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ABSTRACT

This booklet provides students with challenging and fun activities to encourage learning about the sustainability of natural forest resources. Activities include: (1) "Forest-opoly"; (2) "Lost in the Woods"; (3) "Chain of Changes"; (4) "Choices, Choices"; (5) "Conflicts & Controversies"; (6) "Tree Towns"; (7) "Feeding the Forest"; (8) "Get to the Heart of It"; (9) "How Many?!"; (10) "Name the Natives"; (11) "Taller Trees"; and (12) "Bird Words." (CCM)

Sustaining Our Forest Resource

What is Your Role?

Wisconsin Department of Natural Resources

PUB-FR-117 97

Introduction

You, as students, are the future stewards of the forest as you become consumers, landowners, producers, and decision makers. By doing the activities in this booklet you will learn about choices that we all make to help maintain the sustainability of our natural forest resource.

We hope you find these activities challenging, interesting, and fun! You can begin by learning the basics of sustainable **forestry** as you do Forest-opoly.

Forest-opoly

1. **Sustainable forestry** means getting as many logs out of the forest as possible without getting hurt.

   If you answer Yes, go to number 4.

   If you answer No, go to number 6.

2. If you're reading this, you're lost in the woods already! You don't take this quiz in numerical order. Return to number 1 and go where the answer sends you.

3. Unfortunately, this isn't the case. Many great civilizations have fallen by taking more out of their resources than the resources could provide. Go back and try 9 again.

4. Sorry! Sustainable forestry is more than growing trees to cut them. Try 1 again.

5. Yes! Healthy forests now and in the future depend on the more than 240,000 private individuals who own 60% of Wisconsin forests. Now go to 12 and give it a try.

6. Good! Sustainable forestry balances what we need from the forest today, including wood production, recreation, wildlife **habitat**, and scenic beauty, with the needs of generations to come. Now go on to 9.

7. Sad, but true. In both ancient Greek and Roman civilizations, growing populations, their heavy use of wood for energy, and soil depletion all contributed to the collapse of their societies. When societies fail to use their **natural resources** wisely, they come crashing down, even the greatest ones. Pull yourself together and give 11 a try.

8. Sorry, thinking about space benefits more than the crew of the Enterprise. Beam back to 12 and try again.

9. Humans have always managed their resources well.

   Yes, certainly — go to 3.

   No, not always — to 7.

10. Approximately 1,800 species of native plants and 657 species of native vertebrates have been identified in Wisconsin. Helping ensure biodiversity across Wisconsin's landscape is an important part of sustainable forestry. Now go to 32.

11. Who decides how Wisconsin's forests will be managed?

    Private citizens. Go to 5.

    The government, of course. Go to 13.

12. Sustainable forestry deals with "space."

    No. What is this, a Star Trek quiz? Beam yourself to 8.

    Sounds reasonable. Go to 17.

13. Not true. Only 30% of Wisconsin's forests are owned by the public and managed by county, state, federal, or tribal agencies. Go back to 11.

14. How do **foresters** use time in making "sustainable" decisions?

    It's important to know the best time to cut all the trees. Buzz over to 18.

    They look into the future. Find your way to 20.

15. Everyone knows the tropics have lots of different species of plants and animals, which is also known as **biodiversity**. In Wisconsin, we don't have biodiversity because we have only a handful of different plants and animals.

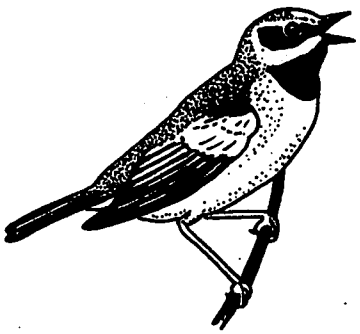
    Yes, we do have biodiversity! Go to 10.

    No, we don't have much biodiversity here. Go to 21.

16. Insect-eating songbirds that nest in northern Wisconsin in the summer depend on healthy forests in Central America.

    Of course they do! Go to 23.

    That's going too far. Go to 19.



17. Well done! The "space" in sustainable forestry is the whole world! Forests of the world are interconnected. For example, some birds spend the winter in the forests of Central America and the summer in northern Wisconsin. Only by looking at the big picture can we make good decisions about individual trees. Head over to 14 to see where time fits into the picture.

18. Bzzt. Remember, sustainable forestry is more than cutting trees. Go back to 14 and try again.

19. No, it's not going too far! Many songbirds migrate over 2,300 miles to Central America for winter because it's warmer and there are insects to eat, which is not true here in the frozen north. Fly on back to 16.

20. Right — the future holds the answers! Forest management choices must be made to provide the things we expect from our forests today while maintaining the ability to meet future needs. Since crystal balls aren't available, technological advances and good scientific data supply the answers! Good work! Now try 16.

21. Although it is true that the tropics support more species of plants and animals than live in Wisconsin, go to 10 to see just how many different species live in our state!

22. Luckily, you're wrong! Try 25 again.

23. Yes! As part of a huge forest puzzle, songbirds interact with each other and with their environment. When any piece of the puzzle changes, such as the health of their wintering ground, songbirds will be affected. Each species of forest plants and animals is an important piece in the puzzle. Now try 25.

24. You're an optimist! Great! There is a direct link between a healthy environment and the choices we make as consumers of our natural resources. Every time you buy something, use something, or throw it away, there are consequences somewhere in the environment. You can make a difference by learning how to be a good consumer and making responsible choices! Now try 34.

25. Each year, Wisconsin is losing more and more forest lands.

    That's right. Go to 22.

    No way. Go to 28.

26. Most people agree that saving the forest resource for wildlife habitat and scenic beauty is more important than harvesting timber for paper, wood products, or fuel.

    If they don't, they should! Go to 33.

    Disagree. Go to 31.

27. Not so. Sustainable forestry is about balancing our various needs for the present with the needs of future generations. Go to 30 to learn how forests are more than trees.

28. From 1968 - 1983, Wisconsin's forest land rose from 14.9 million acres to 15.4 million acres. This increase amounted to an average gain of 27,000 acres a year. Move to 26.

29. Hey, don't give up! There's always something you can do to help! Try 32 again.

30. Well done! Sustainable forestry balances the harvesting of trees for useful products with the **conservation** of soil, air and water quality, wildlife and fish habitat, as well as beauty and recreational uses. Each of us must make choices that will meet our needs as well as those of our children's children. Congratulations, you're on your way to being a responsible steward of the environment!

