livestock are especially undesirable in the woods at such times. Grass produced in the shade of timber is known to be less nutritious than that grown in other places, due to lack of sunlight. It is also usually sparse and the value therefore is small. The timber is, as a general rule, more valuable if properly handled, than the grass found.

Thrifty timber and good pasture cannot both be produced at the same time. Large amounts of grass in woods indicate the presence of too much sunlight and poor forest practice.

Insects and diseases may be controlled by spraying, but this is seldom practiced in forestry. Disease resistant species may be planted as an insurance against disease.

Damage from insects and disease is always possible, but it is more serious in some species of trees than in others, due to certain characteristics. In woodlands where the trees have been damaged by fire, grazing, and improper timber harvesting methods, disease is more likely to be common, although any agency which causes breaks in bark and roots, exposing inner tissues, is likely to be the forerunner of disease. A sound stand of trees is therefore the best insurance against trouble from insects, diseases, and pests. Diseased trees are likely to contaminate others close by if not removed. Dead trees may harbor different kinds of destructive insects and should be disposed of promptly.

TO PROMOTE FORESTS AND FARM WOODLANDS

Growing crops on trees besides in the ground or on beanstalks is just an old, old practice of the human family. Anthropologists tell us that nuts were used by mankind for centuries before it was even known that cow's milk could be used for food. Even the use of domestic animals for meat came later in the evolution of our food requirements.

Too often improvements for the individual have been, in reality, handicaps to the race. Under this category some of the present land-use practices must be placed. We have been inclined to ruin our most valuable resource, the surface soils, and to arrive at the stage where we must make our lands produce or suffer the consequences.

1. Tree Crops For Farm Feeding.

a. Hog Feeding

All farmers realize that oak tree mast (acorns) makes a profitable feeding medium for hogs. As the forests become depleted, the farmer must resort to other sources of feed and very often encounters higher costs for supplemental feed. He can profit by planting trees for their crops, either fruits or nuts.

b. Chicken Feeding

Poultry thrive on mullberries, persimmons, pawpaws, small acorns and many small berries. At least partial assistance can be given the feeding of chickens.

c. Cattle Feeding

Data gathered in different parts of the United States and Europe show that persimmons, honey locusts and acorns are comparable to or even higher in food value than corn and other cereals in feeding sheep, goats, horses, mules and cattle.

ACTIVITIES:

Visit a woodlot that has been grazed.
Visit a woodlot that has not been grazed.
Make a collection of insects that prey on forest trees.
Map livestock feeding program utilizing tree crops.

GAME CONSERVATION

JOB NO. 1: TO PROVIDE SHELTER FOR UPLAND GAME

(Teacher outline)	(Student questions)
1. Materials used for cover	1. (a) Name some trees that afford shelter for birds. (b) How do they afford shelter? (c) Name some shrubs that afford shelter for birds (d) Name some vines that afford shelter for birds (e) Name some grasses and weeds that afford shelter. (f) What other plants may provide shelter? (g) Why should the natural shelter be preserved? (h) What soil-conserving plants offer a dual service in wildlife cover? (i) Is the cleaning of fence rows on the farms worth the time and effort as compared with the shelter the "filth" would afford wildlife?
2. Types of cover	2. (a) What is meant by concealing cover? (b) What is meant by shelter cover? (c) What is meant by nesting cover? (d) What is meant by emergency cover?
3. Distribution	3. (a) How should cover be distributed? (b) What are the needs for all these types of cover to be within short distance of each other?
4. Development of cover	4. (a) How does the farm woodlot provide cover? (b) How does grazing affect cover? (c) How does fire affect cover? (d) How do orchards provide cover? (e) How do roadsides provide cover? (f) How does cover affect weeds? (g) How does cover affect insects? (h) How does cover affect disease? (i) How does cover affect rodents? (j) How do windbreaks provide cover? (k) In what way is the flushing bar important in the question of cover? (l) If a farmer were to create as nearly as possible, an ideal composite cover arrangement would he necessarily sacrifice much area? (m) How does the cover fit into the picture of food? Can the two be coordinated?



Good manners in the field are as necessary as good manners are in your home. The failure of some shooters to remember



MATERIAL FOR TEACHERS

Trees afford an excellent shelter for game and song birds. Any of the forest trees are suitable for this shelter. More information about forest trees can be found in the units on forestry. Song birds find nesting places in the hollow trees. Many of the fruiting trees afford excellent seasonal food for song birds and in the case of the mulberry too much credit for attracting song birds and squirrels cannot be given.

A game program without permanent planting for food as well as shelter is futile. Adequate plantings of woody food-bearing plants is the solution. Criticism of game management either State or Federal is not going to solve the problems. It falls to the lot of all conservation-minded persons and communities to "pitch in" and help by planting as an example. Sponsor club and individual plantings, thereby being the pacemakers for the Department of Conservation.

Shrubs affording food or shelter for birds are black hawthorn, apple, redbud, sumac, etc. The wild grape should not be cut from the forest trees if the greatest amount of food is to be provided for the birds.

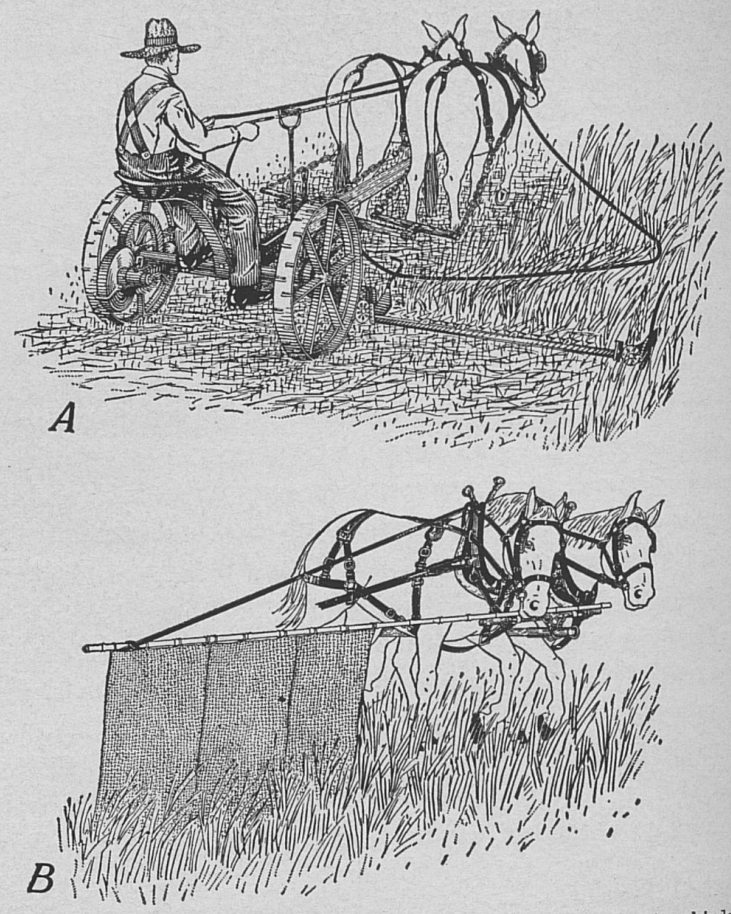
Other kinds of cover that may be found are brush piles, hedges, holes, etc.

Much of this natural cover should be preserved for the benefit of the wildlife. This practice is somewhat contradictory to accepted farm practices. However, a good farmer can permit some of his waste land to grow up to shelter without doing serious injury to his agriculture and at the same time obtain benefits accruing from utilization of waste lands for game and birds.

Cover is sometimes classified as concealing cover, shelter cover, nesting cover and emergency cover. A few large bunches of grass may furnish hiding for rabbit or Bob White Quail. This is called concealing cover. Birds may take refuge in evergreens to protect themselves from storm. This is shelter cover. Crop land in which birds may nest makes suitable nesting cover. Emergency cover is that kind to which wild creatures may flee when pursued.

Grazing routs wildlife and destroys its hiding places. Sheep seem to be especially bad about running out wildlife. Little game is found in sheep pastures.

Grass fires are especially destructive to wildlife and its shelter. Unfortunately, many farmers are laboring under the impression that grass fires are desirable. Yet it is known that grass fires distinctly are undesirable on the farm. Many farmers believe that cover for



Flushing bars will save quail and other ground nesting birds from the destruction of the cutting blades.

A. The Gopher Camp Fire Club Flushing Bar. B. The Iowa Flushing Bar. (Courtesy A. Game Assn., U. S. Farmer's Bulletin.)

The Gopher Camp Fire Club Flushing Bar is made of 5/16 inch soft iron, one end looped and the other welded to a 2x6 inch plate in which two 3/8 inch holes are drilled. The drilled end of the bar is bolted to the tongue near the mower, and the looped end fastened to the hames.

The Iowa Flushing Bar consists of a bamboo pole extending out from neck pole and supporting burlap sacks that are slightly weighted. The outer end of this bar is supported by strap attached to top of hames.

birds makes good hiding places for rodents, insects, diseases and weeds. Less harm seems to be done by permitting such places to grow up with brush than most persons believe. Much work can be avoided by permitting waste land to grow up.

ACTIVITIES:

Set trees for shelter and timber.

Set trees for shade or for windbreaks.

Take a field trip to observe the different types of cover.

INTEGRATION ACTIVITIES:

A. English:

Give book reports on the life of the Bob White Quail, squirrel, beaver, turkey, the white-tail deer, or any mammal or bird. Prepare a short talk or lecture on "The Benefits of an Organization for the Restoration and Preservation of Wildlife."

Write a story on the work of a Conservation Officer.

Prepare a debate on the negative and affirmative sides for "An Open Season on All Wildlife."

Write an essay on some particular bird or animal that you have observed.

B. Shop:

Make feeding boxes and shelters.

Build bird houses.

Construct some kind of a humane animal trap.

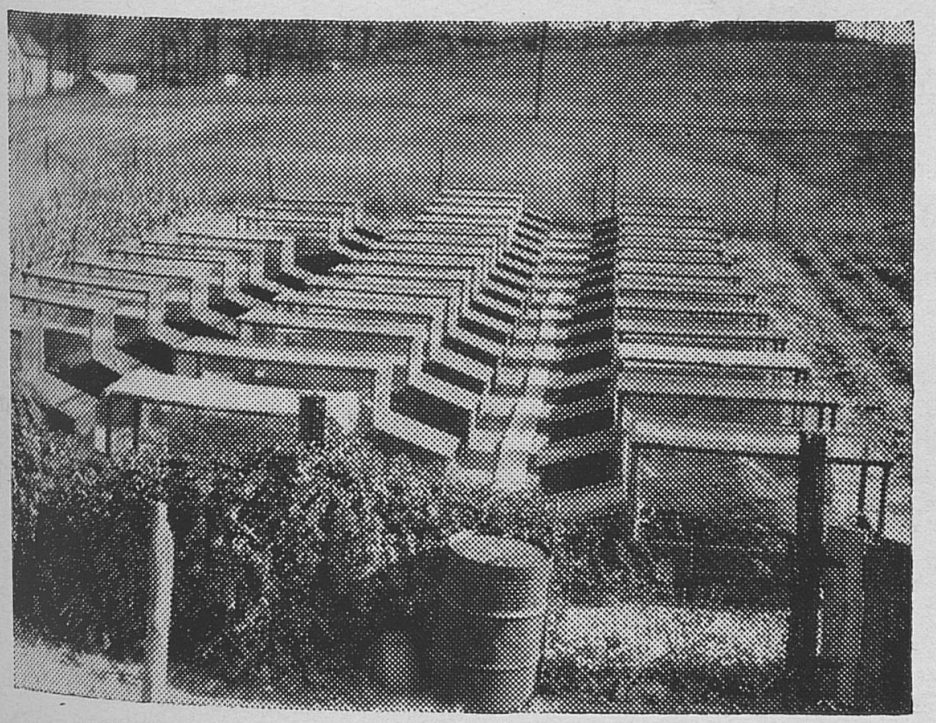
Construct a holding pen for game birds.

Construct a breeding pen for quail propagation.

Construct a brooding unit for quail propagation.

C. Civics:

Organize and set up a society for the protection of wildlife. Solicit contributions or devise some plan for revenue for the



QUAIL HOLDING STATION IN NORTHERN KENTUCKY.

supply of seed for planting winter food and cover for birds and animals.

D. Science:

Vo-ag.

Propagate some kind of game birds.

Plant seed for wildlife food and cover.

Feed wildlife during severe winter weather.

Make a quail census in your district; plot off your district according to the location and residence of all the pupils in your school, assigning sections to each so that the entire district is covered.

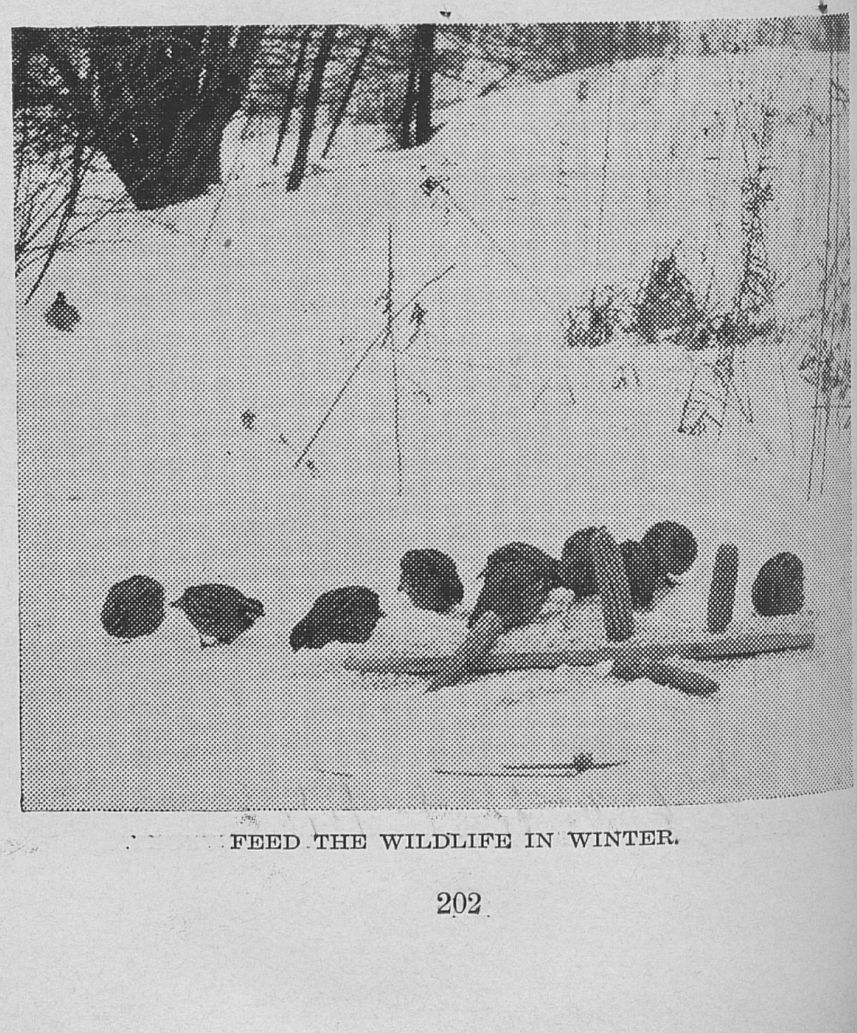
Experiment with hormodin or other material recently developed to increase cellular growth when making hardwood cuttings.

Visit a nursery or greenhouse.

Visit a poultry or game bird propagation farm.

Compile a list of trees and list the months fruit or mast is furnished.

Start a small tree crop plot for cattle, poultry, and hogs.



FEED THE WILDLIFE IN WINTER.

JOB NO. 2: TO PROVIDE FOOD FOR UPLAND GAME.

(Teacher outline)	(Student questions)
1. Materials that can be planted for game food	1. (a) What kinds of grain can be planted for wildlife? (b What kinds of shrubs? (c) What kinds of vines? (d) What kinds of trees? (e) Explain why a selection of foods should bear fruit or food throughout the entire year.
2. Distribution of plantings	2. (a) Is a large plot of a single grain better than a narrow strip of mixed grains? (b) Why is it better to plant food species along or adjacent to natural or artificial cover? (c) How can food and cover plants be used in gullies or erosion sites; and explain the two-way benefits? (d) Make a planting sketch of some tract of land or farm showing that very little regular agricultural land is sacrified in so doing.
3. Farm game cooperation	3. (a) How can a land owner receive posters and assistance from the State Conservation Commission? (b) Can the state game protector assist the land owner in prosecuting trespassers? (c) It is necessary for a landowner to sacrifice much land area to improve his land for wildlife?

MATERIALS FOR TEACHERS

The secret of attracting and keeping wildlife is to provide an abundance of natural food and cover adjacent to one another. Much of the farm land in Kentucky in its present form is unsuitable for game birds and other forms of wildlife. Among the causes are a lack of suitable year-around cover and a year-around supply of food.

An excellent mixture of grains is: Sudan grass, buckwheat, cowpeas, flax, hemp, corn, millets, proso or hog millet, kaffir corn, sorghum, soybean, sunflower, serecia lespedeza. Strips of this mixture if planted along fence rows or woodlots provide excellent food and cover for wildlife. A partial list of the permanent foods and cover plants is: red chockecherry, dogwood, hazelnut, Chinese chestnut, Russian olive, beech, crabapple, wild plums, fragrant sumac, buckthorn, mountain ash, coralberry, black haw, mulberry.

One of the greatest problems in game administration is that of harvesting the surplus of game by the hunter when large areas are posted against trespass. The reason some landowners post their lands

is because so many hunters fail to consider the landowner's rights, safety and property. The Department of Conservation of Kentucky believes that a more cooperative and friendly attitude between landowner and sportsman will do much to bring about a better understanding between the farmer and hunter and at the same time benefit both parties from the increases in wildlife population resulting from a concentrated effort on the part of both the man in the town and the man in the country striving for better conservation of the natural resources. The sportsmen of Kentucky are doing their part in this cooperative plan by releasing Bob White Quail on the farmer's land where they do their hunting; they are releasing fish in the waters where they seek their sport; they are inviting the landowner to their Game and Fish Club meetings in order for him to hear and see just what the purposes and aims of such an organization really are; and the sportsmen are doing their bit towards helping to educate the farmer's boy and girl in conservation and its value to future generations. All in all, this type of relationship is producing results and now the hunter and farmer are, more and more, putting their shoulders to the wheel and pushing for more game and birds in the woods and fields and better fishing in the streams of this Commonwealth.

ACTIVITIES:

1. Cooperate with a farmer in carrying out wildlife restocking program for the land.
2. Plant suitable grain mixtures to be left standing as food.
3. Map an all-year food and cover improvement program for a group of farms.

FISH CONSERVATION

JOB NO. 1: TO PROPAGATE AND RESTOCK FISH

(Teacher outline)	(Student questions)
1. Need for artificial propagation	1. (a) Give three reasons why it has become necessary for us to resort to artificial propagation in order to maintain adequate populations of certain fishes.
2. Fishes raised in hatcheries	2. (a) What fish are raised in hatcheries in Kentucky? (b) What is meant by game fish? (c) What is meant by the term, "fry"? (d) What is meant by fingerling?
3. Methods of artificial propagation	3. (a) What is meant by intensive propagation? (b) By extensive propagation? (c) Name fish propagated by each method. (d) Name three sources of food for artifically-reared fish. (e) For best results when should fish be taken from the hatchery?
4. Transporting hatchery fish	4. (a) What type of conveyance is used to transport fish? (b) What kind of containers are used? (c) What is usually wrong when fish die enroute to the stream? (d) In what way may this be prevented?
5. Stocking fish	5. (a) What is meant by "tempering" fish before placing them in the stream? (b) Why is tempering necessary? (c) How many fish should be released in one place? (d) Should fish be stocked in deep pools or fast riffles? Why? (e) Where should they be released?

MATERIAL FOR THE TEACHER

The tremendous increase in numbers of anglers during recent years together with the destruction of natural habitat, spawning grounds and food by erosion and flood, and increased pollution, have so reduced the numbers of game fish inhabiting many of our once famous fishing streams that it has become necessary to augment the natural production with artificially reared fish.

Both the federal government and the state operate fish hatcheries which raise great numbers of both the large-mouth and small-mouth bass which are prized by the angler for the sport of the catch.

Bass are raised by an intensive method. That is, the bass are allowed to spawn in ponds, but soon after hatching the small bass are trapped and moved to rearing ponds, usually from one to two acres in extent. Here they feed upon the naturally occurring aquatic organisms for a time. Later they are fed ground beef and other foods occasionally supplemented by minnows.

Bass are also reared by an extensive method whereby they are allowed to remain in the pond where they are spawned with the parent fish and live entirely upon natural foods. Ponds used for this type of propagation should be large enough (from 3 to 10 or more acres) to give the small bass an opportunity to escape cannibalism from the adults as well as their own generation. Generally this type of bass rearing is not as successful as the intensive method. In Kentucky this method is usually always carried on in private ponds. That is, the pond has bass or newlights of adult age in it. These fish reproduce under natural conditions and the seining crew of the Division of Game and Fish removes the surplus fish upon request from the land-owner. These surplus fish are transferred to public waters and in this way the Division of Game and Fish restocks the public waters of Kentucky with more than a million fish, of all species, each year from ponds, bar-pits, slews, lakes, reservoirs, where fish reproduce naturally.

Under ordinary weather conditions the spawning for most fish in the waters of Kentucky usually comes during the month of May. The brood fish at the state Fish hatcheries spawn in May or the first of June. When the little fish have been hatched from a week to ten days—measuring approximately ½ inch in length—they are removed from the parents and transferred to rearing ponds where they are fed and cared for during the summer and early fall months. At the time of removal they are known as "fry." During that summer period they grow and by the middle of October these fish will have attained a growth to measure from 3 to 7 inches in length. They are then known as "fingerlings." They are then removed from the rearing ponds and planted in the public waters of the state. At about the last of October the waters begin to cool from approach of winter and fish practically cease to feed. When young fish are released under these conditions they are pretty certain of going through the winter without being molested by larger kinfolks. When spring announces its arrival with warm sunshine and the budding of trees fish begin to feed once

more but those "fingerlings" that were released during the past October are now practically grown and are able to take care of themselves. This is the method of artifical propagation carried on by the Division of Game and Fish in Kentucky for the improvement of Fishing in the public waters of the state.

