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ABSTRACT

These two environmental education units were designed for use at the sixth-grade level. The first unit focuses on science and is a five-week study which emphasizes ecology along a creek. The unit is designed around the idea that a creek and its surrounding area serve as a suitable focus for environmental study because they illustrate many ecological principles. The objectives, teaching strategies, materials, and evaluation techniques reinforce the basic creek theme. A flowchart, worksheets, supplementary materials, illustrations, tables, and maps are included. The second unit, a social studies unit, illustrates the environmental concepts which are inherent in the program Man: A Course of Study (MACOS) and are designed to be used in conjunction with the MACOS program. The unit is developed around three environmental generalizations: interdependency, adaptation, and recycling. Objectives, activities and strategies, materials, and evaluation techniques are identified for each generalization. The unit also contains a flowchart to help the teacher coordinate the unit and MACOS program, quizzes, vocabulary words, and graphs. (TK)

EAST SYRACUSE-MINOA SCHOOLS

Environmental Education Materials

Middle School Package

Grade Six (Science)

Produced Under USOE Grant OEG-0-71-4621
by East Syracuse-Minoa Central Schools
407 Fremont Road
East Syracuse, N.Y. 13057
Dr. Fritz Hess, Superintendent

Overview of Grade Six Environmental Sciences

This unit was designed to make relevant a study which emphasizes ecology along a local creek. The creek used in this study is Limestone Creek which was followed during a culminating field trip from its mouth near the Minoa 9th grade to its source at DeRuyter Reservoir. Ecological interrelationships as well as the aquatic factors of depth, temperature, pollution, and flowing speed were compared at a series of five stops made along the creek.

By doing this unit, sixth grade students can become aware of the existing dangers of flooding as well as planning possible good uses for land long the flood plain. Some of the practical implications of this unit emerged in the spring of 1972 when Hurrican Agnes caused Limestone Creek to flood some adjacent low-lying areas.

Topographic maps are introduced to show the spatial extent of the watershed area and variations in relief and vegetation.

With today's emphasis on an activity-oriented science class, a unit on a local creek can provide first-hand experience in the vast array of scientific phenomena.

FLOW CHART FOR GRADE SIX ENVIRONMENTAL SCIENCE

WEEK ONE -

Generalization

I. A creek and its surrounding area serve as a suitable focus for environmental study because it illustrates many ecological principles.

Activities

I. A-D Group work and discussions on flood plain information
I. E Construction of a classroom creek
I. F. Worksheet on understanding flood plains

WEEK TWO -

Generalization

I. A creek and its surrounding area serve as a suitable focus for environmental study becuase it illustrates many ecological principles.

Activities

I. G-H. Introduction of topographic maps and relation to Limestone Creek
I. I. Contour lines and computing elevation
I. J. Computations using the scale of distance
I. K. Worksheet on topographic maps

WEEK THREE -

Generalization

I. A creek and its surrounding area serve as a suitable focus for environmental study because it illustrates many ecological principles.

Activities

I. L. Library work for individual reports and preliminary preparations for field trips
I. M. Basic Fossil Information

WEEK FOUR -

Generalization

I. A creek and its surrounding area serve as a suitable focus for environmental study because it illustrates many ecological princples.

Activities

I. N. Field trip to Limestone Creek

WEEK FIVE -

Generalization

I. A creek and its surrounding area serve as a suitable focus for environmental study because it illustrates many ecological principles.

Activities

I. O. Summaries, presentations and displays of Limestone Creek Field Trip
I. P. Conclusions of the study

Generalization I: A creek and its surrounding area serve as a suitable focus for environmental study because it illustrates many ecological principles.

OBJECTIVES	STRATEGIES
I. A: Given the text, Flood Plain Information: Limestone Creek, the student will be able to trace Limestone Creek in its entirety on Plate 1.	I. A: Teacher may ask the question, "Where does Limestone Creek begin and end?"
I. B: In a class discussion, the student will be able to define the word watershed.	I. B: The teacher may tell the students what a watershed is and point to the watershed for Limestone Creek on Plate 1. Class may form their own watershed by using roles of crepe paper or yarn.
I. C: The student will be able to discuss the term flood plain in a class situation.	I. C: The children may read the definition in their glossary on page 52 of their text. After a discussion, the teacher may have then turn to Plate 4 in their text and go over the reasons for the pink, blue and yellow coloring on the map. The teacher may ask students to locate their house and decide if it is in danger of being flooded.
I. D: By focusing on plates 4 and 5 of the text, the student will be able to identify the standard project flood area, intermediate regional flood area and the 1960 flood area.	I. D: Teacher might pose the questions, "Where were houses flooded in 1960?" and "Which color on the map is in least danger of being flooded?"

MATERIALS	EVALUATION	NOTES
I. A: Booklet from Eastern Oswego Basin Regional Water Resources Planning Board entitled Flood Plain Information: Limestone Creek, Manlius Township, Onondaga County, New York.	I. A: The student will be able to point out that Limestone Creek begins at DeRuyter Reservoir and ends where it flows into Chittenango Creek.	
I. B: Flood Plain Booklet	I. B: The student will be able to say that a watershed includes a body of water and all smaller bodies of water flowing into it.	
I. C: Flood Plain Booklet	I. C: The student will be able to say that a flood plain is the land near a body of water that has been or may be covered with flood water.	
I. D: Flood Plain Booklet	I. I: Students will be able to say that houses in Fayetteville and houses along Limestone Creek near Kirkville Road were flooded in 1960, as well as houses along the Costello Parkway. Children will know that the pink and yellow area show less chance of being flooded in that it would occur every 100 and 500 years respectively.	

Generalization I: A creek and its surrounding area serve as a suitable focus for environmental study because it illustrates many ecoligical principles.

OBJECTIVES	STRATEGIES
I. E: After observing the photographs of bridges in the text, the student will be able to say why some flooding occurs.	I. E: Have the students spend time looking at pictures. They will enjoy being able to identify the structures. A classroom creek may be constructed to show that debris building up would retard the flow and cause flooding.
I. F: When given a worksheet to help him better understand flooding and how it relates to land development, the student will complete it by using the flood plain booklet.	I. F: Students may be allowed to work in pairs on the worksheet allowing for discussion with one another. After the worksheet has been completed, the answer to the question may be covered in a class discussion.
I. G: The student will be able to point out Limestone Creek in its entirety on the topographic maps displayed which show it.	I. G: Teacher might point out that a topographic map shows elevation, vegetation, transportation, waterways as well as showing housing. Volunteers might be selected to point out Limestone Creek on the map.
I. H: The watershed of Limestone Creek will be identified by the student on the maps displayed.	I. H: Teacher may review the term watershed and ask for volunteers to come to the maps displayed and point it out.
I. I: Given a topographic map, the student will be able to compute elevation of any given item on the map.	I. I: Teacher may explain that the brown lines on the map show elevation. Students might be asked to compute contour intervals after a teacher demonstration on the chalkboard or overhead projector. Typical questions for drill are listed in the appendix. Students should realize that the southern portion of the map has a contour interval of 10 ft., while the norther portion has a contour interval of 5 ft.

MATERIALS	EVALUATION	NOTES
I. E: Flood Plain Bookley "The Classroom Creek" by Don Kreisman in Science Activities. Nov. 1971	I. E: The student will discuss that debris building up on either side of the bridge may result in flooding.	
I. F: Flood Plain Booklet Worksheet on Limestone Creek in the Appendix of this booklet.	I. F: Students will have completed the worksheet and have the majority of the questions correct.	
I. G: Topographic maps for: DeRuyter, New York Oran, New York Manlius, New York East Syracuse, New York	I. G: The student will identify Limestone Creek running from its source at DeRuyter Reservoir to its mouth where it merges with Chittenango Creek.	
I. H: Topographic maps for: DeRuyter, New York Oran, New York Manlius, New York E. Syracuse, New York Tully, New York Jamesville, New York	I. H: The student will identify Butternut Creek as well as many smaller creeks flowing into Limestone Creek as all being a part of the watershed.	
I. I: Copies of topographic maps of Syracuse, East for all students "Elevation Questions" listed in the Appendix of this section	I. I: The student will be able to compute elevation by taking into account the elevation posted on nearby contour lines as well as the change in elevation exhibited by the contour intervals.	

Generalization I: A creek and its surrounding area serve as a suitable focus for environmental study because it illustrates many ecological principles.

OBJECTIVES	STRATEGIES
I. J: Given a topographic map, the student will be able to use the scale of miles to compute distance in miles, feet and filimeters.	I. J: Children might be asked to compute the distance in miles along Kirkville Road from the junction of Fly Road to the junction of Fremont Road. After miles have been calculated, give more examples for further practice A must in using the scale of miles is that the students realize that zero is in the center of the scale.
I. K: When given a worksheet that will help the student to further understand the reading of topographic maps, the students will be able to successfully complete it.	I. K: Students should be urged to hunt for the answers either on the topographic Map Symbols. They may be permitted to give each other assistance in answering the questions. Above average students might benefit from enrichment materials giving additional ties between Topographic Maps and Limestone Creek.
I. L: Given a list of topics, the student will choose one and make preparations for turning in a short report on the subject after the field trip.	I. L: Many students will need at least two days in the library to become familiar with their topic. Preparations need to be made by those people who are taking water and soil samples. Children who are doing water temperature need practice in learning to use and read thermometers. Students doing water pollution will need to be instructed on the procedures and chemicals they are using. Some children will need to learn to use a scientific key.

MATERIALS	EVALUATION	NOTES
I. J: Topographic map for East Syracuse, New York. "Scale-Distance Problems" in the Appendix of this section.	I. J: Students will be able to correctly find solutions for the problems listed on the sheet "Scale-Distance Problems" listed in the Appendix of this section.	
I. K: Topographic maps of East Syracuse, New York Key entitled "Topographic Map Symbols" available free of charge at most places which sell topographic maps. "Worksheet on Topographic Maps" listed in Appendix of this section "Supplementary Material on Limestone Creek using Topographic Maps" listed in the Appendix of this section	I. K: Students will have completed the worksheet and have the majority of questions correctly answered.	
I. L: "Project Topics for Limestone Creek" located in the Appendix of this section. Books for researching all suggested topics. Thermometers Keys or suitable reference material on insects, trees, plants, and birds.	I. L: The student will be able to inform the teacher of his plans for collecting information during the field trip on a chosen topic.	

Generalization I: A creek and its surrounding area serve as a suitable focus for environmental study because it illustrates many ecological principles.

OBJECTIVES	STRATEGIES
I. M: By reading given sheets on fossils to develop a basic understanding of the subject, the student will be able to successfully complete the work-sheets accompanying them.	I. M: Since DeRuyter Reservoir is an excellent place to find fossils, the children will need some basic back-ground information. Teacher may have a display of various fossils setting out. Children can be encouraged to bring in fossils they have collected. If time permits, the class might like to make their own fossils from Plaster of Paris. After reading about and discussing the different fossil types, the student should be able to do the accompany-ing worksheets.
I. N: Each student that goes on the field trip will collect information for an individual report on a topic chosen for Limestone Creek. Each student will also complete the field trip worksheet. Each student will also be able to identify with the aid of the Fossil Terms Sheet, the fossils that he finds.	I. N: It is best to allow 4 1/2 - 5 hours for the field trip. During the bus route students will recognize many structures pictured in the flood plain booklet. They will also become aware of changes in the elevation of the land during the trip. Under teacher direction, the students answer the questions on the field trip worksheet of each stop. After the answers have been discussed, the students should be allowed time to collect specimens or information for their individual report. It is best to split the group into two categories - those that will need to be venturing close to the water and those that will need to be only on land. Extra supervision should be given to those going near the water. At stop five, the students are permitted to hunt for fossils. After stop five, the teacher and students may go to Highland Forest for a picnic. A nature trail and pioneer museum provide additional educational opportunities for students.

MATERIALS	EVALUATION	NOTES
I. M: Fossil collections Fossil terms listed in the Appendix of this section Fossil worksheets listed in the Appendix of this section Golden Nature Book on Fossils for further identification Plaster of Paris	I. M: The child will be able to identify various fossils by using his fossil terms and will have successfully completed the work-sheets on fossils.	
I. N: Map of Limestone Creek for every student Field trip worksheet for every student Small jars attached to a pole for locations where the water is difficult to reach A bottle of iodine for water samples Sieves and small plastic bags for collecting soil samples Thermometers Insect nets Bags for collecting samples of plants Meter sticks for measuring the depth of the water Hammer and safety glasses for cracking open rocks Fossil term sheets Golden Nature Book on Fossils	I. N: Students return to school safely with information collected for their individual topics and their field trip sheets correctly answered. Some students may also feel successful if they return with many fossils and are able to give the scientific name of the fossil.	

Generalization I: A creek and its surrounding area serve as a suitable focus for environmental study because it illustrates many ecological principles.

OBJECTIVES	STRATEGIES
I. O: Upon completion of the field trip, the student will write a summary of his chosen topic and present his findings to the class in the form of an oral presentation and a display.	I. O: Students will need at least two days in class to work on their summaries. Much assistance will need to be given to some students in identification. For class presentations, all people with the same topic should form a panel and make plans for the presentation. Displays of various findings may be set up around the room. Some students might like work on a bulletin board. Some bulleting board suggestions are: 1. Make a map of different water depth, temperature, pollution or speed of flow for Limestone Creek. 2. Make a vegetation map of plants in and around Limestone Creek. 3. Make a map of the different types of soil found at each stop.
I. P: The student will be able to draw conclusions about the source and mouth of Limestone Creek with regard to flood plain, temperature, pollution, and speed of flow.	I. P: The teacher should lead the discussion and possibly illustrate the information on the chalkboard while the discussion is going on. Students may volunteer answers.
I. Q: Upon conclusion of the unit, the student will be able to draw up a plan for good usage of land included in the flood plain.	I. Q: This objective could be met by either class discussion or by letting each student write up his own individual plan.

MATERIALS	EVALUATION	NOTES
I. O: Materials collected on the field trip References for identification Microscopes Chemicals for water pollution tests	I. O: The students will turn in a summary that shows evidence of accomplishment and the class presentations will be informing to those who are listening. Displays showing evidence of findings will be set up around the room.	
	I. P: Students will conclude that the flood plain is widest at the mouth, temperature is warmest at the mouth and the flow is slowest at the mouth.	
I. Q: "Concluding Discussion Questions" listed in the Appendix of this section may be considered for a terminating discussion on this unit.	I. Q: The student will have concluded that the best use of land most subject to Limestone Creek flooding would be agriculatural or recreational rather than urban or industrial.	

Key

WORKSHEET ON LIMESTONE CREEK

1. Define: (Glossary, p. 52)

   Flood Plain - (land adjoining water which has been or may be covered with water)

   Flood Crest - (highest point reached by water)

   Watershed (Use dictionary) - (a body of water)

2. (p. 1) When did the greatest flooding of Limestone Creek occur and why? (1960 - Melting snow, heavy rain)

3. (p. 2) An Intermediate Regional Flood occurs how often? (every 100 years)

4. (p. 2) A Standard Project Flood occurs how often? (every 500 years)

5. (p. 3) When is the main flooding season? (late winter and spring)

6. (p. 3) Give an example of a hazardous condition set up by floods. (Basement floods extinguish furnace fire)

7. (p. 5) What has been done to prevent floods? (levee, channel improvements)

8. (Plate 1) Trace Limestone Creek from its head at DeRuyter Reservoir to its mouth at Chittenango Creek.