31. Sustainable forestry means that forests can be managed to meet many needs. Forests can meet ecological needs such as wildlife habitat, economic needs such as timber, and cultural needs such as scenic beauty. We can have a healthy economy, a healthy environment, and a strong culture. But we may not be able to have all we want or as much as we want of everything. Go to 15.

32. Considering how bad the world's ecological crisis is and how big the problem is, there's not much I can do as an individual to make a difference.

    Sad, but true! Go to 29.

    Hogwash! Go to 24.

33. Not necessarily. Natural resources are used to meet many of our society's needs including cultural (scenic beauty), economic (timber) and ecological (wildlife habitat). Try 26 again.

34. The main thing I learned from this quiz is that sustainable forestry is about trees! trees! trees!

    Well, of course! Go to 27.

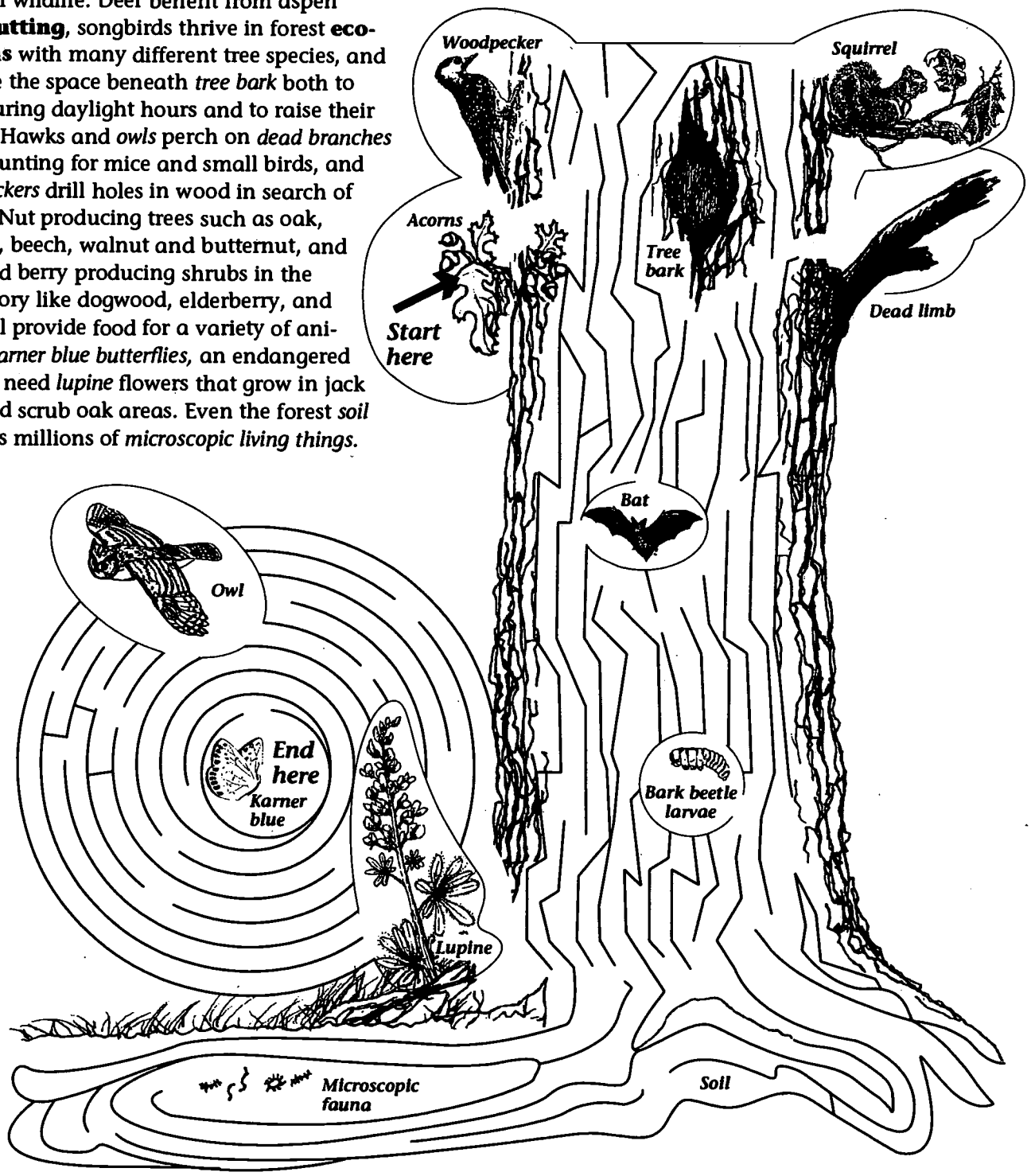
    I don't think so. Go to 30.

Lost in the Woods

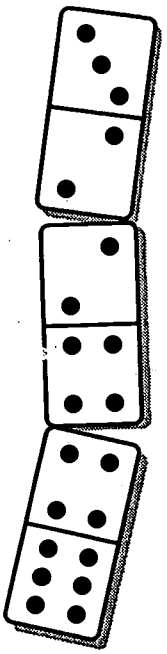
Think of sustainable forestry as a huge maze, with the goal being a healthy forest now and in the future. To complete the picture, many pieces have to be considered. Along with recreation, timber production, soil and water conservation and other pieces, it takes wildlife to win the game.

Sustainable forestry practices consider the habitat needs of wildlife. Deer benefit from aspen **clearcutting**, songbirds thrive in forest **ecosystems** with many different tree species, and *bats* use the space beneath *tree bark* both to roost during daylight hours and to raise their young. Hawks and *owls* perch on *dead branches* while hunting for mice and small birds, and *woodpeckers* drill holes in wood in search of *insects*. Nut producing trees such as oak, hickory, beech, walnut and butternut, and seed and berry producing shrubs in the understory like dogwood, elderberry, and alder all provide food for a variety of animals. *Karner blue butterflies,* an endangered species, need *lupine* flowers that grow in jack pine and scrub oak areas. Even the forest *soil* supports millions of *microscopic living things.*

To complete this maze you are required to pass through something a forest provides (acorns) and then go to an animal that needs it (squirrel). Start at the acorns, and without lifting your pencil, find your way to the Karner Blue butterfly. In nature's complicated puzzle, the survival of various kinds of wildlife depends on the health and makeup of the forest.