Fish are usually transported on trucks in cans of five to ten gallon capacity. Occasionally fish exhaust all the oxygen from the water in the container and may succumb if immediate measures are not taken to renew the oxygen supply. This may be done most easily by removing quantities of the water in a small container and allowing it to fall back into the can with a splash.

Often when fish reach the stream, due to ice or other conditions, the water in which they have been transported may be several degrees warmer or colder than the stream water. Obviously any great change in temperature quickly experienced would be a distinct shock to the small fish. For this reason it is necessary to add small amounts of the stream water at intervals of several minutes until the temperatures of the stream and water are the same. This process is called tempering. When the water has been tempered, the fish are released at the rate of about one can to several locations in a hundred yards of stream. In planting the fish, deep pools are avoided because here the small fish might become easy prey to any lurking large fish; riffles also are avoided because the small fish might be washed downstream or injured by the current. The ideal place is water of moderate depth with an appreciable current but not distinctly pool or riffle.

JOB NO. 2: STREAM POLLUTION

(Teacher outline)	(Student questions)
1. Definition and origin	1. (a) What is meant by the term pollution?
	(b) Who is responsible for pollution?
	(c) By what means has most of our stream pollution been brought about?
	(d) Why was pollution ever allowed to begin?
	(e) Could most of our stream pollution have been avoided? How?
2. Sources and kinds	2. (a) What is meant by domestic pollution?
	(b) What is meant by industrial pollution?
	(c) What is meant by agricultural pollution?
	(d) Give examples of each of the above.

3. Action of pollutants on aquatic life	3. (a) What is the source of the oxygen used by fish? (b) Name a pollutant that removes this oxygen? (c) How is the oxygen obtained by the fish? (d) Name a pollutant which may cause mechanical injury to the fish's breathing apparatus. (e) Name two ways in which this injury may cause the death of the fish. (f) Name one other way beside injuring tissues or removing oxygen that a pollutant may kill fish. (g) Give an example of this latter type of pollutant. (h) How may erosion silt affect fish life?
4. Methods by which pollution may be eliminated	4. (a) How may domestic sewage be made harmless to aquatic life? (b) Does your town have a sewage disposal plant? (c) How may sawdust be kept out of streams? (d) What is meant by a neutralizer? (e) What is meant by mine sealing? (i) What are settling ponds? (g) What practices are now being carried on for the elimination of soil pollution?
5. Why is pollution a public responsibility?	(Optional discussion under teacher leadership, relating to health, economic factors and conservation of natural resources)

MATERIAL FOR THE TEACHER

When used in connection with fish conservation the term pollution refers to the introduction into the streams of materials injurious to fish and other aquatic life. When the white man first came to this country stream pollution was a thing unheard of and it is to his activities alone that it has become so widespread today. With the advance of civilization it became necessary to cut timber, mine coal and other minerals and set up manufacturing plants of all kinds to satisfy the increasing needs of a growing population. Naturally there were certain waste materials from all these processes which had to be eliminated and the streams offered the quickest and cheapest means of their disposal. It was obvious even in the beginning that such practices were rendering the streams unfit for aquatic life; but what matter that, when there were so many streams teeming with fish life in this vast new country? Thus the number of polluted streams has grown until today many once beautiful streams support a reduced

amount of aquatic resources. There are means of eliminating almost any type of pollution and with a slightly increased capital expenditure most of the early industrial plants could easily have been equipped with these means, and the havoc of our public waters avoided.

Pollutants may be classified under three general types as to origin:

1. Domestic, or that caused by human excrement, garbage or other animal or vegetable waste included in the sewage of cities and towns.
2. Industrial, caused by waste materials from manufacturing or mining processes.
3. Agricultural, or that caused by large quantities of soil being washed into the streams as a result of improper farm operation and also of the denudation of our forests.

Fish breathe oxygen which is dissolved in the water in which they live. It is removed by the gills, the very delicate tissues of these organs being able to remove the oxygen as the water moves over them. Certain types of pollution, especially sewage, greatly reduce or wholly remove the oxygen from water thus causing the death of the fish by asphyxiation. Pollutants such as sawdust, coal washings or other solid particles often scratch and abrase the delicate gill tissues until they are no longer able to perform their breathing function; or the scratch may become the point of some infection which will eventually destroy the gill tissue or cause death by its toxic action. Strong acids from mine drainage or strong alkalies from certain chemical plants are in the group which cause death by their strong corrosive action, literally cooking the fish to death. Erosion silt may act directly upon the fish by injuring or clogging the gills or indirectly by forming a smothering blanket over the myriads of larval insects and other bottom forms upon which the fish must depend for food. Often, too, the spawning beds may become completely covered with silt, making them unfit for use or smothering any eggs that may be in them.

Various methods of treatment for polluting materials have been devised which render them inactive to aquatic life. Most of the larger cities now have sewage disposal plants, where domestic wastes are so treated as to be quite harmless before being admitted to the stream. Sawdust may be cared for by burning or simply by piling it where it cannot get into the stream. Certain strong chemicals may be treated with a "neutralizer," a substance which turns them into less

harmful chemicals. Abandoned coal mines are being modified as serious sources of pollution by a program of mine sealing. The mouths of abandoned mines are sealed in such a way that the water is allowed to escape from them but the air which causes the formation of the toxic substance within the mine is prevented from entering. Many waste waters carrying toxic substances are allowed to stand in ponds until the poisonous material settles out and only the water is admitted to the stream. Such settling ponds are quite effective in the treatment of tannery wastes. Soil erosion control which has gained widespread popularity and use in the United States is working wonders in the elimination of erosion pollution.

ACTIVITIES:

Study a stream on your farm or immediate neighborhood as to pollution, type and source. Plan for elimination of this pollution.

Visit a mine sealing project carried on by the state or the federal governments and report on observations, and effect of work you have seen on stream purity.

JOB NO. 3: STREAM IMPROVEMENT

(Teacher outline)	(Student questions)
1. Physical factors influencing fish production.	1. (a) Explain what is meant by physical constituents of a stream. (b) What is the relationship of the physical and biological nature of a stream? (c) What has brought about the changes in physical aspects of streams? (d) What is meant by stream improvement?
2. Preparation for stream improvement	2. (a) What procedure should precede all projects? (b) Why is this necessary?
3. Types and functions of stream improvement devices	3. (a) Name three types of stream improvements. (b) What is the function of each? (c) How does each influence the fauna of the stream? (d) List ways in which physical stream conditions may be improved without structural devices.
4. Appearance of improvement devices	4. (a) What standards should be observed in appearance? (b) How may choice of construction materials help to attain this standard? (c) How may it affect the cost?

5. Practicability of stream improvement	5. (a) Discuss briefly limitations of such work. (b) Discuss factors influencing cost. (c) What financial gains to a community from fishing justify improvement of fishing streams? (d) What indirect benefits accrue from such improvement? (e) List four reasons which justify improvement on the basis of dependable, year-after-year trout yield.

MATERIAL FOR THE TEACHER

Stream improvement means the restoration or betterment of streams to a desired fish producing condition by means of structural devices and other mechanical alteration of existing physical stream conditions.

Physical constituents affecting fish life include pools, riffles, shelter such as overhanging rock ledges, shade, temperature, water flow and stream bank erosion. The biological constituents depend upon the physical nature of the stream. For instance, in streams which are mostly riffle, the lotic forms of aquatic life predominate; in streams which are mostly pool, or non-riffle, the static forms predominate. Streams whose bottom consists primarily of silt contain for the most part the burrowing insect larvae which are not readily available as fish food. Another example of biological change in stream resulting from physical changes is the transformation of many formerly cold, rapidly-flowing streams supporting the musky and bass to warm, sluggish, silt-carrying waters better suited for bluegill, carp, buffalo and other warm water fish. Fires, floods, improper farming methods, timber cutting, exploitation of the forest and other natural resources tend to bring about general physical changes in streams.

Before any program of stream improvement is undertaken, the stream should be subjected to a complete survey of its physical, chemical and biological condition. This is necessary in order that the program may make improvements actually needed and not accentuate already-existing factors beyond desirable limits. Unless the structural devices produce the desired biological results, it would be better that they not be constructed.

All stream improvements are generally classified under one of three types: dams, deflectors, shelters. By dams is meant obstructions entirely across the stream from bottom up. They have been widely used to make pools suitable for large fish, tending to concentrate fish in

the static water above and in the lotic water below, according to their individual needs. Dams provide holding basins for fish in streams subject to great fluctuations in flow. They may be used to create spawning beds by flooding gravel bars and weed beds. They impound water, slowing up run-off; affect temperatures; provide excellent wintering quarters, and improve spawning and feeding places for game and forage fish. Deflectors block off only part of the stream thus concentrating and accelerating the current where not blocked. Deflectors when properly slanted deepen the flowing water, move silt, protect banks from erosion, and create enlarged pools in soft-bottomed streams. They make the water cooler and create a habitat inducive to the development and growth of more desirable fish food organims. Shelters are devices designed to create protection for fish from man and natural enemies thus making large open pools more acceptable and inhabitable to fish. They may consist of individual logs, mats of brush or saplings, or large rocks raised from the bottom to admit entrance for the fish. Other practices which improve streams without involving actual construction include stream bank and watershed planting, dredging and removing barriers which may impede fish migration.

Improvement devices should be natural in appearance and inconspicuous, thus preserving the aesthetic advantages of a stream. Dams should be kept as low as possible consistent with achievement of good results; deflectors should be constructed in such a way so as to simulate natural conditions; cover should be made to appear as though they were nature's handiwork. If a stream is in a heavily wooded area, log structures preserve this naturalness; if the stream is rough and rocky, large stones or rocks should be used. Use of materials on hand always tends to preserve naturalness as well as to reduce the cost of installation. Such foreign items as concrete, sawed lumber and masonry should be avoided. Structures should be sound and of permanent nature according to accepted engineering principles.

There are limits to the practicability of stream improvement. Extensive improvement eventually must encounter the law of diminishing returns. The limit depends largely on the fishing value of the water. A balance must be struck between intensive development of short stretches and extensive development of long mileages. Scientific investigation can strike this balance through experience.

If improvement practices outlined previously are followed, the cost of such projects is almost entirely labor. Logs, stones and other materials are generally found in abundance along streams; wire,

staples and other similar materials need not cost much. Thus, including labor, a mile of stream improvement may cost between $50 and $100.

A stream with improved fishing attracts increased numbers of fishermen. Communities located near such streams benefit from increased expenditures by fishermen for supplies, gasoline and other motoring needs, food and lodging, and similar requirements. Improved streams reduce bank erosion, control run-off, thus aiding in prevention of floods, purify the waters, and provide added recreational opportunities for wholesome use of leisure time.

It has been demonstrated barriers such as dams, deflectors and covers can be installed cheaply and soundly; that the life-conditions for fish (shelter, spawning and food) can be markedly bettered by these means; that fish respond quickly and take advantage of the better conditions, and that long stretches of heretofore fish-less or almost fish-less water can be made to yield good catches within a few months after installation of well-designed improvements.

Stream improvement has at times been hailed as cure-all. This is erroneous. It is, however, an excellent tool in the management of fishing streams when properly controlled. The Division of Game and Fish maintains a fish technican or Biologist for investigations, surveys and direction of fish management practices.

ACTIVIES:

Select a fast-flowing stream and study aquatic life found therein; do the same in a slow-flowing stream. Tabulate differences and similarities.

Plot a stream, marking riffles, pools, shelter, and other factors affecting fish life. Map out a tentative improvement program, showing biological justification for each device, if improvement is deemed advisable during class discussions.

Study costs and practicability of the improvement.

Build models of improvement devices.

●

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4-H CONSERVATION ACTIVITIES

FOREWORD

Last year (1940) the Department of Agriculture at the University of Kentucky, the League of Kentucky sportsmen (comprising Game and Fish Clubs throughout the state), and the Division of Game and Fish, working together, compiled an activity unit for 4-H club boys and girls for the purpose of interesting the rural children more and more in the conservation of our natural resources. This unit was set up in contest form with the winner being sent to a state 4-H club camp for one week during the month of July with all expenses paid by the local Game and Fish Club. During that week at camp the 4-H club member had intensive training in all forms of Conservation and upon completion of the camp he could go back home to tell the story to fellow 4-H club members. As the result of this, competition has become greater this year and the Camp in July proved a very successful one from the standpoint of attendance and interest.

J. W. Whitehouse, State Leader, Junior Club Work, Department of Agriculture, University of Kentucky, is in charge of the 4-H Conservation activities and supervises the camp each year.

The plan as set up for competition among 4-H club members is as follows:

The

.....County

Conservation Plan

Name ..... Age .....

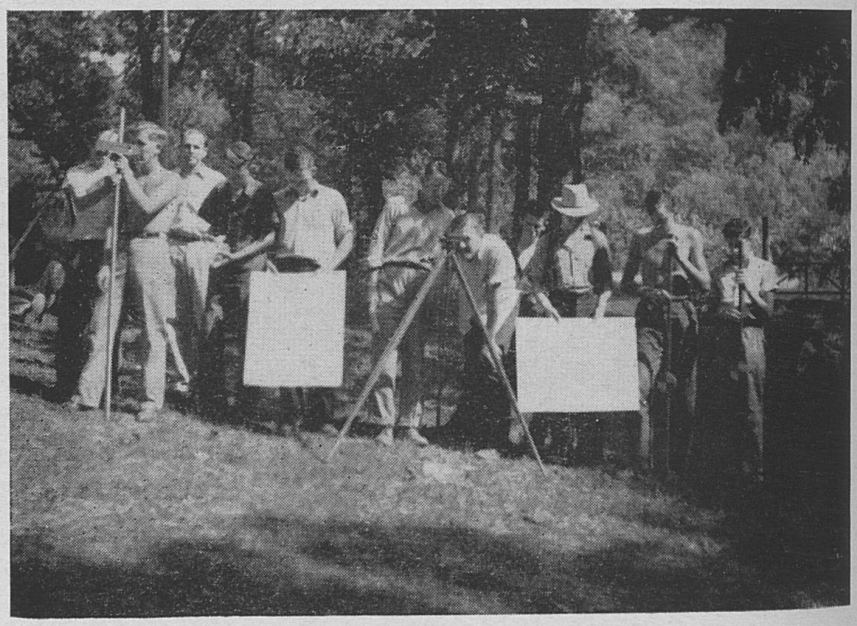
Address .....

Club .....

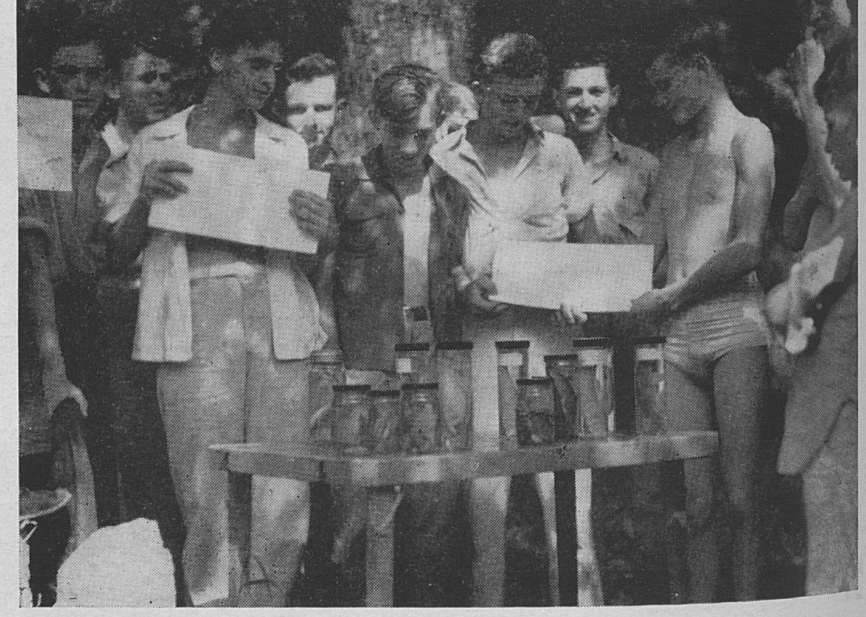
Date Started ..... Date Finished .....

4-H CLUB BOYS LEARN ABOUT CONSERVATION AT ANNUAL STATE CAMP

(Sponsored by Department of Agriculture of University of Kentucky, Division of Game and Fish, and League of Kentucky Sportsmen)



Boys learn about contour farming.



These 4-H clubers learn about fishes native to waters of Kentucky.

4-H CONSERVATION ACTIVITIES:

1. Draw a map of the farm indicating by different colors, eroded areas, groves, thickets, streams, ponds and pools.—50 points if complete.
2. Plant trees. a. One-eighth acre wild life thicket—200. b. To check erosion (six trees)—60. c. Food for wildlife (two trees)—20.



Traps and trapping also included in the course of conservation studies.



Hawks and owls, both harmful and beneficial are studied by the 4-H boys.

3. Construct wire, straw, brush or stake dam to stop a gully.—15 each.
4. Build and erect bird houses for martin, bluebird, wren or robin—15 each up to 4 houses.
5. Arrange cat guards on nest trees.—5 each.
6. Build bird bath and watering devices and keep filled in dry season.—25.



Conserving and protecting the soil is demonstrated by this project which the boys have set up, showing the difference between land that is completely barren and land that has cover crops.

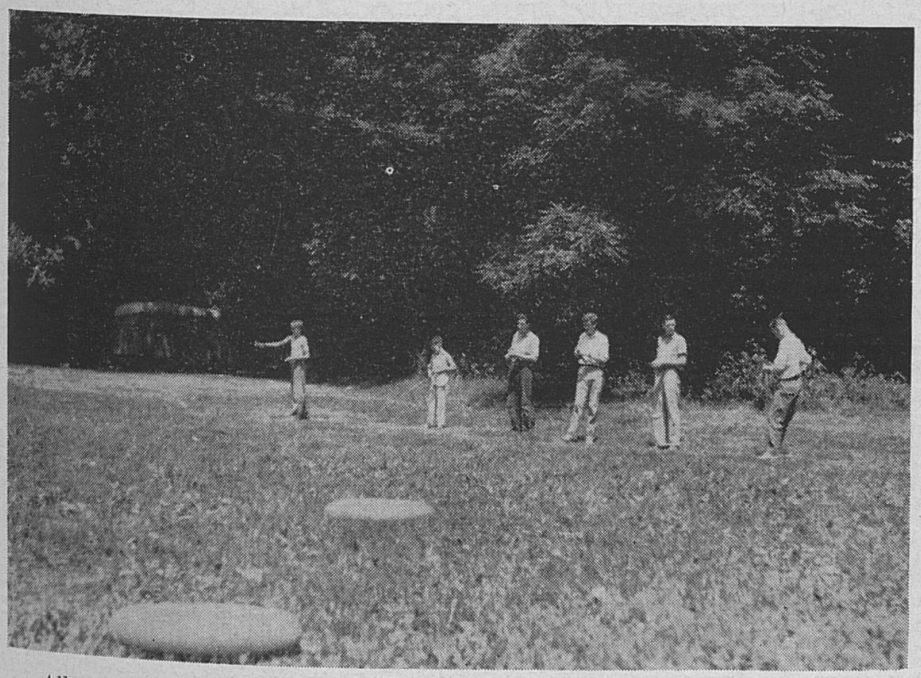


Conservation talks on wildlife and other natural resources are given by authorities on the various subjects and here is seen the entire 4-H camp group seated on ground listening to one of the lectures.

7. Construct or provide feeding stations for different kinds of birds. —20.
8. Keep food stations supplied during snow and icy weather—30.
9. Protect nests of quail during hatching season by marking nests so they will not be disturbed by mower or binder.—25 for each nest.



The 4-H club boys also study about insects and tree leaves and their values to wildlife and to the human being.



All work and no play would make a very dull camp so recreation and outdoor sports are presented to the group daily. Some of the boys are shown learning to use the rod and reel.

10. Confine dogs during quail hatching season.—50 for each dog confined during April, May, June and July.

11. Plant or seed some crop that will furnish food for wildlife. (Lespedeza, Italian Rye Grass, Sorghum on waste land preferably).—100 for each ½ acre.

12. Stop a field or forest fire that would destroy food and cover for birds.—25.

13. Destroy rats.—1 each.

14. Be able to follow or stake out the contours of a hill or grade. Construct a simple terrace with a plow.—100.

15. Read a circular or bulletin on conservation of wildlife.—5.

16. Make a talk or lead a discussion on some phase of conservation. —25.

17. Subscribe to " Kentucky Sportsman" or some magazine related to wildlife.—10.

18. Some things to learn:
    a. Know harmful hawks from useful hawks.—25.
    b. Know what other birds are harmful and what are useful. —25.
    c. Know the food and nesting habits and natural habitat of our game birds.—25.
    d. Be familiar with the painless steel trap.—25.
    e. Know the common fur-bearing animals of your community. —25.
    f. Know the names of all birds seen on the farm.—25.
    g. Know the game fish of your section.—25.
    h. Know the useless and harmful fish.—25.
    i. Know the names of all the trees on your place. 25.

19. Know the Kentucky hunting, fishing and forestry laws.—200.

20. Attend regular meeting of county Game and Fish Club.—25 up to 4 meetings.

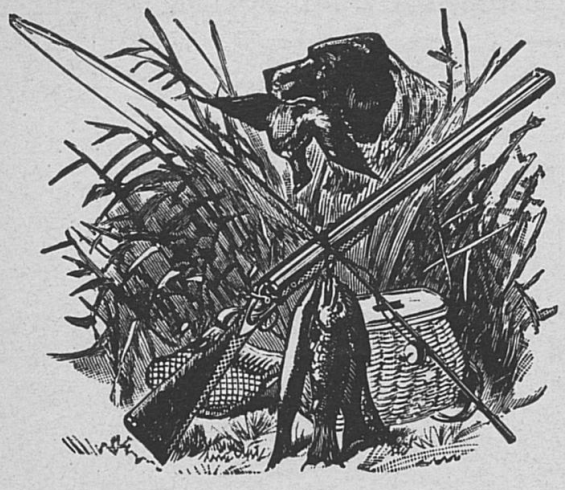
EXPLANATION.

1. The purpose of this plan of the ..... County Conservation Club is to enlist the help of as many 4-H Club members and their parents as possible in improving conditions and environment for our song and game birds and other forms of desirable wildlife. It is our earnest hope that more feed, cover and protection will be afforded our desirable wildlife with the active assistance of all club members and their friends in ..... county. We are also encouraging the conservation of soil, our few remaining forests and every other natural resource which belongs not only to this generation but belongs to future generations of our people if we are to remain a strong nation.