9. (p. 7) How could proper legislation help cut down the damages caused by floods? (to keep flood damageable development out of the flood plain)

10. (p. 10, 11) Are people tending to move into or leave the city of Syracuse? (leave)

11. (p. 10) Are there presently regulations limiting building or land use in areas of high flood risk? (no)

12. (p. 12) In what two areas in Onondaga County have the highest percentage of people moved by 1960? (DeWitt, Manlius)

13. (p. 13) What is the largest tributary of Limestone Creek? (Butternut)

14. (p. 14) How long is Limestone Creek, from its source to its mouth? (25.5 miles)

15. (p. 14) Is the elevation of land surrounding Limestone Creek higher near its source of near its mouth? (source)

16. (p. 14) Is the land around Limestone Creek highly developed? (no)

17. (p. 15) What happens when debris (you may have to look up the word in the dictionary) builds up at the upstream side of bridges? Look at the pictures on pg. 20-25 to help you get the answer. (flows are retarded, chances of flooding are increased)

18. (p. 30) What would be some possible use of land in areas which might be subject to flooding? (recreation)

19. (Plate 3) On what date in 1960 was water the highest? (March 30)

Look at the pictures on pages 31-36. See how many of the flooded areas you can recognize.

Examine the S.P.G. and I.R.F. in the pictures on pages 48-51.

20. (Plate 4) Is Minoa in danger of being flooded? (yes)

21. (Plate 4) Is Oot Park in danger of being flooded? (no)

22. (Plate 5) Were any houses flooded in 1960? (yes) If so, where? (Fayetteville, Manlius Center)

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   Flood Plain

   Flood Crest

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22. (Plate 5) Were any houses flooded in 1960? If so, where?

Key

ELEVATION QUESTIONS

USING THE EAST SYRACUSE TOPOGRAPHIC MAP

1. What are the contour intervals used on this map? (five and ten feet)

2. What is the change in elevation between the contour lines on Clark Hill? (ten feet)

3. What is the change in elevation between contour lines near the junction of Kirkville and Fremont Roads? (five feet)

4. How many feet above sea level is the junction of Kirkville Road and Fremont Road? (433 feet)

5. How many feet is the top of Clark Hill above sea level? (532 feet)

6. How many feet is the top of Clark Hill above the forest area just southeast of Clark Hill ? (112 feet)

7. In the lower right hand corner of the map, how many feet is the YMCA camp above sea level? (645 feet)

8. In the lower right hand corner of the map, how many feet is the surface of Los Lake above sea level? (598 feet)

9. How many feet does Limestone Creek drop between High Bridge Road and the Genesee Turnpike? (50 feet)

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5. How many feet is the top of Clark Hill above sea level?

6. How many feet is the top of Clark Hill above the forest area just southeast of Clark Hill ?

7. In the lower right hand corner of the map, how many feet is the YMCA camp above sea level?

8. In the lower right hand corner of the map, how many feet is the surface of Lost Lake above sea level?

9. How many feet does Limestone Creek drop between High Bridge Road and the Genesee Turnpike?

Key

SCALE DISTANCE PROBLEMS

USING THE EAST SYRACUSE TOPOGRAPHIC MAP

1. Where is the scale of miles located? (bottom center)

2. How many scales for measuring distances are contaned on this map? (three)

3. One inch equals approximately how many miles, feet, and kilometers on this map?
   (3/8 mile, 2000 feet, and 6/10 kilometer)

4. Why is the zero on the scale of miles located at the center of the scale rather than at the left hand side? (to make measuring fractions of miles somewhat simpler)

5. As the crow flies how many miles is it from Carrier Circle to Ratnour Bridge? (3.3 miles)

6. How many miles wide and how many miles long is this map? (6.35 by 8.6 miles)

7. How many miles, feet, and kilometers is it from Fremont School to the highest point on Clark Hill? (4/5 mile, 4400 feet, and 1/3 kilometers)

8. By road what is the shortest distance between the Fremont School and the Powlesland School? (2.9 miles)

9. How many miles is it between High Bridge Road and the Genesee Turnpike via Limestone Creek. (1.5 miles)

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Key

WORKSHEET ON TOPOGRAPHIC MAPS

These questions will help you develop skills for reading topographic maps

1. Who made this map? (U.S. Geological Survey)

2. What does red tint indicate? (Urban areas, areas in which only landmark buildings are shown)

3. When was the latest revision of this map? (1957)

4. What is a symbol for a school on this map? 

5. Is Pine Grove Middle School shown on this map? (no) Why or why not? (Built after 1957)

6. What is the symbol for a house? 

7. What is the name of this map? (Syracuse East, or Syracuse East Quadrangle)

8. What is the name of the topographic map that covers land east of this map? (Manlius)

9. Draw a symbol for a swamp.

10. What does green on the map indicate? (woods, marsh, vegetation)

11. What are the brown lines on this map? (contour lines)

12. In the southwest corner of your map is the Delaware, Lackawanna and Western Railroad. Is it located in the valley or on a ridge? (valley)

13. What is the contour interval in the vicinity of the Jamesville-DeWitt High School. (Remember that one contour interval indicates either 5 or 10 feet.) (10 feet)

14. What is the contour interval at the junction of Kirkville Road and Fremont Road? (5 feet)

15. How many feet above sea level is Clark Hill? (525)

16. What does  mean? (depressions or holes)

17. Where on this map is Limestone Creek? (east - southeast to south central)

18. How many feet above sea level is the Jamesville-DeWitt High School? (620)

19. How is the New York State Thruway shown on this map? (double red lines)

20. What type of road is the Kirkville Road? (heavy duty)

21. What is the symbol for a railroad track?

22. How many miles is it between the Fremont School and the Jamesville-DeWitt High School? (3 1/4)

23. How many feet is it along the Fremont Road from the junction of the Kirkville Road to the junction of Bridgeport? (11,500 feet)

24. How many kilometers? (Refers to question 23). (3 1/2 k.)

25. How many miles? (Refers to question 23). (2 1/4 miles)

26. What are the green dots on Clark Hill? (orchard)

27. What is located on the south side of Clark Hill? (cemetery)

28. Go west out of Fayetteville across Limestone Creek on the Genessee Turnpike until you reach an elevation of 500 feet. Then take the first left. Proceed on that road until you cross a creek (any blue line). Take the first right. Follow that road until it meets another medium duty road. What is your elevation. (600 feet)

29. How many houses are on Clark Hill? (16)

30. How many miles of the Old Erie Canal is shown on this map? (2-3 1/2 miles)

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1. Who made this map?

2. What does red tint indicate?

3. When was the latest revision of this map?

4. What is a symbol for a school on this map?

5. Is Pine Grove Middle School shown on this map? Why of why not?

6. What is the symbol for a house?

7. What is the name of this map?

8. What is the name of the topographic map that covers land east of this map?

9. Draw a symbol for a swamp.

10. What does green on the map indicate?

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Key

SUPPLEMENTARY MATERIAL ON LIMESTONE CREEK

USING TOPOGRAPHIC MAPS

INTRODUCTION:

Rivers tend to have some very basic characteristics in common. Some of these characteristics can be identified by looking at Limestone Creek on topographic maps. However some features of Limestone Creek are not typical of most rivers. One big reason for this is that most rivers make their own valleys but the valley containing the middle portion of Limestone Creek was made by a glacier. For example, the Grand Canyon was made by the Colorado River eroding away rock over millions of years, but Pompey Hollow (shown on the Oran topographic map) was cut by a glacier and later occupied by Limestone Creek.

VOLUME OF WATER:

Rivers which are wide and deep can carry more water than rivers which are narrow and shallow. Also rivers with steep gradients (a lot of drop per mile) can carry more water than rivers with little gradient. If a small river and a large river have the same gradient, the water in the large river will travel faster.

1. Examine Limestone Creek at several points between its mouth (its end where it joins Chittenango Creek) and its source (its beginning at DeRuyter Reservoir). Does Limestone Creek become wider or narrower as one proceeds downstream? (wider)

2. Why does the width of Limestone Creek change as one proceeds downstream? (because more water is being added to Limestone Creek and/or the gradient is becoming less)

GRADIENT:

The typical nature of streams is that they have gradual gradients near their mouth and steep gradients near their source. Gradient can be calculated by dividing how much a stream drops over a given distance. For example, if a stream drops ten feet in two miles its gradient is five feet per mile (that is 10 / 2).

1. What is the gradient of Limestone Creek between DeRuyter Reservoir and Hamilton Road (see DeRuyter Map) (188/1.9 = 96 ft. per mile)

2. What is the gradient of Limestone Creek between route 20 and the second road to the north crossing this creek? (30/3.1 = 9.7 feet per mile)

3. What is the gradient of Limestone Creek between High Bridge Road and the Genesee Turnpike? (see East Syracuse map) (50/1.1 = 45.5 feet per mile)

4. What is the gradient of Limestone Creek between its mouth and the New York State Thruway? (see Manlius map)
(1.5/1.5 = one foot per mile - very approx.)

5. Which one of these gradients is not in accord with the typical nature of most streams? (second gradient)

6. What produced this untypical gradient? (glaciation)

FLOOD PLAINS:

When a stretch of river has a steep gradient, the water runs fast and will therefore pick up and carry away a lot of dirt. Thus a stretch of river with a steep gradient will be cutting down fast and will therefore have steep banks for containing floods. When the gradient of a river becomes less the water slows down and as a result deposits dirt rather than picks it up. A river in this condition will have low banks and will flood and change course easily.

Use both topographic maps and the flood plain report on Limestone Creek in answering the following questions. Also, assume that flood plains are defined by standard projected flood levels.

1. How wide is the Limestone Creek flood plain half-way between High Bridge Road and the Genesse Turnpike? (one half mile)

2. How wide is the Limestone Creek flood plain at the Genesee Turnpike? (6/10 miles)

3. How wide is the Limestone Creek flood plain at the main track of the New York Central Railroad? (2 and 7/10 miles)

WATERSHED:

The watershed of a river is the area it drains. For example:

(1) If rain falls on the village of Manlius, this water will run into Limestone Creek; thus Manlius is in the Limestone Creek Watershed.

(2) Rain which falls on Jamesville runs into Butternut Creek and Butternut Creek runs into Limestone Creek, thus Jamesville is in both the Butternut Creek Watershed and in the Limestone Creek Watershed.

(3) Rain that falls on the Onondaga Indian Reservation runs into Onondaga Creek. The Onondaga Creek does not run into Limestone Creek, therefore the Onondaga Indian Reservation is not in the Limestone Creek Watershed.

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Which watershed a place is in can be found using topographic maps. Just proceed downhill from the point of concern to the nearest stream and then follow that stream to see what other streams and rivers it joins.

1. Is Green Lake (see Manlius map) in the Limestone Creek Watershed? (no)

2. Is Pratts Falls (see Oran map) in the Butternut Creek Watershed? (no)

3. Is Eagle Village (bottom center on the Manlius map) in the Limestone Creek Watershed? (yes)

4. Is Fayetteville in the Chittenango Creek Watershed? (yes)

5. Is the village of Fabius (DeRuyter map) in the Limestone Creek Watershed? (no)

MAN:

As indicated by the topographic maps, list some places where man appears to be taking out or adding water to Limestone Creek.

(Some possible answers are the Minoa sewage disposal plant, the Fayetteville aqueduct, and the bypass near Edwards Falls)

SUPPLEMENTARY MATERIAL ON LIMESTONE CREEK

USING TOPOGRAPHIC MAPS

INTRODUCTION:

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MAN:

As indicated by the topographic maps, list some places where man appears to be taking out or adding water to Limestone Creek.

PROJECT TOPIC SHEET FOR LIMESTONE CREEK FIELD TRIP

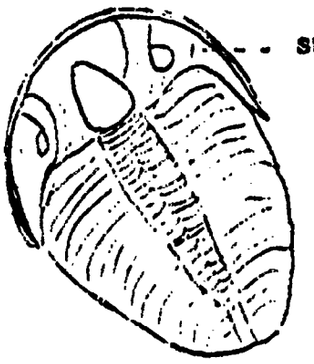
Choose one of the following topics for an individual report on the Limestone Creek Field Trip:

flowering plants
non-flowering plants
trees
birds
fish
algae
protozoa
insects
fossils
water depth
water temperature
water pollution
rocks
soil types
animals along the water
animal nests
photography

SOME COMMON FOSSILS

TRILOBITES

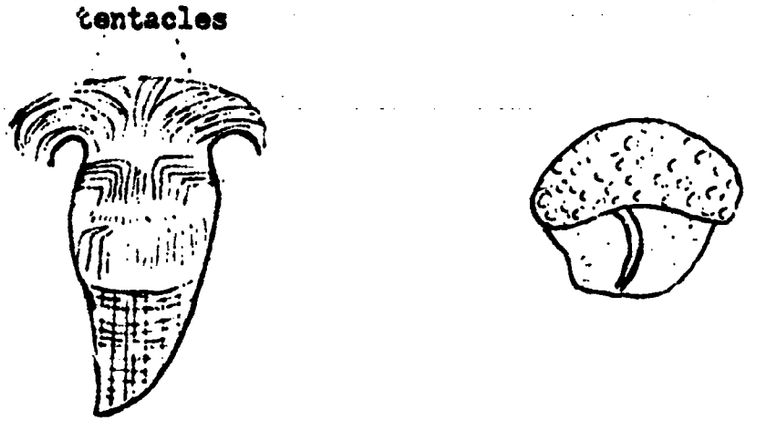
Trilobites belong to an extinct class of arthropods. Arthropods include such familiar animals as spiders, cockroaches, horseshoe crabs, and crayfish. They do not have backbones, but still have a comples body structure. Trilobites had a hard exoskeleton which served as a shield against their environment. Trilobites grew larger by molting - the skeleton split along the facial sutures. The configuration of facial sutures is helpful in the classification of trilobites. The reason for extinction is unknown; some people think there was an increase in the number of fish that fed on trilobites.



HORN CORALS

Horn corals belong to a class of animals known as colenterates, which are simple aquatic animals including corals, sea anemones, sea fnas, and tiny hydra, as well as the familiar jellyfish. Horn corals are sometimes given the name "flower animals" because their tentacles produce this effect. They often live in colonies. Corals secrete a horny of limy skeleton. All horn corals are not hor-shaped. Some are cap-shaped, button-shaped, worm-shaped, and even cylindrical.

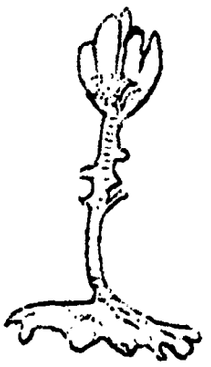
Most horn coral require a minimum water temperature of 70° F. Their presence in Northern regions today (Clark Reservation) indicates climatic conditions very different from the present.

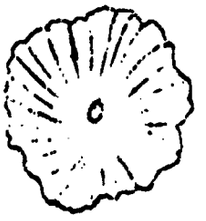


CRINOIDS

Crinoids, or sea lillies are flower-like echinoderms, often beautifully colored, which grow in colonies on the sea floor. Echinoderms, or "spiny skinned" animals, include such living animals as crinoids, starfish, brittle stars, sea cucumbers, sea urchins, and sand dollars.

Some fossil forms were free swimming but most were fixed by a stem formed of variously shaped discs. Crinoids have greatly decreased in population.





BRYZOANS

Bryzoans are tiny, colonial animals found mainly in the ocean, although a few freshwater species are known. The word bryzoan means moss animal and refers to the appearance of the tiny animals housed in cup-shaped structures.

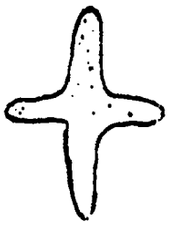
Fossils of bryzoans are overlooked by the average fossil collector. Their small structures make a hard lens necessary in order to identify them as bryzoans. They often appear as irregular plates, lacy fronds, or twig-shaped objects. Sometimes they are embedded in limestone and difficult to remove.

Geologists find them to be excellent index fossils because of their wide geographic distribution and narrow geologic range. Bryzoans are usually thin-sectioned for more detailed study and identification.

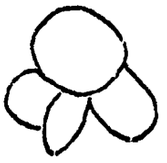
PROTOZOANS

Protozoans are minute, aquatic or parasitic animals whose single cell performs all the life functions. A few species are visible, but most are microscopic. Radiolaria, foraminifera and diatoms are the most common types of fossils.