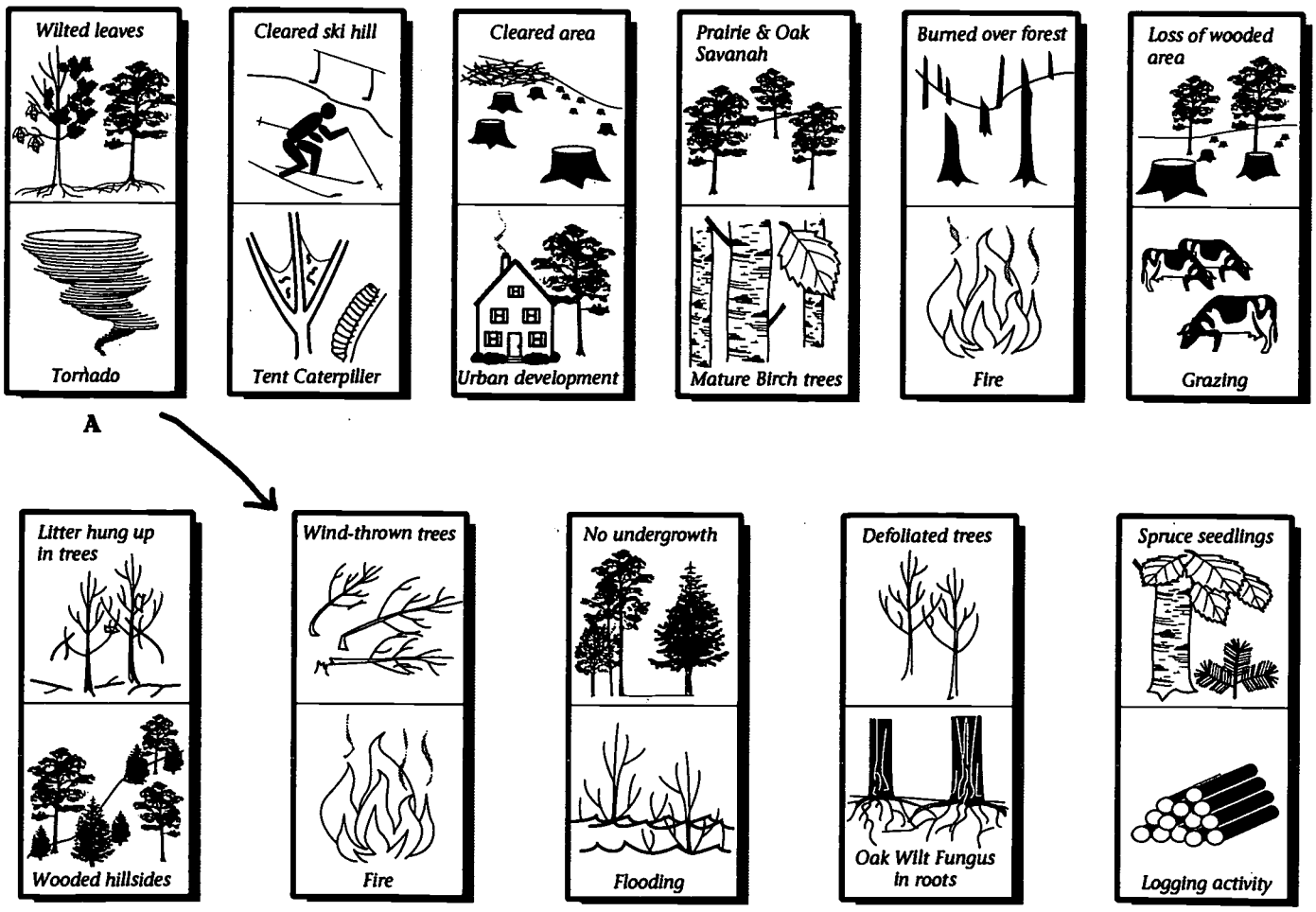
Chain of Changes



Forests are flexible, dynamic natural systems where change is normal. Change occurs both through nature and human intervention. Change can take place slowly over time, as forest species replace one another in a process called **succession,** or it can occur rapidly, when wind, fire, or insects disturb the way a forest is growing and cause new growth patterns to begin. Humans, too, cause changes in the forest through land use choices such as timber harvesting practices and recreational use. Given all these influences, there is no way we can put a glass bubble over a forest and keep it the same forever. Forests are an unfolding event, not a finished product.

The dominoes below, like their spotted counterparts, can be linked together to create a chain. In this activity, they will create a chain of forest stories. The pictures on the dominoes suggest a chain of events caused by either natural or human-made changes that can occur in a forest. The bottom half of each domino begins a forest story about change. You'll find the effect of that change which is the rest of the story, on the top half of another domino.

Begin at the bottom of domino A and draw a line to the top of a domino that describes the likely change. Now go to the bottom picture on that domino and find its effect on the top of another domino. Eventually the story chain will end up at the top of domino A.