2. All Club members who cooperate with this plan to the extent of completing eight or more conservation activities and earning 450 or more points will be awarded a junior membership in the ..... County Conservation Club, and the members will be eligible for the various activities of the club.

3. The ..... County Conservation Club will finance the trip to the State Conservation Camp for one or more boys who have done the best work under this plan.

4. Each 4-H Club member will keep this record and list the points as they are earned and turn in to the County Agent not later than November 1, each year.



SOCIAL STUDIES

SCHOOL AND COMMUNITY FUR, FEATHER AND FIN CLUB

FOREWORD

The teacher should attempt to arouse interest in wildlife and in conservation practices by assembly talks, distribution of literature, lantern slides and motion pictures.

It is always better to have suggestions to form an organization come from the pupils themselves. An organization or activity coming from the teacher, already worked out and in a manner forced on the children, rarely succeeds.

When sufficient interest has been aroused and desirability of an organization is recognized by the pupils, the teacher should proceed to guide the formation of the club.

GENERAL OBJECTIVES:

1. To offer to the children of the school and the adults of the community an opportunity to participate more actively in the conservation movement in Kentucky.
2. To form an organization which can create public interest in the protection and restoration of wildlife in the community and secure concerted action in the execution of a definite conservation program.

SPECIFIC AIMS:

1. To encourage pupils to carry on practical projects in conservation in the community.
2. To teach parliamentary practice and procedure.
3. To protect and care for wildlife for use and enjoyment.

4. To create understanding of game laws and regulations and encourage observance of same.
5. To promote better and fuller consideration of landowner's interests and property in use of wildlife.

APPROACH:

SUGGESTED CONSTITUTION

ARTICLE I

Section 1. The name of this organization shall be the ..... Fur, Feather and Fin Club of ..... High School.

ARTICLE II

Membership

Section 1. All 7-8-9-10-11-12 grade pupils who demonstrate an active interest in wildlife are eligible to become members of this organization. Specific eligibility rules may be drawn by each club.

Section 2. Parents and adults of the community may become members in an honorary capacity.

Section 3. Fees and dues—To be decided by the local lodge.

ARTICLE III

Officers

Section 1. The officers of this organization shall be (1) Conservation Chief, (2) Junior Protector, (3) Keeper of the Records, (4) Custodian of the Wealth, (5) Counselor (must be a teacher), (6) Senior Advisor (member adult sportsmen club, Conservation Officer, or other adult active in conservation).

Section 2. Duties of the officers shall be in keeping with accepted parliamentary procedure and designed to forward the work of the club.

ARTICLE IV

Election of Officers

Section 1. Officers shall be elected at the second meeting in September and shall serve for a period of one year or until the installation of their successors.

ARTICLE V

Time and Place of Meeting

(To be decided by the club)

ARTICLE VI

Purpose

Section 1. The purpose of this organization shall be:

1. To learn to know and recognize the wildlife in the community.
2. To make a study of habits of birds, animals and fish in order to better know conservation principles.
3. To learn methods of protection and management of wildlife.
4. To institute approved practices in the community for protection and management of wildlife.

Protect Our Fish and Game

YOU

Are Invited To Help Us



Pike County Fish And Game Protective Association

PIKEVILLE, KENTUCKY

STOP FOREST FIRES

Report Violations At Once

Assist The Game Wardens

Game and Fish Club activities help our natural resources.

5. To discourage practices that tend toward destruction of wildlife and forests.
6. To coperate in worthwhile conservation projects of the local sportsman's club.
7. To lend aid to the Department of Conservation of Kentucky in the execution of its program.
8. To enlist help of all hunters and fishermen in wildlife conservation.
9. To become familiar with state game, fish and forestry laws.
10. To foster understanding and cooperation between the hunter and the landowner.

ARTICLE VII

Committees

The following standing committees shall be appointed by the Conservation Chief for a period of one year. Additional committees may be named as the need arises.

1. Publications (It shall be the duties of this committee to secure books, folders and pamphlets for the use of the club).
2. Finance (Carry on activities to raise funds needed to carry out program of the club).
3. Publicity (newspaper items, posters, talks, etc.)
4. Birds.
5. Game animals and game management.
6. Fish and fish management.
7. Non-game animals and fish.
8. Protective devices.
9. Propagation and restocking.
10. Winter care of wildlife.
11. Farmer-sportsman cooperation.

ARTICLE VIII

Quorum

(To be decided by the local lodge.)

ARTICLE IX

Method of Amending

This constitution may be amended by a two-thirds vote of members present.

NOTE: A ritual may be written for use in regular meetings, installation of officers, public meetings, etc.

List of Activitithe and Projects:

1. To construct a workable and inexpensive "flushing bar." Contact each farmer in the community, explain and demonstrate the use and purpose of the device and solicit his cooperation in using flushing bars in all his mowing. Keep records of such uses and ascertain results.
2. Build bird houses suitable for the various birds of the community and place them in suitable and desirable places.
3. Build and place feeding boxes and tables for the birds.
4. Carry on wildlife feeding campaigns during emergency periods in winter.
5. Plant trees and shrubs for bird protection and for game food and shelter.
6. Contact the farmers of the community and secure permission to plant seed to provide food for birds and wild animals.

7. Make a list of the predatory animals and birds of the community and work on a plan to control them without resorting to extermination
8. Visit forest nurseries and game preserves.
9. Build up a Conservation and Wildlife Library for use of the entire school in teaching conservation. (Enlist the help and cooperation of the librarian and ask that a corner of the library be given for this material.)
10. With cooperation of the Conservation Officer, who is a representative of the State Division of Game and Fish, plan and carry out a restocking program for fish and game animals in the community
11. Make a natural resource survey of the County.
12. Read stories of animals of the great outdoors.
13. Make an estimate of the number of rabbits in your community. Are more needed? If so, plan with your Conservation Officer methods of increasing the numbers of rabbits.
14. Keep a record of the kind and number of wild animals you see that have been killed on the highways.
15. Make an estimate of the number of quail. Plan restoration program.
16. Make suggested year program for your club.
17. Plan September organization meeting of the club. Study food possibilities for winter for wildlife.
18. Make an estimate of the number of squirrels, raccoon, opossum, red foxes. Plan restoration program.
19. Write a letter to (or see personally) the president of the Game and Fish organization in your county. Tell him about your club and ask him to send a speaker for your next meeting and solicit the cooperation of his club in your work.
20. Make an annual report of activities. Send copy to the Kentucky Division of Game and Fish, Frankfort.

SUGGESTED PLEDGE FOR MEMBERS

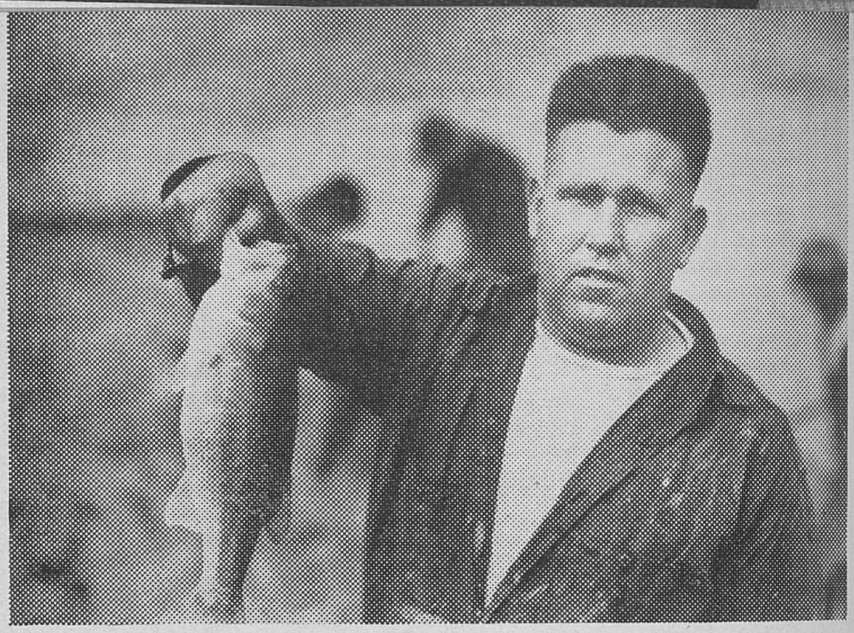
I, Frank Phipps, member of the ..... Fur, Feather and Fin Club of ..... High School pledge myself . . . to learn what is meant by conservation and why conservation laws are necessary; to help conserve wildlife, including birds, animals, fish, trees, wild flowers and shrubs in Kentucky. To remember that wildlife belong to everyone and to act accordingly.

SUGGESTED CLUB ADMISSION REQUIREMENTS

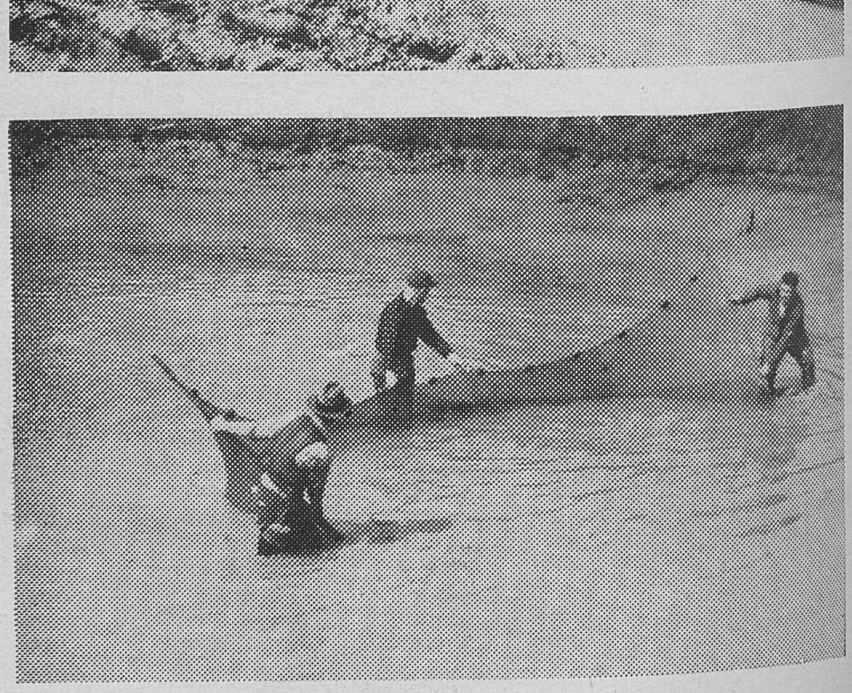
It has been suggested that some clubs may desire to establish requirements for admission to membership. To attain neophyte status, it is suggested that a candidate first acquire 500 points from among these suggested activities, working in cooperation with a committee member of the entire club. Neophyte ranking would entitle student to participate in full club activities without a vote and without eligibility to office or committee membership. Pledge badge or other insignia may be worn. Upon completion of additional activities totaling 500 (or any desired number of points from additional suggestions here listed) neophyte is eligible to initiation and full membership.

Suggested schedule for points and activities for neophyte ranking:

1. Identify 15 Kentucky birds—resident, migrant, game, non-game —100. Each additional bird—10.
2. Identify 10 Kentucky mammals; list habits, uses and regulations on each—100. Each additional mammal—10.







Transferring fish at the State Hatchery near Ashland, Ky.

3. Identify 15 Kentucky trees and name uses to wildlife, scenic resources, or timber—100. Each additional tree—10.
4. Identify 10 fishes; habits, uses and regulations on each—100. Each additional fish—10.
5. Take part in field trip with teacher or organization leader for wildlife study. Each trip—50.
6. Write 500-word history of conservation in own community—300.
7. Service feeding shelter for wildlife (in emergency periods only) per shelter, per day—25.
8. Identify 10 Kentucky vines and shrubs and name uses to wildlife—100. Each additional vine or shrub—10.
9. Know open seasons, bag limits, creel limits, length limits on Kentucky game and fish—250.
10. Each Boy Scout merit badge on conservation (Agriculture, angling, bird study, botany, farm home and its planning, forestry, hiking, insect life, reptile study, soil management, stalking, taxidermy, zoology)—100.
11. Each Girl Scout proficiency badge on conservation (Bird finder, insect finder, land animal finder, water life finder, tree finder, wildflower finder)—100.

Club can select manner of demonstrating candidate's right to points through tests, supervision, etc.

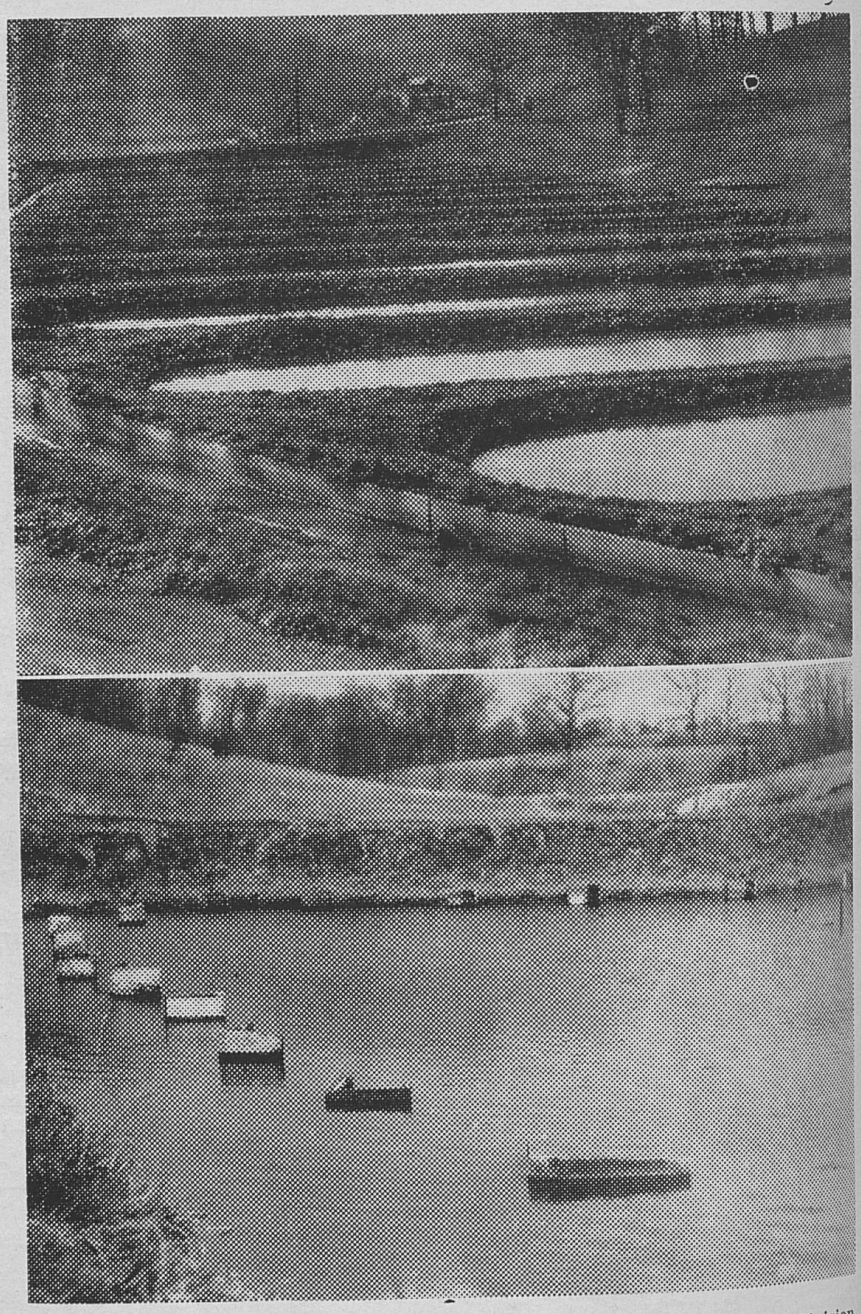
FULL MEMBERSHIP REQUIREMENTS

(1,000 points suggested as standard for membership)

1. Participate in Kentucky Wildlife week educational program—50.
2. Make talk before class or group on "Why Conservation Laws"; or "What is Conservation?"—150.
3. Plant trees on reforestation project, trees, shrubs and vines for wildlife refuge or farm management project. First 100 trees, or vines and shrubs—200. Each additional tree, vine or shrub—5.
4. Make conservation posters. For each poster made and displayed—50.
5. Supply 25 pieces for wildlife conservation museum, including game bird food samples, shells, colored pictures of native game fish and birds, and wood samples—200. Each additional specimen—5.
6. Participate in planting or school ground beautification activity—50.
7. Plant small area with corn, millet, soybean, perennial lespedeza, wheat, sunflower to be left standing. For each rod—300.
8. Assistance in school bird haven—50.
9. Establish wildlife haven of one-half to once acre; planted with lespedeza, and other game foods, not less than 50 trees, including hawthorn, hickory and other nut or fruit-bearing trees and shrubs; fenced from grazing and protected from fire—2,500.
10. Build emergency feeding shelter of type approved by The Division of Game and Fish. Each shelter—300.
11. Provide bird houses (not on school grounds). Each occupied by nesting bird—100.
12. Rescue game birds by marking nests with stake during harvest or when grass is cut. For each nest saved—100.
13. Participation in construction and demonstration of flushing bar to farmer—100.

14. Explore a brook for half a mile and write notes on observations of water, its channel, speed of flow, fish and plant life, insects and vegetation on bank—400.

15. Start library of not less than 25 books or state and federal pamphlets on wildlife conservation, forestry, and soil erosion—250.



State Fish Hatchery near Ashland, Ky., owned and operated by Division of Game and Fish.

16. Make survey of farm, including map showing creeks, ponds, timber, fields, den trees, nesting sites, etc.—500.
17. Cooperation with game or fish technician on wildlife restoration units—300.
18. Participation in rabbit, quail, squirrels or other wildlife survey and estimate, and formulating of restoration program and sending final survey report to the Division of Game and Fish, Frankfort—50.
19. Participation in game restocking program in cooperation with the County Game and Fish Club.—200.
20. Participation in approved predator control program—50.
21. Supplying of conservation news items to newspapers; for each printed item—100.
22. Installation of den trees, corn shock for wildlife use, or brush pile for wildlife shelter; each tree, shock or brush pile—200.
23. Cooperation in giving information or otherwise assisting in bringing observance of conservation laws—1,000. Must be attested by Conservation officer.
24. Completion of arrangement with farmer or other landowner for cooperative wildlife habitat improvement on his land—1,500.
25. Completion of allotted period of work on community or school forest. For each period—100.

Club may set up additional suggested activities and points or modify these points to suit community requirements and needs.

Upon receiving full membership a student can continue accumulating points toward Distinguished Service in Conservation award which may be made by agreement with local sportsmen's club. Standard of 10,000 points may be established for eligibility to this award.

CHECK-LIST OF THE BIRDS OF KENTUCKY

A.O.U. Number

By BURT L. MONROE
State Ornithologist

Order GAVIIFORMES

Family GAVIIDAE (Loons)

7 Common Loon. Gavia immer immer (Brünnich).

Order COLYMBIFORMES

Family COLYMBIDAE (Grebes)

2 Holboell's Grebe. Colymbus grisegena holboelli (Reinhardt).
3 Horned Grebe. Colymbus auritus Linnaeus.
6 Pied-billed Grebe. Podilymbus podiceps podiceps (Linnaeus).

Order PROCELLARIIFORMES

Family PROCELLARIIDAE (Shearwaters, Fulmars, and Petrels)

†98 Black-capped Petrel. Pterodroma hasitata (Kuhl).

Order PELECANIFORMES

Family PELECANIDAE (Pelicans)

125 White Pelican. Pelecanus erythrorhynchos Gmelin.

Family PHALACROCORACIDAE (Cormorants)

120 Double-crested Cormorant. Phalacrocorax auritus auritus (Lesson).

Family ANHINGIDAE (Darters)

118 Water-Turkey. Anhinga anhinga (Linnaeus).

Order CICONIIFORMES

Family ARDEIDAE (Herons and Bitterns)

194 Great Blue Heron. Ardea herodias herodias Linnaeus.
194b Ward's Heron. Ardea herodias wardi Ridgeway.

196 American Egret. Casmerodius albus egretta (Gmelin).
197 Snowy Egret. Egretta thula thula (Molina).
200 Little Blue Heron. Florida caerulea caerulea (Linnaeus).
201 Eastern Green Heron. Butorides virescens virescens Linnaeus).
202 Black-crowned Night Heron. Nycticorax nycticorax hoactli (Gmelin).
203 Yellow-crowned Night Heron. Nyctanassa violacea violacea (Linnaeus).
190 American Bittern. Botaurus lentiginosus (Montagu).
191 Eastern Least Bittern. Ixobrychus exilis exilis (Gmelin).

Family CICONIIDAE (Storks and Wood Ibises)

188 Wood Ibis. Mycteria americana Linnaeus.

Order ANSERIFORMES

Family ANATIDAE (Swans, Geese, and Ducks)

180 Whistling Swan. Cygnus columbianus (Ord). [Mig. G. B.]
*181 Trumpeter Swan. Cygnus buccinator Richardson. [Mig. G. B.]
172 Common Canada Goose. Branta canadensis canadensis (Linnaeus). [Mig. G. B.]
169 Lesser Snow Goose. Chen hyperborea hyperborea (Pallas). [Mig. G. B.]
169.1 Blue Goose. Chen caerulescens (Linnaeus). [Mig. B. G.]
132 Common Mallard. Anas platyrhynchos platyrhynchos Linnaeus. [Mig. G. B.]
133a Red-legged Black Duck. Anas rubripes rubripes Brewster. [Mig. G. B.]
133 Common Black Duck. Anas rubripes tristis Brewster. [Mig. G. B.]
135 Gadwall. Chaulelasmus streperus (Linnaeus). [Mig. G. B.]
136 European Widgeon. Mareca penelope (Linnaeus). [Mig. G. B.]
137 Baldpate. Mareca americana (Gmelin). [Mig. G. B.]
143 American Pintail. Dafila acuta tzitzihoa (Viellot). [Mig. G. B.]
139 Green-winged Teal. Nettion carolinense (Gmelin). [Mig. G. B.]
140 Blue-winged Teal. Querquedula discors (Linnaeus). [Mig. G. B.]

