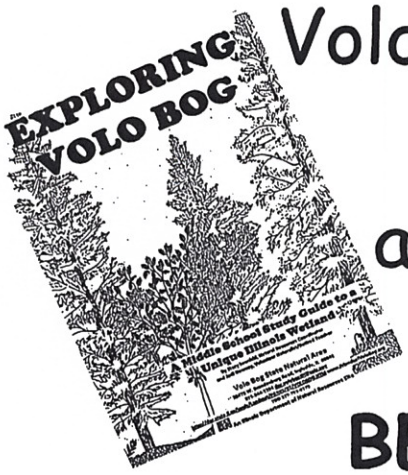
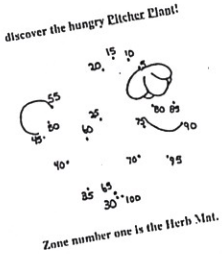
DEAR EDUCATOR!

Please **MAKE COPIES** of this
Volo Bog State Natural Area
ACTIVITY GUIDE
and have your students
complete it
BEFORE THEIR VISIT!



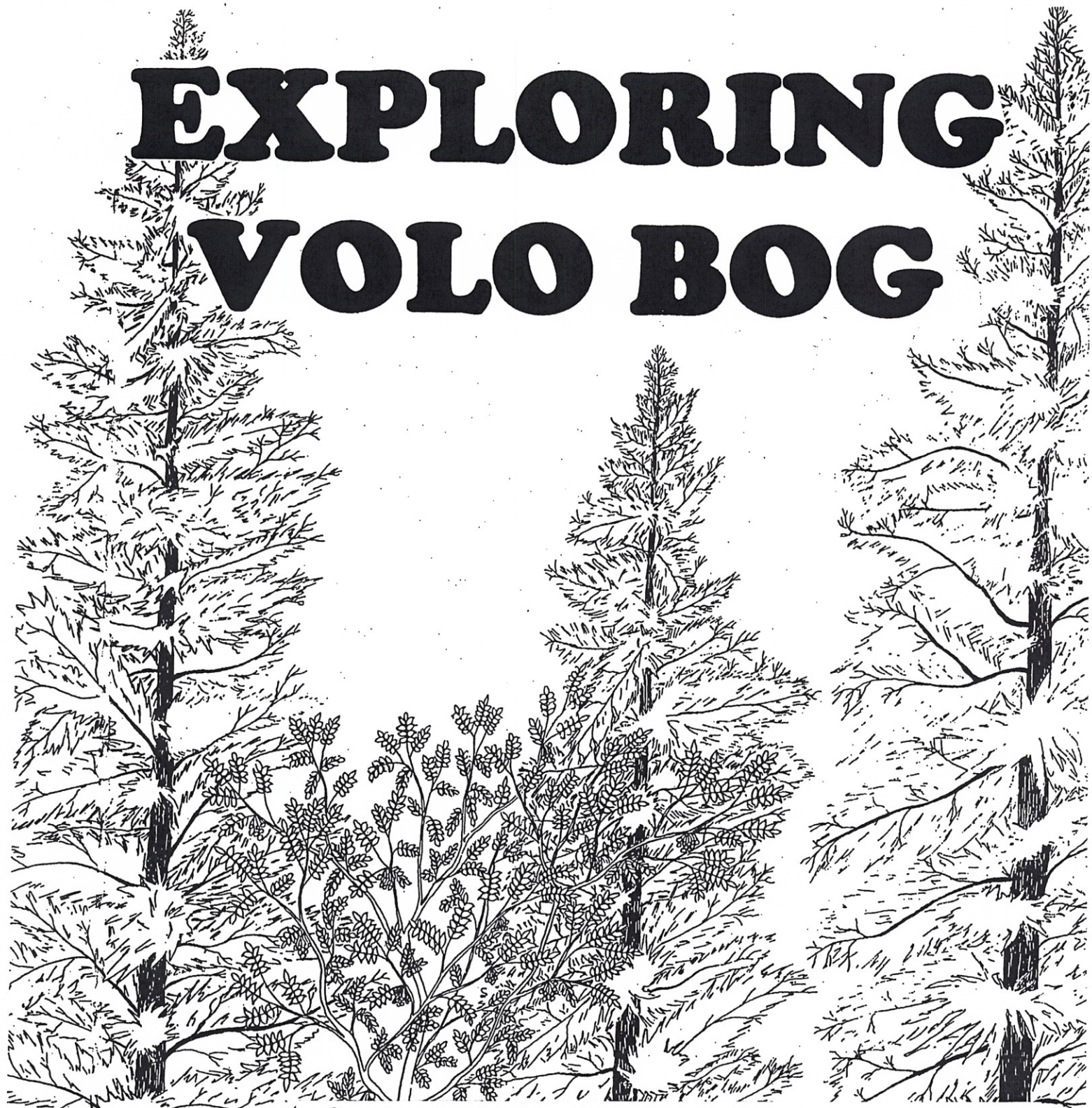
We believe
it will greatly enhance their
learning experience!
If you have any questions, please
call us at 815-344-1294



Thanks,
Stacy Iwanicki & the Volo Bog Volunteers!