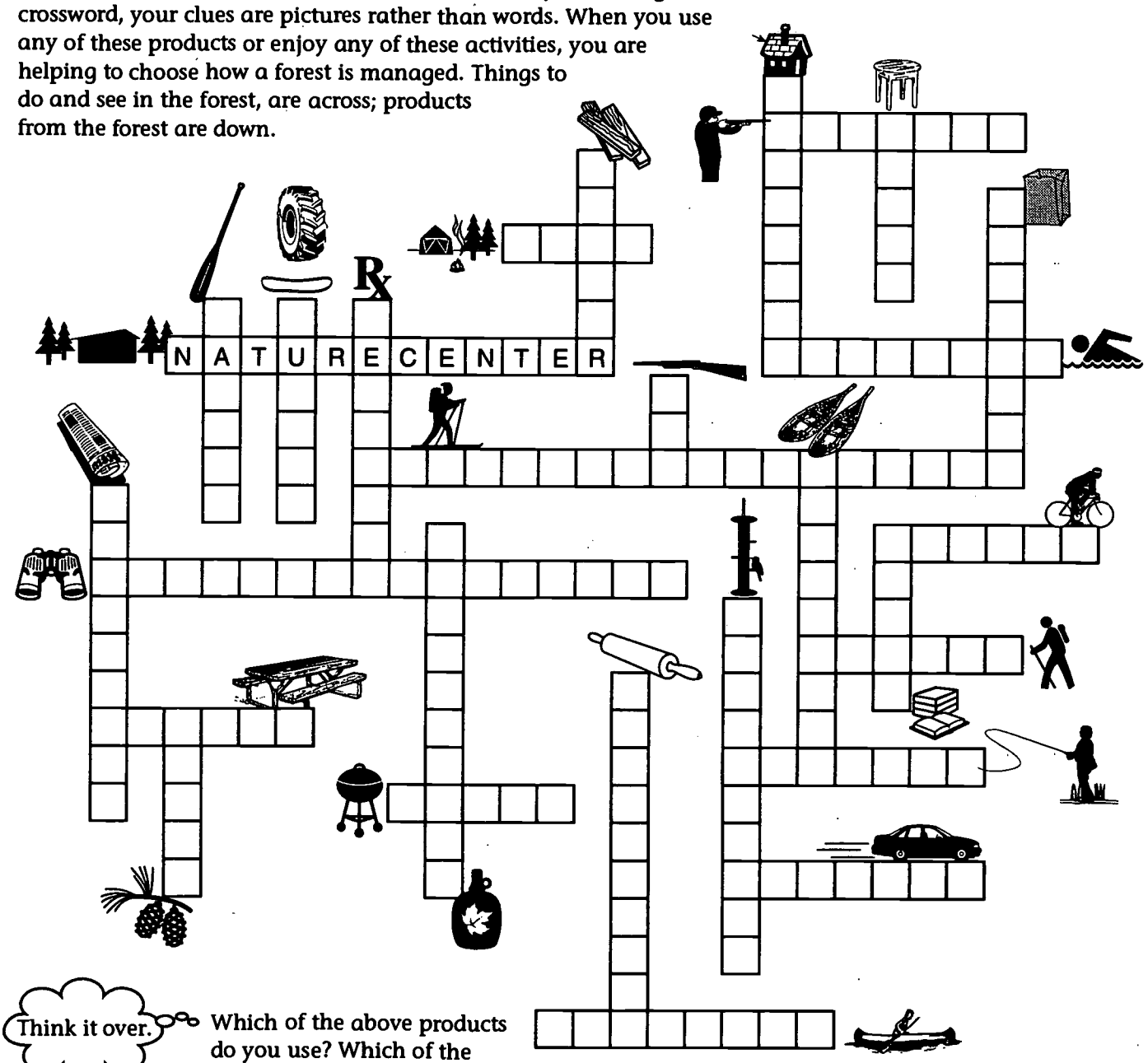


Choices, Choices

When we manage our forests, we must make choices about the products that can be produced and the types of activities that can take place in a particular forest. Our choices affect the variety of benefits we receive from our forests. Products such as lumber, minerals, maple syrup, and paper are desired. Fishing, hunting, cross-country skiing, and wildlife watching are activities many people enjoy in our forests. Not all products can be produced by the same forest, just as not all activities can take place in the same area at the same time.

By using sustainable forestry principles when making choices on how to manage a particular forest, forest managers are able to meet the needs of people, wildlife, and the forest itself, for today and for future generations.

The picture crossword below will help you learn about some of the many products and activities for which a forest may be managed. In this crossword, your clues are pictures rather than words. When you use any of these products or enjoy any of these activities, you are helping to choose how a forest is managed. Things to do and see in the forest, are across; products from the forest are down.



Think it over.

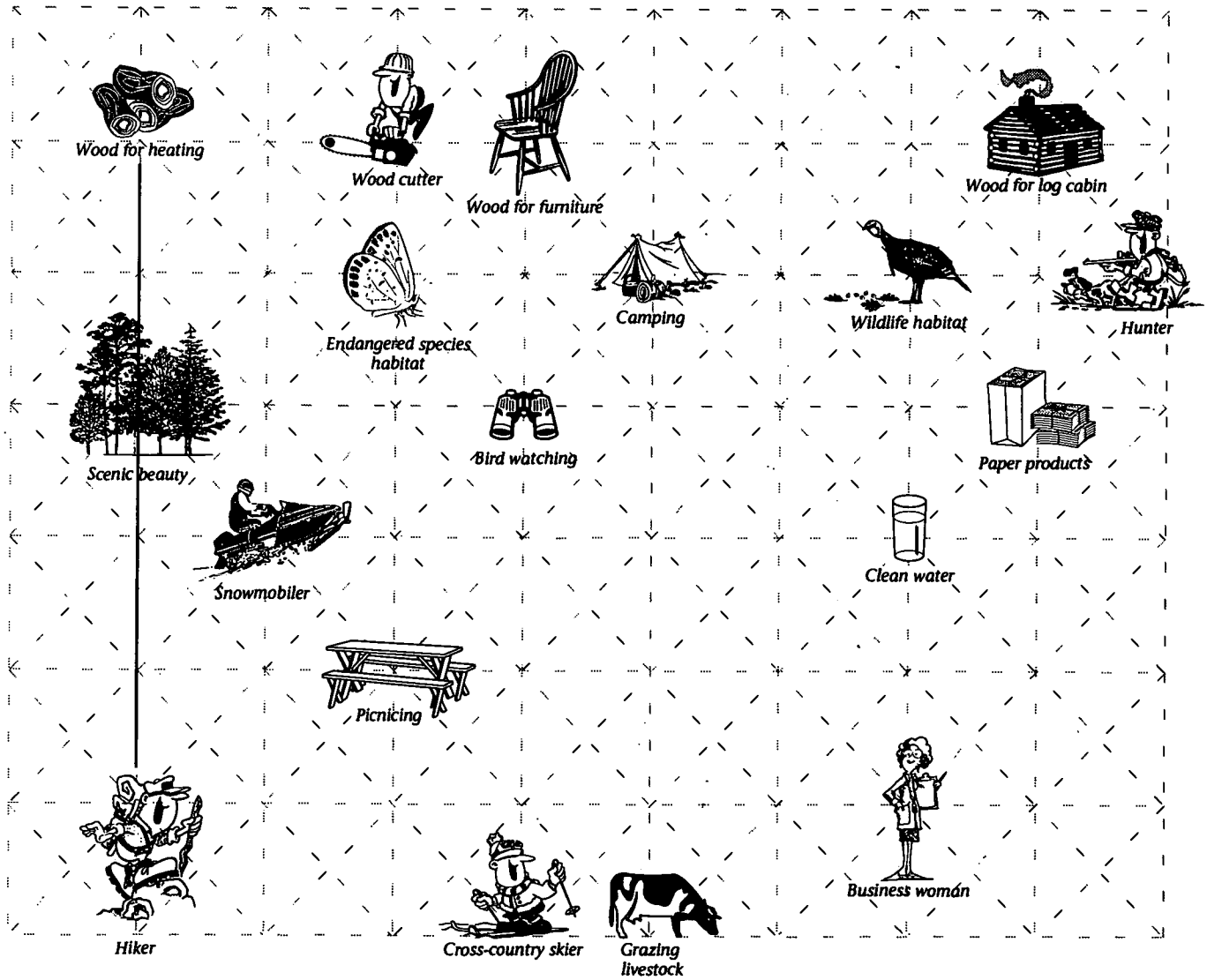
Which of the above products do you use? Which of the above activities do you enjoy? Ask someone else what his or her choices would be.