142 Shoveller. Spatula clypeata (Linnaeus). [Mig. G. B.]
144 Wood Duck. Aix sponsa (Linnaeus). [Mig. G. B.]
146 Redhead. Nyroca americana (Eyton). [Mig. G. B.]
150 Ring-necked Duck. Nyroca collaris (Donovan). [Mig. G. B.]
147 Canvas-back. Nyroca valisineria (Wilson). [Mig. G. B.]
148 Greater Scaup Duck. Nyroca marila (Linnaeus). [Mig. G. B.]
149 Lesser Scaup Duck. Nyroca affinis (Eyton). [Mig. G. B.]
151 American Golden-eye. Glaucinonetta clangula americana (Bonaparte). [Mig. G. B.]
153 Buffle-head. Charitonetta albeola (Linnaeus). [Mig. G. B.]
154 Old-squaw. Clangula hyemalis (Linnaeus). [Mig. G. B.]
165 White-winged Scoter. Melanitta deglandi (Bonaparte). [Mig. G. B.]
166 Surf Scoter. Melanitta perspicillata (Linnaeus). [Mig. G. B.]
163 American Scoter. Oidemia americana Swainson. [Mig. G. B.]
167 Ruddy Duck. Erismatura jamaicensis rubida (Wilson). [Mig. G. B.]
131 Hooded Merganser. Lophodytes cucullatus (Linnaeus). [Mig. G. B.]
129 American Merganser. Mergus merganser americanus Cassin. [Mig. G. B.]
130 Red-breasted Merganser. Mergus serrator Linnaeus. [Mig. G. B.]

Order FALCONIFORMES

Family CATHARTIDAE (American Vultures)

325 Turkey Vulture. Cathartes aura septentrionalis Wied.
326 Black Vulture. Coragyps atratus atratus (Meyer).

Family ACCIPITRIIDAE (Kites, Hawks, and Allies)

*327 Swallow-tailed Kite. Elanoides forficatus forficatus (Linnaeus).
*329 Mississippi Kite. Ictinia misisippiensis (Wilson).
334 Eastern Goshawk. Astur atricapillus atricapillus (Wilson).
332 Sharp-shined Hawk. Accipiter velox velox (Wilson).
333 Cooper's Hawk. Accipiter cooperi (Bonaparte).
337 Eastern Red-tailed Hawk. Buteo borealis borealis (Gmelin).

339 Northern Red-shouldered Hawk. Buteo lineatus lineatus (Gmelin).

343 Broad-winged Hawk. Buteo platypterus platypterus (Viellot).

347a American Rough-legged Hawk. Buteo lagopus s. johannis (Gamelin).

349 Golden Eagle. Aquila chrysaetos canadensis (Linnaeus).

352 Southern Bald Eagle. Haliaeetus leucocephalus leucocephalus (Linnaeus).

331 Marsh Hawk. Circus hudsonius (Linnaeus).

364 Osprey. Pandion haliaetus carolinensis (Gmelin).

356a Duck Hawk. Falco peregrinus anatum Bonaparte.

357 Eastern Pigeon Hawk. Falco columbarius columbarius Linnaeus.

360 Eastern Sparrow Hawk. Falco sparverius sparverius Linnaeus.

Order GALLIFORMES

Family TETRAONIDAE (Grouse and Ptarmigans)

300a Canada Ruffed Grouse. Bonasa umbellus togata (Linnaeus). [Res. G. B.]

*305 Greater Prairie Chicken. Tympanuchus cupido americanus (Reichenbach).

Family PERDICIDAE (Partridges and Quails)

289 Eastern Bob-White. Colinus virginianus virginianus (Linnaeus). [Res. G. B.]

289b Texas Bob-white. Colinus virginianus texanus (Lawrence). Introduced [Res. G. B.]

Family PHASIANIDAE (Pheasants)

309.1 Ring-necked Pheasant. Phasianus colchicus torquatus Gmelin. Introduced [Res. G. B.]

Family MELEAGRIDIDAE (Turkeys)

310a Eastern Turkey. Meleagris gallopavo silvestris Viellot. [Res. G. B.]

Order GRUIFORMES

Family GRUIDAE (Cranes)

*204 Whooping Crane. Grus americana (Linnaeus). [Mig. G. B.]

206 Sandhill Crane. Grus canadensis tabida (Peters). [Mig. G. B.]

Family RALLIDAE (Rails, Gallinules, and Coots)

208 King Rail. Rallus elegans elegans Audubon. [Mig. G. B.]
212 Virginia Rail. Rallus limicola limicola Viellot. [Mig. G. B.]
214 Sora. Porzana carolina (Linnaeus). [Mig. G. B.]
215 Yellow Rail. Coturnicops noveboracensis (Gmelin). [Mig. G. B.]
218 Purple Gallinule. Ionornis martinica (Linnaeus). [Mig. G. B.]
219 Florida Gallinule. Gallinula chloropus cachinnans Bangs. [Mig. G. B.]
221 American Coot. Fulica americana americana Gmelin. [Mig. G. B.]

Order CHARADRIIFORMES

Family CHARADRIIDAE (Plovers, Turnstones, and Surf-birds)

277 Piping Plover. Charadrius melodus Ord. [Mig. G. B.]
274 Semipalmated Plover. Charadrius semipalmatus Bonaparte [Mig. G. B.]
273 Killdeer. Oxyechus vociferus vociferus (Linnaeus). [Mig. G. B.]
272 American Golden Plover. Pluvialis dominica dominica (Müller). [Mig. G. B.]
270 Black-bellied Plover. Squatarola squatarola (Linnaeus). [Mig. G. B.]
283a Ruddy Turnstone. Arenaria interpres morinella (Linnaeus) [Mig. G. B.]

Family SCOLOPACIDAE (Woodcock, Snipe, and Sandpipers)

228 American Woodcock. Philophela minor (Gmelin). [Mig. G. B.]
230 Wilson's Snipe. Capella delicata (Ord). [Mig. G. B.]
261 Upland Plover. Bartramia longicauda (Bechstein). [Mig. G. B.]
263 Spotted Sandpiper. Actitis macularia (Linnaeus). [Mig. G. B.]
256 Eastern Solitary Sandpiper. Tringa solitaria solitaria Wilson. [Mig. G. B.]
258a Western Willet. Catoptrophorus semipalmatus inornatus (Brewster). [Mig. G. B.]
254 Greater Yellow-legs. Totanus melanoleucus (Gmelin). [Mig. G. B.]

255 Lesser Yellow-legs. Totanus flavipes (Gmelin). [Mig. G. B.]
239 Pectorial Sandpiper. Pisobia melanotos (Viellot). [Mig. G. B.]
240 White-rumped Sandpiper. Pisobia fuscicollis (Viellot). [Mig. G. B.]
241 Baird's Sandpiper. Pisobia bairdi (Coues). [Mig. G. B.]
242 Least Sandpiper. Pisobia minutilla (Viellot). [Mig. G. B.]
243a Red-backed Sandpiper. Pelidna alpina sakhalina (Viellot). [Mig. G. B.]
232 Long-billed Dowitcher. Limnodromus griseus scolopaceus (Say). [Mig. G. B.]
233 Stilt Sandpiper. Micropalama himantopus (Bonaparte). [Mig. G. B.]
246 Semipalmated Sandpiper. Ereunetes pusillus (Linnaeus). [Mig. G. B.]
247 Western Sandpiper. Ereunetes maurii Cabanis. [Mig. G. B.]
262 Buff-breasted Sandpiper. Tryngites subruficollis (Viellot). [Mig. G. B.]
248 Sanderling. Crocethia alba (Pallas). [Mig. G. B.]

Family PHALAROPODIDAE (Phalaropes)

222 Red Phalarope. Phalaropus fulicarius (Linnaeus). [Mig. G. B.]
224 Wilson's Phalarope. Steganopus tricolor Viellot. [Mig. G. B.]

Family LARIDAE (Gulls and Terns)

51a Herring Gull. Larus argentatus smithsonianus Coues.
54 Ring-billed Gull. Larus delawarensis Ord.
60 Bonaparte's Gull. Larus philadelphia (Ord).
69 Forster's Tern. Sterna forsteri Nuttall.
70 Common Tern. Sterna hirundo hirundo Linnaeus.
74 Least Tern. Sterna antillarum antillarum (Lesson).
64 Caspian Tern. Hydroprogne caspia omperator (Coues).
77 Black Tern. Chlidonias nigra surinamensis (Gmelin).

Order COLUMBIFORMES

Family COLUMBIDAE (Pigeons and Doves)

313.1 Rock Dove. Columba livia livia Gmelin.
316 Eastern Mourning Dove. Zenaidura macroura carolinensis (Linnaeus). [Mig. G. B.]
*315 Passenger Pigeon. Ectopistes migratorius. (Linnaeus)

Order PSITTACIFORMES

Family PSITTACIDAE (Parrots, Paroquets, and Macaws)

*382a Louisiana Paroquet. Conurpois carolinensis ludovicianus (Gmelin).

Order CUCULIFORMES

Family CUCULIDAE (Cuckoos, Roadrunners, and Anis)

387 Yellow-billed Cuckoo. Coccyzus americanus americanus (Linnaeus)

388 Black-billed Cuckoo. Coccyzus erthropthalmus (Wilson).

Order STRIGIFORMES

Family TYTONIDAE (Barn Owls)

365 Barn Owl. Tyto alba pratincola (Bonaparte).

Family STRIGIDAE (Typical Owls)

373m Eastern Screech Owl. Otus asio naevius (Gmelin).

373 Southern Screech Owl. Otus asio asio (Linnaeus)

375 Great Horned Owl. Bubo virginianus virginianus (Gmelin).

376 Snowy Owl. Nyctea nyctea (Linnaeus).

368 Northern Barred Owl. Strix vari vari Barton.

366 Long-eared Owl. Asio wilsonianus (Lesson).

367 Short-eared Owl. Asio flammeus flammeus (Pontoppidan).

372 Saw-whet Owl. Cryptoglaux acadica acadica (Gmelin).

Order CAPRIMULGIFORMES

Family CAPRIMULGIDAE (Goatsuckers)

416 Chuck-will's-widow. Antrostomus carolinensis (Gmelin).

417 Eastern Whip-poor-will. Antrostomus vociferus vociferus (Wilson).

420 Eastern Nighthawk. Chordeiles minor minor (Forster).

Order MICROPODIFORMES

Family MICROPODIDAE (Swifts)

423 Chimney Swift. Chaetura pelagica (Linnaeus).

Family TROCHILIDAE (Hummingbirds)

428 Ruby-throated Hummingbird. Archilochus colubris (Linnaeus).

Order CORACIIFORMES

Family ALCEDINIDAE (Kingfishers)

390 Eastern Belted Kingfisher. Megaceryle alcyon alcyon (Linnaeus).

Order PICIFORMES

Family PICIDAE (Woodpeckers)

412a Northern Flicker. Colaptes auratus luteus Bangs.

412 Southern Flicker. Colaptes auratus auratus (Linnaeus).

405 Southern Pileated Woodpecker. Ceophloeus pileatus pileatus (Linnaeus).

409 Red-bellied Woodpecker. Centurus carolinus (Linnaeus).

406 Eastern Red-headed Woodpecker. Melanerpes erthrocephalus erthrocephalus (Linnaeus).

402 Yellow-bellied Sapsucker. Sphyrapicus varius varius (Linnaeus)

393 Eastern Hairy Woodpecker. Dryobates villosus villosus (Linnaeus).

393b Southern Hairy Woodpecker. Dryobates villosus audubonі (Swainson).

394c Northern Downy Woodpecker. Dryobates pubescens medianus (Swainson).

394d Nelson's Downy Woodpecker. Dryobates pubescens nelsoni Oberholser.

395 Red-cockaded Woodpecker. Dryobates borealis (Viellot).

*392 Ivory-billed Woodpecker. Campephilus principalis (Linnaeus).

Order PASSERIFORMES

Family TYRANNIDAE (Tyrant Flycatchers)

444 Eastern Kingbird. Tyrannus tyrannus (Linnaeus).

†442 Fork-tailed Flycatcher. Muscivora tyrannus (Linnaeus).

452a Northen Crested Flycatcher. Myiarchus crintus boreus Bangs.

456 Eastern Phoebe. Sayornis phoebe (Latham).

463 Yellow-bellied Flycatcher. Empidonax flaviventris (Baird and Baird).

465 Acadian Flycatcher. Empidonax virescens (Viellot).

466a Alder Flycatcher. Empidonax trailli tralli (Audubon).

467 Least Flycatcher. Empidonax minimus (Baird and Baird).

461 Eastern Wood Pewee. Myiochanes virens (Linnaeus).

459 Olive-sided Flycatcher. Nuttallornis mesoleucus (Lichtenstein).

Family ALAUDIDAE (Larks)

474 Northern Horned Lark. Otocoris alpestris alpestris (Linnaeus).

474b Prairie Horned Lark. Otocoris alpestris praticola Henshaw.

Family HIRUNDINIDAE (Swallows)

614 Tree Swallow. Iridoprocne bicolor (Viellot).
616 Bank Swallow. Riparia riparia riparia (Linnaeus).
617 Rough-winged Swallow. Stelgidopteryx ruficollis serripennis (Audbuon).
613 Barn Swallow. Hirundo erythrogaster Boddaert.
612 Northern Cliff Swallow. Petrochelidon albifrons albifrons (Rafinesque).
611 Purple Martin. Progne subis subis (Linnaeus).

Family CORVIDAE (Jays, Magpies, and Crows)

477 Northern Blue Jay. Cyanocitta cristata cristata (Linnaeus).
477a Florida Blue Jay. Cyanocitta cristata florincola Coues.
*486a Northern Raven. Corvus corax principalis Ridgway.
488 Eastern Crow. Corvus brachyrhynchos brachyrhynchos Brehm.
488c Southern Crow. Corvus brachyrhynchos paulus Howell.

Family PARIDAE (Titmice, Verdins, and Bush-Tits)

735 Black-capped Chickadee. Penthestes atricapillus atricapillus (Linnaeus).
736 Carolina Chickadee. Penthestes carolinensis carolinensis (Audubon).
..... Northern Carolina Chickadee. Penthestes carolinensis extimus Todd and Sutton.
731 Tufted Titmouse. Baeolophus bicolor (Linnaeus).

Family SITTIDAE (Nuthatches)

727 White-breasted Nuthatch. Sitta carolinensis carolinensis Latham.
727b Florida Nuthatch. Sitta carolinensis atkinsi Scott.
728 Red-breasted Nuthatch. Sitta canadensis Linnaeus.

Family CERTHIIDAE (Creepers)

726 Brown Creeper. Certhia familiaris americana Bonaparte.

Family TROGLODYTIDAE (Wrens)

721 Eastern House Wren. Troglodytes aedon aedon Viellot.
721a Western House Wren. Troglodytes aedon parkmani Audbon.
..... Ohio House Wren. Troglodytes aedon baldwini Oberholser.
722 Eastern Winter Wren. Nannus hiemalis hiemalis (Viellot).
719 Bewick's Wren. Thryomanes bewicki bewicki (Audubon).

718 Carolina Wren. Thryothorus ludovicianus ludovicianus (Latham).

725 Long-billed Marsh Wren. Telmatodytes palustris palustris (Wilson).

725d Prairie Marsh Wren. Telmatodytes palustris dissaeptus (Bangs).

724 Short-billed Marsh Wren. Cistothorus stellaris (Naumann).

Family MIMIDAE (Mockingbirds and Thrashers)

703 Eastern Mockingbird. Mimus polyglottos polyglottos (Linnaeus).

704 Catbird. Dumetella carolinensis (Linnaeus).

705 Eastern Brown Thrasher. Toxostroma rufum (Linnaeus).

Family TURDIDAE (Thrushes, Bluebirds, Stonechats, and Solitaires)

761 Eastern Robin. Turdus migratorius migratorius Linnaeus.

761b Southern Robin. Turdus migratorius achrusterus (Batchelder).

755 Wood thrush. Hylocichla mustelina (Gmelin).

759b Eastern Hermit Thrush. Hylocichla guttata faxoni Bangs and Penard.

758a Eastern Olive-backed Thrush. Hylocichla ustulata swainsoni (Tschudi).

----- Western Olive-backed Thrush. Hylocichla ustulata almae Oberholser.

757 Gray-cheeked Thrush. Hylocichla minima aliciae (Baird).

756 Veery. Hylocichla fuscescens fuscescens (Stephens).

756a Willow Thrush. Hylocichla fuscescens salicicola Ridgway.

766 Eastern Bluebird. Sialia sialis sialis (Linnaeus).

Family SYLVIIDAE (Warblers, Gnatcatchers, and Kinglets)

751 Blue-gray Gnatcatcher. Polioptila caerulea caerulea (Linnaeus.)

748 Eastern Golden-crowned Kinglet. Regulus satrapa satrapa Lichtenstein.

749 Eastern Ruby-crowned Kinglet. Corthylio calendula calendula (Linnaeus).

Family MOTACILLIDAE (Wagtails and Pipits)

697 American Pipit. Anthus spinoletta rubescens (Tunstall).

Family BOMBYCILLIDAE (Waxwings)

619 Cedar Waxwing. Bombycilla cedrorum Viellot.

Family LANIIDAE (Shrikes)

621 Northern Shrike. Lanius borealis borealis Viellot.

622e Migrant Shrike. Lanius ludovicianus migrans Palmer.

Family STURNIDAE (Starlings)

493 Starling. Sturnus vulgaris vulgaris Linnaeus.

Family VIREONIDAE (Vireos)

631 White-eyed Vireo. Vireo griseus griseus (Boddaert).

628 Yellow-throated Vireo. Vireo flavifrons Viellot.

629 Blue-headed Viero. Viero solitarius solitarius (Wilson).

629c Mountain Vireo. Vireo solitarius alticola Brewster.

624 Red-eyed Vireo. Vireo olivaceus (Linnaeus).

626 Philadelphia Vireo. Vireo philadelphicus (Cassin).

627 Eastern Warbling Vireo. Vireo gilvus gilvus (Viellot).

Family COMPSOTHLYPIDAE (Wood Warblers)

636 Black and White Warbler. Mniotilta varia (Linnaeus).

637 Prothonotary Warbler. Protonotaria citrea (Boddaert).

638 Swainson's Warbler. Limnothlypis swainsoni (Audubon).

639 Worm-eating Warbler. Helmitheros vermivorus (Gmelin).

642 Golden-winged Warbler. Vermivora chrysoptera (Linnaeus).

641 Blue-winged Warbler. Vermivora pinus (Linnaeus).

640 Bachman's Warbler. Vermivora bachmani (Audubon).

647 Tennessee Warbler. Vermivora peregrina (Wilson).

646 Orange-crowned Warbler. Vermivora celata celata (Say).

645 Nashville Warbler. Vermivora ruficapilla ruficapilla (Wilson).

648a Northern Parula Warbler. Compsothlypis americana pusilla (Wilson).

652 Eastern Yellow Warbler. Dendroica aestiva aestiva (Gmelin).

657 Magnolia Warbler. Dendroica magnolia (Wilson).

650 Cape May Warbler. Dendrocia tigrina (Gmelin).

654 Black-throated Blue Warbler. Dendrocia caerulescens caerulescens (Gmelin).

654a Cairn's Warbler. Dendrocia caerulescens cairnsi Coues.

655 Myrtle Warbler. Dendrocia coronata coronata (Linnaeus).

667 Black-throated Green Warbler. Dendroica virens virens (Gmelin).
658 Cerulean Warber. Dendroica cerulea (Wilson).
662 Blackburnian Warbler. Dendroica fusca (Müller).
663 Yellow-throated Warbler. Dendroica dominica dominica (Linnaeus).
663a Sycamore Warbler. Dendroica dominica albilora Ridgway.
659 Chestnut-sided Warbler. Dendroica pensylvanica (Linnaeus).
660 Bay-breatsed Warbler. Dendroica castanea (Wilson).
661 Black-poll Warbler. Dendroica striata (Forster).
671 Northern Pine Warbler. Dendroica pinus pinus (Wilson).
670 Kirtland's Warbler. Dendroica kirtlandi (Baird).
673 Northern Prairie Warbler. Dendroica discolor discolor (Viellot).
672 Western Palm Warbler. Dendroica palmarum palmarum (Gmelin).
674 Oven-bird. Seiurus aurocapillus (Linnaeus).
675 Northern Water-thrush. Seiurus noveboracensis noveboracensis (Gmelin).
675a Grinnell's Water-thrush. Seiurus noveboracensis notabilis Ridgway.
676 Louisiana Water-thrush. Seiurus motacilla (Viellot).
677 Kentucky Warbler. Oporornis formosus (Wilson).
678 Connecticut Warbler. Oporornis agilis (Wilson).
679 Mourning Warbler. Oporornis philadelphia (Wilson).
681d Northern Yellow-throat. Geothlypis trichas brachidactyla (Swainson).
681 Maryland Yellow-throat. Geothlypis trichas trichas (Linnaeus).
683 Yellow-breasted Chat. Icteria virens virens (Linnaeus).
684 Hooded Warbler. Wilsonia citrina (Boddaert).
685 Wilson's Warbler. Wilsonia pusilla pusilla (Wilson).
686 Canada Warbler. Wilsonia canadensis (Linnaeus).
687 American Redstart. Setophaga ruticilla (Linnaeus).

Family PLOCEIDAE (Weaver Finches)

688.2 English Sparrow. Passer domesticus domesticus (Linnaeus).

Family ICTERIDAE (Meadowlarks, Blackbirds, and Troupials)

494 Bobolink. Dolichonyx oryzivorus (Linnaeus).
501 Eastern Meadowlark. Sturnella magna magna (Linnaeus).

501c Southern Meadowlark. Sturnella magna argutula Bangs.
497 Yellow-headed Blackbird. Xanthocephalus xanthocephalus (Bonaparte).
498 Eastern Red-wing. Agelaius phoeniceus phoeniceus (Linnaeus).
506 Orchard Oriole. Icterus spurius (Linnaeus).
507 Baltimore Oriole. Icterus galbula (Linnaeus).
509 Rusty Blackbird. Euphagus carolinus (Müller).
511 Purple Grackle. Quiscalus quiscula quiscula (Linnaeus).
511b Bronzed Grackle. Quiscalus quiscula aeneus Ridgway.
495 Eastern Cowbird. Molothrus ater ater (Boddaert).