Find this also at
www.FriendsofVoloBog.org/Educators%20Note.htm

EXPLORING VOLO BOG



A Middle School Study Guide to a Unique Illinois Wetland

By Stacy Iwanicki, Natural Resources Coordinator
and Judi Downey, Volunteer Naturalist/Retired Teacher

Volo Bog State Natural Area
28478 W. Brandenburg Road, Ingleside, IL 60041
815-344-1294 dnr.volobog@illinois.gov
http://dnr.state.il.us/lands/Landmgt/PARKS/R2/VOLOBOG.HTM www.FriendsofVoloBog.org
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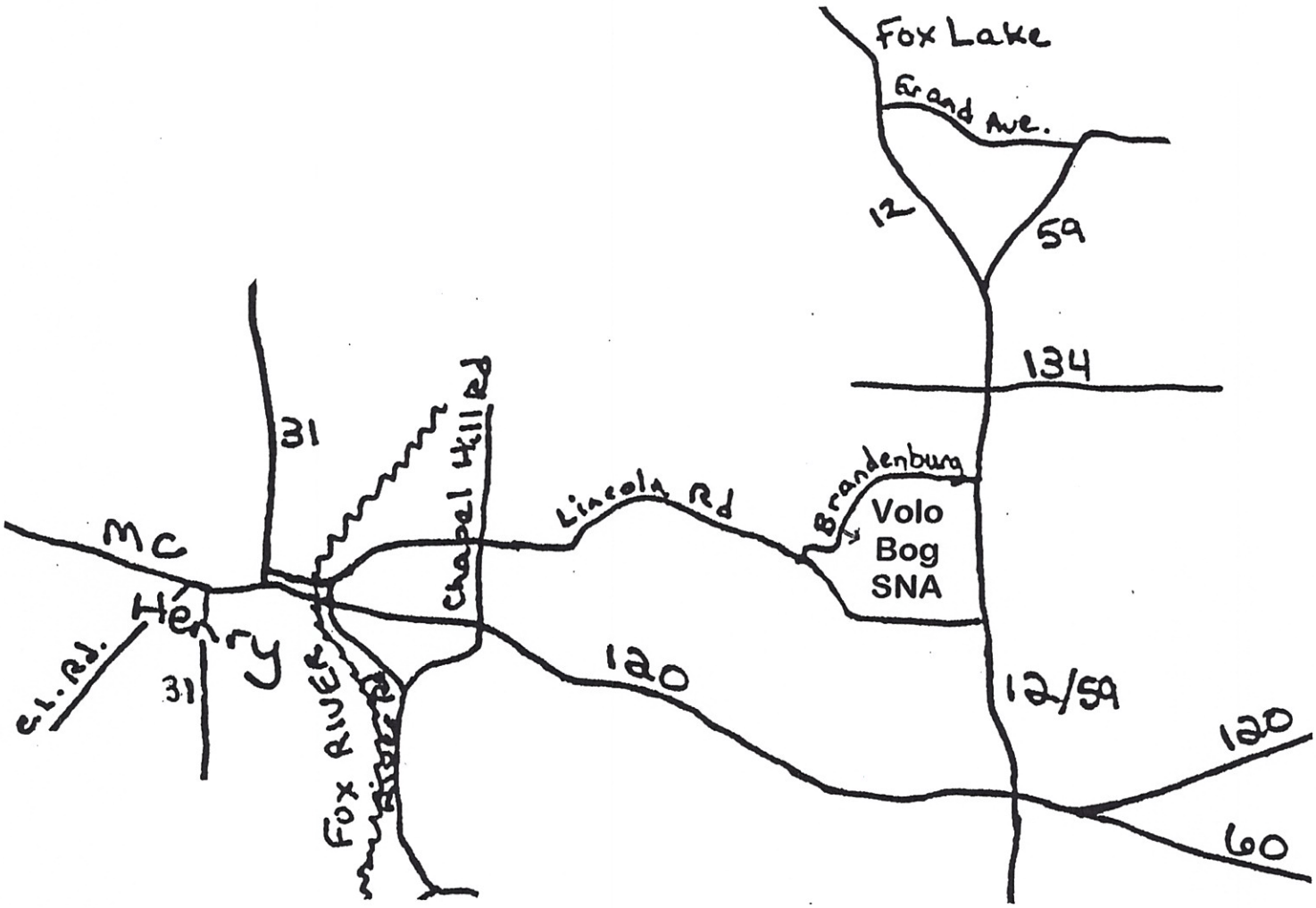

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THE BIRTH OF VOLO BOG

Volo Bog is a gift of the glacier. About 30,000 years ago the Wisconsin Glacier covered much of what is now Illinois. The weight of the glacial ice, which was up to a quarter of a mile thick, caused the glacier to flow over the land. As the ice flowed, it scraped the land gathering anything that could not move out of its way into the mass of the glacier. The materials collected are called glacial **till** and include rocks of all sizes, gravel and sand. The glaciers covered northeastern Illinois for about 15,000 years until as recently as 12,000 years ago. As the climate warmed, the glacier began to melt, depositing the rocks, gravel and sand in place. The hilly topography of the region is made up of piles of glacial till.