Conflicts & Controversies

We use forests in many ways including harvesting timber, camping, hiking, hunting, fishing, and grazing livestock. Forests are also valuable for fish and wildlife habitat, soil conservation, scenic beauty, keeping water clean, and preserving **biodiversity**.

Each of us has certain ideas about how the forest resource should be used. All of these demands often add up to more than any one forest can supply, so choices have to be made. Some of these choices might eliminate other choices and conflicts may arise. Each of us is responsible for our forests; we all have a responsibility to make choices that meet the needs of people as well as the needs of the forest and its inhabitants, both for today and tomorrow.

Each person below has two distinct ideas about choices for forest management. Draw a vertical, horizontal, or diagonal line from each person connecting them with their choices. No picture can be crossed more than once and each picture is used one time.



Think it over.

Which of these demands can the forest resource meet at the same time? Which choices might result in conflict? How should we resolve conflicts? Who should decide how the forest resource is used?

Ask someone else what he or she thinks.

Tree Towns

Eighty percent of the people in Wisconsin live in a forest! How can this be? The trees, school yards, community parks, riverbanks, vacant lots, cemetaries, and suburban housing tracts in and around our towns, cities and villages are part of our **urban** forest. Maintaining a healthy urban forest enhances the quality of life for those of us who live in the midst of our tree towns. Sustainable urban forestry manages the needs of both the human and plant community for future generations, since we are all part of the urban forest community.

Fill in the blanks in the statements below to learn more about urban forestry and to find out what you can do to take care of the trees in your town. All of the answers you will need are listed below. Then fill in each letter with its corresponding number on the bottom line to find out what you can do to help support sustainable urban forestry in your community.

1. Trees in our cities release _ _ _ _ _ _ (25) for us to breathe as well as take in _ _ _ _ _ _ (3) _ _ _ _ _ _ _ (10, 22).

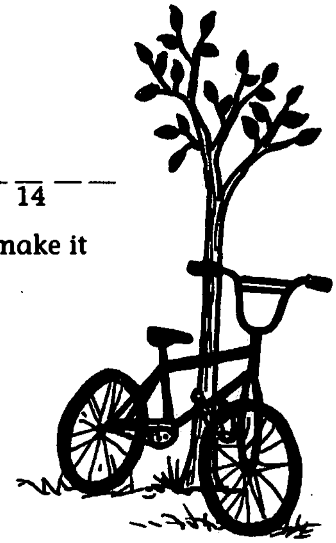
2. On a summer day, trees provide welcome cooling and _ _ _ _ _ _ _ (21, 17).

3. During a _ _ _ _ _ _ _ _ _ (28, 15), water runs off sidewalks and streets, right into storm sewers. This _ _ _ _ _ _ (23, 19), which can cause flooding, is reduced when trees intercept rain letting it soak gradually into unpaved ground around the tree.

4. Sound urban forestry includes thinking about our energy supply and planting for energy _ _ _ _ _ _ _ _ _ _ _ _ _ _ (31, 17, 13, 4). Trees planted on the north side of a building protect it from the coldest winter winds. This can lower _ _ _ _ _ _ _ (7, 27, 11) bills by 10-20%! Planting a tree on the _ _ _ _ _ (20 26) side will help make your house cooler in the summer.

5. To be sustainable, an urban forest should have a _ _ _ _ _ _ _ _ (9, 32, 5) of tree species, so that a certain insect or _ _ _ _ _ _ _ (24, 16, 8) can't damage all of the trees in one area.

6. Urban trees are not in their native habitat and things like ___ ___ ___ ___ (11) ___ (30) ___ ___ (14) ___ ___ soil, weed killers, ___ ___ (18) ___ ___ ___ ___ (2) ___ ___ chained to trees, and lawnmowers make it difficult for trees in town to survive.



7. Having trees in our towns makes us feel better and our cities look better. Urban trees also provide ___ ___ (12) ___ ___ (29) ___ (6) ___ ___, food, and homes for wildlife.

Tree Town answers: heating disease compacted runoff variety carbon dioxide downpour oxygen bicycles conservation bicycles south shading shelter

___ ___ ___ ___ ___ (1 2 3 4 5) ___ ___ ___ (6 7 8) ___ ___ ___ ___ ___ (9 10 11 12 13) ___ ___ ___ ___ (14 15 16 17) ___ ___ (18 19) ___ ___ ___ (20 21 22) ___ ___ ___ ___ ___ (23 24 25 26 27) ___ ___ ___ ___ ___. (28 29 30 31 32)

Feeding the Forest

What tree crop feeds more forest animals than any other?

To figure out the answer to the above question, answer the questions below and draw lines connecting the correct answers in the left column with the same number in the right column. Circle the letters your line passes through and write them on the blanks below. These letters spell the answer to the question above.