Family THRAUPIDAE (Tanagers)

608 Scarlet Tanager. Piranga erythromelas Viellot.
610 Summer Tanager. Piranga rubra rubra (Linnaeus).

Family FRINGILLIDAE (Grosbeaks, Finches, Sparrows, and Buntings)

593 Eastern Cardinal. Richmondena cardinalis cardinalis (Linnaeus).
595 Rose-breasted Grosbeak. Hedymeles ludovicianus (Linnaeus).
597 Eastern Blue Grosbeak. Guiraca caerulea caerulea (Linnaeus).
598 Indigo Bunting. Passerina cyanea (Linnaeus).
604 Dickcissel. Spiza americana (Gmelin).
514 Eastern Evening Grosbeak. Hesperiphona vespertina vespertina (Cooper).
517 Eastern Purple Finch. Carpodacus purpureus purpureus (Gmelin).
515 Canadian Pine Grosbeak. Pinicola enucleator leucura (Müller).
533 Northern Pine Siskin. Spinus pinus pinus (Wilson).
529 Eastern Goldfinch. Spinus tristis tristis (Linnaeus).
521 Red Crossbill. Loxia curvirostra pusilla Gloger.
522 White-winged Crossbill. Loxia leucoptera Gmelin.
587 Rey-eyed Towhee. Pipilo erythrophthalmus erythrophthalmus (Linnaeus).
542a Eastern Savannah Sparrow. Passerculus sandwichensis savanna (Wilson).

542d Labrador Savannah Sparrow. Passerculus sandwichensis labradorius Howe.

542e Nevada Savannah Sparrow. Passerculus sandwichensis nevadensis Grinnell.

546 Eastern Grasshopper Sparrow. Ammodramus savannarum australis Maynard.

546a Western Grasshopper Sparrow. Ammodramus savannarum bimaculatus Swainson.

548 Leconte's Sparrow. Passerherbulus caudacutus (Latham).

547a Western Henslow's Sparrow. Passerherbulus henslowi henslowi (Audubon).

540 Eastern Vesper Sparrow. Pooecetes gramineus gramineus (Gmelin).

552 Eastern Lark Sparrow. Chondestes grammacus grammacus (Say).

575a Bachman's Sparrow. Aimophila aestivalis bachmani (Audubon).

567 Slate-colored Junco. Junco hyemalis hyemalis (Linnaeus).

567e Carolina Junco. Junco hyemalis carolinensis Brewster.

559 Eastern Tree Sparrow. Spizella arborea arborea (Wilson).

560 Eastern Chipping Sparrow. Spizella passerina passerina (Bechstein).

563 Eastern Field Sparrow. Spizella pusilla pusilla (Wilson).

554 White-crowned Sparrow. Zonotrichia leucophrys leucophrys (Forster).

558 White-throated Sparrow. Zonotrichia albicollis (Gmelin).

585 Eastern Fox Sparrow. Passerella iliaca iliaca (Merrem).

583 Lincoln's Sparrow. Melospiza lincolni lincolni (Audubon(.

584 Eastern Swamp Sparrow. Melospiza georgiana georgiana (Latham).

..... Western Swamp Sparrow. Melospiza georgiana ericrypta Oberholser.

581 Eastern Song Sparrow. Melospiza melodia melodia (Wilson).

581u Mississippi Song Sparrow. Melospiza melodia beata Bangs.

536 Lapland Longspur. Calcarius lapponicus lapponicus (Linnaeus).

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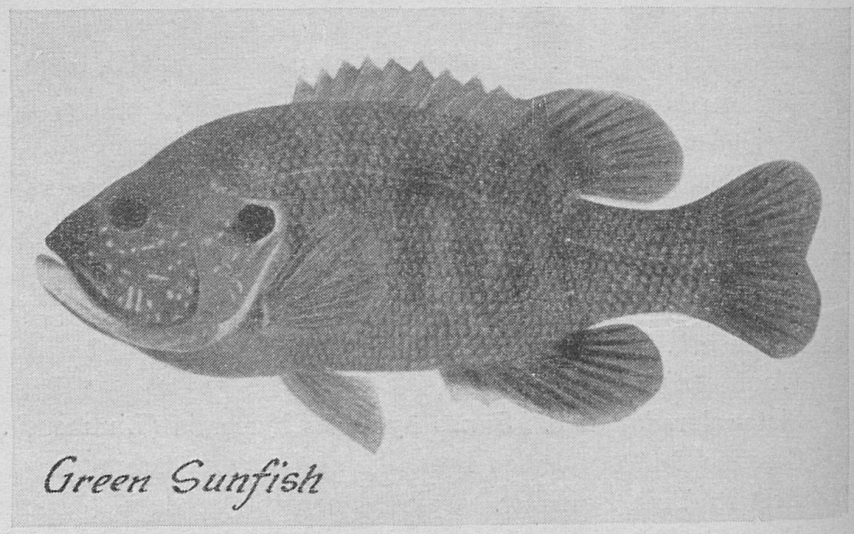
* Species now completely exterminated in the State of Kentucky.
† Species recorded but considered accidental.
[Res. G. B.] Resident Game Bird.
[Mig. G. B.] Migratory Game Bird.
The numbers used are those from the American Ornithologists Union Check-List, 1931 Edition.

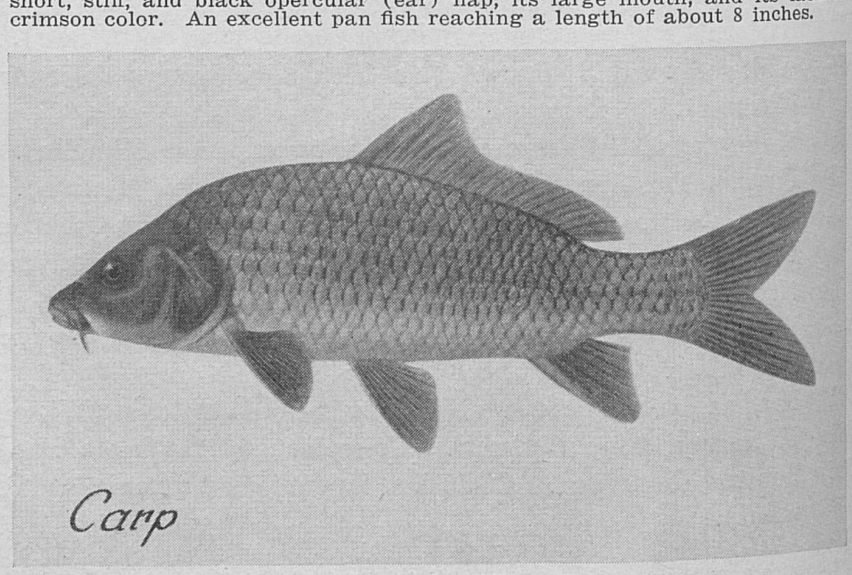
THE FISHES OF KENTUCKY

M. E. CLARK

Superintendent of Hatcheries, Kentucky Division Game and Fish



A common species in all streams of Kentucky which shows a preference for silty to muddy bottom and fairly sluggish current. It is known by its short, stiff, and black opercular (ear) flap, its large mouth, and its lack of crimson color. An excellent pan fish reaching a length of about 8 inches.



EUROPEAN CARP.

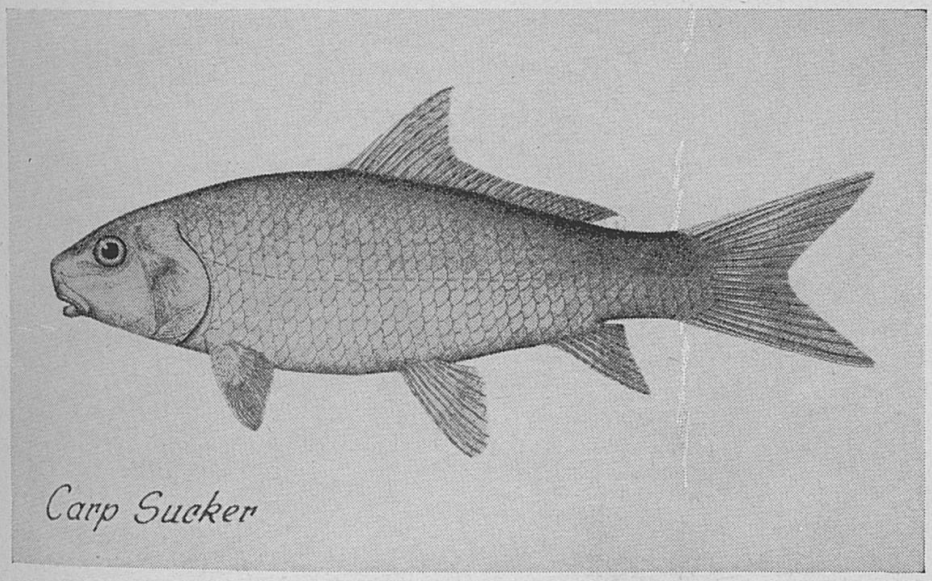
A minnow introduced to this country from Germany. Its three varieties, namely, the scaleless, the partially scaled, and the scaled type are a single species. The female may produce as many as 250,000 eggs which are scattered broadcast. The carp reaches a weight of 30 pounds and a length of two feet. It is usually regarded as an undesirable species.

Family POLODOUTIDAE

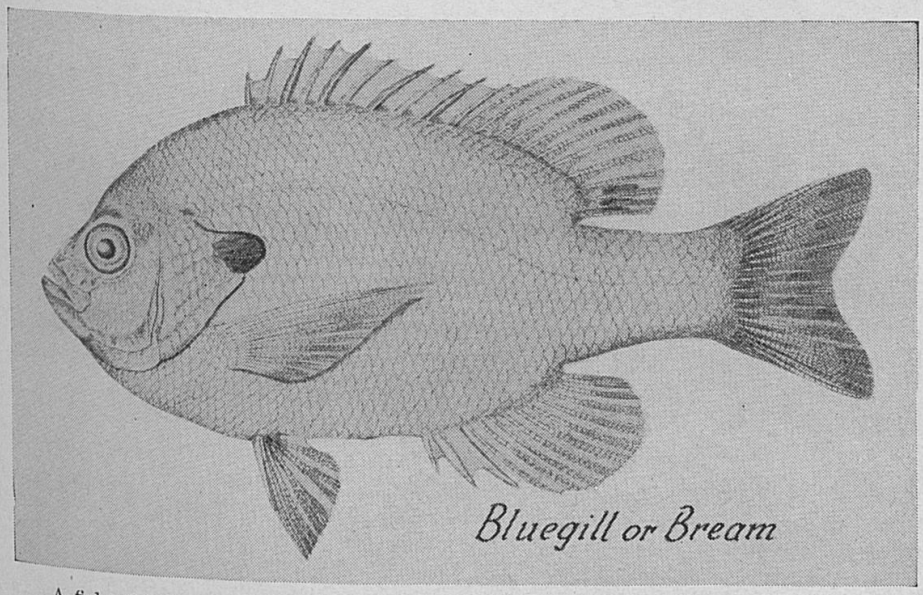
1. Spoonbill Cat, Polyodon spathula (Walbaum).

Family ACIPENSERIDAE

2. Lake Sturgeon, Acipenser fulvescens Rafinesque.
3. Shovelnose Sturgeon, Scaphirhynchus platorynchus (Rafinesque).



The river carp seldom ascends the smaller streams, as it prefers the larger rivers. It reaches a weight of ten pounds. Because of its size, it is used for food, but the flesh is flavorless and soft.



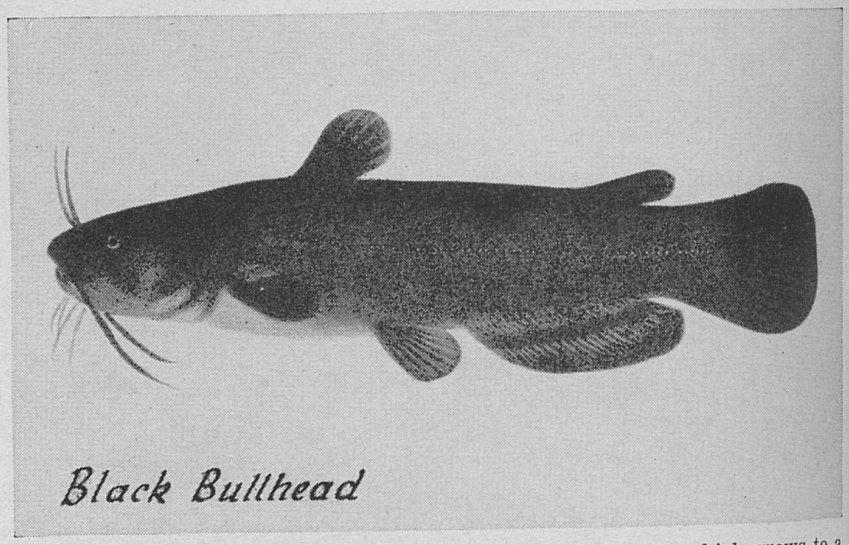
A fish of lakes, ponds, and larger rivers usually found in company with the large mouthed bass. It is known by its short black opercular (ear) flap which is not at all stiff, its smaller mouth, and high dorsal which contains a black spot on the last part. A game, excellent pan fish which reaches a length of 12 inches.

Family LEPISOSTEIDAE

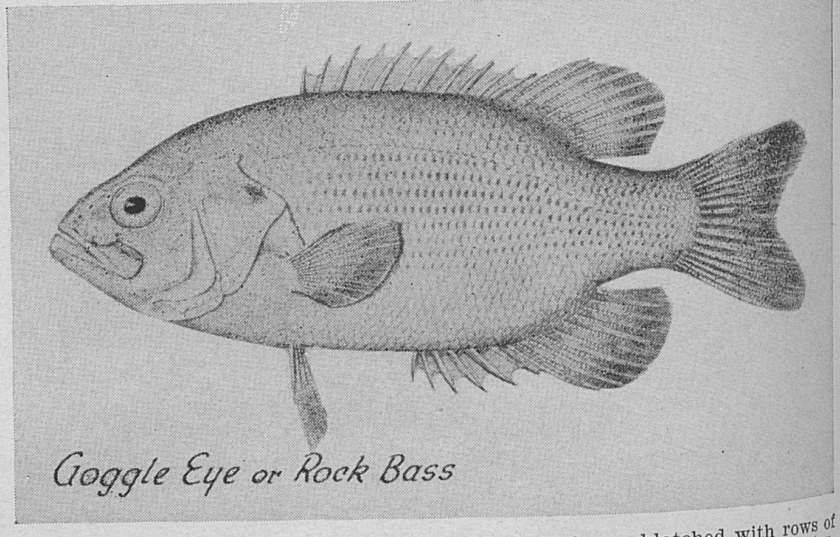
4. Long-nosed Gar, Lepisosteus osseus (Linnaeus).
5. Short-nosed Gar, Lepisosteus platostomus Rafinesque.
6. Mississippi Alligator Gar, Lepisosteus spathula Lacépède.

Family AMIIDAE

7. Bowfin or Grindle, Amia calva Linnaeus.



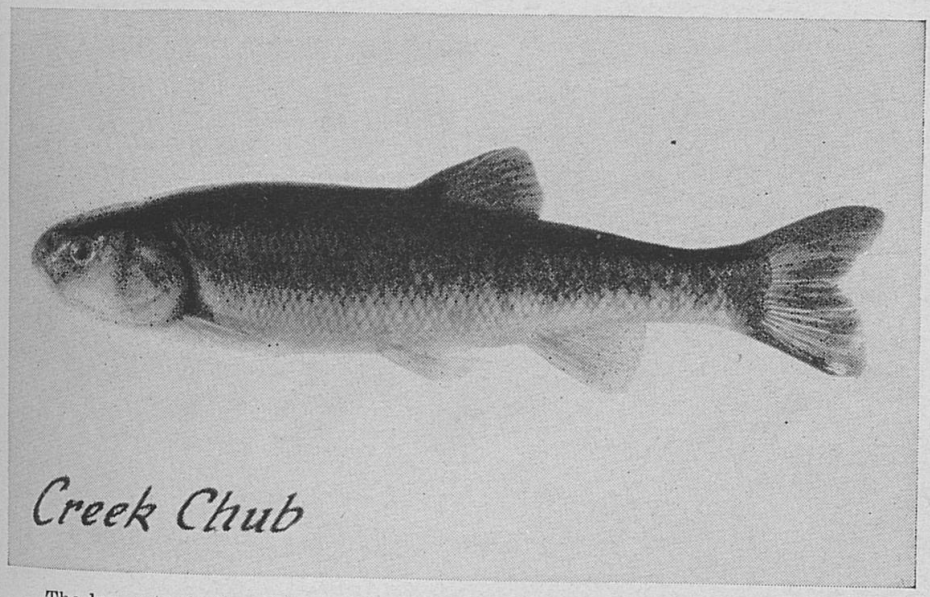
The common catfish of our smaller streams and ponds which grows to a length of 16 inches. It shows a preference for muddy bottom and can live well where other fish cannot. The bullhead is recognized by its big head and square tail.



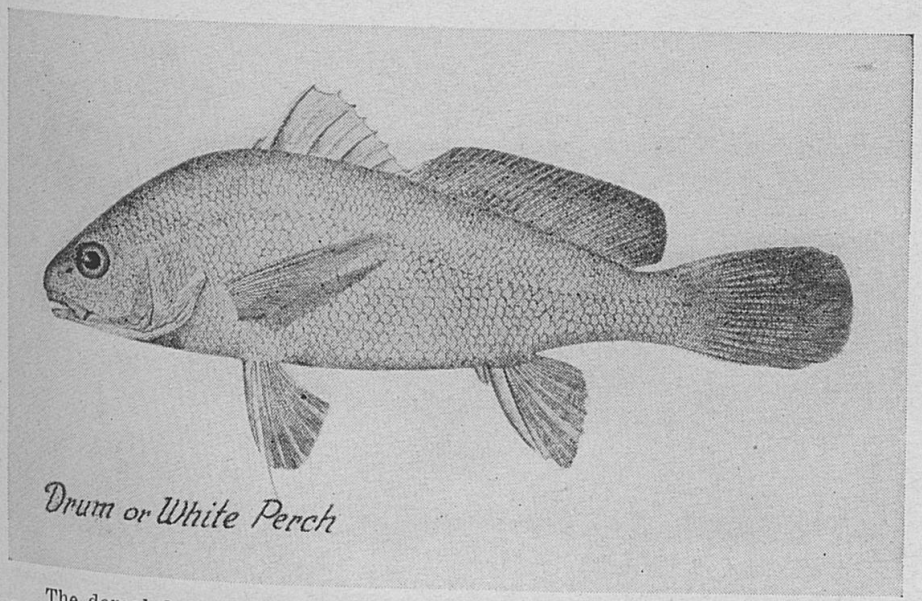
The large mouth, the brassy green sides which are blotched with rows of black spots, and the short anal fin which contains six spines are the characteristics which easily identify the species. It agrees with the small mouth on habitat as well as food and spawning conditions. It reaches a length of one foot and a weight of a pound or more.

Family HIODONTIDAE

8. Toothed Herring, Hiodon tergisus Le Sueur.
9. Southern Mooneye, Hiodon selenops (Jordan and Bean).
10. Mooneye, Amphiodon alosoides Rafinesque.



The largest of all native Kentucky minnows and common to all fishermen as it lives well on a hook, is abundant in brooks and creeks, and is used extensively as live bait when fishing for game fish. The chub takes the hook readily as it feeds on animal food. For this reason it is a competitor for food with the game fishes.



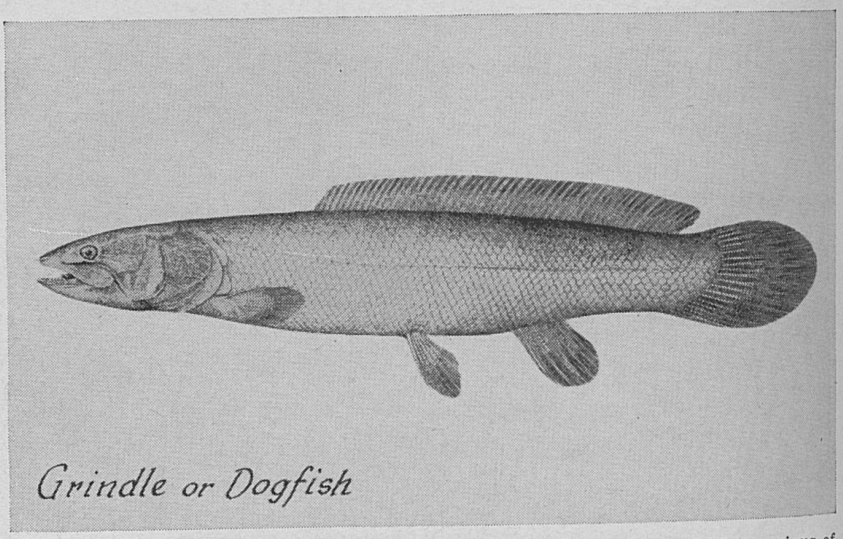
The dorsal fin though single is composed of two parts, spines and rays. The ray or soft portion is extremely long and this character serves to distinguish the drum from other Kentucky fishes. The common name "drum" refers to a croaking sound which the fish is able to make.

Family CLUPEIDAE

11. Blue Herring, Pomolobus Chrysochloris Rafinesque.
12. Ohio Shad, Alosa ohiensis Evermann.

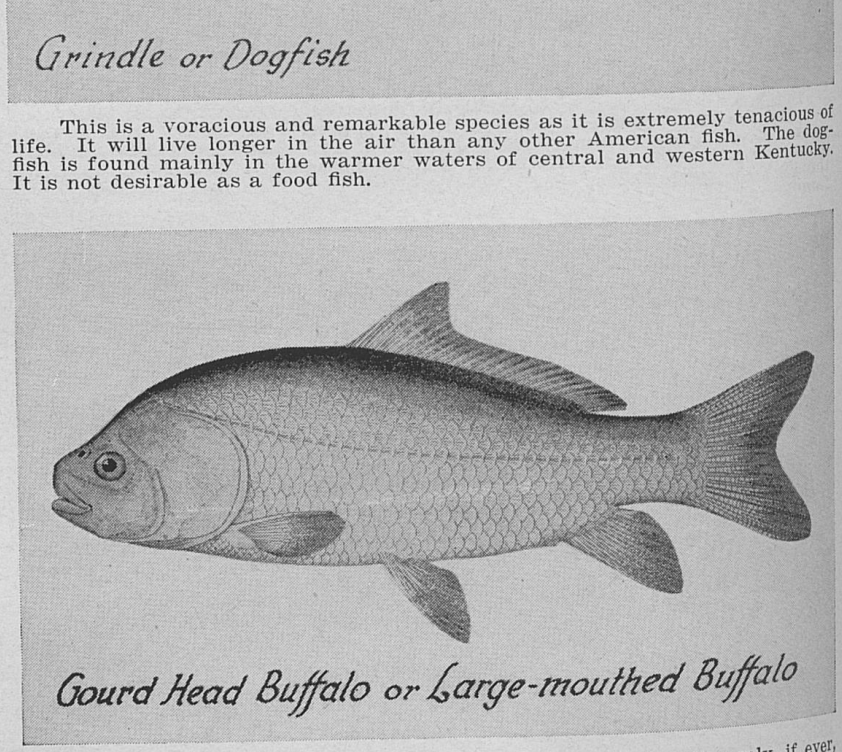
Family DOROSOMIDAE

13. Hickory Shad, Dorosoma cepedianum (LeSueur).



Grindle or Dogfish

This is a voracious and remarkable species as it is extremely tenacious of life. It will live longer in the air than any other American fish. The dogfish is found mainly in the warmer waters of central and western Kentucky. It is not desirable as a food fish.