As the glacier was retreating to the north, chunks of ice sometimes broke off and got buried in the till. These giant "ice cubes" were the last to melt leaving depressions in the land where water collected and formed lakes. Many of the lake were interconnected and water flowed between them. Some of the depressions were isolated and were referred to as kettle holes which often had steep sides and poor drainage. Since there were no streams flowing into or out of the **kettle hole**, whatever water that collected there became stagnant (still) and had very low oxygen content.

Volo Bog was once a kettle lake and the stagnant water with low oxygen content limited the kinds of organisms that could live there. Without oxygen fish and bacteria, one of nature's decomposers, could not survive. When the plants that grew around the edges died and fell into the water, the lack of bacteria kept the plants from breaking down. The dead plants floated on the top of the water and more plants grew out of them forming a floating mat. Some of the dead plants sank to the bottom and the kettle hole was filled from not only from the top down but also from the bottom up. One of the key plants to begin forming the floating mat is sphagnum moss. As the dead moss accumulates, it turns into soil known as **peat**. Eventually the peat mat gets thick enough to support other plants, even trees.

Arrange the steps in the formation of Volo Bog in order. Write #1 by the event that occurred first and #7 by the event that occurred last.

_____Pieces of the glacier broke off and became stuck in the till.

_____Climate warmed and the glacier melted.

_____Lakes sometimes formed in the kettle holes.

_____As the glacier flowed over the land, it scraped the land and gathered till.

_____Northeastern Illinois was covered by a huge glacier.

_____When the ice blocks finally melted, giant holes called kettle holes were left in the landscape.

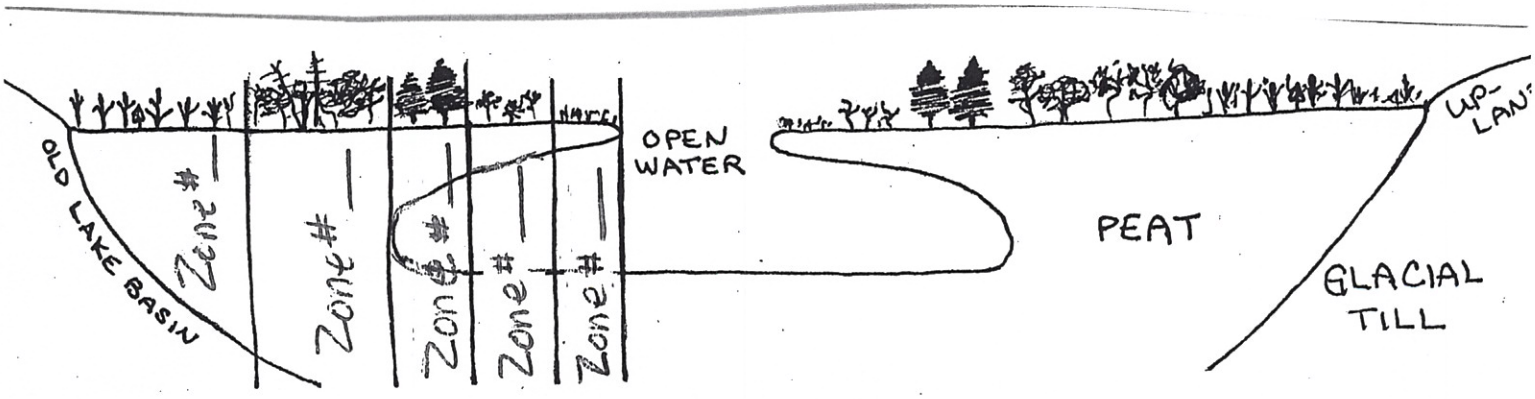
_____Plants began to grow around the edge of the kettle lake forming a floating mat when they died.

PLANT COMMUNITIES OF VOLO BOG

The plants in Volo Bog grow in five different rings around a center of open water. The center of open water is like the bull's eye of a target but the rings in the bog do not form perfect circles around the bull's eye. The floating mat of plants that grew around the edge of the kettle lake that was destined to become Volo Bog thickened and grew closer to the center of the glacial lake. Some of the peat sank to the bottom and accumulated from the bottom up. Eventually the floating peat mat met up with the bottom peat. Because the soil no longer floated, different conditions existed and different types of plant communities became established.

Because some of the soils of Volo Bog are floating, visitors to the bog walk on a boardwalk to reach the center of the bog. There are several turns in the boardwalk as it provides a safe path over the floating soils. The boardwalk helps to protect, not only the visitor but the wetland ecosystem of Volo Bog. Make a sketch of the five "rings" around the open center. Number the "rings" starting with #1 next to the open center and continuing to #5 for the outermost "ring".