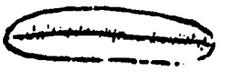
Foraminifera and radiolaria are so abundant that their tiny shells cover thousands of square miles of ocean floor and form great deposits. Some limestones are composed largely of foraminifera. Diatoms form deposits which are called diatomaceous earth.



radiolaria



foraminifera



diatoms

BRACHIOPODS

Brachiopods or Lamp Shells are small marine invertebrates. These shells once enclosed a small, soft-bodied animal. Brachiopods grow either attached to some plant or animal or are bottom dwelling. Their shells show bilateral symmetry in that if it were divided by a plane down the middle, one half is a mirror image of the other half. Brachiopods are considered bivalves, for they have two shells - one top shell and one bottom shell.

The inside of these shells were once lined with cilia which caused the water to come and pass from the animal, bringing in a food supply and taking out wastes.

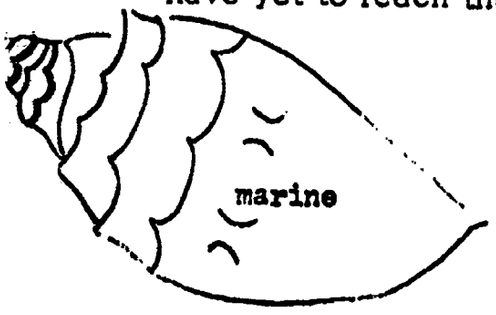
The reasons for the rise, decline, and extinction of species is not fully understood. However, it is interesting to speculate about the animal's food supply, absence of salt water, temperature, and kinds of predators.

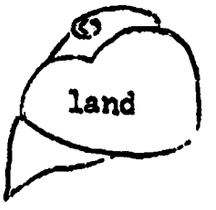
GASTROPODS

Gastropods are a class of mollusks that usually have only one shell. They are abundant in oceans, lakes, and streams as well as on land. Gastropods that have no shell are called slugs. Slugs are mostly terrestrial and because of their lack of hard parts, they have left a meager fossil record.

The animal consists mainly of a head which has eyes and feelers, a visceral hump, and a well-developed foot used for locomotion. The mouth of the gastropod is located at the bottom of the foot. When the foot passes over the pastropod's food, the mouth, containing thousands of teeth, in a special structure called a radula, grinds the food in a rasping motion.

Gastropods range in size from 1/25 of an inch to more than 18 inches. Approximately 50,000 species have been described, of which only 15,000 are fossil species. This seems to indicate that gastropods have yet to reach their peak of development.





PELECOPODS

Pelecopods are sometimes called "hatchet-foot" of bivalved mollusks. They are mostly marine, but some live in fresh water. Oysters, mussels, and clams are living types. They show bilateral symmetry with the plane of symmetry running between the valves. This means that one shell is a pelecopod is the mirror image of the other. The two valves of the shell, usually similar, are joined along a hinge line and are held together by teeth and muscles, which leave impressions on the inside of the shell. The shall can open to expose the foot and siphons by which the animal takes food and oxygen from the water.

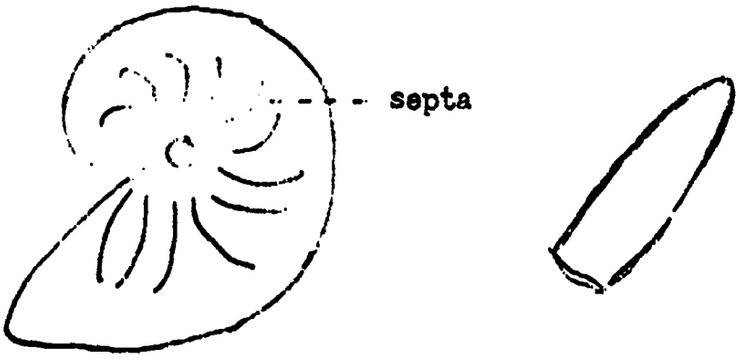
When the animal dies and its soft parts decompose, a cavity is left between the shells. This cavity is often filled with mud or sand. The shells may then dissolve from around the hardened mud and sand, leaving a hardened stone center. They are helpful because they show the general shape of the original shells and they show imprints of some of the internal structures of the original animal.

CEPHALOPODS

Cephalopods are the most highly developed of all mollusks. They have a well-defined head and well-developed eyes. They are represented by the living nautilus, octopus and squid. The shell may be external, internal or absent, and it may be variously coiled.

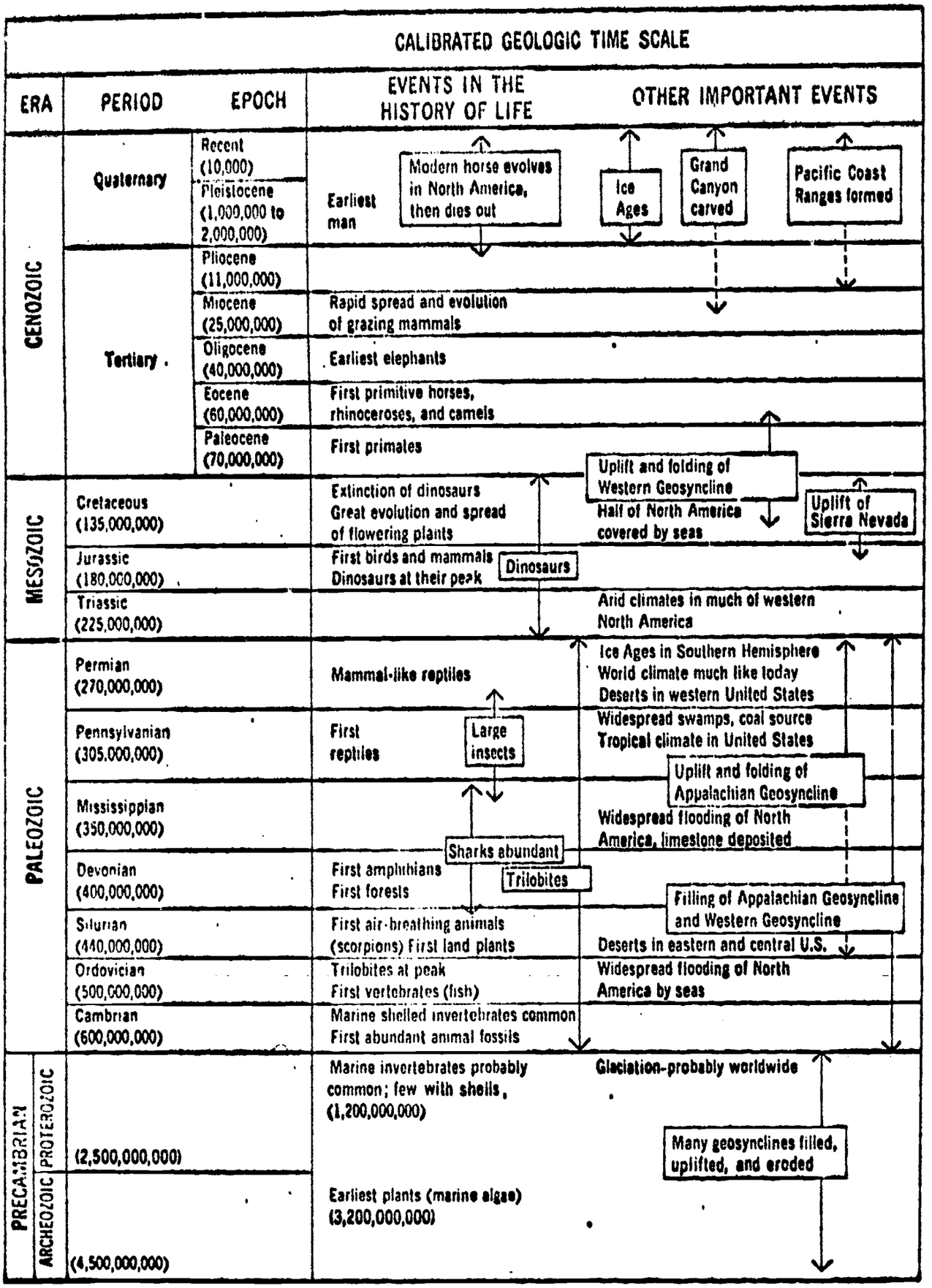
Most fossil forms had well-developed shells. It would be difficult to tell the difference between fossil gastropods and fossil cephalopods if it were not for the fact that cephalopods build a series of walls (septa) between themselves as they grow larger. These walls are helpful in identifying the relative age of the cephalopod.

Cephalopods seems to be losing the battle for suvival. Almost 10,000 fossil species have been described, while less than 200 species are know in modern oceans.



Sources:

Teacher's Guide to Fossils
Fossils - A Student Reference Book
Fossils - A Guide to Prehistoric Life



NUMBERS REFER TO TIME IN YEARS B.P. (BEFORE PRESENT) SINCE THE BEGINNING OF THE ERA, PERIOD, OR EPOCH

Key

WORKSHEET ON FOSSILS

Directions: Put the letter of the correct answer in each blank.

a. trilobites	d. bryzoans	g. gastropods
b. horn corals	e. protozoans	h. pelecopods
c. crinoids	f. brachiopods	i. cephalopods

d 1. The names means moss animal and refers to the appearance of tiny animals housed in cup-shaped structures.

e 2. Include a group of animals known as radiolaria.

g 3. This animal has a muscular foot and a spiral-shaped shell.

i 4. This animal is the most highly developed of all mollusks.

b 5. This animal has tentacles, but no septa.

f 6. Are also known as lamp shells.

a 7. A group of fossils from animals which once had attennae.

g 8. Slugs belong to this group.

c 9. Belong to a group of animals called echinoderms.

g 10. These animals have facial sutures.

f 11. These animals grow attached to some plant of animal or are bottom dwelling.

i 12. This animal has an eye, tentacles, and septa.

a 13. This group grew larger by molting.

g 14. This animal has a special structure called a radula.

d 15. These animals are sometimes overlooked because they appear as small twigs.

c 16. This fossil contained a stem formed of variously shaped discs.

f 17. What other group besides pelecopods are considered bivalven?

a 18. This fossil once had a hard exosheleton.

g 19. This group of animals has a visceral hump.

e 20. Diatoms belong to this group.

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Directions: Put the letter of the correct answer in the blank provided

b 1. Which type of fossil resembles the wing span of a bat?
a) gastropod b) brachiopod c) pelecypod d) cephalopod

d 2. Which fossils are cup-shaped, button-shaped, worm-shaped and cylindrical?
a) crinoids b) gastropods c) bryzoans d) horn corals

b 3. When one side of a fossil is the mirror image of the other side this is called
a) simple b) symmetry c) summons d) exoskeleton

c 4. Septa are a) tiny insects b) a type of fossil c) walls d) tentacles of cephalopods.

b 5. Which fossils build up limestone? a) trilobites b) foraminifers c) crinoids d) cephalopods

a 6. Which animal has no hard parts? a) slugs b) tilobites c) pelecypods d) bryzoans

c 7. Which animal is the most highly developed of all mullusks?
a) pelecypods b) gastropods c) cephalopods d) brachiopods

b 8. Which fossils are also known as lamp shells? a) crinoids b) brachiopods c) trilobites d) horn corals

a 9. Which animals grow attached to some plant or animal or are bottom dwelling?
a) brachiopod b) pelecypods c) gastropods d) bryzoans

c 10. Which fossils are sometimes overlooked because they appear as small twigs?
a) horn corals b) crinoids c) bryzoans d) protozoans

b 11. Which fossil contains a stem of variously shaped disc? a) horn corals b) crinoids c) trilobites d) cephalopod

d 12. Which fossil once had a hard exoskeleton? a) bryzoan b) crinoid c) protozoan d) trilobite

a 13. Diatoms belong to what group? a) protozoand b) bryzoans c) brachiopods d) horn corals

b 14. Table rock at Clark Reservation is made of a) sandstone b) limestone c) soapstone d) jokestone

b 15. Limestone is made from a) dead trees b) calcium of bones c) decayed plants d) none of these

d 16. What fossil looks like a flower? a) bryzoan b) trilobite
c) cephalopod d) crinoid

b 17. Spiders, cockroaches, horseshoe crabs and crayfish belong to what group?
a) horn corals b) arthropods c)brachiopods d) echinoderms

c 18. Which fossil is a bivalve? a) cephalopod b) gastropod
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c 19. Horn Corals belong to what class of animals? a) arthropods
b) Lamp shells c) colentrates d) tilobites

d 20. Which fossil does not live in colonies a) horn corals b) crinoid
c) bryzoan d) trilobite

c 21. In which era were animals mostly one-celled? a) Cenozoic
b) Mesozoic c) Precambrian d) Paleozoic

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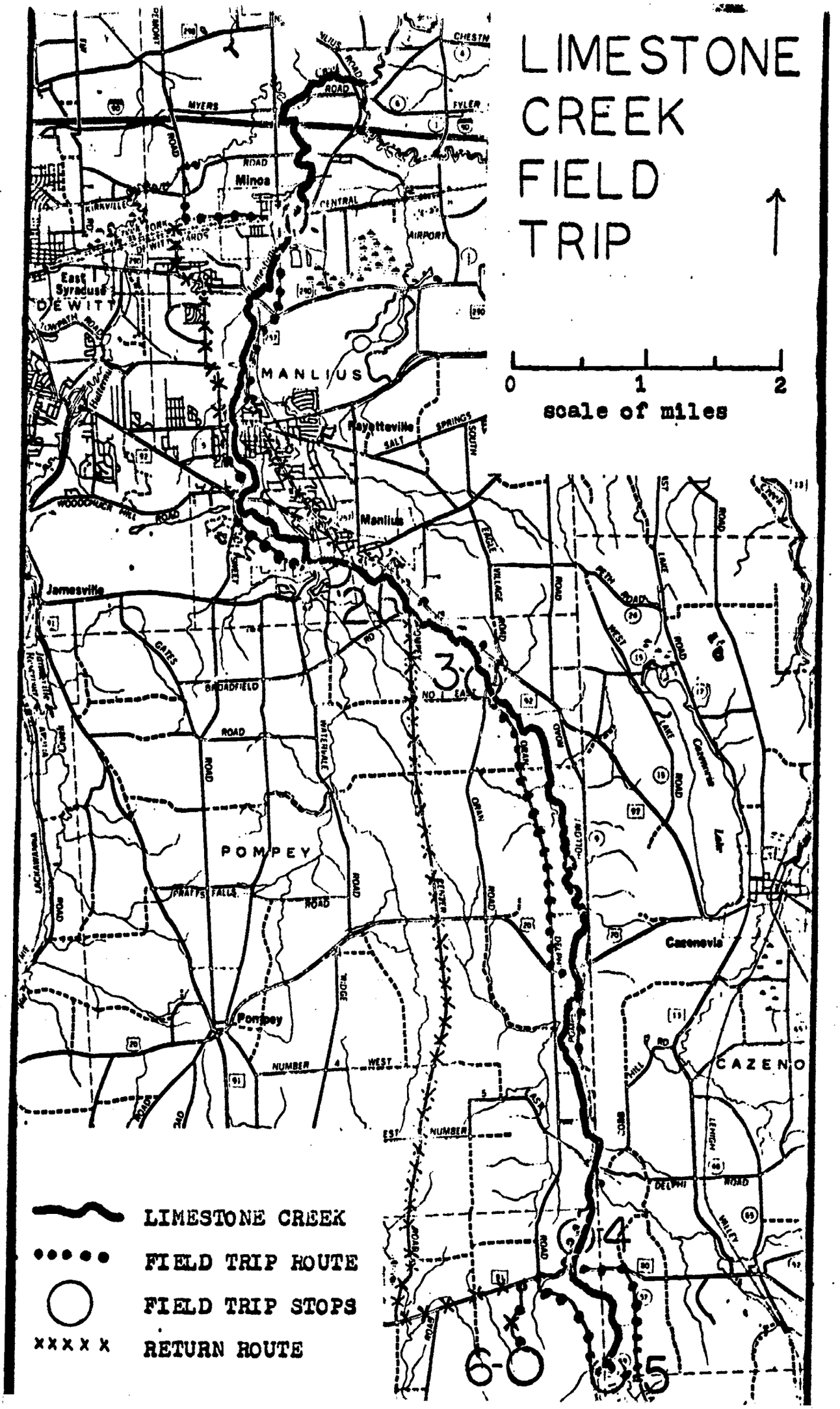
_____ 21. In which era were animals mostly one-celled? a) Cenozoic
b) Mesozoic c) Precambrian d) Paleozoic



FIELD TRIP WORKSHEET

RULES:

1) No singing or shouting on the bus.
2) All talking stops when the whistle is blown.
3) No littering of bus or natural environment.
4) No picking of flowers or collecting offossils in the park.
5) Do not pick up or handle items in the museum.