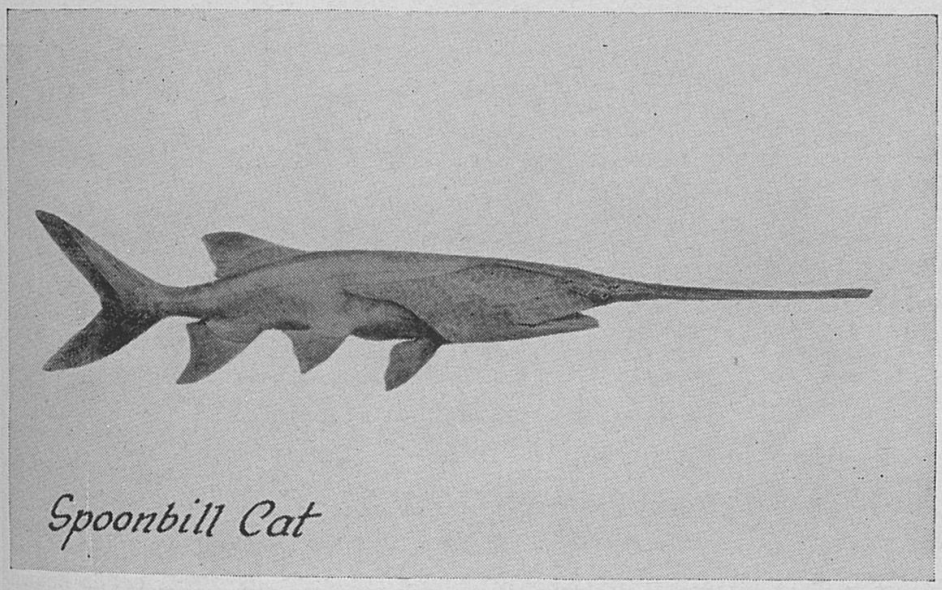


Gourd Head Buffalo or Large-mouthed Buffalo

A fish of the larger streams which is seldom seen since it rarely, if ever, takes a hook. During the high water of spring these fish run out in great numbers into the shallow waters. The fish reaches a weight of 50 pounds and a length of four feet.

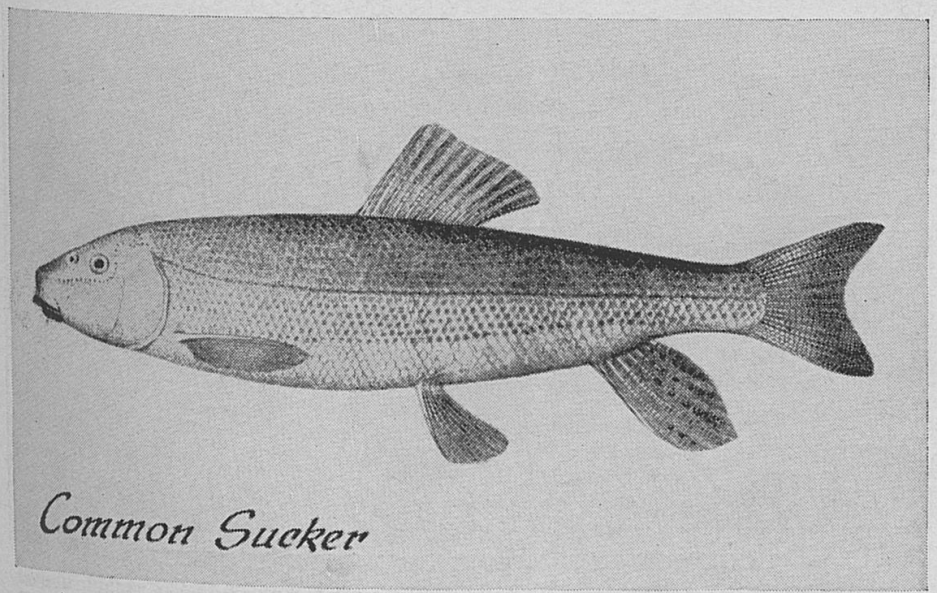
Family CATOSTOMIDAE

14. Black Horse, Cycleptus elongatus (LeSueur).
15. Common Buffalo, Megastomatobus cyprinella Cuvier and Valencinnes).
16. Black Buffalo, Ictiobus urus (Agassiz).



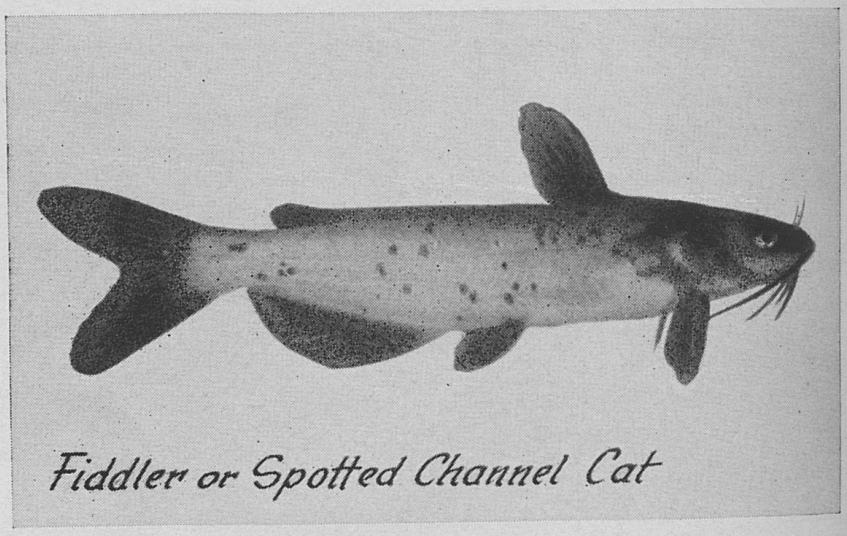
SPOONBILL CAT OR PADDLEFISH.

The spoonbill is found in the more quiet waters of our larger rivers where, in spite of its great size, it feeds entirely on minute plants and animals. The fish reaches a weight of 150 pounds and a length of six feet. Although commonly called a cat, the spoonbill does not belong to the catfish family.

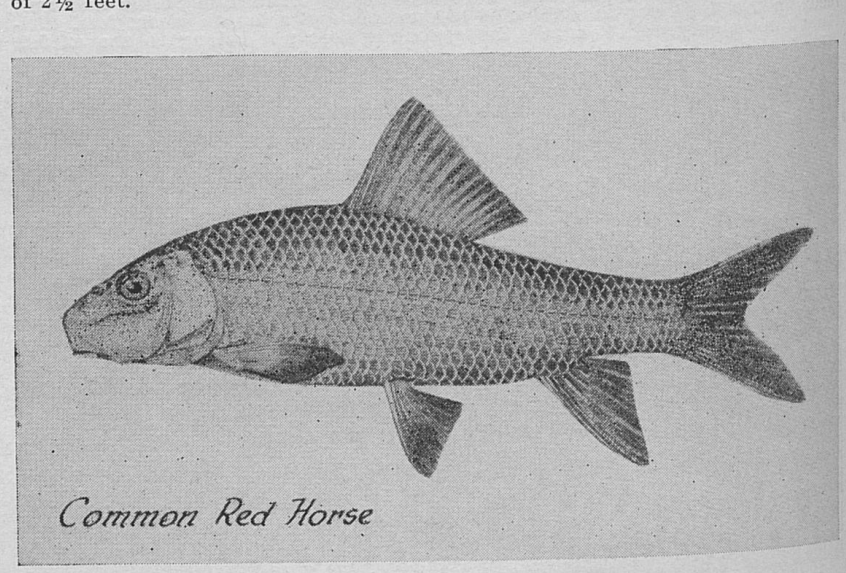


A common, well distributed species in Kentucky streams which is easily distinguished from other suckers by its much smaller scales. The flesh is firm and sweet but full of small bones. Lengths of 18 inches have been reported for this species.

17. Razorback Buffalo, Ictobus bubalus (Rafinesque).
18. Quillback, Carpiodes cyprinus (LeSueur).
19. Carpsucker, Carpiodes carpio carpio (Rafinesque).
20. Highfin Sucker, Carpiodes velifer (Rafinesque).



All channel catfish are known by their forked tail. This cat is known by its dark spots and shorted anal fin. It prefers clear, unpolluted, and flowing water of our larger streams. It is well distributed over the state and is fairly abundant. The fiddler attains a weight of 25 pounds and a length of 2½ feet.



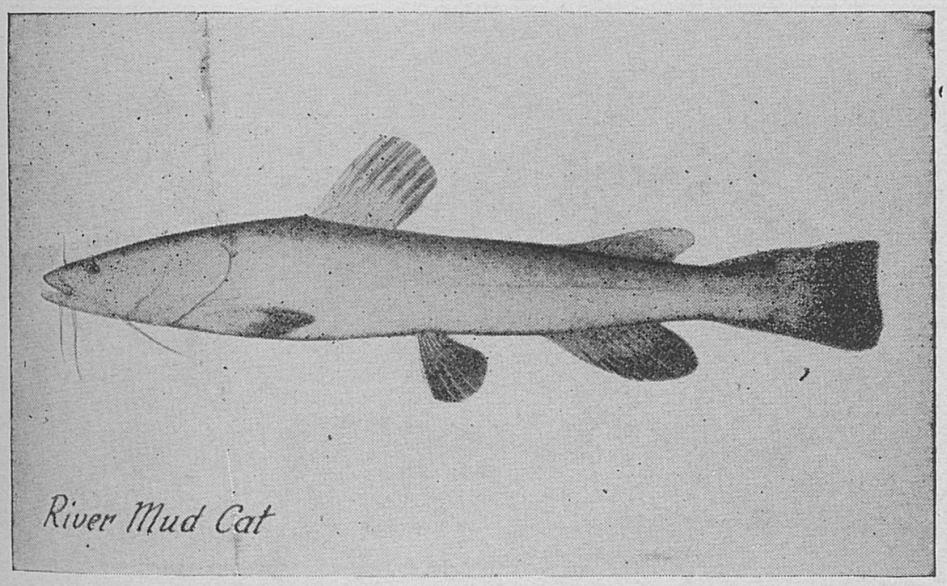
COMMON RED HORSE OR WHITE SUCKER.

Most any stream which contains clean water will yield an abundance of this species. As a food fish it is excellent except for the many small bones. In spring the red horse leaves the deep water and runs up stream where it spawns on the riffle. It attains a weight of 3½ pounds and a length of 18 inches.

21. Eastern White Sucker, Catostomus commersonnii commersonnii (Lacépède).

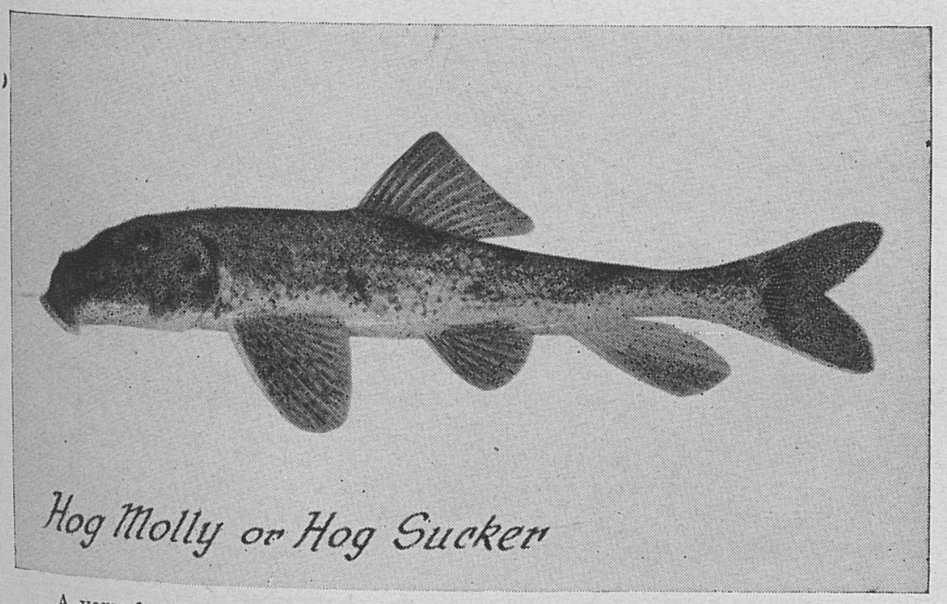
22. Hog Sucker, Hypentelium nigricans (LeSueur).

23. Western Creek Chubsucker, Erimyzon oblongus claviformis. (Girard).



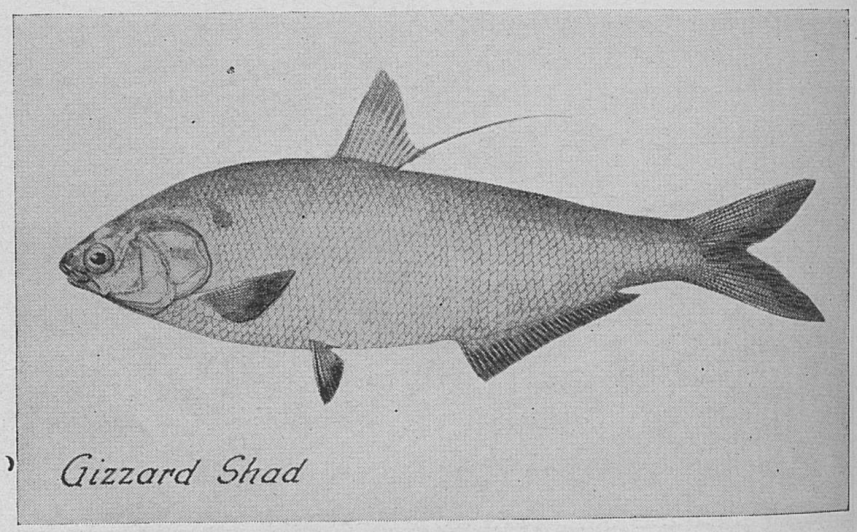
RIVER MUD CAT OR FLATHEAD.

A fish taken often in our large streams, weighing as much as 80 pounds or more. Easily separated from the other catfish by its long projecting lower jaw, short anal fin, and rounded tail. It is a mud loving species which feeds on fish and other animals preferably.



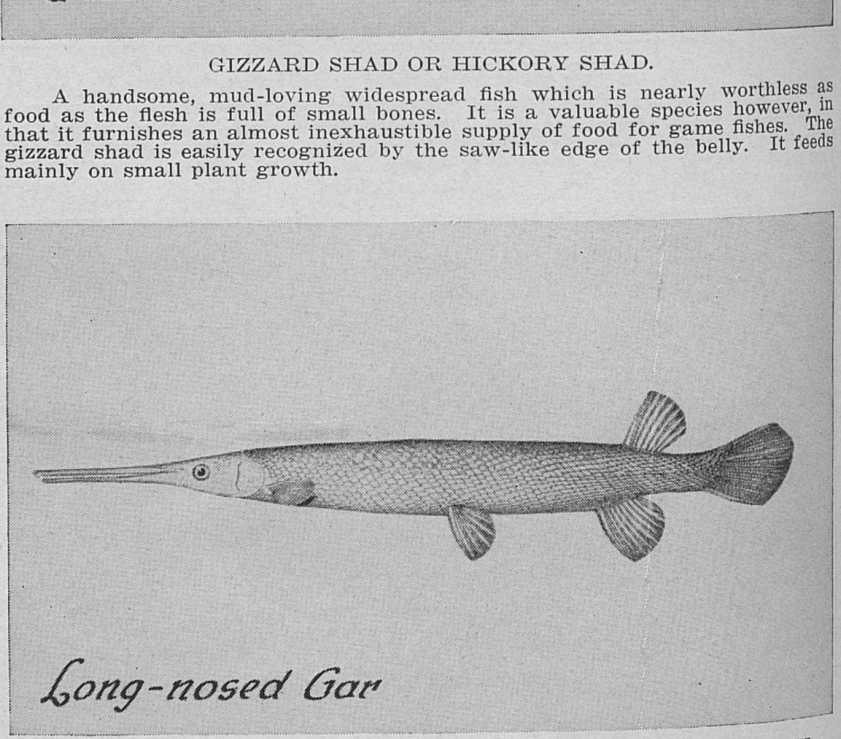
A very familiar species which frequents for the most part clear running water where it is usually found resting on the bottom. When disturbed, it darts away quickly for a distance of eight to ten feet, then comes to rest again on the bottom. Although the fish reaches a length of 1½ feet, it is not valued as food.

24. Chubsucker, Erimyzon sucetta kennerlii (Girard).
25. Spotted Sucker, Minytrema melanops (Rafinesque).
26. Black Redhorse, Moxostoma duquesnii duquesnii (LeSueur).
27. Golden Redhorse, Moxostoma erythrurum (Rafinesque).
28. Silver Redhorse, Moxostoma anisurum (Rafinesque).



GIZZARD SHAD OR HICKORY SHAD.

A handsome, mud-loving widespread fish which is nearly worthless as food as the flesh is full of small bones. It is a valuable species however, in that it furnishes an almost inexhaustible supply of food for game fishes. The gizzard shad is easily recognized by the saw-like edge of the belly. It feeds mainly on small plant growth.



The gar is a common fish found in the creeks, rivers, and lakes of Kentucky. It has no commercial value as the flesh is not fit for food. The gar is a voracious and destructive fish as it feeds almost entirely on better species. It frequently attains a length of six feet and a weight of 30 pounds.

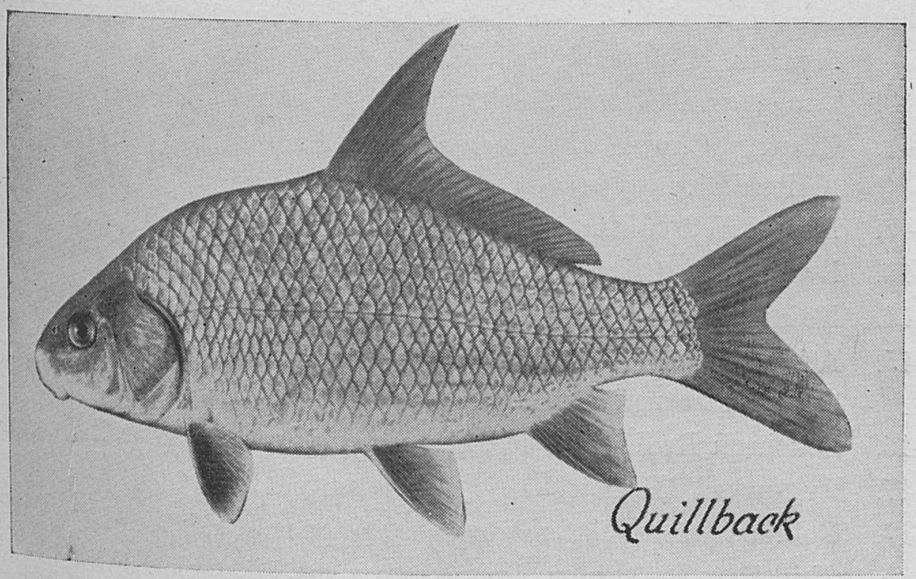
29. Shorthead Redhorse, Moxostoma breviceps (Cope).
30. Big-toothed Redhorse, Placopharynx carinatus Cope.
31. Harelip Sucker, Lagochila lacera Jordan and Brayton.

Family CYPRINIDAE

32. Carp, Cyprinus carpio Linnaeus.
33. Goldfish, Carassius auratus (Linnaeus).

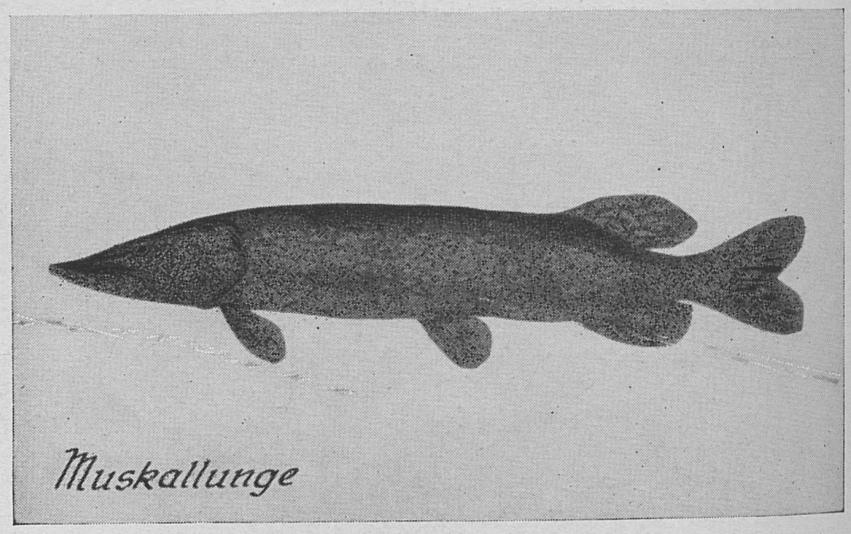


The species is easily recognized by the 6 or 7 longitudinal black stripes. It is a fish of lakes and large sluggish streams which are deep and clear. The flesh is of fine quality, since it is firm, flaky, and a good flavor. This bass has been known to reach a length of 18 inches and a weight of 3 pounds.



A relatively small species found in the smaller rivers and creeks. The fish is a filthy feeder, swallowing great quantities of mud. It is known by the much elevated anterior rays of the dorsal fin. At the time of spring floods, it ascends small streams in large numbers.