On the cross section view of the bog, number the zones starting with zone #1 next to the open center and ending with zone #5 by the old lake basin. Each zone has different plant sketches because each zone supports a different plant community.

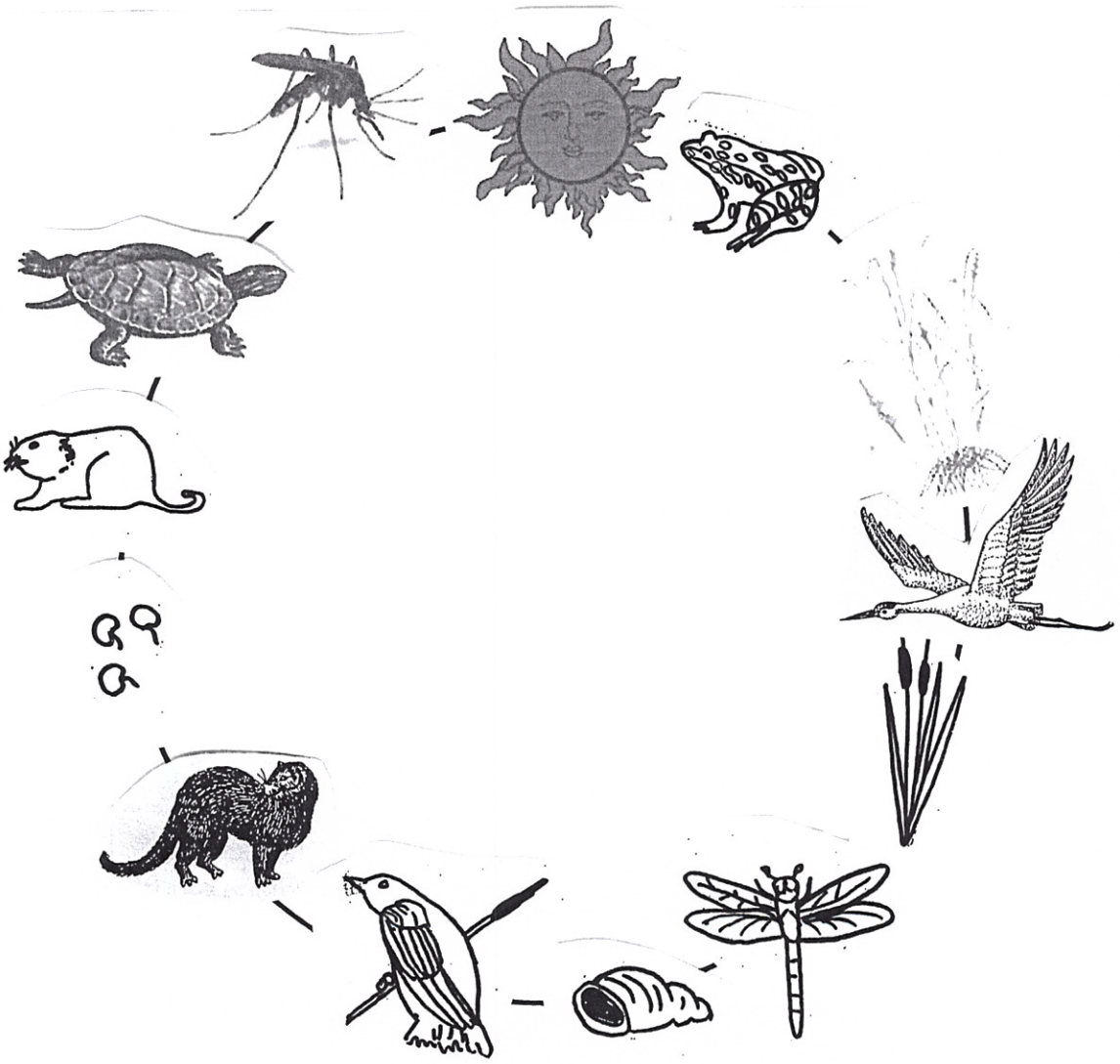


THE MARSH ZONE

The outermost zone closest to the edge of the old glacial lake is the marsh zone. This zone is dominated by soft-stemmed (herbaceous) plants. In the marsh zone there is no floating soil as the soil is composed of solid peat from the surface to the bottom of the old glacial lake. The water depth varies with the time of year and weather conditions. During the spring the entire marsh zone can be covered with up to a half meter of water. Digging several centimeters into the soil is often necessary to find water during dry times.