STOP 1 - MINOA 9th GRADE

1) How much higher would the water have to be to flood the 9th grade school?

2) Does the far side of Limestone Creek look as though it has even been flooded?

3) What unnatural happening has taken place near the culvert and why?

STOP 2 -

4) Compare the two bodies of water in terms of flow, depth, and pollution.

STOP 3 - ORAN DELPHI ROAD

5) Compare the speed of the water with that at the 9th grade.

6) Compare the width of the creek with the width at the 9th grade.

7) Does the creek appear to be clearer or cloudier than its location at the 9th grade?

NOTE - As we drive down Oran Delphi Road and Pompey Hollow Road, we are in a glaciated valley and Limestone Creek is at the bottom.

STOP 4 - GARDNER ROAD

8) Is the water moving faster or slower than the water you saw before?

9) You will notice that the creek forms a natural curve. Compare the water depth on both sides of the curve (by looking). Is the water deeper on the inside of the curve or on the outside of the curve?

10) On which side of the curve is the bank being cut away?

STOP 5 - DERUYTER RESERVOIR

11) List the fossils you were able to find.

Concluding Discussion Questions:

1) Who pollutes Limestone Creek?

2) What does Limestone Creek tell us about population growth?

3) Why does Limestone Creek flood?

4) If Limestone Creek were located in a different climate, would it be likely to flood?

5) Should floods be prevented or should people be prevented from living on the flood plains or should nothing be done?

6) How would one stop Limestone Creek from flooding?

7) What impact will flood control have on animal life?

8) Would preserving some of the flood plains as wildlife snactions be of any value to man?

9) Will controlling floods have an impact upon vegitation?

10) Does the Limestone Creek flood plain have an agricultural use? How about a recreational use?

EAST SYRACUSE-MINOA SCHOOLS

Environmental Education Materials

Middle School Package

Grade Six (Social Studies)

Produced Under USOE Grant OEG-0-71-4621
by East Syracuse-Minoa Central Schools
407 Fremont Road
East Syracuse, N.Y. 13057
Dr. Fritz Hess, Superintendent

Overview of grade six Environmental Social Studies.

The purpose of this unit is to illustrate the environmental concepts which are inherent in the program Man: A Course of Study. The materials are designed to be used in conjunction with the M.A.C.O.S. program.

Man: A Course of Study is organized around three questions:

What is human about human beings?

How did (do)they get that way?

How can they be made more so?

This unit was designed to give the sixth grade students of East Syracuse-Minoa an environmental awareness that man is human and as a rational being is responsible for his environment. Man may only observe nature to see how interdependence, survival and recyclement are inherent in nature. We are rational human beings and as such are accountable for our use of the environment and preservation of the environment for continued generations.

Flow Chart for Environmental Education Based on M.A.C.O.S.

I. Generalization: Living things are interdependent with one another and with their environment.

Salmon

1. Find how salmon gather information from their environment.
2. Find causes of diminishing salmon.
3. List ways man has contributed to the depletion of salmon.
4. Construct a bulletin board illustrating life cycle of the salmon.
5. Construct a model of an ecological dam.
6. Construct the salmon's food chain.

Herring Gulls

7. Give examples of organized behavior of herring gulls.
8. Determine how man may learn from animals.

Baboons

9. Develop an awareness of the interdependence of the animal life on the African Savanna.
10. List examples of animals of the African savanna which have a mutual reliance upon one another.
11. Diagram area habituated by herbivores.
12. Diagram area habituated by carnivores.
13. Illustrate the balance of nature.
14. Illustrate man's effect upon this balance.
15. Give examples of animal adaptations.
16. Construct a model of an Amboseli Environment.

Netsilik Eskimo

17. List the elements which compose the Netsilik Eskimo environment.
18. Determine how plants survive on the tundra.
19. Construct a food web illustrating interdependence of plants and animals.
20. Give examples of the Netsilik dependence upon animal life.
21. List effects of seasons upon the Netsilik.
22. Contrast economic interdependence of American with Netsilik families.

II. Generalization: Survival continuing life (or existence) in the presence of difficult conditions... survival depends upon the ability of an organism to adjust to its environment.

Salmon

1. Match up protective devices to appropriate animal.
2. Construct a bulletin board to illustrate protective devices.
3. How the salmon survives.

Herring Gull

4. How the herring gull survives.

Baboon

5. Illustrate life cycle of the baboon.
6. Discuss need of baboon troop life.
7. Design and illustrate a hypothetical animal which can survive on the tundra.

Netsilik Eskimo

8. Give examples of Netsilik flexibility and survival.
9. Give examples of Netsilik migration and survival
10. Illustrate the importance of hunting to Netsilik survival.

III. Generalization: Continuous feedback for reuse...man would do well to observe nature's example and reuse the results of his technology.

Netsilik Eskimo

1. Diagram Netsilik reuse of materials.
2. Illustrate Netsilik alterning materials.

Flow Chart of M. A. C. O. S. filmloops and Basic Environmental Concepts

Titles of Filmloops	9 Basic Environmental Concepts: Survival	Inter-depend.	Recycle-ment	Right vs. Responsibility	Planning	Valuing	Social Forces	Optimism	Scarcity
Life Cycle of a Salmon	X								X
Knud	X	X			X		X	X	X
Animals in Amboseli	X								
Life on the Tundra	X	X							X
Miss Goodall & the Wild Chimps	X	X			X				
Baboon Troop	X	X							X
Herring Gull Behavior	X	X							
Younger Infant	X	X							
Older Infant	X	X							
Autumn River Camp #1	X	X							X
Autumn River Camp #2	X	X			X				X
Autumn River Camp #3	X	X			X				
Autumn River Camp #4	X	X			X				
Winter sea Ice Camp #1	X	X				X			X
Winter Sea Ice Camp #2						X			

Flow Chart of M. A. C. O. S. Filmloops and Basic Environmental Concepts

Titles of Filmloops	9 Basic Environmental Concepts								
	Survival	Interde-pendance	Recycle-ment	Right vs. Responsibility	Planning	Valuing	Social Forces	Optimism	Scarcity
Fishings at the Stone Weir #1	X	X							X
Fishing at the Stone Weir #2	X	X			X				
At the Caribou Cross-ing Place #3	X	X							
At the Caribou Cross-ing Place #4	X	X							
Winter River Camp #5	X	X			X				
Winter River Camp #6	X	X			X				X

Vocabulary - 6th grade Social Studies unit based on Man: A Course of Study.

accountable
adapt
Amboseli
camouflage
carnivores
characteristic
competition
dependent
deterimental
differentiation
dominance
dwindle
flexibility
foraging
habitat
herbivores
homestream
interdependence
lichens
migration
nonconsumable
permafrost
ptarmigan
preening
preservation
protective
range
regurgitate
replenish
reuse
savanna
scavenger
stimuli
tundra

Generalization: I. Living things are interdependent with one another and with their environment.

Objectives	Activities and Strategies	Materials	Evaluation
I. 1. To make students aware of the manner in which animals gather information from their environment.	I. 1 After class has used the worksheets on How do Salmon Find Their Homestreams? pp 41 to 44 in M.A.C.O.S. booklet three Introductory Lessons...Salmon. Follow procedure suggested and discuss how salmon use environmental data to find their homestreams. Have students find examples of how man pollutes rivers and streams. How would these pollutants affect the salmon? How do dams effect the salmon?	I. 1 Worksheet: How do Salmon Find Their Homestreams?	I. 1. Have students fill in charts illustrating relationship between structure, behavior and environment. Salmon Ways it behaves. Structures that help it behave the way it does. The way the behavior helps the salmon in its environment. How environmental pollution has affected the salmon.

Generalization: I. Living things are interdependent with one another and with their environment.

Objectives	Activities and Strategies	Materials	Evaluation
2. To give three examples of how animals gathered information from their environment and how they respond to this information.	2. Use article "The Incredible Salmon" reprinted from National Geographic, August, 1968. Also- "Lost Wild America" by Robert McClung, pg. 210-211. Children should find information on reasons why salmon fishing is dwindling, and how water pollution and dams have caused this species to dwindle. Ask why does man need fish such as the salmon? How can we help preserve this species? What efforts have been made to control overfishing of the salmon?	2. Article: The Incredible Salmon from National Geographic, August, 1968. Book: "Lost Wild America" by Robert McClung.	
3. To lead students to an awareness of the importance of environmental stimuli to the survival of animals and the necessity of man's preservation of the natural environment and the widespread distruction which can result if man upsets this delicate balance.	3.a. Use resource book, "Wondrous World of Fishes" by National Geographic Society. Have class read article, White - Water Highways of the West. pp. 222 to 231. Ask class: 1. What effect did the Canadian Pacific Railroad's blasting in an area around Fraser River in 1913, have upon the salmon? 2. What has man done to replenish the salmon? 3. How is longterm environmental planning necessary for salmon's survival?	3.a. Book: "Wondrous World of Fishes" by National Geographic Society.	

Generalization: I. Living things are interdependent with one another and with their environment.

Objectives	Activities and Strategies	Materials	Evaluation
	Supplemental Activities: 3.b. Students may construct a bulletin board illustrating the life cycle of the salmon, for reference the class may use the filmloop, "The Life Cycle of the Salmon" and the booklet Salmon. c. Have students construct a model of a dam built across a river that salmon usually use. How might the dam be constructed so that the salmon can continue their journey? d. Students may construct a food chain of the salmon. e. Students may use reference materials to determine how the structure of the salmon enables him to survive, and how the salmon gathers data to find his homestream and man's affect on the salmon.		

Generalization: I. Living things are interdependent with one another and with their environment.

Objectives	Activities and Strategies	Materials	Evaluation
II. 1. To illustrate the role that herring seagulls play in the environment and how they help maintain the ecological balance of nature.	II. 1.a. Ask students if they have ever seen gulls? Do they have any idea what they eat? How can this be of any value to man? Have class use Austin's book, Birds of the World and read pp. 130 to 132. Have class define the word scavenger. Ask why nature needs scavengers and what would happen without them. b. After class has seen filmloop on herring gulls and read the booklet, Herring Gulls, encourage the students to give examples of how the life and behavior of gulls is organized. How do they protect their territory? How do they provide for their young? Do gull islands appear to be well orgainized? Lead class to compare the organization of the gull community to our community.	II.1.a. Birds of the World by Austin. b. Filmloop: Herring Gulls.	II. 1. a. Class may construct the life cycle of the herring gull and compare to the salmon. Have class list the similarities and differences.

Generalization: I. Living things are interdependent with one another and with their environment.

Objectives	Activities and Strategies	Materials	Evaluation
	Are gulls a threat to their own kind? Could man be considered a threat to his own kind? If so, how? (Bring in war, overkilling of animals, overmining of natural resources, air, land and water pollution. How can man learn from observation of animal communities such as the gulls?		
III. 1. To give children the opportunity to research elements which compose the environment of the animals in the Amboseli Game Park in Kenya.	III. 1. After viewing film, "Animals in Amboseli" and reading the booklet Animals of the African Savanna, have class list elements which compose the environment of Amboseli. Discuss the distinctive features of the environment. Are the elements in balance with one another? Do the animals depend on one another?	III. 1. Film-loop: "Animals in Amboseli". Booklet: Animals of the African Savanna.	III. 1. Have class define meaning of words, predator, prey, and competition and havitat. Have class thake on animal of the savanna and draw its food chain to illustrate the role of predators, prey and competition. Example of a food web of a baboon. light (source) plants (herbs) insects (scorpion, grubs) Baboon Cheetah and leopards or may use pyramid type as illustrated on pg. 5 in booklet.

Generalization: I. Living things are interdependent with one another and with their environment.

Objectives	Activities and Strategies	Materials	Evaluation
			How does this illustrate the importance of a balance of nature? What happens when this balance is upset? How might man affect this balance?
III. 2. To illustrate the interdependence of animal life on the African savanna.	III. 2. a. Use booklet, Animals of the African Savanna. Read pg. 14 and discuss the importance of sun and rain to the kinds of life, both plant and animal, which can survive on the savanna. Read pg. 9 - ask why is there room for many species within the same general environment. Is this true for man? pg. 10 - ask how do some herbivores help other herbivores survive? How do baboons and impalas help each other survive? Have class read pg. 12 and list other examples of animals which make use of each other. b. Use diagram of pg. 23. Ask: 1. Which area do the herbivores frequent the most?...least? 2. Which areas do the carnivores frequent the most?...least? 3. Which animals do you think are most closely tied to one habitat?		

Generalization: I. Living things are interdependent with one another and with their environment.

Objectives	Activities and Strategies	Materials	Evaluation
	c. Where would man fit on the chart? Think of all the different types of environments there are around the world. Can most animal species move easily from one to another? Can man?		
III. 3. To give an opportunity to see the balance of nature between predators and prey, and illustrate how the balance may be upset by man's activities.	III. 3. Obtain copy of Jean Bothwell's Vanishing Wildlife of East Africa and read chapter on "Too Many Baboons". Ask why are there too many baboons? How did the overkilling of leopards affect the balance of nature? How did overpopulation of baboons affect the farmers in the area?	III. 3. Book: Vanishing Wildlife of East Africa by Jean Bothwell. May be obtained at Pine Grove Middle School.	
4. To illustrate special habits and special habitats which enable animals of the savanna to survive.	4a. Read pgs 16 & 17 of booklet Animals of The African Savanna. Ask: 1. How does the height of different animals species help avoid competition for the same food? 2. Why do some herivores have to live in different habitats?	4a. Booklet: Animals of the African Savanna.	4. Have class read pg. 16 in booklet Animals of the African Savanna, and give at least three examples of how special adaptions of animals help them survive on the savanna. Ex. Baboons can dig for and eat roots, rhinoceroses eat thornbushes, impalas graze on young shoots of grass, & buffaloes eat coarser grasses.

Generalization: I. Living things are interdependent with one another and with their environment.

Objectives	Activities and Strategies	Materials	Evaluation
	b. Have children list the essential environmental needs of baboons: waterholes or rivers sleeping trees grasslands What happens when one of these elements are not obtainable?		
III. 5. To give students an opportunity to construct a model environment illustrating the baboons interdependence with the environment.	III. 5. a. Have class gather as many of any kind of materials they can find which will enable them to construct a model of the Amboseli environment. They should include areas representing grasslands, woodlands and sources of water. Have a large area of fairly open grassland.		
	b. Have one child come up and circle with a string the area he thinks a troop of baboons would inhabit. Explain that this are is called a range. Ask children if they agree that this could be the range of one troop. Have a child point to the path a troop might take one day in this range. Is there more than one place to get water in case it's a dry season? Do they have to compete for their food with some other animal? How does this environment support baboon life?	b. Baboon Troop Ranges unit five Baboons, page 55.	

Generalization: I. Living things are interdependent with one another and with their environment.