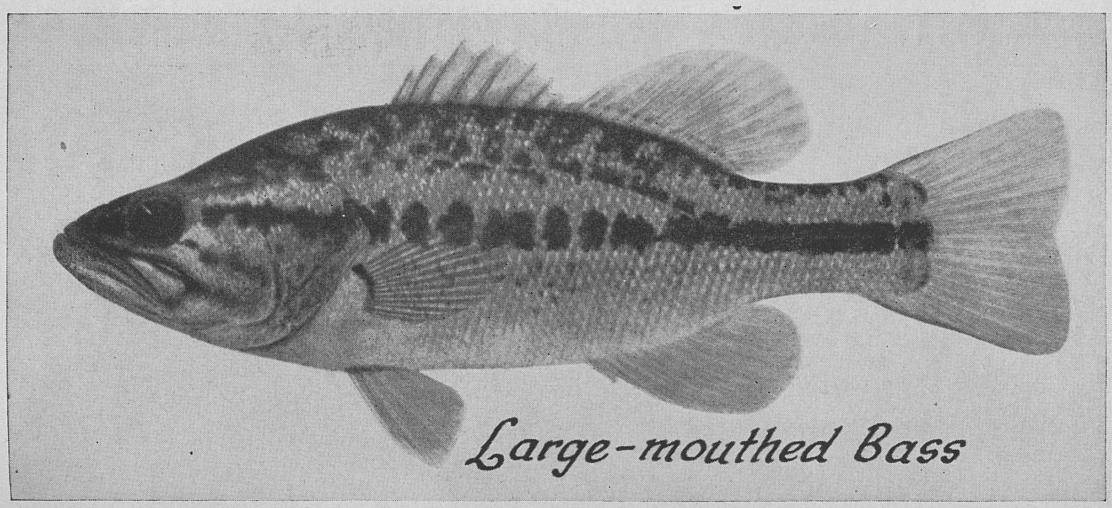
34. River Club, Nocomis micropogon (Cope).
35. Silver Chub, Hybopsis storerianus (Kirtland).
36. Northern Bigeye Chub, Hybopsis amblops amblops (Rafinesque).
37. Watauga Chub, Erimystax watauga (Jordan and Evermann).
38. Ohio Speckled Dace, Extrarius aestivalis hyostomus (Gilbert).



The largest and perhaps the most voracious of all our game species. A 30- to 40-pound pike represents a ton or more of other fishes. Its strong, slim, long body and its large mouth, which contains many sharp teeth, makes the fish well suited for the life it leads. The pike is found in cleaner, cooler streams which have a gravel or rock bottom.

39. Mountain Blacknose Dace, Rhinichthys atratulus obtusus Agassiz.
40. Long-nosed Chub, Rhinichthys cataractae (Valenciennes).
41. Creek Chub, Semotilus atromaculatus atromaculatus (Mitchill).
42. Red-bellied Minnow, Hemitremia vittata (cope).
43. Rosy Dace, Clinostomus vandoisulus (Valenciennes).
44. Redside Dace, Clinostomus elongatus (Kirtland).
45. A hybrid form, Chrosomus erythrogaster Rafinesque, ——— Semotilus atromaculatus atromaculatus (Mitchill).
46. Southern Redbelly Dace, Chrosomus erythrogaster Rafinesque.
47. Pug-nosed Minnow, Opsopoedus emiliae Hay.
48. Golden Shiner, Notemigonus chysoleucas (Mitchill).
49. Ohio Rosefin Shiner, Notropis ardens lythrurus Jordan.
50. Southern Redfin Shiner, Notropis umbratilis umbratilis (Girard).

The equal length of the dorsal and anal fin, the six dorsal spines, and the silvery-olive, much mottled body, will distinguish the species. It has a decided preference for lakes and ponds, although often being found in the sluggish streams of the state. The crappie is known to reach a length of 16 inches and a weight of 2½ pounds.



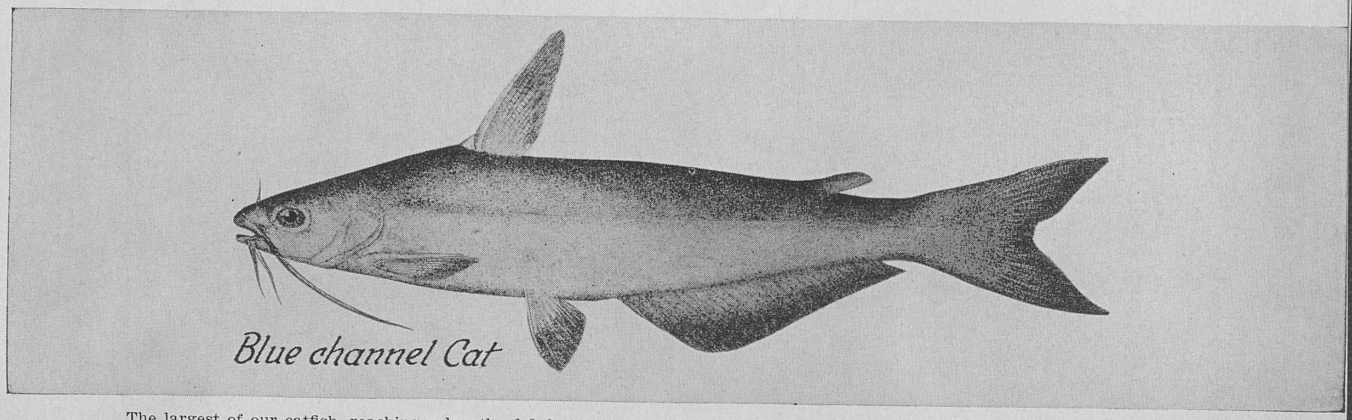
Characters which distinguish the large mouth are the bone of the upper jaw which extends past the middle of the eye, the large scales, the three dark stripes across the cheeks, and the black band on the sides, especially in the young. The species prefer lakes, bayous and sluggish water.

the large scales, the three dark stripes across the cheeks, and the black band on the sides, especially in the young. The species prefer lakes, bayous and sluggish water.

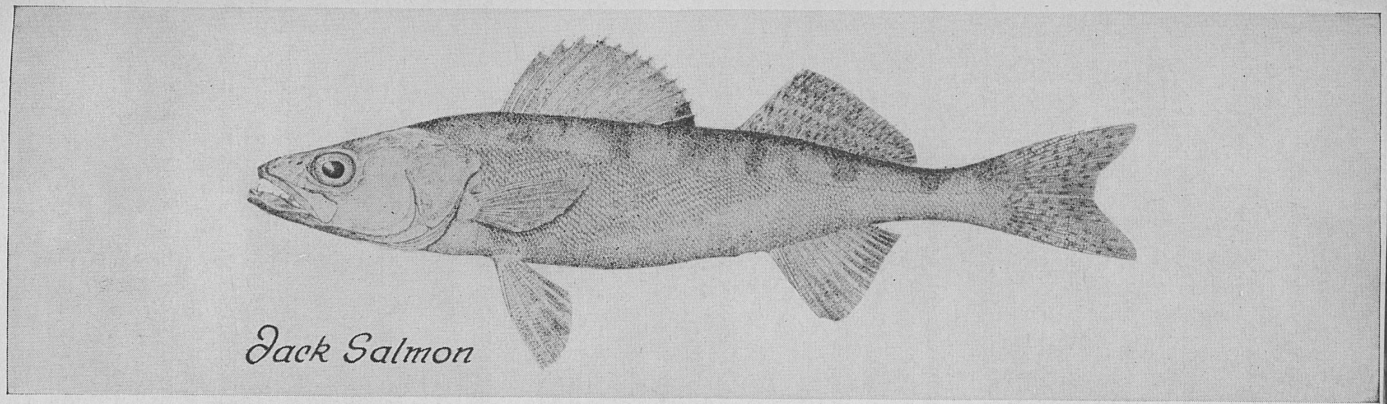


Small-mouthed Bass

The small mouth is a fish of the fast flowing, clean waters which have a rock or gravel bottom. Characters which distinguish the small mouth are the upper jaw bone which extends only to the middle of the eye, the three bronze stripes on the cheeks, the small scales, and the vertical bars on the sides. The bars fade with age.



The largest of our catfish, reaching a length of 3 feet and a weight of 150 pounds, usually much smaller. Although all catfish have a preference for meats, they utilize a wide range of all types of food. The blue cat prefers larger streams than does the spotted cat.



WALLEYE OR JACK SALMON.

The long body and the two separate dorsal fins, the first of which contains 13 spines, are the main characteristics of the species. It prefers clean, cool water with a gravel and rock bottom. The walleye requires a tremendous amount of forage fishes and for this reason should not be stocked with other desirable species.

51. Northern Redfin Shiner, Notropis umbratilis cyanocephalus (Copeland).
52. Southern Emerald Shiner, Notropis atherinoides diletus (Girard).
53. Silver Shiner, Notropis photogenis (Cope).
54. Rosyface Shiner, Notropis rubellus (Agassiz).
55. Small-finned Shiner, Notropis micropteryx (Cope).
56. Notropis ariommus arimmus (Cope).
57. Pop-eye Shiner, Notropis ariommus telescopus (Cope).
58. War-paint Shiner, Notropis Coccogenis (Cope).
59. Notropis arge (Cope).
60. Central Common Shiner, Notropis cornutus chrysocephalus (Rafinesque).
61. Spotfin Shiner, Notropis spilopterus (Cope).
62. Steelcolor Shiner, Notropis whipplii (Girard).
63. White-tail Shiner, Notropis galacturus (Cope).
64. River Shiner, Notropis blennius (Girard).
65. Bigeye Shiner, Notropis boops Gilbert.
66. Northern Sand Shiner, Notropis deliciosus stramineus (Cope).
67. Mirror Shiner, Notropis spectrunculus (Cope).
68. Mimic Shiner, Notropis volucellus volucellus (Cope).
69. Ghost Mimic Shiner, Notropis volucellus buchanani Meek.
70. Silverjaw Minnow, Ericymba buccata Cope.
71. Suckermouth Minnow, Phenacobius Mirabilis Jordan.
72. Suckermouth Minnow, Phenacobius uranops Cope.
73. Silver Minnow, Hybognathus nuchalis Agassiz.
74. Bullhead Minnow, Ceratichthys taurocephalus (Hay).
75. Northern Fathead, Pimephales promelas promelas Rafinesque.
76. Bluntnose Minnow, Hyborhynchus notatus (Rafinesque).
77. Ohio Stoneroller, Campostoma anomalum anomalum (Rafinesque).

Family AMEIURIDAE

78. Southern Channel Catfish, Ictalurus lacustris punctatus (Rafinesque).
79. Blue Catfish, Icatalurus furcatus (Valenciennes).
80. Eel Cat, Ictalurus anguilla (Evermann and Kendall).
81. Northern Black Bullhead, Ameiurus melas melas (Rafinesque).
82. Northern Brown Bullhead, Ameiurus nebulosus nebulosus (LeSueur).

83. Northern Yellow Bullhead, Ameiurus natalis natalis (LeSueur).
84. Mud Cut, Pilodictis olivaris (Rafinesque).
85. Stone Cat, Noturus Flavus Rafinesque.
85. Schilbeodes elutherus (Jordan).
86. Freckled Madtom, Schilbeodes nocturnus (Jordan and Gilbert).
87. Brindled Madtom, Schilbeodes miurus (Jordan).
88. Tadpole Madtom, Schilbeodes gyrinus (Mitchill).

Family UMBRIDAE

89. Mud Minnow, Umbra limi (Kirtland).

Family ESOCIDAE

90. Mud Pickerel, Esox vermiculatus LeSueur.
91. Green Pickerel, Esox niger LeSueur.
92. American Pike, Esox estor LeSueur.
*93. Ohio Muskellunge, Esox masguinongy ohioensis Kirtland.

Family ANGUILLIDAE

94. American Fresh-Water Eel, Anguilla bostoniensis (LeSueur).

Family CYPRINODONTIDAE

95. Starhead Top-minnow, Fundulus dispar (Agassiz).
96. Black-banded Topminnow, Fundulus notatus (Rafinesque).
97. Redspotted Topminnow, Fundulus chrysotus (Holbrook).
98. Studfish, Fundulus catenatus (Storer).

Family POECILIIDAE

99. Mosquito Fish, Gambusia affinis affinis (Baird and Girard).

Family AMBLYOPSIDAE

100. Cavefish, Forbesichthys agassizii (Putnam).
101. Cavefish, Forbesichthys papillifera (Forbes).
102. Small Blindfish, Typhlichthys subterraneus Girard.
103. Cavefish, Typhlichthys osborni Eigenmann.
104. Mammoth Cave Blindfish, Amblyopsis spelaeus De Kay.

Family PERCOPSIDAE

105. Troutperch, Percopsis omiscomaycus (Walbaum).

* Game fish or fish protected by Kentucky law.

Family APHREDODERIDAE

106. Pirate Perch, Aphredoderus sayanus (Gilliams).

Family SERRANIDAE

*107. White Bass, Lepibema chrysops (Rafinesque).
*108. Yellow Bass, Morone interrupta Gill.

Family PERCIDAE SUBFAMILY LUCIOPERCINAE

*109. Sauger, Stizostedion canadense (Smith).
*110. Yellow Pikeperch or Walleye, Stizostediom vitreum vitreum (Mitchell).

Subfamily ETHEOSTOMINAE

111. Hypohomus cymatotaenia (Gilbert and Meek).
112. Hypohomus spilotus (Gilbert).
113. Channel Darter, Imostoma shumardi (Girard).
114. Northern Dusky Darter, Hadropterus scierus scierus (Swain).
115. Blacksided Darter, Hadropterus maculatus (Girard).
116. Longhead Darter, Hadropterus macrocephalus (Cope).
117. Slenderhead Darter, Hadropterus phoxocephalus (Nelson).
118. Gilded Darter, Hadropterus evides (Jordan and Copeland).
119. Hadropterus ouachitae (Jordan and Gilbert).
120. Log Perch, Percina caprodes caprodes (Rafinesque).
121. River Darter, Cottogaster copelandi, (Jordan).
122. Northern Sand Darter, Ammocrypta pellucida (Baird).
123. Western Sand Darter, Ammocrypta clara (Jordan and Meek).
124. Black-sided Snubnose, Ulocentra simotera (Cope).
125. Ulocentra histrio (Jordan and Gilbert).
126. Speck, Ulocentra stigmaea (Jordan).
127. Northern Johnny Darter, Boleosoma nigrum nigrum (Rafinesque).
128. Susan's Darter, Boleosoma nigrum susanae (Jordan and Swain).
129. Crystallaria asprella (Jordan).
130. Spotted Darter, Poecilichthys maculatus (Kirtland).
131. Sed-lined Darter, Poecilicththys rufilineatus Cope.
132. Northen Banded Darter, Poecilichthys zonalis zonalis Cope.
133. Variegated Darter, Poecilichthys variatus (Kirtland).
134. Poecilichthys virgatus Jordan.
135. Poecilichthys obeyense (Kirch).

* Game fish or fish protected by Kentucky law.

136. Tippecanoe Darter, Poecilichthys tippecanoe (Jordan and Evermann).
137. Poecilichthys cinereus (Storer).
138. Northern Rainbow Darter, Poecilichthys caeruleus caeruleus (Storer).
139. Orangethroat Darter, Poecilichthys spectabilis spectabilis Agassiz.
140. Poecilichthys sagitta (Jordan and Swain).
141. Spottail Darter, Catonotus squamiceps Jordan.
142. Banded Fantail, Catonotus flabellaris flabellaris (Rafinesque).
143. Catonotus flabellaris cumberlandicum (Jordan and Swain).
144. Striped Fantail, Catonotus flabellaris lineolatus Agassiz.
145. Tennessee Greenside Darter, Etheostoma blennioides newmanii (Agassiz).
146. Northern Greenside, Etheostoma blennioides blennioides Rafinesque.
147. Fusiform Darter, Boleichthys fusiformis (Girard).
148. Least Darter, Microperca punctulata Putnam.

Family CENTRARCHIDAE

*149. Kentucky Bass, Micropterus punctulatus punctulatus (Rafinesque).
*150. Smallmouth Bass, Micropterus dolomieu dolomieu Lacépède.
*151. Largemouth Bass, Huro salmoides (Lacépède).
152. Green Sunfish, Lepomis cyanellus Rafinesque.
153. Red-breated Sunfish, Lepomis auritus (Linnaeus).
154. Spotted Sunfish, Lepomis punctatus miniatus (Jordan)
155. Orange-spotted Sunfish, Lepomis humilis (Girard).
156. Central Longear Sunfish, Lepomis megalotis megalotis (Rafinesque).
157. Northern Bluegill, Lepomis macrochirus microchirus Rafinesque.
158. Redear Sunfish, Lepomis microlophus (Gunther).
159. Eupomotis heros (Baird and Girard).
160. Round Sunfish, Centrarchus macropterus (Lacépède.
*161. Northern Rock Bass, Ambloplites rupestris rupestris (Rafinesque).
*162. Black Crappie, Pomoxis sparoides (Lacépède).
*163. White Crappie, Pomoxis annularis Rafinesque.
164. Pigmy Sunfish, Elassoma zonatum Jordan.

* Game fish or fish protected by Kentucky law.

Family Atherinidae

165. Brook Silverside, Labidesthes sicculus sicculus (Cope).

Family SCIAENIDAE

166. Drum, White Perch, Aplodinotus grunniens Rafinesque.

Family COTTIDAE

167. Northern Millers Thumb, Cottus bairdii bardii (Girard).

168. Southern Millers Thumb, Cottus bairdii carolinae (Gill).

AMPHIBIANS

By Roger W. Barbour

Order CAUDATA

1. Mud Puppy—Necturus maculosus maculosus Rafinesque.
2. Hellbender—Cryptobranchus alleganiensis (Daudin).
3. Newt—Triturus viridescens viridescens (Rafinesque).
4. Spotted Salamander—Ambystoma maculatum (Shaw).
5. Marbled Salamander—Ambystoma opacum (Gravenhorst).
6. Small-mouthed Salamander—Ambystoma texanum (Matthes).
7. Tiger Salamander—Ambystoma tigrinum (Green).
8. Four-toed Salamander—Hemidactylium scutatum (Schlegel).
9. Richmonds Salamander—Plethodon richmondi Netting and Mittleman.
10. Ashy Salamander—Plethodon cinereus (Green).
11. Dorsal Salamander—Plethodon dorsalis (Cope).
12. Slimy Salamander—Plethodon glutinosus (Green).
13. Purple Salamander — Gyrinophilus porphyriticus duryi (Weller).
14. Mountain Salamander — Pseudotriton montanus montanus (Baird.)
15. Red Salamander—Pseudotriton ruber ruber (Sonnini).
16. Two-lined Salamander—Eurycea bislineata bislineata (Green).
17. Long-tailed Salamander—Eurycea longicauda (Green).
18. Cave Calamander—Eurycea lucifuga Rafinesque.
19. Green Salamander—Aneides aneus (Cope and Packard).
20. Dusky Salamander—Desmognathus fuscus (Rafinesque).
21. Seal Salamander—Desmognathus phoca (Matthes).
22. Lead-backed Salamander — Desmognathus ochrophaeus ochrophaeus Cope.
23. Carolina Salamander—Desmognathus ochrophaeus carolinensis (Dunn).

Order SALIENTIA

1. Spadefoot Toad—Scaphiopus holbrookii holbrookii (Harlan).
2. American Toad—Bufo americanus americanus Holbrook.
3. Fowler's Toad—Bufo fowleri Hinckley.
4. Mountain Chorus Frog—Pseudacris brachyphona (Cope).

5. Chorus Frog—Pseudacris nigrita triseriata (Wied).
6. Cinereous Frog—Hyla cinerea cinerea (Schneider).
7. Spring Peeper—Hyla crucifer Wied.
8. Squirrel Frog—Hyla squirella Latreille.
9. Tree Toad—Hyla versicolor versicolor (Le Conte).
10. Cricket Frog—Acris gryllus (Le Conte).
11. Bull Frog—Rana catesbiana Shaw.
12. Spring Frog—Rana clamitans Latreille.
13. Pickerel Frog—Rana palustris Le Conte.
14. Leopard Frog—Rana pipiens pipiens Schreber.
15. Southern Leopard Frog—Rana sphenocephala (Cope).
16. Wood Frog—Rana sylvatica Le Conte.
17. Narrow Mouth Toad—Gastrophryne carolinensis (Holbrook).

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MAMMALS

By Dr. W. A. Allen, University of Kentucky.

Order MARSUPIALIA

1. Virginia Opossum—Didelphis virginiana virginiana (Kerr).

Order INSECTIVORA

1. Smoky Shrew—Sorex fumeus fumeus (Miller).
2. Cinereus Shrew—Sorex cinereus cinereus Kerr.
3. Short-tailed Shrew—Blarina brevicauda talpoides (Gapper).
4. Little Short-tailed Shrew—Cryptotis parva (Say).
5. Common Mole—Scalopus aquaticus machrinus (Rafinesque).
6. Hairy-tailed Mole—Parascalops breweri (Bachman).

Order CHIROPTERA

1. Brown Bat—Myotis lucifugus lucifugus (Le Conte).
2. Gray Bat—Myotis grisescens Howell.
3. Long-eared Brown Bat—Myotis keenii septentrionalis (Trouessart).
4. Little Sooty Bat—Myotis sodalis Miller and Allen.
5. Least Brown Bat—Myotis subulatus leibii (Audubon and Bachman).
6. Silver-haired Bat—Lasionycteris noctivigans (Le Conte).
7. Georgian Bat—Pipistrellus subflavus subflavus (Cuvier).

8. Big Brown Bat—Eptesicus fuscus fuscus (Beauvois).
9. Twilight Bat—Nycticeius humeralis Rafinesque.
10. Red Bat—Nycteris borealis borealis (Muller).
11. Hoary Bat—Nycteris cinerea (Beauvois).
12. Long-eared Bat—Corynorhinus rafinesquii rafinesquii (Lesson).

Order CARNIVORA

1. Black Bear—Euarctos americanus americanus (Pallas).*
2. Raccoon—Procyon lotor lotor (Linnaeus).*
3. Common Skunk—Mephitis nigra (Peale and Beauvois).*
4. Spotted Skunk—Spilogale putorius (Linnaeus).*
5. Mink—Lutreola vison vison Schreber.*
6. New York Weasel—Mustela noveboracensis noveborancensis (Emmons).
7. Red Fox—Vulpes fulva fulva (Desmarest).*
8. Gray Fox — Urocyon cinereoargenteus cinereoargenteus (Schreber).
9. The Wildcat—Lynx rufus rufus (Schreber).