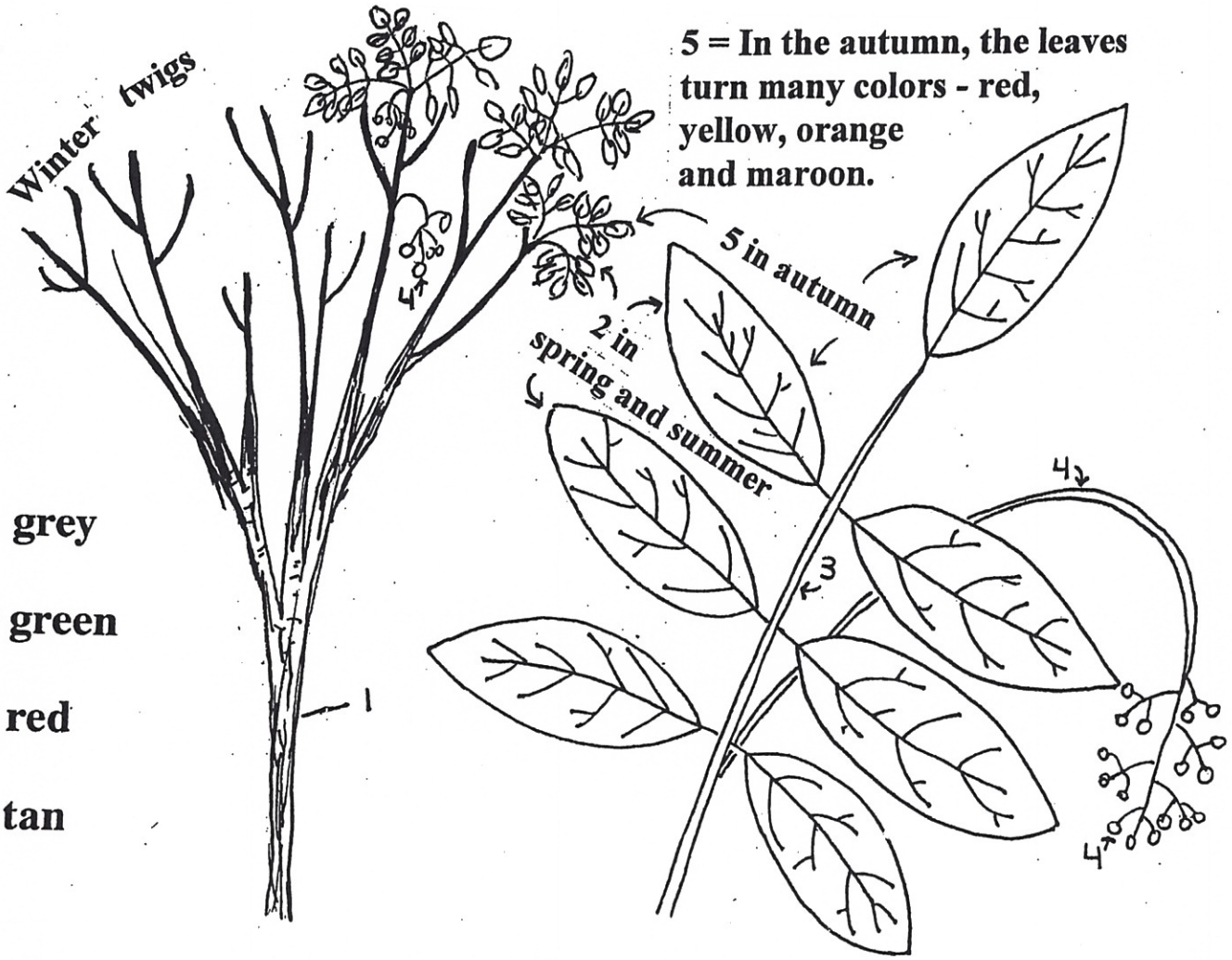
Some members of the marsh community are called **producers** because they convert the sun's energy to produce usable energy in the form of food. Other organisms eat the producers and are called **primary consumers**. Organisms which eat primary consumers are called **secondary consumers**. **Decomposers** break down break down dead material to release the nutrients back into the environment. Volo Bog is unique because much of the plant and animal material present in the soil is not being decomposed.

The movement of the sun's energy through a community is called a **food chain**. The interconnecting ways that all of the organisms are related is called a **food web**. On the diagram below, identify 4 food chains that exist in the marsh zone. Start with the sun and draw a line to a producer then to a primary consumer and finally to a secondary consumer.



THE TALL SHRUB ZONE

Walking along the boardwalk toward the center of Volo Bog, you will notice a sudden change in the types of plants around you. The plants will be much taller and have woody bark. One of the plants in the tall shrub zone has poisonous oils in its stem and leaves. This plant is poison sumac and touching any part of it at any time may cause a real nasty rash. Poison sumac is recognized by its heavy grey branches and compound leaves. The leaflets on each compound leaf are opposite each other and there is usually a single leader leaf. In the poison sumac drawings below use the colors in the key to color the plant structures.