Objectives	Activities and Strategies	Materials	Evaluation
IV. 1. To illustrate the interdependence of plants and animals of the tundra.	IV. 1.a. After reading the booklet, The Arctic, have children list the elements which compose the environment of the Netsilik Eskimo. (snow, ice, rivers, lakes, permafrost, plants and animals). Ask why this type of land is called a tundra. Would life be easy in such a climate? Would one of us be able to survive? b. Ask class what plants need in order to survive. (Sun, air, water and soil). Ask if they know any plants which can survive without soil. Have class turn to picture on pg. 15 of the booklet of The Arctic, discuss how this plant might survive without soil. Read materials on plants pp. 14 to 16. Discuss how lichens are able to survive without soil. How do the insects of the tundra help lichens to survive. Read pg. 19. How are ptarmigan able to survive life on the tundra? (Change color, in winter it is white, and in spring it changes to grey-brown to blend into the changing tundra).	IV. 1.a. booklet: The Arctic	

Generalization: I. Living things are interdependent with one another and with their environment.

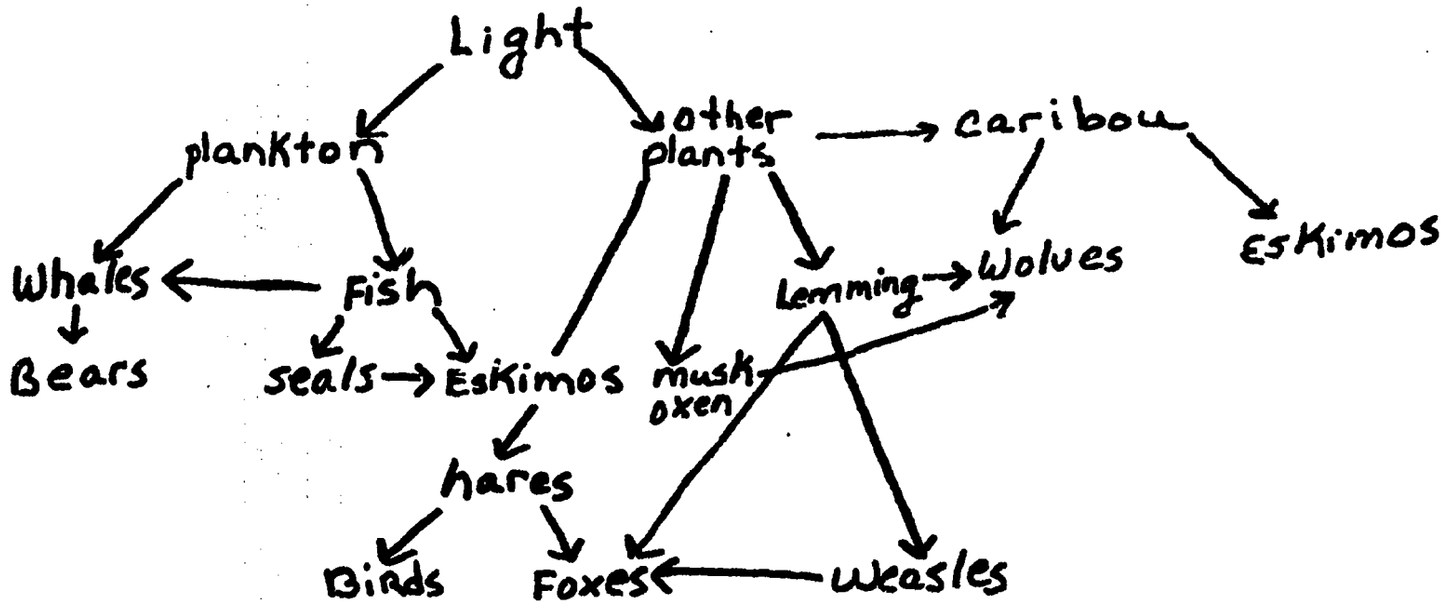
Objectives	Activities and Strategies	Materials	Evaluation

Continue reading booklet and have children form groups of 4 or 5 and take an animal in the booklet and write a list of their methods of survival. Have groups exchange lists and compare.

Are there any common elements? If so, what? Include reference to their interdependence with one another and with other animals or plants.

c. Have class use booklet, The Arctic, and construct a food web to illustrate the interdependence of plant and animal live on the tundra.

Food Web - Arctic Life



Generalization: I. Living things are interdependent with one another and with their environment.

Objectives	Activities and Strategies	Materials	Evaluation
IV. 2. To illustrate the affect the environment of the tundra has upon the Netsilik Eskimo.	IV. 2. a. Give students a copy of map showing the migration route of Ugak and Uerlongayok. Have class give examples of the Eskimo's dependence upon animal life? Have class find pictures of the animals mentioned and place on their maps where numbers indicate they should be placed. Ask class why the Eskimo has to migrate along with the animals? Do we move when the supermarket moves? Why?	IV. 2. a. map illustrating migration route of Ugak and Uerlongayok. copy attached also use filmstrip:"Netsilik Life" frames 1-4.	
	b. Use filmloop "Winter Sea Ice Camp", have class list affects the change of seasons has upon the food supply.		
	c. After teaching lesson D. The group acts to protect itself, from unit on the Netsilik Eskimos on the Sea Ice. Ask class to give reasons why members of a group must co-operate and provide for the needs of the group. Do we have to be accountable to our own society? Does this illustrate a form of interdependence.		
	d. Contrasting Netsilik and American families in terms of economic interdependence. Have class list all the people who contributed to bringing meat to their own dinner table last night and what they did.	d. Unit Seven Netsilik Eskimos on the Sea Ice.	

Generalization: I. Living things are interdependent with one another and with their environment.

Objectives	Activities and Strategies	Materials	Evaluation
	For example: Father: earned money mother: bought meat at store grocer: sold meat trucker: brought meat to store meat inspector: made sure meat was good slaughter-house workers: butchered animals cattle-train men: brought animals to slaughter house rancher: raised animals How are the people who supply Umiapik's food related to each other?		

Generalization: II. Survival continuing life (or existence) in the presence of difficult conditions... survival depends upon the ability of an organism toadjust to its environment.

Objectives	Activities and Strategies	Materials	Evaluation
V. 1. To illustrate the protective devices and instincts animals and plants have in order to survive in their environments.	V. 1. a. Have students use the booklet The Arctic and do match up exercise attached. b. To follow up children may wish to use the booklets on the Grizzly Bear, African Elephant, Bottlenose Porpoise, Brown Rat, the Gnu and the Chimpanzee. Children may wish to work in small groups and construct a bulletin board to illustrate the protective devices of these animals. A list of these animals and their protective devices are attached.	V. 1. a. booklets: The Arctic The Grizzly Bear African Elephant Bottlenose Porpoise Brown Rat The Gnu The Chimpanzee Match up exercise attached.	
2. To give an awareness of the overwhelming survival instinct of the salmon and the devices the salmon h., in order to survive.	2. a. May use in conjunction with lesson C. Examining the Behavior of Salmon. After class has used worksheets #'s 41, 42, 43, & 44. Ask: 1. How did Hasler's experiment show that the salmon has a unique sense of smell? 2a. Why does the salmon's ability to swim against the current enable it to survive? 2b. How does the salmon's eyesight enable it to jump waterfalls and therefore survive? 2c. How is man trying to help the salmon survive?	2.a. Worksheets #'s 41, 42, 43, & 44 from M.A.C.O.S. booklet three - Introductory Lessons Salmon.	

Generalization: II. Survival continuing life (or existence) in the presence of difficult condition... survival depends upon the ability of an organism to adjust to its environment.

Objectives	Activities and Strategies	Materials	Evaluation
V. 3. To illustrate the herring gull's ability to survive in its environment.	V. 3. a. Use Herring gull filmstrip and booklet, Herring Gulls, have class list the behaviors, instincts and bodily structures which enable the herring gulls to survive. Their list should include. 1. excellent fliers 2. gulls feet 3. gulls bill 4. red spot on beak 5. eyesight 6. color differentiation 7. egg tooth 8. camouflage 9. regurgitate food 10. preening	V 3.a. Filmstrip "Herring Gulls"	V. 3. a. Have class use their list and describe how each of these abilities and structures insure the herring gull's survival. Example: 1. excellent fliers - advantage of being able to hover, glide, turn suddenly or fly quickly. 2. Gulls webbed feet - are adapted for swimming as well as for walking. Gulls do most of their foraging on foot. 3. Gulls bill - long and strong, it can swallow large pieces of food: moles and rats are swallowed whole. 4. Red spot on beak - enables young to find source of their food. 5. Gull's eyesight - excellent to find prey from air and recognize their mates and chicks. 6. Color differentiation - can camouflage eggs to blend with rocks. 7. Egg tooth - enables the baby chicks to break his shell and hatch.
4.a. To illustrate how the baboon is able to survive in his environment.	4.a. After class has completed lessons B & C in unit five on the Baboons, they well have used the films: "The Younger Infant", "The Older Infant", the filmstrip: "Baboons", and the booklets: Baboons, and The Observer's Handbook. Ask class what physical characteristics insure the baboon's survival?		

Generalization: II. Survival continuing life (or existence) in the presence of difficult conditions... survival depends upon the ability of an organism to adjust to its environment.

Objectives	Activities and Strategies	Materials	Environment
	Have class make charts illustrating the life cycle of the baboon and his development which enables his survival in his environment.		8. Camouflage - baby chicks blend well into their environment. 9. Regurgitate food - to enable young to eat food which would normally be too large for them to swallow. 10. Preening - to protect the bird in cold weather and is important to flight. Preening involves putting the feathers in order and spreading a fatty substance over them. The fatty substance protects the bird in cold or hot weather. (The fatty substance is produced in a tail gland of the bird.)
	New born Baboon clinging reflex nursing ability		
	Four month old infant change in color eating solid food stays close to mother		
	Eight-month old infant imitates actions of older troop members mother begins to reject to enable infant to become independent and integrated into the troop.		
	Year-old infant has learned to eat and move independently has learned social skills of grooming thus establishing affectional ties with the troop members.		

Genreralization: II. Survival continuing life (or existence) in the presence of difficult conditions... su. 'val depends upon the ability of an organism to adjust to its environment.

Objectives	Activities and Strategies	Materials	Evaluation
V. 4. b. To illustrate the need for troop life and organization to fulfill the needs of the baboon and insure his survival.	V. 4. b. Use M.A.C.O.S. teacher's manual five - Boboons · lesson F. Examining Troop Organization - Setting Up Troops on Environment Boards. After children have completed lesson and have visited each other's boards. Lead into a discussion of troop life. 1. Ask children why baboons which are agressive animals live peacefully together in well organized troops? 2. How does troop life illustrate bonds of dominance and affection between troop members. 3. How has man organized his society to insure survival. Do we have bonds of affection and dominance? Give examples.	V. 4. b. M.A.C.O.S. teacher's manual unit five The Baboons.	
V. 5. To demonstrate that survival on the Arctic tundra is difficult, but that at the same time, the environment contains the necessary resources for survival.	V. 5. After viewing films, "Life on the Tundra" and "Netsilik Life" and using booklets, The Arctic, Songs and Stories of the Netsilik Eskimos, have children design and draw an animal that could survive in the Arctic. It need not look like any existing animal. The children should make sure, however, that every characteristic they give their animal helps it to survive. Before they start to draw, they should consider the checklist below. When they have	V. 5. Films: "Life on the Tundra" "Netsilik Life" Booklets: The Arctic, and Songs and Stories of the Netsilik Eskimo.	

Generalization: II. Survival continuing life (or existence) in the presence of difficult conditions... survival depends upon the ability of an organism to adjust to its environment.

Objectives	Activities and Strategies	Materials	Evaluation
	finished, they should be prepared to defend before the class their animal's ability to survive. Checklist: Where does the animal get food? Does it migrate? How does it defend itself? How many young does a female have in her lifetime? How many survive to reproduce? When and where are its young born? Which behaviors in the young are innate and which must be learned in order to survive? pgs. 26 & 27 of unit six, The Netsilik Eskimo at the Inland Camp.		
V. 6. To illustrate how flexibility and migration are vitally important to the survival of the Netsilik Eskimo.	V. 6. Have class define and give examples of terms flexibility and migration. How are these terms related to survival of the Netsilik Eskimo? Discuss how we must be flexible in our daily lives? How rapid change in our society is forcing us to be flexible. Example: growth of industry and crime in large cities and flight to suburbia.	V. 6. Copy of names of Eskimo Months attached.	V. 6. Children may construct a wall mural contrasting the environment of the Netsilik at the Inland Camp to the environment of the winter trek. How must the Netsilik alter his behavior to survive in each of these environments. Must he be flexible? If so, how?

Generalization: II. Survival continuing life (or existence) in the presence of difficult conditions... survival depends upon the ability of an organism to adjust to its environment.

Objectives	Activities and Strategies	Materials	Evaluation
	Rise in water pollution and decrease in fish in our diet, due to scarcity and rapid increase in price of fish. Relate to Netsilik flexibility for survival, snice at any time the game may fail in a particular area or a given technique may prove unproductive. Alternate techniques, even though not equally efficient, are a valuable reserve in unusual circumstances. Ask class if they can give examples of how the Netsilik has to be flexible, must be movile and ready to move with the migration of animals, must be ready to live in small groups yet be able to come together and live harmoniously in a large group. Children may construct charts illustrating the sequence fishing at the weir, caribou hunting, spearing fish through the ice, hunting the ringed seal. Hand out a copy of the names of the Eskimo months. Have class underline Netsilik month names which reflect a deep awareness of the natural environment.		Children may be placed into small groups to give hypothetical situations where the Netsilik would have to be flexible or migrate to survive in each of these environments. After using materials from lesson E. Migratory Life on the Tundra, children may fill in identification worksheet attached.

Generalization: II. Survival continuing life (or existence) in the presence of difficult conditions... survival depends upon the ability of an organism to adjust to its environment.

Objectives	Activities and Strategies	Materials	Evaluation
V. 7. To emphasize the importance of hunting to the survival of the Netsilik Eskimo.	V. 7. Ask class why they think such a large section of our unit on the Netsilik Eskimo has to do with hunting. Let them give examples of where they have seen pictures, films, booklets in the M.A.C.O.S. materials where the Eskimo is seen hunting. Why is it necessary that the Netsilik spend such a great deal of time and energy hunting? Why is the birth of an Eskimo child referred to as the birth of a hunter? Use booklet, A Journey to the Arctic, pg. 24. Have class compare the Netsilik values regarding the birth of baby girls to boys. Lead into the importance of a male hunter to the survival of the family. Could possibly lead into a role playing exercise. Have class look closely at frames 5 - 9 on the filmstrip, "Netsilik Life". Find as many examples of things Netsilik boys and girls learn. Make one list for boys and another for girls. Underline each item that is related to hunting, killing, and preparing animals for food.	V. 7. M.A.C.O.S. materials on the Eskimo.	V. 7. Have children reread "The Ancient Rules of Life" in This World We Know. 1. Make a list of things mentioned in this chapter that Netsilik children have to learn. 2. Choose one item on your list that has to do with hunting and describe the ways it might be taught to a Netsilik child.

Generalization: III. Continuous feedback for reuse...man would do well to observe nature's example and reuse the results of his technology.

Objectives	Activities and Strategies	Materials	Evaluation
1. To illustrate how the Netsilik Eskimo reuses materials.	1. Have children diagram the reuse of materials showing the different use a form of each nonconsumable material at different times in the year, year after year. An example of how this could possibly be done may be found on pg. 82 of unit six The Netsilik Eskimo at the Inland Camp.	1. Unit Six The Netsilik at the Inland Camp.	
2. To give students an opportunity to see how natural materials can be altered to adapt them to a new purpose.	2. Have children experiment with materials to determine which changes can be made and record the results of their experience on a chart as below.		

V. 1a. Directions: match up the protective devices and behaviors in column two with the correct plant or animal in column one.