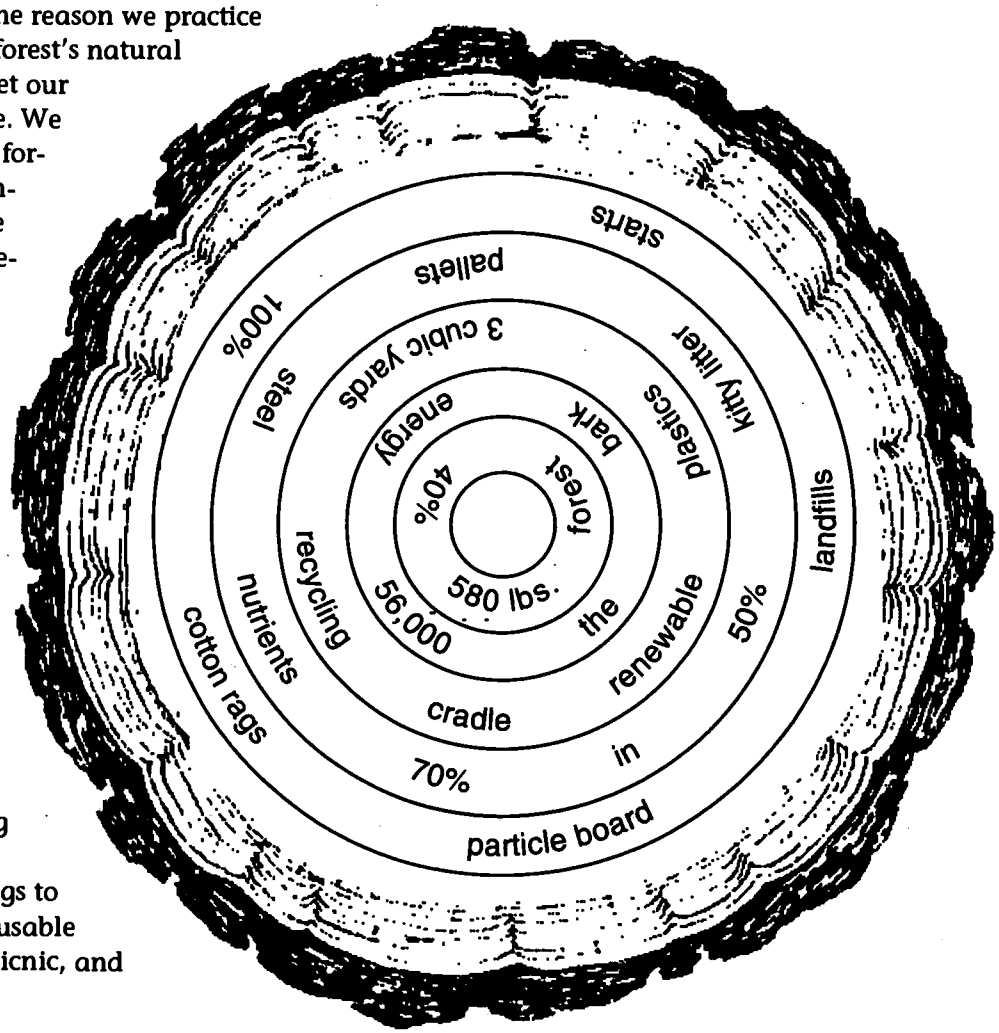
1. The earth's population will double from 5.8 billion to 11.6 billion people within how many years?
2. Wisconsin's first forester, E.M. Griffith, was hired how many years ago?
3. Each American uses the equivalent of how tall a tree (in feet) in one year?
4. How many trees would a 12 year old have to plant to offset the amount of carbon she will put into the atmosphere during her lifetime?
5. How many years old is Smokey Bear?

>90	E	L	X	**70**
111	A	R	B	**29**
65	D		C	**111**
83	F	M		**100**
100	O	H	U	**>90**
>50		R		**>50**
29	P	S	N	**83**
70	I	W	T	**65**

_____ _____ _____ _____ _____

Get to the Heart of It

We use natural resources such as oil, trees, and aluminum to meet our needs. One reason we practice sustainable forestry is so the forest's natural resources will continue to meet our needs for generations to come. We can help support sustainable forestry by making good environmental choices that minimize our use of **non-renewable** resources and meet as many of our needs as possible by using **renewable** resources.



Oil is a non-renewable resource, while trees are a renewable resource. We can plant new trees to replace the ones we've used and we can recycle many forest products. Today, more than 1.97 million tons of recycled paper are used to make new useful products. Wisconsin is the leading recycler of paper, as well as a leader in recycling other forest products. You can help by bringing your own bags to the grocery store, by using re-usable containers for your lunch or picnic, and by recycling.

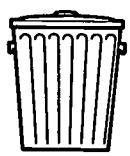
Answer the questions below to learn more about recycling. The answers are in the tree cross section. Cross out the answers as they are used. Put the words that are left in the right order to make a phrase that will help you remember what you learn here.

1. Nature recycles too, when tree leaves or needles fall and decay, what is recycled back into the soil?

2. Instead of a product going from "cradle to grave," we now think of how a product can go from "cradle to _____."

3. What is the amount of paper used by an average American in one year?

4. What is the percent of garbage thrown out by Americans each year that could be recycled?



5. Paper products make up what percentage of our landfill waste?

6. What was the first paper made in an American paper mill made of?

7. To make each product we use, a source of renewable or non-renewable _____ is needed.

8. Even a product that is recycled does not return _____ of the energy used to create it.

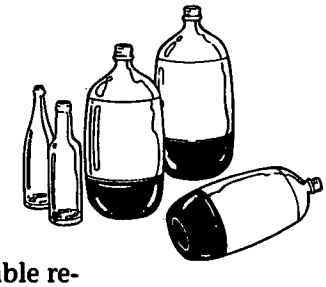
9. Trees are a _____ resource.

10. Since 1980, the state's papermakers have increased the amount of recycled fiber used in the manufacturing process by what percentage?

11. While it is important to recycle newspapers to provide the basis for more newsprint, the biggest reason to recycle them is to reduce the amount of material going into _____.

12. What is the amount of landfill space saved by each ton of recycled paper?

13. Wisconsin businesses spend about $7 million a year to dispose of 500,000 tons of wood residue in the form of _____.



14. To make plastics, the U.S. uses a billion barrels of petroleum by-products (a non-renewable resource) each year. How many olympic sized swimming pools could that fill each year?

15. Some papers are difficult to recycle because of the glues, **resins**, and _____ they contain.

16. What is one product currently made with some of the leftover material from a paper recycling mill?

17. Wood shavings used to be thrown away. Now they are used to make what kind of product important in furniture manufacturing?

18. What tree product is commonly used as fuel in boilers to create energy for forest industry mills?

19. Producing aluminum requires more energy than producing _____ but vehicles constructed with aluminum are lighter and take less energy to propel.

How Many?!

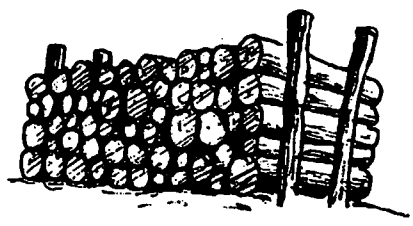
It requires 15 trees with a diameter of 10 inches at chest height to produce a **cord** of wood. A cord is a stack of cut fuel wood measuring 4 feet by 4 feet by 8 feet.