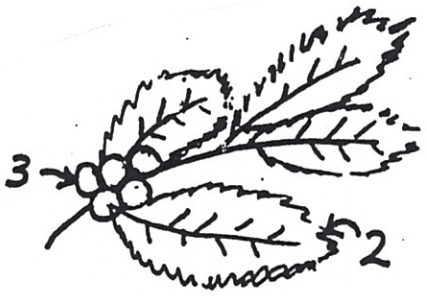
1 = grey

2 = green

3 = red

4 = tan

One of the other shrubs growing in this zone is winterberry holly. The berries turn bright red in the winter. Use the color codes from the key above to color the winterberry holly.



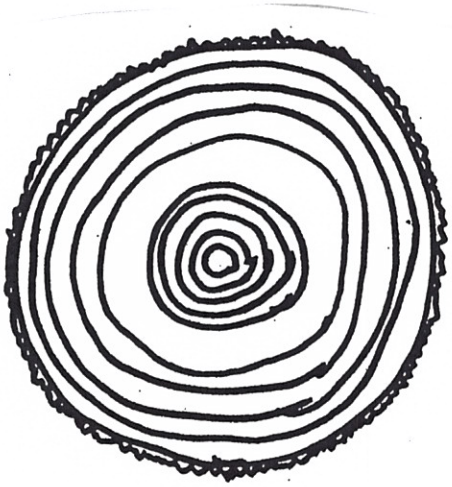
THE TAMARACK ZONE

This zone was named for the tamarack tree which is also known as the eastern larch. The tamarack tree produces its seeds in a pine cone so it is classified in the family of trees called Pinaceae or pine trees. Unlike most **conifers**, the tamarack is a **deciduous** tree which means it looses all of its needles (leaves) at one time in the fall. This helps the tamarack to conserve water in the winter because there is less surface area exposed to the drying winds. The needles of the tamarack have tannic acid which is released into the soil and water of the bog when they drop off the trees. The tannic acid helps to turn the water brown. It is also used to prepare and preserve (tan) leather hides

There are **hummocks**, or hills of moss, growing in this zone. This moss is sphagnum moss. When sphagnum moss dies it decomposes very slowly and incompletely. The incomplete and slow decomposition is attributed to the acid conditions of the water and lack of oxygen which together keeps bacteria from growing. Each year new moss grows on top of the old, pushing the old moss into layers below. The peat forms a floating mat which becomes thick enough to support other plants even tamarack trees. Over time, the dead plants become soil we call peat. Peat is an early stage in the formation of coal.

The tamarack trees are floating on the mat of moss and other vegetation. The shallow spreading roots of the tamarack grow at right angles from the trunk through the moss mat. A constant amount of soil moisture is received by the trees as the mat moves up and down with the changing water levels.

You can tell how old a tree is by counting the rings in a cross section of its trunk. If one ring = one year, how old is this tree?



_____years

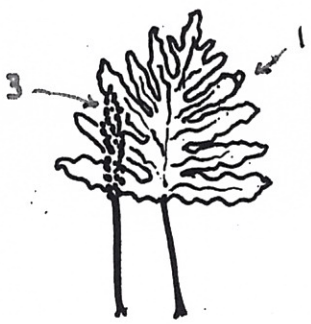
THE LOW SHRUB ZONE

The zones of Volo Bog are not always real distinct meaning that one doesn't end and another instantly begin. There is a gradual transition of one zone to another. Each zone is constantly undergoing change as Volo Bog is composed of many dynamic communities. **Dynamic** means "changing" and the process of change in biological communities is called **natural succession**. Natural succession can be observed in the presence of tamarack trees in three of the zones in Volo Bog. The low shrub zone has a lot of young tamarack trees growing in it and the tall shrub zone has a lot of dead tamaracks. The dead tamaracks were alive as recently as 1987 when the high water caused the tamaracks to drown. Some of the tamaracks in the low shrub zone sprouted last year. The oldest tamaracks are more than 100 years old. Nature does not always fit into neat labeled packages or follow exact rules.

In addition to the young tamarack trees, other plants in the low shrub zone include baby poison sumacs, bog buckbean, ferns, small shrubs and sphagnum moss growing on the thinning floating mat. Over the years, six species of orchids have been documented in Volo Bog. Presently, only the rose pogonia orchid may be found in the summer. This plant with its tiny pink flowers are so rare is identified as an **endangered species** in Illinois. Endangered species may become extinct if they are not protected. Many threatened and endangered species find a safe place to live in Volo Bog.

Color these Cool Bog Plants

1 = Green 2 = Maroon 3 = brown 4 = white



Sensitive Fern

Sphagnum Moss

Marsh Cinquefoil

Bog Buckbean

Leatherleaf

Bog Birch

THE HERB MAT

The last zone before the center of Volo bog is the floating herb mat. Surrounding the open water pond, the plants growing here are on a thin mat too delicate to support the heavier trees and shrubs. The center pond of Volo Bog, now only ½ acre in size, represents all that remains of the kettle hole lake that was once about 50 acres. For approximately the last 12,000 years the lake has been filling in from the edges toward the center, from the bottom up and from the top down. Over time one plant community has replaced another in a process called **natural succession** which will proceed onward until a force larger than itself takes the community in another direction. Fire, a tornado or even another glacier could change the direction of succession. In time, what do you think will happen to this pond? What forces may change the direction of succession and what effect may they have?