Arctic Plants and Animals	Protective Devices and Instincts
A. _____ptarmigan	1. grows with out soil breaks up rock to make soil able to find food easily on bare rock.
B. _____raven	2. layer of fat under skin - extra insulation sleek body for swimming protective oil over eyes strong teeth
C. _____owls	3. strong horns for fighting heavy fur for warmth & protection from insects in summer wide, strong hooves (to paw for food in winter)
D. _____seals	4. thick feathers
E. _____musk oxen	5. changes color with seasons
F. _____wolves	6. migration
G. _____lichen	7. instinct to follow the animals it gets its food from. (follows wolf)
H. _____Arctic fox	8. thick coat broad hooves for walking on snow easily migration calves are born with teeth for early survival
I. _____Arctic hare	9. speed protective coloring hunt in groups instinct to bury excess food for later use sharp teeth and powerful jaw
J. _____caribou	10. cunning follows other animals for food they leave protective coloring heavy winter coat

Arctic Plants and Animals	Protective Devices and Instincts
K. _____Polar Bear	11. protective coloring
L. _____walrus	12. rapid rate of reproduction live underground for safety, warmth, and good food supply
M. _____other birds	13. thick skin tusks for digging food speed
N. _____lemmings	14. thick fur coat good swimmer and fisher skin lubricated with oil (acts as a waterproof) speed

KEY

Arctic Plants and Animals	Protective Devices and Instincts
A. ptarmigan	changes color with seasons
B. raven	instinct to follow the animals it gets its food from. (follows wolf)
C. owls	thick feathers
D. seals	layer of fat under skin - extra insulation sleek body for swimming protectve oil over eyes strong teeth
E. musk oxen	strong horns for fighting heavy fur for warmth and protection from insects in summer wide strong hooves (to paw for food in winter)
F. wolves	speed protective coloring hunt in groups instinct to bury excess food for later use sharp teeth and powerful jaw
G. lichen	grows without soil breaks up rock to make soil
H. Arctic fox	cunning follows other animals for food they leave protective coloring heavy winter coat
I. Arctic hare	protective coloring
J. caribou	thick coat broad hooves for walking on snow easily migration calves are born with teeth for early survival
K. Polar Bear	thick fur coat good swimmer and fisher skin lubricated with oil (acts as a waterproof) speed

Arctic Plants and Animals	Protective Devices and Instincts
L. walrus	thick skin tusks for digging food speed
M. other birds	migration
N. lemmings	rapid rate of reproduction live underground for safety, warmth and good food supply

V. 6. Directions: The Netsilik live half of the year inland and half on the sea ice. They think differently about the two phases of the migration cycle. Identify each of the following according to the Netsilik feelings of life on the sea ice and life inland. Number one is filled in for you.

1. security life inland
2. conflict _____
3. calm _____
4. pleasure _____
5. excitement _____
6. small group life _____
7. woman does domestic tasks _____
8. large group life _____
9. fishing at the weir _____
10. danger _____
11. ten to fifteen hunters hunting together _____
12. time of ceremony _____
13. hunting ringed seal _____
14. closely related families _____
15. relaxation _____
16. life with immediate family _____
17. land surrounding Pelly Bay _____
18. repair stone weirs _____
19. caribou hunting _____
20. sea ice _____

V. 6. Key

1. security life inland
2. conflict life on the sea ice
3. calm life inland
4. pleasure life inland
5. excitement life on the sea ice
6. small group life life inland
7. woman does domestic tasks life inland
8. large group life life on the sea ice
9. fishing at the weir life inland
10. danger life on the sea ice
11. ten to fifteen hunters hunting together life on the sea ice
12. time of ceremony life on the sea ice
13. hunting ringed seal life on the sea ice
14. closely related families life inland
15. relaxation life inland
16. life with the immediate family life inland
17. land surrounding Pelly Bay life inland
18. repair stone weirs life inland
19. caribou hunting life inland
20. sea ice life on the sea ice

V. 1b. The Arctic

Survival

lichen - adapted to the tundra by being able to grow without soil, makes soil by breaking up rocks to find food.

seals - extra insulation (layer of fat under skin) against cold, sleek body for swimming, protective oil for eyes, strong teeth.

musk oxen - horns for fighting, has heavy fur coat for protection from cold and from insects in the summer, wide, strong hooves to paw for plants in winter.

owls - thick feathers for protection.

birds - migration, change color with season (ex. ptarmigan), stay near the animals that they get their food from (ex. ravens stay near wolves in winter).

caribou - thick coat of hair, broad hooves for walking easily on snow, migration, calves born with teeth for early survival.

wolves - speed, protective coloring, hunt in groups, instinct to bury food, sharp teeth, powerful jaws.

Arctic fox - cunning, follow other animals for traces of food, protective coloring, heavy winter coat.

weasels - winter coat, cunning.

Arctic hares - protective coloring.

lemmings - rapid rate of reproduction, live underground for protection, food supply and warmth.

walrus - thick skin, tusks for digging clams, ability to move rapidly.

Polar Bears - thick fur, good swimmers and fishers for food, skin lubricated with oil (waterproof), speed.

Grizzly Bear - strong jaw and teeth, strength, speed, easy adaptation to food supply, powerful claws, stand on two legs (easy for picking fruit) keen sense of smell (avoid danger and to catch prey), winter hibernation, coat thickens in winter.

African Elephant - 4 large,flat, grinding teeth, tusks for fighting and digging roots or underground water, keen sense of smell, tremendous strength, females and calves live in groups for protection, big ears to keep cool.

Bottlenose Porpoise - streamlined body to glide easily, strong tail (moves up and down to make it easy for porpoise to surface for air every 5 minutes), good hearing, pointed teeth, live in groups for protection, communication system.

Brown Rat - live in colonies, easily adapts to environment, instincts, rapid reproductive rate, powerful teeth and claws.

The gnu - gives birth to calves in morning (allows calves to gain strength for the night as a protection from predators), lives in groups (herds), bearded throat for protection (fights on knees with horns), migration.

The chimpanzee - lives in groups for protection, easily climbs trees, makes much noiseto scare predators, makes and uses tools to get at food.

The following graphs were based on information taken from the September 1971 issue of Scientific American published by Scientific American, Inc. N. Y., N. Y.

They are used here to give an example of how table and graph skills may be taught using information based on Eskimo Life.

The graphs are used to contrast two Eskimo families. When reference is made to household I, this is a more traditional Eskimo household, one which lives in a quagmag, a low wood-frame tent some 20' long, 15' wide and seven feet high. These structures were covered with canvas, old mailbags and animal skins and were insulated with a 10 inch layer of dry shrubs. Approximately nine people lived in a quagmag and heated it with stone lamps that burned seal oil.

Household II was a wood house occupied by six people comprising a single family unit. The house was heated with a kerosene stove.

Use Graph I to fill in the answers below.

1. What is the total number of hours? _____

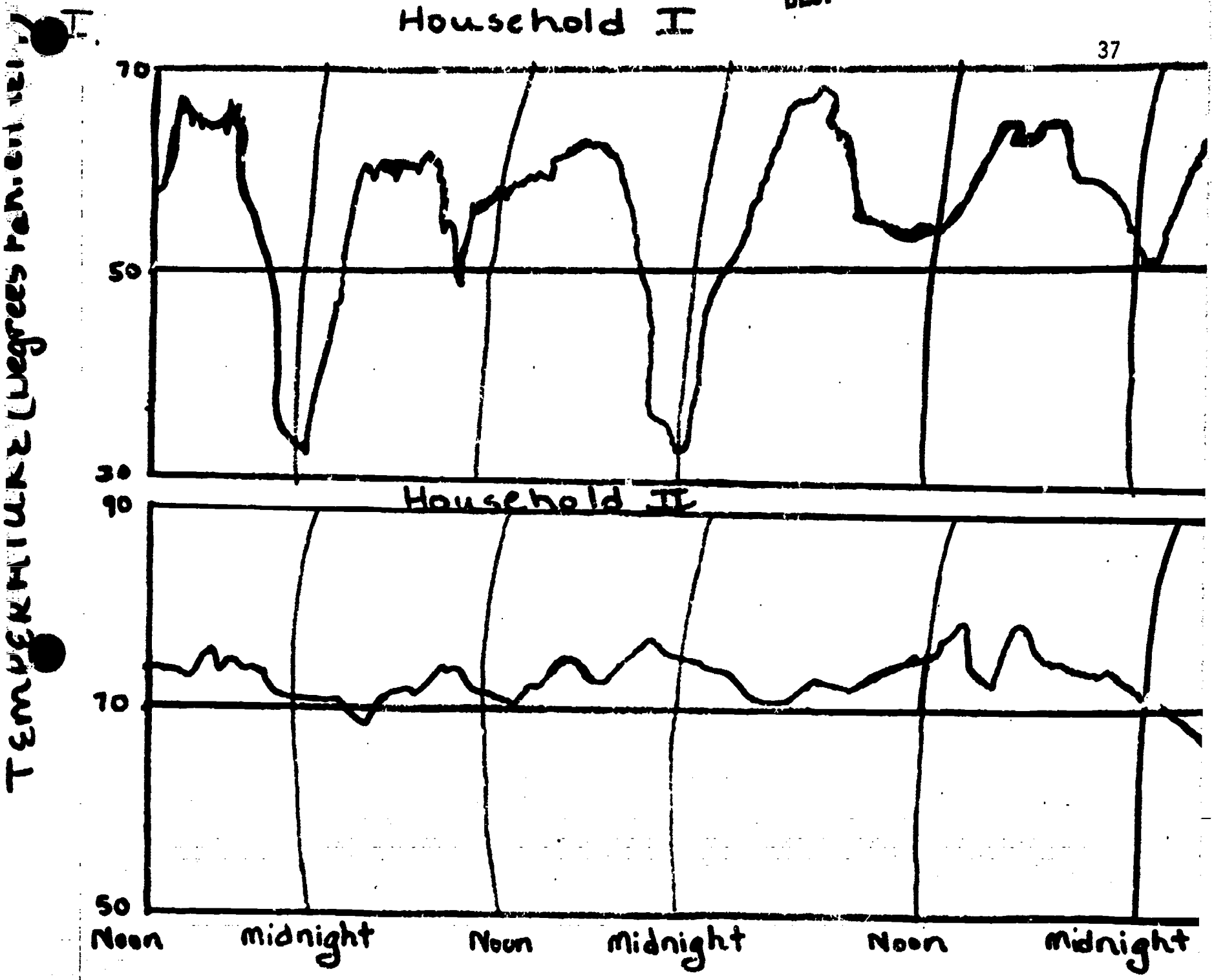
2. Which household has the greatest extremes in temperatures?

_____ _____

3. At what time does the temperature drop the greatest? _____

4. What is the warmest termperature on the graph? _____

5. What is the lowest temperature recorded? _____



Contrasting methods of heating maintained different house microclimates with the consumption of different amounts of fuel. In Household I (top), the more traditional one, the use of three lamps that burned seal oil produced an average temperature of 58 degrees F. A kerosene stove (bottom) in the more modern Household II kept the average closer to .5 degrees. As a result Household II used three gallons a day to the other's two.

Graph II

Gasoline consumption by two Eskimo households is shown over a 12-month period. The fuel was used to power the two snowmobiles and the marine engines that greatly increased the villagers' hunting efficiency. Purchases by the three hunters of Household I are shown in black and those by the single hunter of Household II are in slanted lines. Gasoline is second only to imported food among the exotic energy imputs to the Eskimo hunting society.

Use Graph II to fill in the answers to the questions below:

1. How many months are illustrated on the table? _____

2. Which household used the greatest amount of fuel? _____

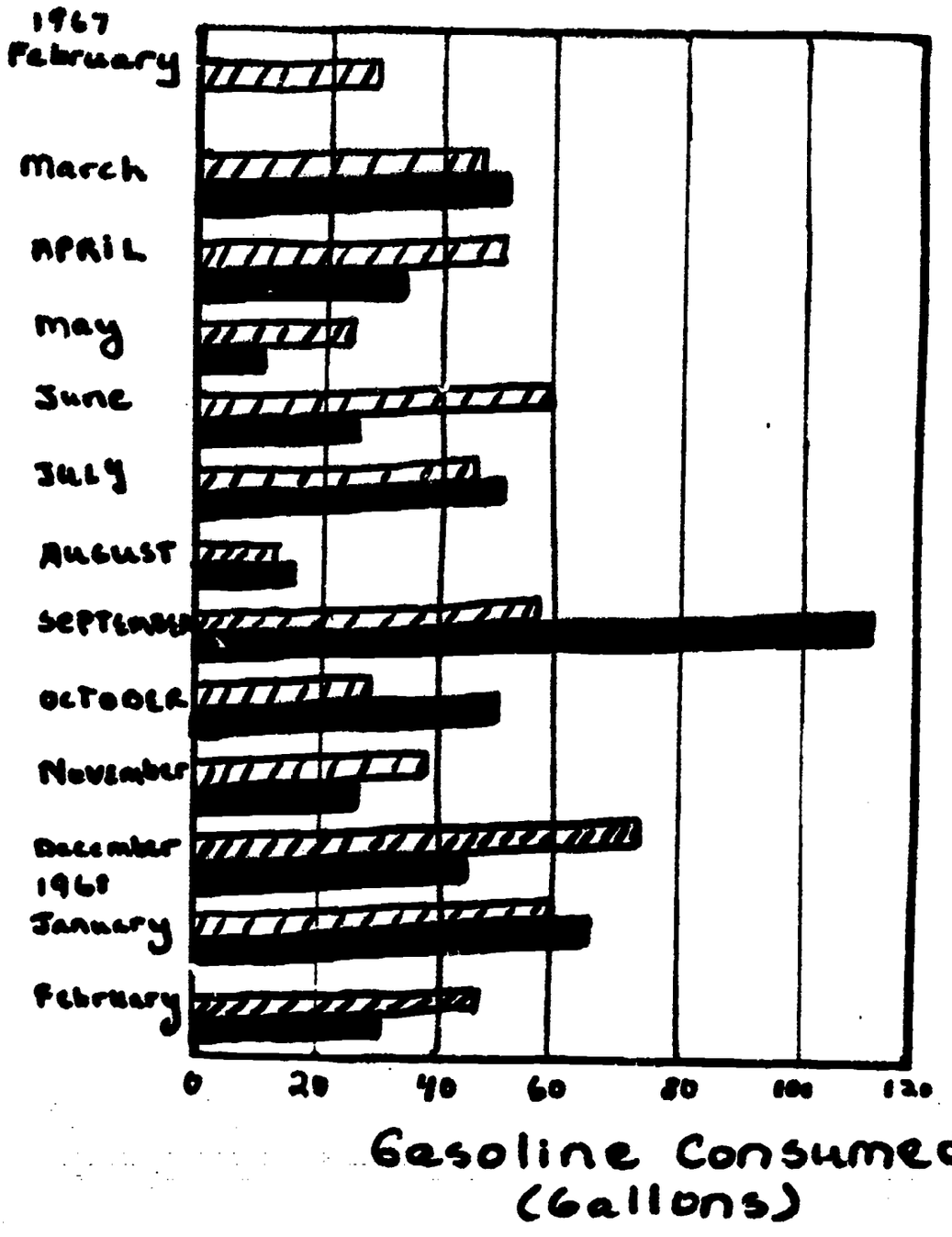
3. Which month was fuel consumption greatest for Household I.

_____

4. Which month was fuel consumption least for Household II.

_____

5. The gasoline consumed is measured in? _____



Graph III and Graph IV

Hunters' bag varies considerably from month to month as a result of chance and preference and also because of seasonal fluctuations. The top graph shows the wild foods acquired by Household I (black) and Household II (slanted lines) in the couse of 13 months. A fish known as arctic char, birds such as murres, geese and ducks, duck eggs and even berries add variety to the Eskimo diet from April through October, while caribou contribute to the smaller game bag of winter months. The 13-month totals, however, show that sea mammals (the common seal in particular) provide most of the Eskimo households' consumable kilocalories (bottom graph).