One cord of wood yields 7,500,000 what?

Unscramble the words and match the numbered letters in the blanks below to discover the answer.

otsefr	thicp	gwti	yihcrok
_ _ _ _ _ _	_ _ _ _ _	_ _ _ _	_ _ _ _ _ _ _
3 10	6 1 8	4 7	5 9 2

Answer: _ _ _ _ _ _ _ _ _ _
1 2 3 4 5 6 7 8 9 10



Name the Natives

Can you name ten trees native to Wisconsin? Native trees are trees that occur naturally and were not introduced to the area by people. Native Wisconsin trees include red and white pine, silver and sugar maple, red and white oak, beech, slippery elm, and a variety of other species. We have several kinds of forest communities in Wisconsin, each containing a different variety of native tree species.

Two hundred years ago a single forest stand usually contained a rich variety of native species. Naturally occurring succession, as well as human impacts, which include logging, farming, and building, can greatly affect the number of different species of native trees present in a forest community.

Sustainable forestry strives for a healthy and diverse forest ecosystem that contains the natural variety of trees native to the region. The health of these diverse forest ecosystems will help ensure their continued presence, meeting today's needs as well as tomorrows.

Read the sentences below carefully! Each sentence contains one or more native Wisconsin trees. Underline the tree species when you find them. There are 21 species in all. The first sentence has an example underlined for you.

1. Will Owen like it better if you put the chair on wood floors?

2. It scared ma plenty when that bee chased first Slippery Elmo and then Hannibal Sam firmly around the tree.

3. If you have thick or yellow mucus, you must hurry to Dr. Obirche!

4. Look by the shack. Berry canes were thick there but that wild plumber has Penelope with him and they may have picked them all.

5. The silver map leads me to agree Nashville must be the home of the secret metal archway.

6. If indeed a pub lack oaken counters, it be a poor place, darling.

7. Please give Beth Emlock, President of P.P. Inc., her rye bread.

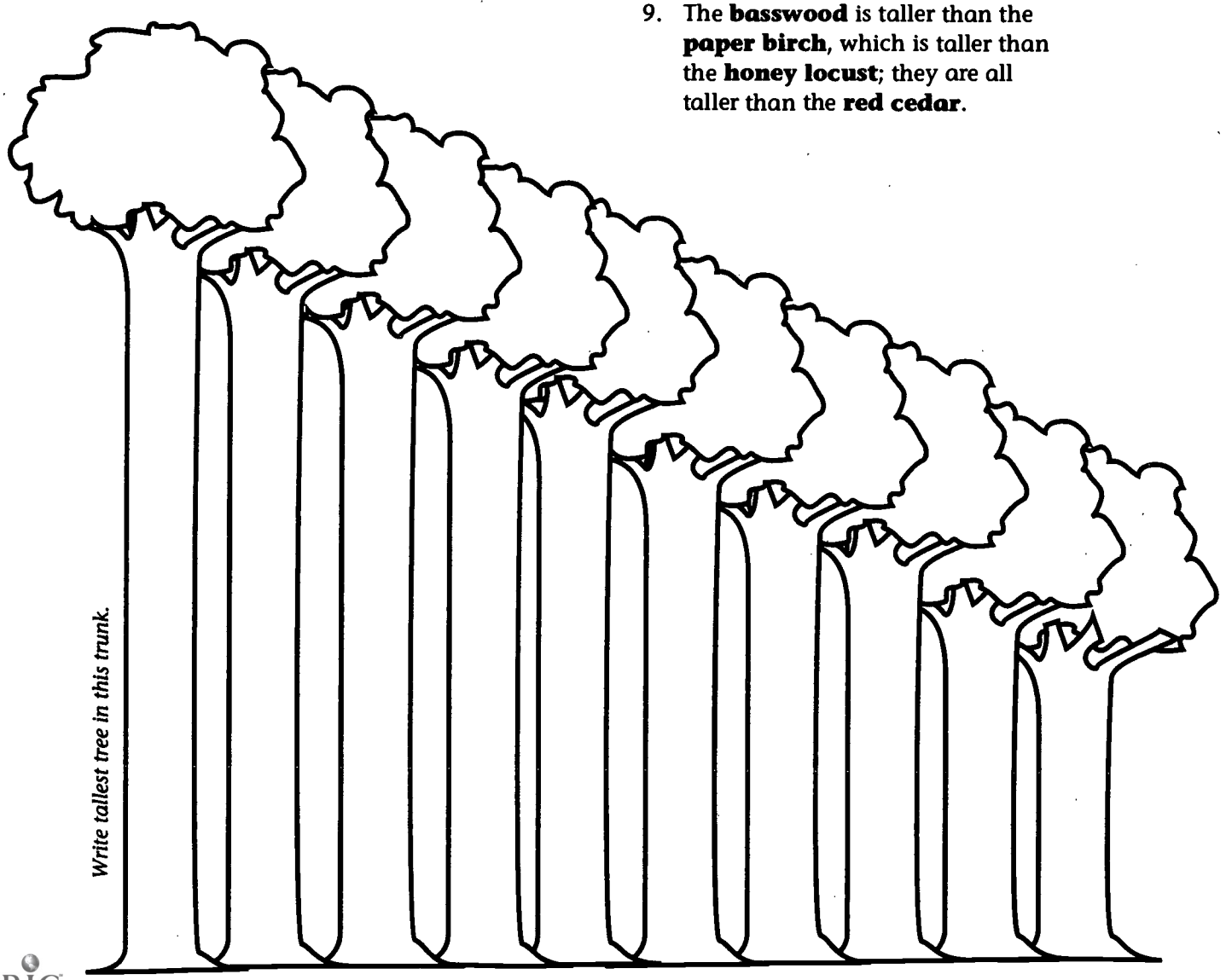
8. The Rib Ox Elder's Club recently voted to put ox soup in each kitchen.

Taller Trees

Like all living things, trees grow, mature, and die. How tall can a healthy tree grow in its lifetime?

Arrange these native Wisconsin trees in order of their *mature* height, starting with the tallest. The names of the trees are in **bold**. There are 10 different trees to arrange.