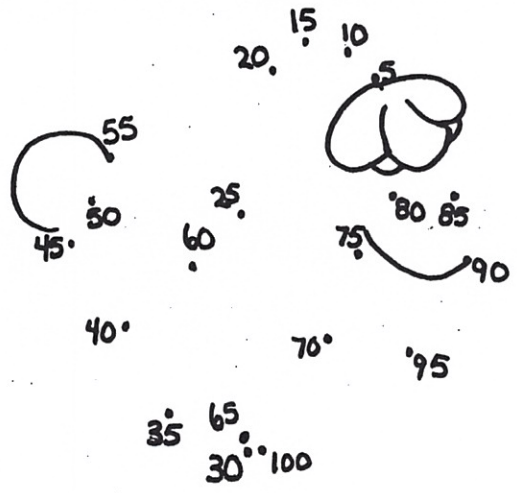
_____

_____

_____

Just a few inches of roots are floating on top of 50 feet of water and mucky peat. Imagine what might happen to a curious explorer who tried to walk on the mat. If someone did fall through the mat and drown, their body would not decompose. Bog water is stagnant and does not hold much oxygen. The sphagnum moss, tamarack trees and other plants make the water **acidic**. Low oxygen and acidic water kill bacteria and without bacteria things do not decompose. Scientists have found over 1000 bodies preserved in the peat soils of Northern European bogs. Their skin has been preserved like leather.

Connect the dots by counting by 5's to reveal one of the most interesting plants that grows on the herb mat and in the low shrub zone.

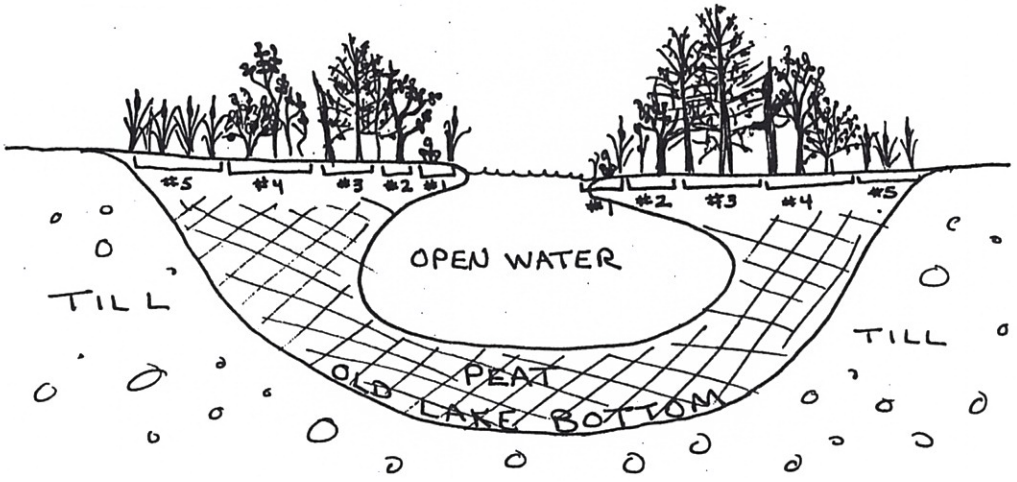


The pitcher plant that was revealed is carnivorous. The leaves are modified like pitchers to hold water to lure insects to help themselves to a meal of nectar. Once inside the pitcher plant the insect is trapped by the slippery leaf surface and downward pointing hairs and drowns. It decomposes and the pitcher plant absorbs its nutrients.

THE OPEN WATER

In the very center of Volo Bog, the open pond is all that is left of the old glacial lake. Because of natural succession, this open water will fill in as time goes by. There are very few bogs in Illinois and Volo Bog is unique in that it is the only bog in the state with an open water center. Bogs are a northern ecosystem found more frequently in Minnesota, Wisconsin and Canada. Volo Bog is that it is the southmost bog in North America to exhibit all the stages of bog succession including the remaining pond. Volo Bog's uniqueness was recognized as early as the 1920's. In 1958 the Illinois chapter of The Nature Conservancy purchased Volo Bog in order to protect it from development and other threats. Volo Bog was designated to be a National Natural Landmark in 1972.

Name the plant zones of in this cross section of Volo Bog.