Use Graphs III and IV to answer the questions below.

1. Which animal provides the greatest amount of game for the Eskimo?

   _____

2. In which month are the greatest amount of caribou bagged? _____

3. Household II consumes the greatest amount of kilocalories during which month? _____

4. During August Household II depends on _____ for its supply of food.

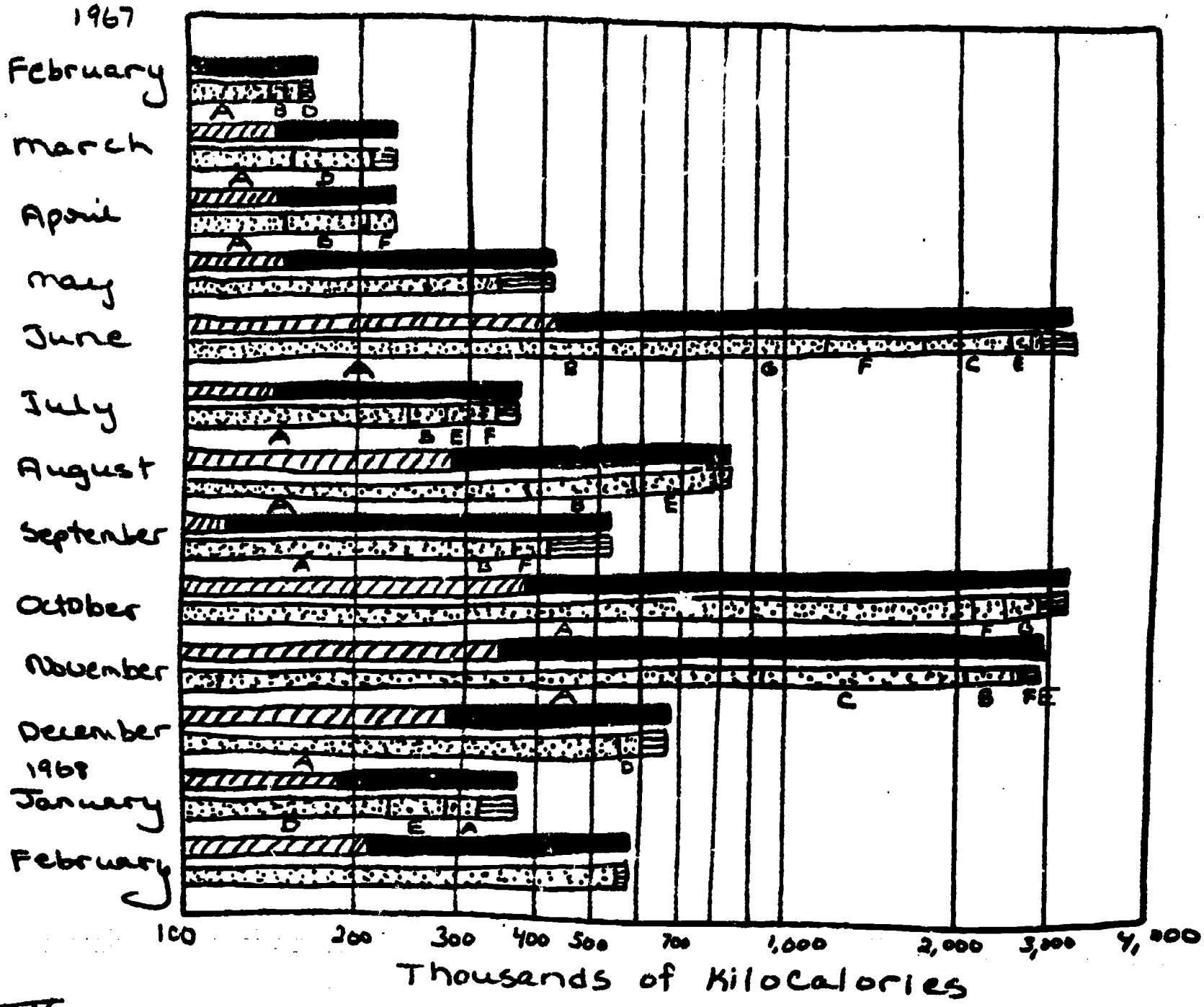
5. During June Household I depends on _____ for its supply of food.

6. Whale are bagged during the months of _____.

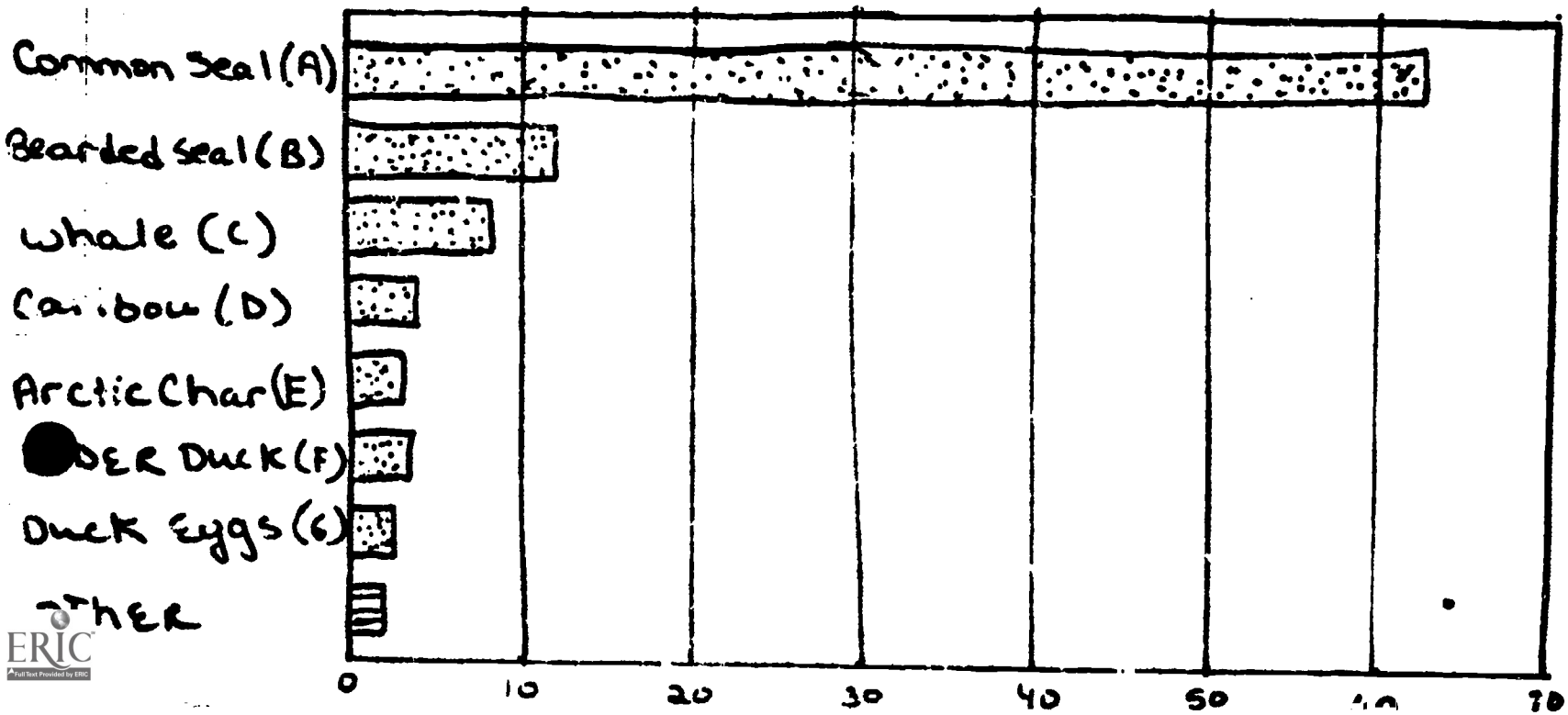
7. Household II has the least amount of game bagged during the month of _____.

8. February of 19___ had the greatest amount of calorie intake.

III.



IV.



Graphs V and Graph VI

Purchases of imported food also show large monthly variations. The top graph shows the kilocalorie values of staples such as flour, lard and sugar and of lesser items such as powdered milk, biscuits, soft drinks and candy acquired over 13 months by Household I (black) and Household II (slants). Most of the flour and lard went to make a kind of bread called bannock. The 13-month totals (bottom graph) show how the two households differed in the percentage of all store-food purchases that each allotted to flour and to lard.

Using graphs V and VI find the answers to the questions below.

1. During which month did Household I use the greatest amount of calories? _____

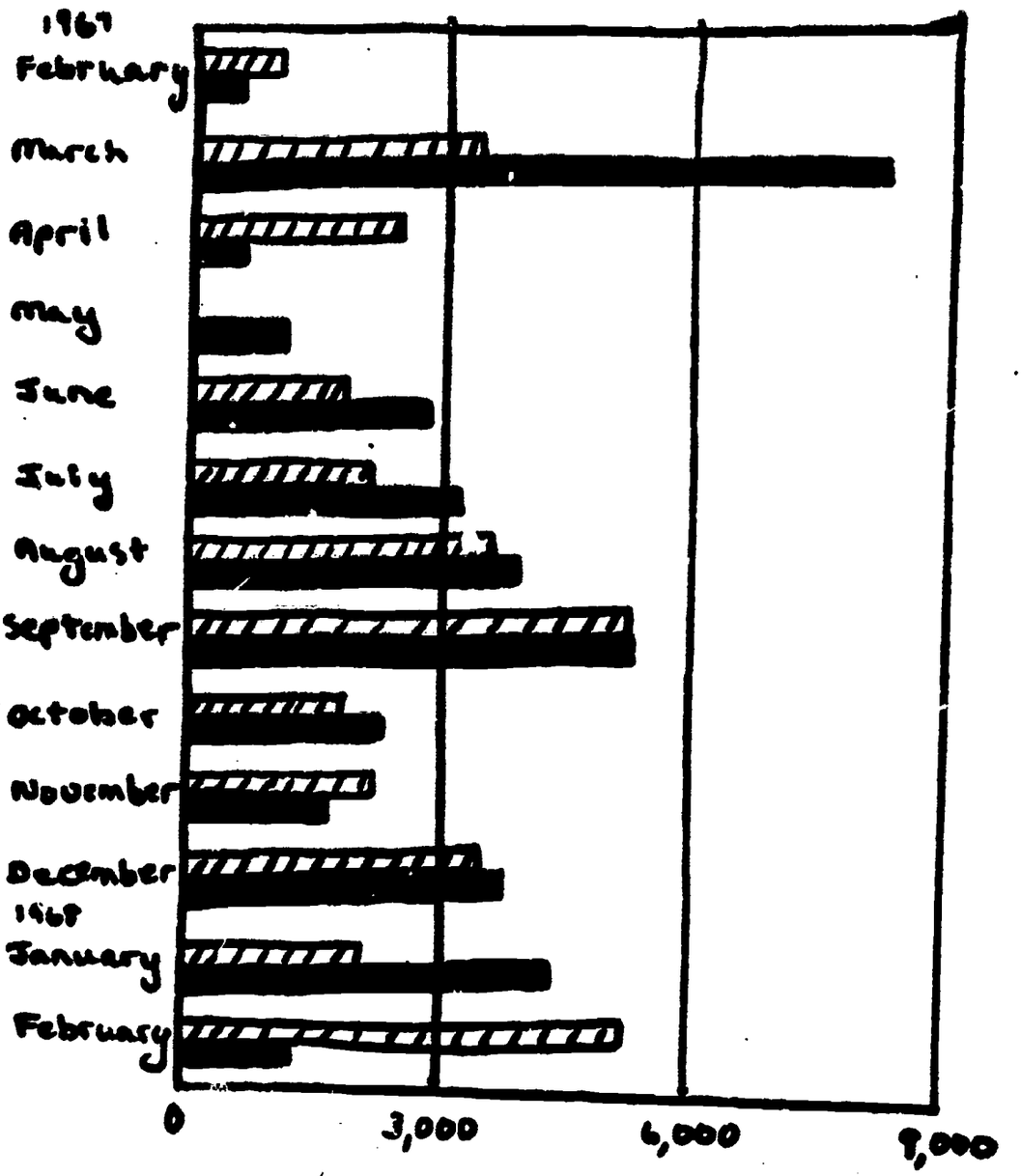
2. During which month did Household I and Household II use the same amount of calories? _____

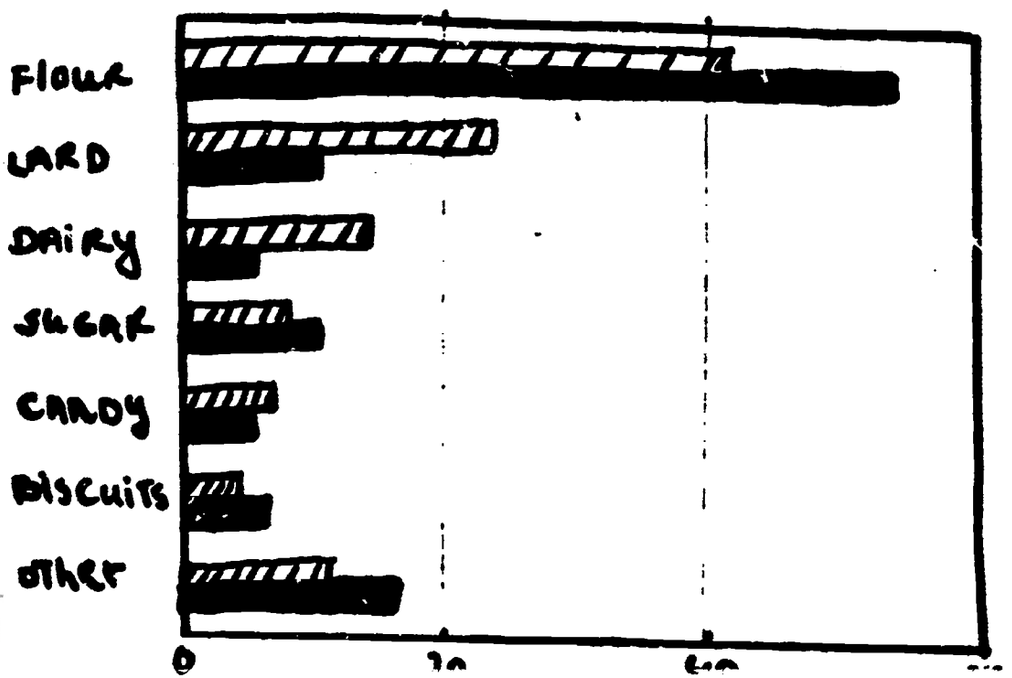
3. Which food was purchased the most by both households? _____

4. What is the percentage of calories allotted to sugar for Household I. _____

5. How many months are pictured on the table? _____

6. During which month does Household II use the least amount of purchased kilocalories? _____





Graph VII

Composition of diet is presented for a 13 month period in terms of monthly acquisitions of protein (top pair of bars), carbohydrates (middle pair of bars) and fat (bottom pair of bars), measured by hundreds of grams. The slanted lines on the bar of each pair indicates the number of grams acquired by hunting and gathering and the solid black bar indicates the number acquired in the form of store-food. Protein outranked the others in total acquisitions: 2.1 million grams, compared with 1.1 million grams of carbohydrates and .7 million grams of fat.