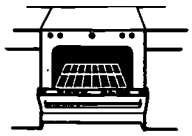
1. The **sugar maple** is next to the **white pine.**
2. The **honey locust** is taller than the **ironwood**, which goes next to the **red cedar**, which is shorter.
3. The **white pine** is the tallest tree in this group.
4. The **paper birch** is taller than the **red cedar,** and they are both taller than the **serviceberry**.
5. The **paper birch** and the **green ash** are next to each other.
6. There are no trees lined up between the **red pine** and the **sugar maple**.
7. The **green ash** is shorter than the **basswood**, which is also shorter than the **red pine**.
8. The **paper birch** is taller than the **green ash**.
9. The **basswood** is taller than the **paper birch**, which is taller than the **honey locust**; they are all taller than the **red cedar**.

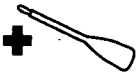


Bird Words

The forests of the world are interconnected in many ways. For example, migratory songbirds depend on habitats here and in the tropics to survive.

Solve the rebus's below to find the names of several neotropical migratory songbirds.

1.  +  + d

2.  + IM +  +  + L

3.  +  + ED + G +  + 

4. IN +  + O + 

5.  +  + D + V +  + EO

6.  + S + 

Here are several more birds that travel between forests here and forests in the tropics.

Try to create your own rebus for each of these:

Common yellowthroat

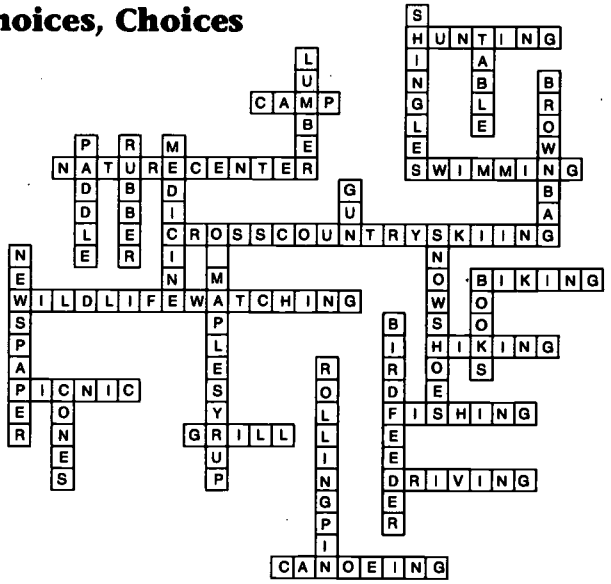
Ruby-throated hummingbird

Common nighthawk

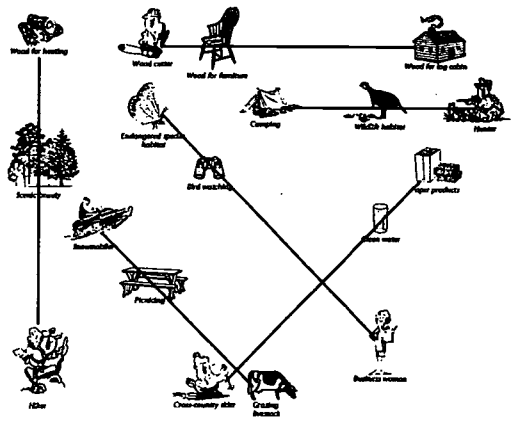
Answers

Lost in the Woods

Choices, Choices



Conflicts & Controversies



Tree Towns

1. oxygen, carbon dioxide
2. shading
3. downpour, runoff
4. conservation, heating, south
5. variety, disease
6. compacted, bicycles
7. shelter

Name the Natives

1. willow, ironwood 2. red maple, beech, fir, slippery elm, balsam fir 3. hickory, birch 4. hackberry, wild plum, aspen 5. silver maple, green ash, larch (also known as tamarack) 6. black oak, cedar 7. hemlock, pin cherry 8. box elder, pine

Get to the Heart of It

1. nutrients 2. cradle 3. 580 lbs 4. 50% 5. 40% 6. cotton rags 7. energy 8. 100% 9. renewable 10. 70% 11. landfills 12. 3 cubic yards 13. pallets 14. 56,000 15. plastics 16. kitty litter 17. particle 18. bark 19. steel

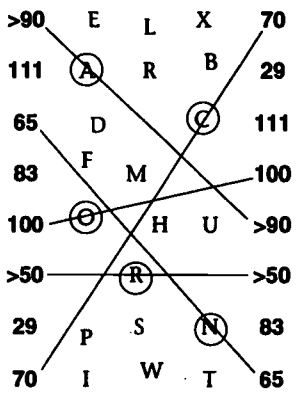
How Many!?

Toothpicks

Feeding the Forest

1. 70; 2. >90; 3. 100; 4. 65; 5. >50;

Acorn



Taller Trees

Answers tallest to shortest:

white pine, sugar maple, red pine, basswood, paper birch, green ash, honey locust, ironwood, red cedar, serviceberry

Bird Words

1. Ovenbird
2. Baltimore oriole
3. Rose-breasted grosbeak
4. Indigo bunting
5. Barn swallow

Glossary

Biodiversity: The variety, distribution, and abundance of life forms in an ecosystem and the ecological processes that support them.

Clearcutting: A harvesting and regeneration technique that removes most of the trees in an area at the same time. Clearcutting is most often used with species like aspen which require full sunlight to reproduce and grow well.

Conservation: Preserving natural resources such as forests, waterways, and topsoil from waste or harm.

Cord: A stack of cut fuel wood measuring 4 feet by 4 feet by 8 feet, or 128 cubic feet.

Ecosystem: The interaction of a group of organisms (microbes, plants, and animals) with their environments (climate, soils, water, and air); a natural system that functions as a unit.

Forester: A person trained in and practicing forestry.

Forestry: The principles and practices utilized in the management, use, and enjoyment of forests. Forestry includes a broad range of activities, such as managing timber, community trees, fish, wildlife, range, watersheds, and recreation.

Habitat: The area or type of environment in which a plant or animal normally lives or occurs.

Natural resources: A source of wealth that occurs in a natural state, such as oil, trees, or minerals.

Nonrenewable resources: Substances such as oil, gas, coal, copper, and gold, which, once used, cannot be replaced, at least not in this geological age.

Renewable resources: Living resources such as plants and animals which have the capacity to renew themselves by natural ecological cycles or sound managment practices.

Resins: Materials used in inks, adhesives, and plastics.

Succession: Change in the composition of the forest as one plant species replaces another slowly over time.

Sustainable forestry: The practice of managing dynamic forest ecosystems to provide ecological, economic, and social benefits for present and future generations.

Urban: Characteristic of the city.

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