Order RODENTIA

1. Woodchuck—Marmota monax monax (Linnaeus).
2. Chipmunk—Tamias striatus (Linnaeus).
3. Gray Squirrel—Sciurus carolinensis Gmelin.*
4. Fox Squirrel—Sciurus niger rufigenter Geoffroy.*
5. Flying Squirrel—Glaucomys volans volans (Linnaeus).
6. Beaver—Castor canadensis Kuhl.*
7. Muskrat—Ondatra zibethica zibethica (Linneaus).
8. Lemming Mouse—Synaptomys cooperi stonei.
9. Prairie Meadow Mouse—Microtus ochrogaster ochrogaster (Wagner).
10. Meadow Mouse — Microtus pennsylvanicus pennsylvanicus (Ord).
11. Pine Mouse—Pitymys pinetorum auricularis Bailey.
12. Red-backed Mouse—Clethrionomys gapperi maurus Kellogg.
13. Harvest Mouse—Reithrodontomys humulis humulis (Audubon and Bachman).
14. Rice Rat—Oryzomys palustris palustris (Harlan).
15. Cloud Land White-footed Mouse—Peromyscus maniculatus nubiterrae Rhoads.
16. White-footed Mouse — Peromyscus leucopus noveboracensis Fischer.

* Game animals protected by law.

17. Golden Mouse—Peromyscus nuttalli nuttalli (Harlan).
18. Cotton Rat—Peromyscus gossypinus gossypinus (Le Conte).
19. The Wood Rat—Neotoma pennsylvanica Stone.
20. The House Mouse—Mus musculus Linneaus.
21. The House Rat—Rattus norvegicus (Erxleben).
22. The Jumping Mouse—Zapus hudsonius (Zimmermann).
23. The Woodland Jumping Mouse—Napaeozapus insignis insignis (Miller).
24. The Cotton-Tail Rabbit—Sylvilagus floridanus mearnsi Allen.*

Order ARTIODACTYLA

1. The White-Tail or Virginia Deer—Odocoileus virginianus virginianus (Boddaert).*

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REPTILES

Order TESUDINATA.

1. Snapping Turtle—Chelydra Serpentina Linn.
2. Musk Turtle—Kingosternum odoratum Latr.
3. Painted Turtle—Chrysemys marginata Aoas.
4. Mud Turtle—Pseudemys troostii Holb.
5. Cumberland Terrapin—Pseudemys elegans Wied.
6. Map Turtle—Malacoclemmys geographicus LeSueur.
7. Box Turtle, box terrapin, terrapin, Pocket-book, etc.—Terrapene carolina carolina Linnaeus.
8. Soft-shell Turtle—Amyda spinifera LeSueur.
9. Leather Turtle—Amyda mutica Lesueur.
10. Ayda nuchalis Agassiz.

Order SQUAMATA

1. Brown Swift Fence Lizard—Sceloporus undulatus undulatus (Catreille).
2. "Glass Snake," "Joint Snake"—Ophisaurus ventralis Linn.
3. Striped Lizard, Six-lined lizard, Sand lizard, "race-runner"—Cnemidophorus sexlineatus Linn.
4. Blue-tailed lizard, Five-lined lizard, Red headed lizard, Skink, "Scorpion," etc.,—Eumeces fasciatus (Linneaus).
5. Black skink, smooth-scale lizard—Eumeces anthracinus Baird.
6. Ground Lizard—Leiolopisma laterale (Say).

* Game animals protected by law.

Suborder OPHIDIA

1. Common garter snake—Thamnophis sirtalis Linn.
2. Ribbon Snake—Thamnophis proximus Say.
3. Plains garter snake—Thamnophis radix B. and G.
4. Queen snake—Natrix septemvittata Say.
5. Common water snake—Natrix sipedon sipedon Linn.
6. Banded water snake—Natrix sipedon fasciata Linn.
7. Red-bellied water snake—Natrix sipedon erythrogaster forst.
8. Ground snake, brown snake, red-bellied ground snake, red-bellied brown snake, Storer's snake—Storeia occipitomaculata Stor.
9. Blacksnake—coluber constrictor constrictor Linn.
10. Fox snake—Elaphe vulpina B. and G.
11. Pilot snake—Elaphe obsoleta obsoleta.
12. Pine snake, Bull snake—Pituophis melanoleucus Daud.
13. Green snake—Opheodrys aestivus Linn.
14. "Ring-necked snake"—Diadophis punctatus Linn.
15. Milk snake, House snake, "cow sucker," "checkered snake"—Lampropeltis triangulum triangulum Lac.
16. Kingsnake, Chain snake, Thunder snake—Lampropeltis getulus Linn.
17. Worm snake—Carphophis amoena amoena.
18. Worm snake—Carphophis amoena helenae Ken.
19. Hog-nosed snake, "Blow snake," "Spreadhead," Spreading Adder, Puffed Adder, Blowing Viper, Spreading Viper—Heterodon contortrix Linn.
20. Coral snake, beadsnake, harlequin snake—Micrurus fulvius Linn.
21. Water moccasin, cotton mouth moccasin, black moccasin—Agkistrodon piscivorus Lac.
22. Copperhead, Highland Moccasin—Agkistrodon mokasen Beauv.
23. Timber Rattlesnake—Crotalus horridus Linn.
24. Diamond-back rattlesnake—Crotalus adamanteus Beauv.

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FOREST TREES OF KENTUCKY

1. White Pine (Pinus strobus L.)
2. Pitch Pine (Pinus rigida Mill.)
3. Shortleaf Pine (Yellow Pine) (Jinus echinata Mill.)
4. Virginia Pine (Scrub Pine, or Spruce Pine.) (Pinus virginiana Mill.)
5. Hemlock (Tsuga canadensis Carr.)

6. Cypress (Taxodium distichum Rich.)
7. Red Cedar (Juniperus virginiana L.)
8. Butternut (White Walnut) (Juglans cinerea L.)
9. Black Walnut (Juglans nigra L.)
10. Pecan (Hicoria pecan (Marsh.) Britton.) (Carya pecan Ashe and Gr.)
11. Scaly-Bark or Shell-Bark Hickory (Hicoria ovata Britton) (Caryn ovata K. Koch)
12. Big Shell-Bark Hickory (King Nut) (Hicora laciniosa (Michx. f.) Sarg.) (Carya lacinoisa Schn.)
13. Pignut or Bitternut Hickory (Hicoria minima Britton) (Carya cordiformis K. Koch)
14. Broom, Black or Pignut Hickory (Hicoria glabra Britton) (Carya glabra Sweet)
15. Whiteheart or Mockernut hickory (Hicoria alba Britton) (Carya alba K. Koch)
16. Black Willow (Salix nigra Marsh)
17. Cottonwood (Carolina Poplar) (Populus deltoides Marsh)
18. River Birch (Red Birch) (Betula nigra L.)
19. Sweet Birch or Black Birch (Betula lenta L.)
20. Hop Hornbeam (Ironwood) (Ostrya virginiana K. Koch)
21. Hornbeam (Carpinus caroliniana Walt.)
22. Beech (Fagus grandifolia Ehrh.)
23. Chestnut (Casteneadentata Borkh.)
24. White Oak (Quercus alba L.)
25. Post Oak (Quercus stellata Wang, formerly Q. minor Sarg.)
26. Burr Oak (Mossy Cup Oak) (Quercus macrocarpa Michx.)
27. Swamp White Oak (Quercus bicolor Willd., formerly Q. plantanoides Sudw.)
28. Chestnut Oak (Quercus montana Willd., formerly Q. prinus L.)
29. Chinquapin Oak (Chinquapin, Pin Oak) (Quercus muhlenbergii Englem., formerly Q. acuminata Sarg.)
30. Red Oak (Northern Red Oak) (Quercus borealis maxima Ashe, formerly Q. rubra L.)
31. Southern Red Oak (Spanish Oak) (Quercus rubra Linn., formerly Q. digitata Sudw.)
32. Black Oak (Quercus velutina Lam.)
33. Scarlet Oak (Quercus coccinea Muench.)
34. Pin Oak (Swamp Oak) (Quercus palustris Muench.)
35. Black Jack Oak (Quercus marilandica Muench.)
36. Willow Oak (Quercus phellos L.)
37. Shingle Oak (Quercus imbricaria Michx.)

38. White Elm (American Elm) Ulmus americana L.)
39. Winged Elm (Ulmus alata Michx.)
40. Slippery Elm (Ulmus fulva Michx.)
41. Hackberry (Celtis occidentalis L.)
42. Red Mulberry (Morus rubra L.)
43. Cucumber tree (Magnolia acuminata L.)
44. Umbrella tree (Magnolia tripetala L.)
45. Yellow Poplar, or Tulip tree (Liriodendron tulipifera L.)
46. Papaw (Asimina triloba Dunal.)
47. Sassafras (Sassafras officinale N. and E.)
48. Sweet Gum (Red Gum) (Liquidambar styraciflua L.)
49. Sycamore (Platanus occidentalis L.)
50. Service-Tree, or Service-Berry (Amelanchier canadensis Medic)
51. Hawthorn (Haw, White Haw, Red Haw, Thorn Bush) (Crataegus species.)
52. Black Cherry (Wild Cherry) (Prunus serotina Erh.)
53. Wild Plum (Prunus americana March.)
54. Red Bud (Cercis canadensis L.)
55. Honey Locust (Gleditsia triacanthos L.)
56. Black Locust (Yellow Locust) (Robinia pseudoacacia L.)
57. Coffee Tree (Kentucky Coffee Tree) (Gymnocladus dioicus K. Koch.)
58. Holly (Ilex opaca Ait.)
59. Sugar Maple (Acer saccharum Marsh.)
60. Red Maple (Acer rubrum L.)
61. Silver Maple (White Maple, Water Maple) (Acer saccharinum L.)
62. Box Elder (Ash-Leaf Maple) (Acer negundo L.)
63. Ohio Buckeye (Fetid Buckeye) (Aesculus glabra Willd.)
64. Basswood, or Linn (Tilia species)
65. Dogwood (Cornus florida L.)
66. Sourwood (Oxydendrum arboreum DC.)
67. Black Gum (Nyssa sylvatica March.)
68. Persimmon (Diospyros virginiana L.)
69. White Ash. (Fraxinus americana L.)
70. Catalpa (Catalpa speciosa Engelm.)

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WILD LIFE RESTORATION UNIT AND STATE FISH HATCHERIES IN KENTUCKY

The State Division of Game and Fish operates a 2,000-acre wildlife restoration unit in Pike county; a 1,200-acre wildlife restoration

Unit in Harlan county; a 1,700-acre tract of land in Hopkins and Caldwell counties known as the Jones-Keeney Game Farm; A state quail and Fish hatchery in Boyd county, near Ashland; a Fish hatchery in Whitley county, near Williamsburg, a floating hatchery and rearing ponds on Herrington lake, near Lane's Camp; and a state Fish Hatchery in Barren County, near Glasgow, Ky.

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BRIEF DESCRIPTION OF KENTUCKY STATE PARKS

1. *Audubon Memorial State Park (320.5 acres)*—A beautiful wooded area, $150,000 museum housing finest collection of Audubboniana in the world, Lakes, shelter houses, tea house, cabins.
2. *Blue Licks Battlefield State Park (37 acres)*—Scene of the last battle of the Revolution, fought August 19, 1782. A granite shaft marks the names of those who fell in the battle fought by 182 whites and some 500 Indians.
3. *Blue and Gray State Park (87 acres)*—This park contains barracks with kitchen and dining room facilities for taking care of 200 people. A popular meeting place for groups such as Kentucky National Guards, 4-H Clubs, foxhunters, church and school groups.
4. *Butler Memorial State Park (420.78 acres)*—Named for General William Orlando Butler and the Butler family of Generals who were buried in the cemetery near the Butler Mansion within the park. Splendid recreational area. Boating, swimming, fishing, tennis, archery, etc. Well-equipped cabins.
5. *Columbus-Belmont Battlefield State Park (361.13 acres)*—This beautiful park is on a bluff known as the Iron Banks overlooking the Mississippi River. Here George Rogers Clark came in 1780 and at this point Thomas Jefferson suggested the Capital of the United States be located, after the burning of the Capitol at Washington in 1812. It was fortified by the Confederates in 1861 and occupied by the Union forces in 1862. The cannon emplacements and redoubts have been restored and old trenches are still to be plainly seen. Facilities for group camping are to be found here.
6. *Cumberland Falls State Park (593 acres)*—This area was donated to the state by Senator T. Coleman du Pont, native of Kentucky Splendid hotel facilities and cabins, as well as camping and picnicking grounds. Cumberland Falls, "Niagara of the West," is one of the principal attractions in this scenic park.

7. *Dawson Springs State Park (459.5 acres)*—Beautiful wooded tract. Lake, with bathing beach, bathhouse, boat landing, etc. Furnished cabins.

8. *Levi Jackson Wilderness Road State Park (750 acres)*—This park marks the scene of one of the bloodiest Indian massacres in history known as Defeated Camp, on Little Laurel River. Here will be found cabins, barracks, picnicking areas, a museum, a loom house and an old water mill. Coverlets and other products from mountain looms are woven here. The old mill grinds corn on millstones shipped from France in 1804. Boone's Trace and Wilderness Road run through this area.

9. *Lincoln Cemetery Memorial (3 acres)*—This plot, donated to the state by the Memorial Association of Abraham Lincoln and Lincoln Pioneers, marks the burial place of Bersheba, grandmother of the President, and four other members of the Lincoln family.

10. *Lincoln Homestead (23.7 acres)*—Abraham Lincoln, grandfather of the President, settled here in 1782. A replica of the log cabin which he built has been placed in the park. In this immediate community there are numerous historic sites connected with the Lincoln family. Nancy Hanks lived nearby with her uncle and her cousin. The houses still stand. The site of Thomas Lincoln's woodworking shop may be plainly seen, as may the home where Nancy Lincoln and Thomas Lincoln began housekeeping.

11. *Jefferson Davis Monument (22 acres)*—The monument upon the spot of ground owned by Jefferson Davis' father was acquired through the efforts of the Confederate Veterans and Daughters of the Confederacy. The monument is 351 feet in height, the second highest in the United States. An elevator runs to the top of the monument where an excellent view may be had of the countryside. Jefferson Davis was born here in 1808.

12. *Dr. Ephraim McDowell and Jane Todd Crawford Memorial (.5 acre)*—This area is a gift from the State Medical Association. It was the home of Dr. Ephraim McDowell, who performed here in 1809 the first ovariotomy operation in the world. The patient was Jane Todd Crawford. The little apothecary shop, a gift to the state from the Ladies' Auxiliary of the State Medical Association, stands near the McDowell House.

13. *My Old Kentucky Home State Park (235 acres)*—"Federal Hill," was built by Judge John Rowan in 1795 and never passed out of the Rowan family until 1922, when it became the property

of the State of Kentucky. In 1852 Stephen Collins Foster, a relative of the Rowans, while a guest at Federal Hill, wrote the song "My Old Kentucky Home." The desk where this song was written may be seen in the hall.

14. *Natural Bridge State Park (1,127 acres)*—One of the most scenic areas in the state. A natural bridge at the top of the mountain is estimated to contain more than 15,000,000 pounds of rock. It is thirty feet wide at the top and forms a natural roadway. Hotel accommodations, picknicking and camping areas and woodland trails.

15. *Old Mulkey Meeting House (29.8 acres)*—The old meeting house which was built in 1804 still stands within this area. A replica of the original house built in the 1770's has been constructed. The sister of Daniel Boone and fifteen or twenty Revolutionary soldiers are buried in the old cemetery.

16. *Pine Mountain State Park (2,500 acres)*—This area includes a section of Pine Mountain with an elevation of 2,200 feet. Laurel Cove, forming a natural amphitheatre, is the scene of the Mountain Laurel Festival each year. Laurel and rhododendron grow in profusion. Picnic areas, camping grounds, trails, roads, etc., are under construction by the CCC.

17. *Pioneer Memorial State Park (28 acres)*—A replica of old Fort Harrod, in memory of the pioneers who settled here in 1774. One of the finest collections of pioneer furniture, cooking utensils, tools, etc., will be found within the cabins. Just outside the stockade is the handsome monument erected by Congress to the first permanent settlement in the West.

18. *Perryville Battlefield Monuments (17 acres)*—Monuments erected to the Confederate veterans and to the Union forces who fell here in the bloodiest battle of the Civil War, fought October 8, 1862. General Buell commanded 22,000 Union soldiers and General Bragg, his brother-in-law, commanded 17,000 Confederates.

19. *Dr. Thomas Walker Memorial (12 acres)*—Upon this area stands a replica of the cabin built by Dr. Thomas Walker in 1750, the first house built by a white man in the state. The area is a gift of the Barbourville Post, American Legion.

20. *Weisiger Memorial (Constitution Square) (.5 acre)*—The old public square in Danville where the log courthouse in which the nine constitutional conventions of the state were held. Replicas

of the old courthouse, gaol and church are under construction. Area donated by the Weisiger family.

21. *William Whitley Home (10 acres)*—The Col. William Whitley Home, the first brick house built west of the Allegheny Mountains, stands in the center of this area recently acquired by the state.

22. *Pennyrile Forest Park (4,000 acres)*—This beautiful wooded area with a 56-acre lake is located in north Christian county. The Soil Conservation Department turned over the area to the Kentucky Department of Conservation. The Division of Parks is operating the recreational area. Swimming, boating, fishing, camping and picnic grounds, cabins, lodge, etc.



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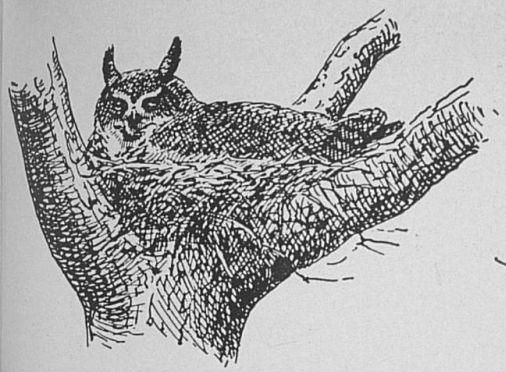

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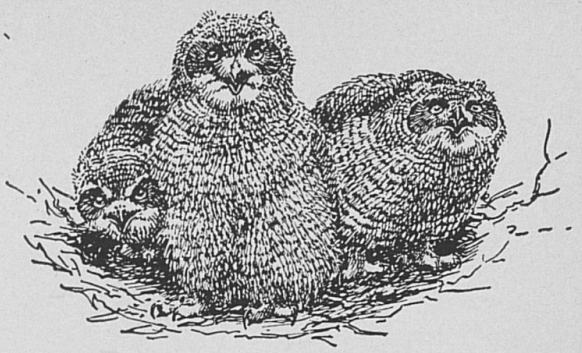

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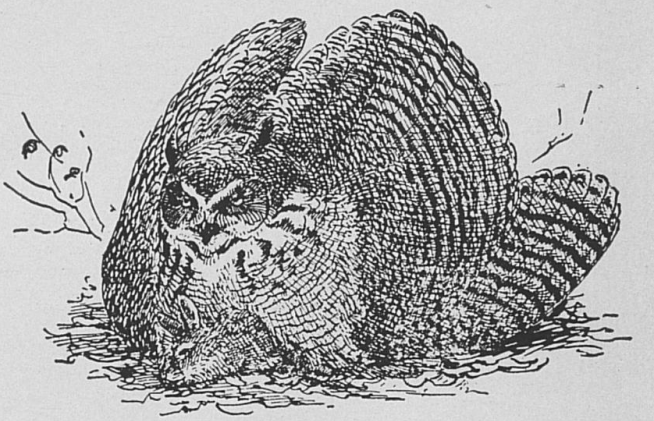
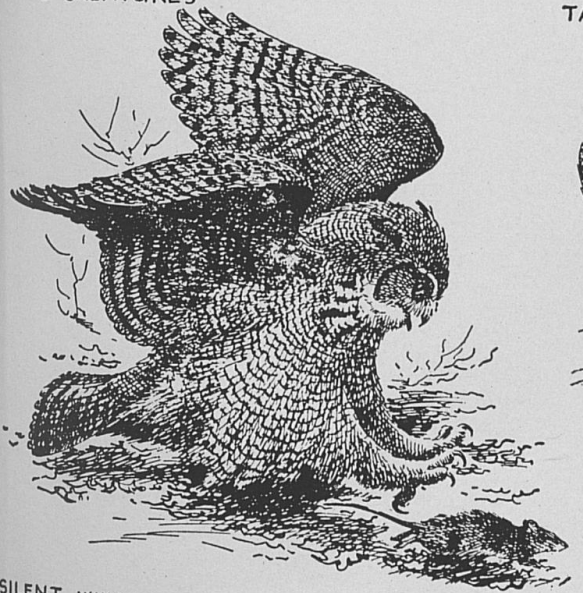
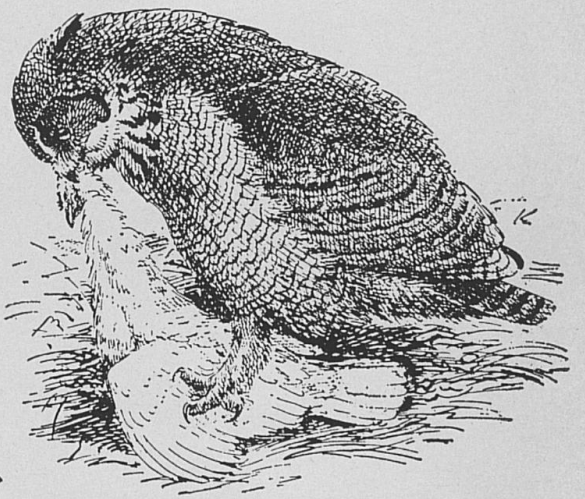


BIRDS AND THE SMALLER MAMMALS ARE QUICKLY KILLED IN ITS POWERFUL TALONS



ON SILENT WINGS IT GLIDES THROUGH THE
WOODS CAPTURING ITS VICTIMS BY SURPRISE



SOMETIMES IT INVADES THE BARNYARD, TAKING TOLL OF THE POULTRY

E L. POOLE

THE GREAT HORNED OWL
(not protected)



THE BOB WHITE QUAIL.