Zone One: _____

Zone Two: _____

Zone Three: _____

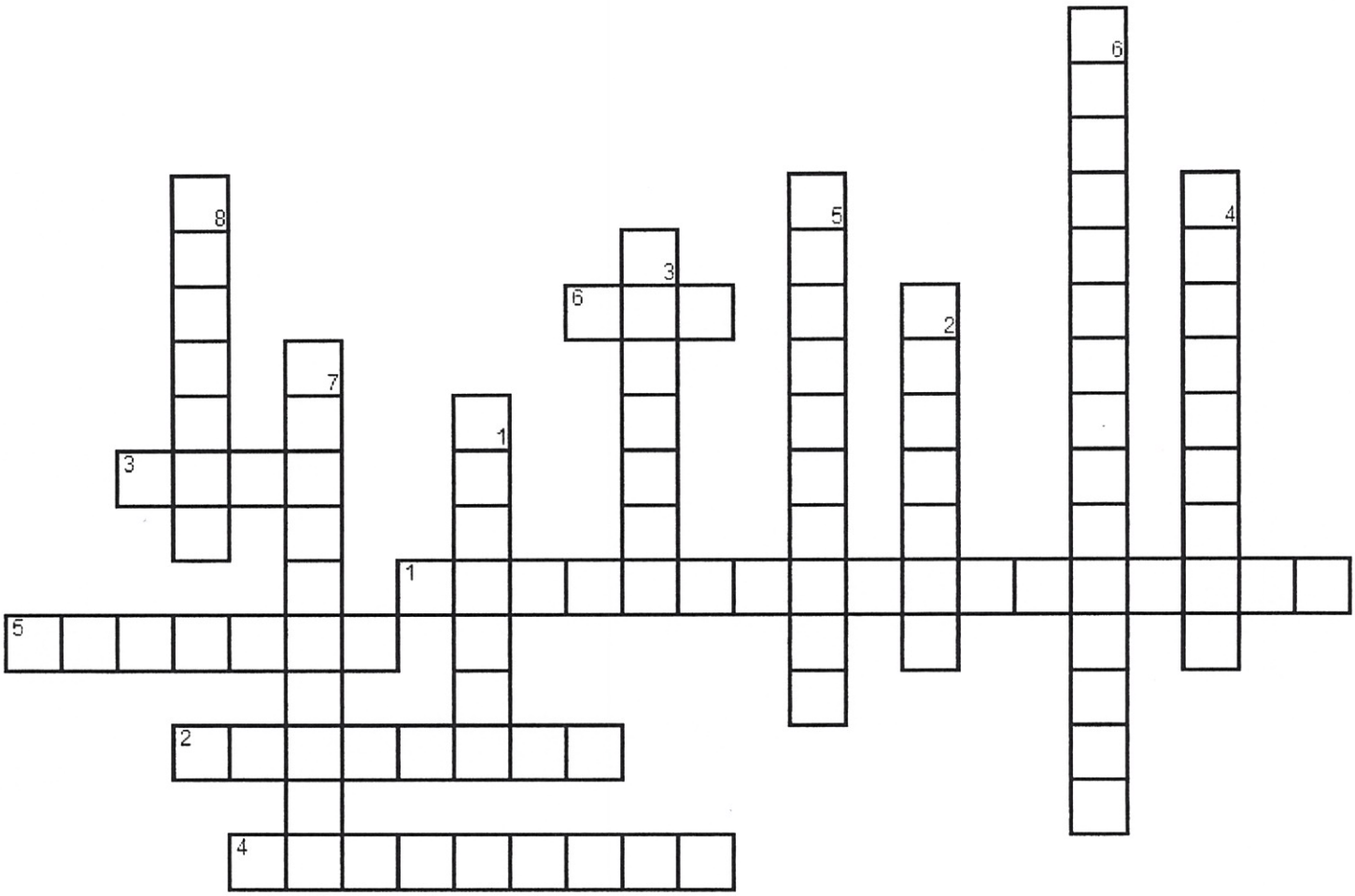
Zone Four: _____

Zone Five: _____

The level of water in the pond fluctuates seasonally with the rainfall. True bogs receive water only from the sky. When there is little precipitation, the water level drops. Volo Bog does receive some runoff from the surrounding area and technically is classified as a **poor fen**. What is the difference between a true bog and a poor fen? _____

_____

VOLO BOG: A WATERLOGGED WORLD!



Across

1. the process of one plant community replacing another
2. an organism that converts the sun's energy to a usable form
3. a soil formed by dead moss
4. a tree that looses all its leaves in winter
5. the interrelated food chains in a community
6. a wetland with floating, acidic soils

Down

1. changing
2. hills of moss
3. a plant that produces seeds in a cone
4. the movement of the sun's energy through a community
5. an organism an organism that breaks down dead organic material
6. organism that eat producers
7. formed when the ice block melted
8. a sheet of ice

A NATURE PRESERVE ETHIC

Walk quietly so as not to disturb others - humans or other animals.

Pick no flowers - so that they may form seeds and so that other smay enjoy their beauty too. Also, pick no other plant parts.

Tread Lightly - stay on trails and in designated study areas. Avoid stepping on plants.

Respect all living things. Do not disturb wildlife or their homes.

Take only memories. Leave only footprints. Do not collect anything except litter.

Please come back and visit again. Bring your friends & family too!

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