Using Graph VII, fill in the answers to the questions below:

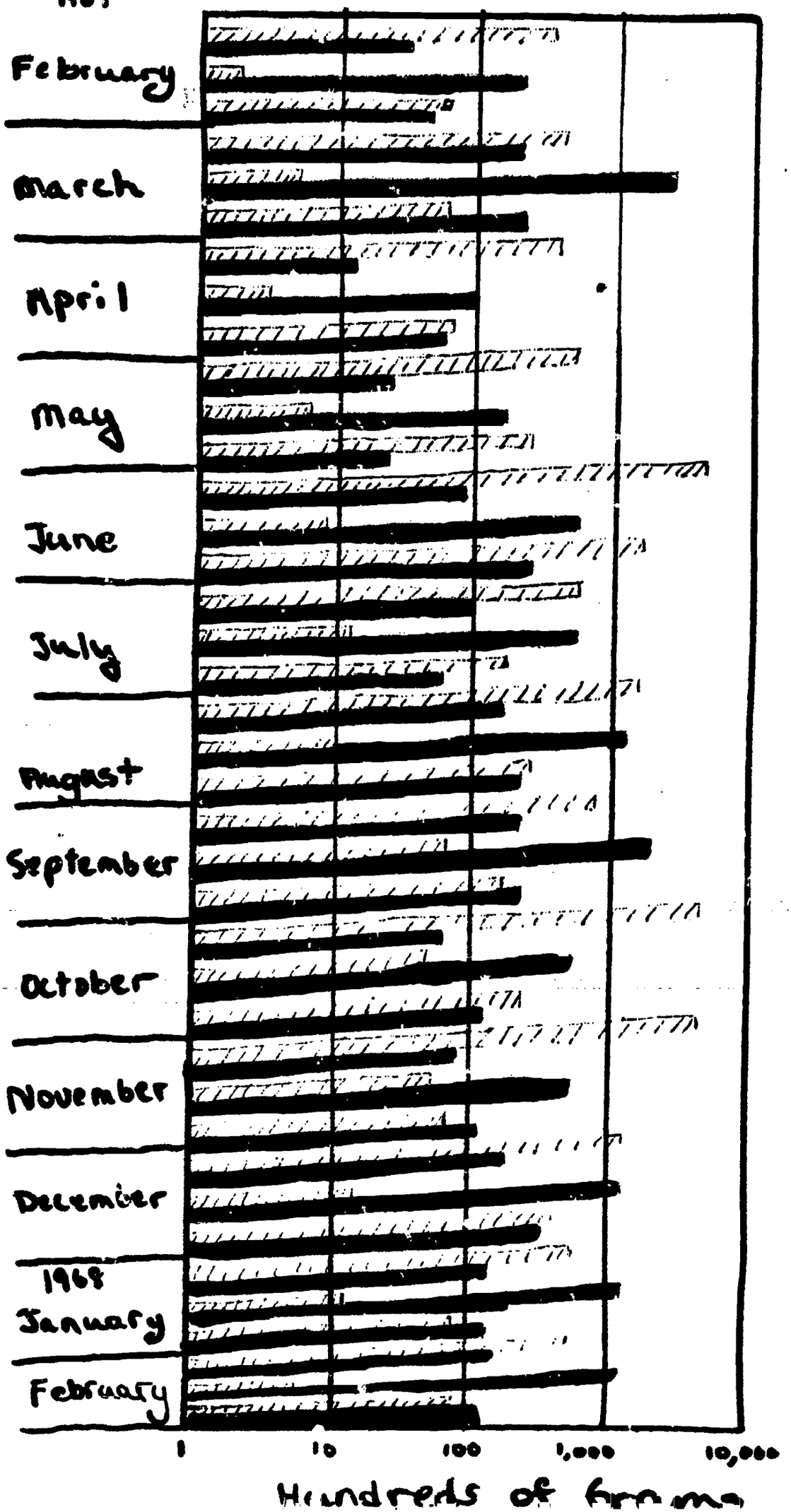
1. During October, how many grams of store-food were consumed? _____

2. _____ 1967 had the least amount of grams acquired by hunting and gathering food.

3. What was the greatest amount of grams consumed? _____

4. During March, the greatest amount of grams of food acquired by _____ was consumed.

5. The composition of diet of the Eskimo shows a great percentage of (protein, carbohydrates or fat) was consumed.



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2. Bothwell, Jean, Vanishing Wildlife of East Africa, Harcourt 1961.

3. Education Development Center, Inc., Man: A Course of Study, Curriculum Development Associates, 1970.

4. McClung, Robert, Lost Wild America, Morrow 1969.

5. National Geographic, "The Incredible Salmon", August 1968.

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Supplemental Language Arts Activity.

Using the vocabulary words introduced, give the students sentences where they have to put in the correct punctuation and underline the correct spelling and/or usage.

Example:

1. The (animals, animal's) of the tundra often use camouflage for (their, there) survival.

2. Did you (know, no) that man is trying (two, to) replenish salmon said tom.

3. Migration and flexibility of the Netsilik (is, are) essential to (there, their) survival.

4. Did you (know, no) that preening is a device (to, two) maintain the feathers of the gull Nancy said.

5. Animals of the tundra often have (to, two) go foraging for (their, there) food.

6. Is the interdependence of herbivores and carnivores (apparent, aparent) on the savanna asked Nancy.

7. We (are, our) accountable for (our, are) use of the environment.

8. The (baboon, baboon's) (habitant, habitat) (is, are) located on the savanna.

9. (It's, Its') determental to (our, are) habitat to pollute the atmosphere.

10. (Your. You're) methods of competition are determental (to, too) said John.

Vocabulary

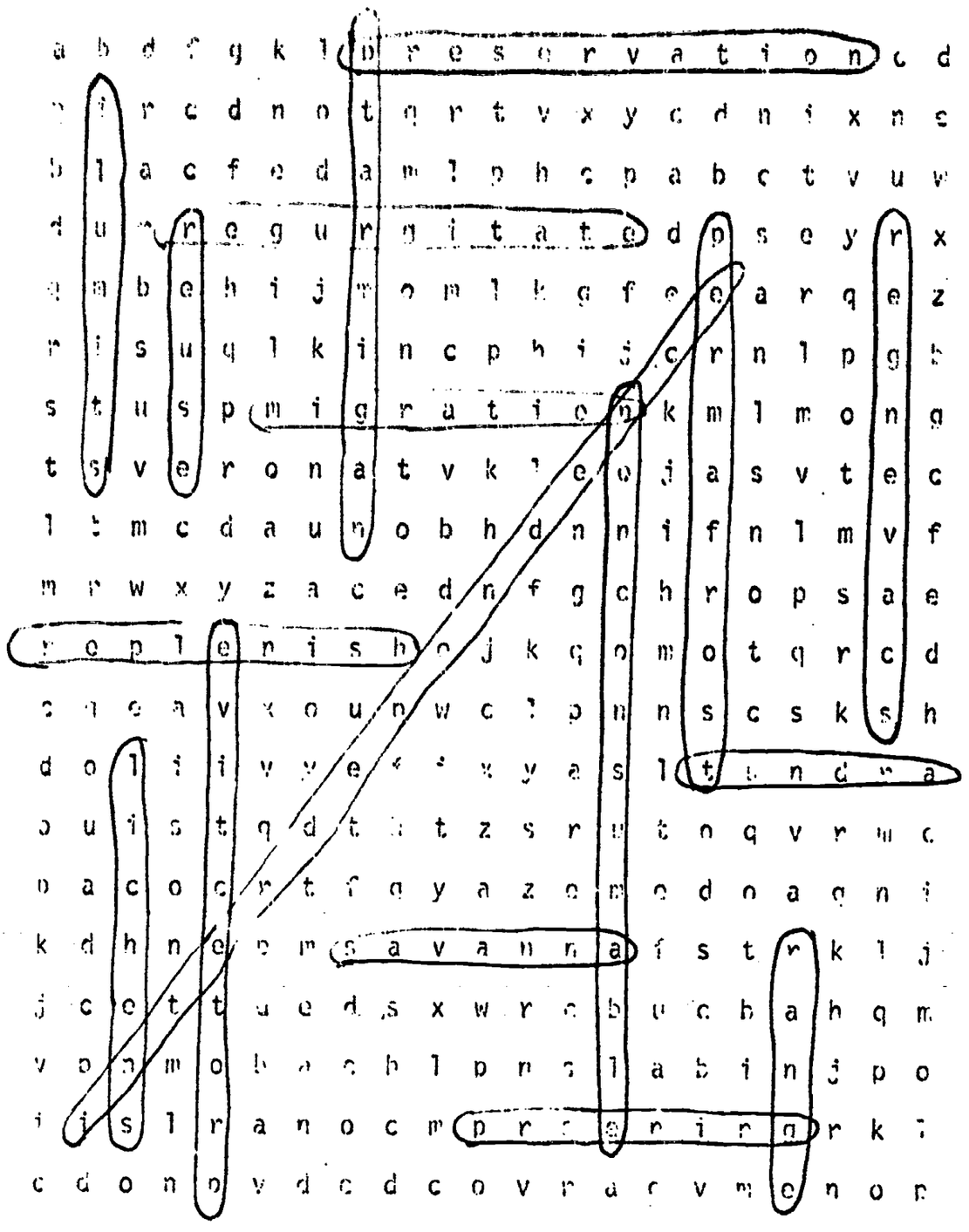
Directions: Find the vocabulary words listed below in the puzzle. When you recognize the correct word, circle it carefully.

a b d f g k l p r e s e r v a t i o n c d
p i r c d n o t q r t v x y c d n i x n e
b l a c f e d a m l p h c p a b c t v u w
d u r r e g u r g i t a t e d p s e y r x
q m b e h i j m o m l k g f e e a r q e z
r i s u q l k i n c p h i j c r n l p g b
s t u s p m i g r a t i o n k m l m o n g
t s v e r o n a t v k l e o j a s v t e c
l t m c d a u n o b h d n n i f n l m v f
m r w x y z a c e d n f g c h r o p s a e
r e p l e n i s h e j k q o m o t q r c d
c q e a v x o u p w c l p n n s c s k s h
d o l i i v y e f i x y a s l t u n d r a
o u i s t q d t h t z s r u t o q v r m c
p a c o c r t f g y a z e m e d o a g n i
k d h n e p m s a v a n n a f s t r k l j
j c e t t d e d s x w r c b u c b a h q m
v p n m o b a c h l p n s l a b i n j p o
i i s l r a n o c m p r e e n i n g r k l
c d o n p v d e d c o v r a q v m e n o p

interdependence, lichens, migration, nonconsumable, permafrost, ptarmigan, preening, preservation, protective, range, regurgitate, replenish, reuse, savanna, scavenger, stimuli, tundra.

Vocabulary

Directions: Find the vocabulary words listed below in the puzzle. When you recognize the correct word, circle it carefully.



interdependence, lichens, migration, nonconsumable, permafrost, ptarmigan, preening, preservation, protective, range, regurgitate, replenish, reuse, savanna, scavenger, stimuli, tundra.

Vocabulary

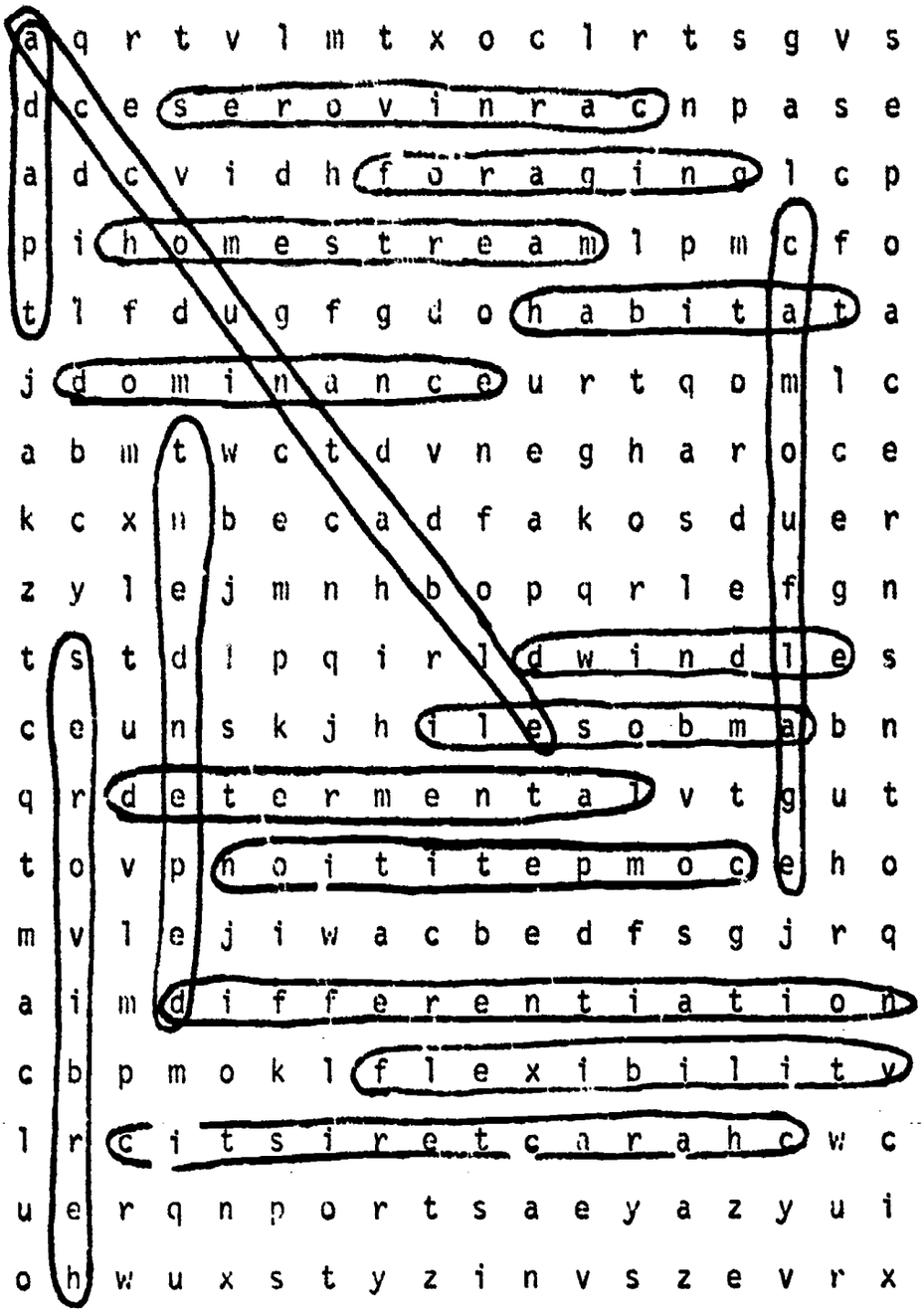
Directions: Find the vocabulary words listed below in the puzzle. When you recognize the correct word, circle it carefully.

a q r t v l m t x o c l r t s g v s
i s e s e r o v i n r a c n p a s e
a d c v i d h f o r a g i n g l c p
n i h o m e s t r e a m l p m c f o
t l f d u g f g d o h a b i t a t a
j d o m i n a n c e u r t q b m l c
a b m t w c t d v n e g h a r o c e
k c x n b e c a d f a k o s d u e r
z y l e j m n h b o p q r l e f g n
t s t d l p q i r l d w i n d l e s
c e u n s k j h i l e s o b m a b n
q r d e t e r m e n t a l v t g u t
t o v p n o l t i t e p m o c e h o
m v l e j i w a c b e d f s g j r q
a i m d i f f e r e n t i a t i o n
c b p m o k l f l e x i b i l i t y
l r c i t s i r e t c a r a h c w c
u e r q n p o r t s a e y a z y u i
o h w u x s t y z i n v s z e v r x

accountable, adapt, amboseli, camouflage, carnivores, characteristic, competition, dependent. detormental, differentiation, dominance, dwindle, flexibility, foraging, habitat, herbivores. homestream.

Vocabulary

Directions: Find the vocabulary words listed below in the puzzle. When you recognize the correct word, circle it carefully.



accountable, adapt, amboseli, camouflage, carnivores, characteristic, competition, dependent, determental, differentiation, dominance, dwindle, flexibility, foraging, habitat, herbivores, homestream.