



Program Purpose: Participants will explore the natural and cultural history of Blackhawk Island, a 210 acre State Wildlife Area, through trail hiking and cave exploration.

Length of Program: 2 – 3 hours

Ideal Age: 3rd- 12th grade, 9 years old – Adult

Maximum Number of Participants: 42
[dependent on barge capacity]

Objectives:

After participating in this lesson, participants will be able to:

- Understand basic paddle skills involved in navigating a barge across the Wisconsin River.
- Describe one cultural history event that occurred on the island.
- Describe one natural history event that helped shape what the island looks like today.
- Understand the concept of a tension zone and how it affects the flora and fauna found on Blackhawk Island.
- Theorize what modern day factors might change the island and explain why and how.

Teacher Preparation:

Before the class arrives,

- Check River Flow Rate posted on board in hallway of Office.
If water flow level reaches 14,000 cfs or above, the hike will be canceled.
- Unlock the boathouse, barge and rescue boat. Gather safety supplies.
- Confirm pictures and other teaching materials are in the naturalist backpack.
- Choose your hike route and discussion topics based on student's grade level and group preferences.

Program Activities:

1. Introduction: Have participants line up along the path by the barge boathouse. Inform participants that they will be hiking Blackhawk Island while pointing to the island on the other side of the river. Inform participants that to get to the island, they will have to paddle across the river as a team, using the barge (point to the barge). In order to do this, they will need a few supplies such as paddles and lifejackets. Fit all of the participants with lifejackets. Explain that in order to steer the barge, participants will have to paddle it across the river. To be effective, the barge needs a minimum of seven participants paddling on each side. As a naturalist, assess the group paddling ability and age to determine if more than fourteen paddlers are necessary.
2. River Crossing: Explain to the participants how to load the barge. Go down to assist with loading onto the barge and have participants come down the ramp to the dock two at a time. Load from the front of the barge and fill the paddlers first, with their knees facing toward the outside of the boat. Once the outer row is full, fill the middle of the barge. Those participants should have their knees facing the middle of the barge. No one should ever sit on the middle connecting board of the barge (this is where the two boats are held together) or on the sides of the boats. Differentiate the sides of the barge by giving each side a name, example: port side = peanut butter, starboard side = jelly. Demonstrate how to use the paddles to propel the boat by explaining forward and backward strokes. Untie the barge and push off. It is best to wait to put paddles into the water and begin steering after the entire barge has cleared the dock. The

naturalist has a paddle to use to help steer the barge more effectively toward the dock on Blackhawk Island. Have the participants begin paddling toward the Blackhawk Island dock.

Once landed and tied off on the Blackhawk Island dock, have the participants unload the barge two at a time, in the opposite order of loading. Unload the middle of the barge first, then have the paddlers lay their paddles down in the barge and unload. Participants should leave their lifejackets on the landing, clipping them to the fence if possible.

3. Hike Blackhawk Island

Included here is an example hike for approximately a 2 – 3 hour hike. After the outline, information for the natural features, historical/cultural, citizen science, and ecological stops are included.

Example Hike Outline

1. Introduction, Lifejacket and paddle fitting (10 minutes)
2. River Crossing (10 minutes)
3. Overland Trail to Upham Cave (45 minutes for hike)
4. Snyder Homestead (5 minutes)
5. Picture Post/Trail Cam (5 minutes)
6. Upham Cave (10 minutes)
7. Serpent Cave (10 minutes)
8. Hike back to Barge (45 minutes)
9. River Crossing (10 minutes)

a. Natural Features

Caves

- i. Upham Cave: This cave is named after the Upham family. Horace Upham, the patriarch of the family and a prominent Milwaukee lawyer, arrived in the Dells and purchased the island and surrounding mainland in 1905. The Upham family used this land as a summer retreat until 1941, when Horace's daughters Elizabeth and Caroline decided to donate the land to the University of Wisconsin. The Upham's also owned other property across the river; this was donated to the Easter Seals and is now Camp Wawbeek, a respite camp for people with disabilities.

Participants are able to explore the sandstone cliffs and formations in and around the cave. Only send in up to five participants at a time into the cave so that everyone has room to explore. Do not let participants climb up and around the top of the cave for safety reasons. Some other topics to discuss at this cave include how the geologic features formed, and exploring with the DOTS tools.

- ii. Serpent Cave: This cave has three sections. One section is off to the left and includes a tight crawl space followed by a small room. Only small participants can enter this cave due to the tight crawl space, and only three participants are allowed in at a time. This section of the cave does require a flashlight. The entrance to the right is the official entrance to Serpent Cave. This main cave has two sections, opening up in the middle. It helps to have an adult/chaperone stationed at the opening between the sections to facilitate movement and safety. The second section of Serpent Cave requires a little more crawling; warn participants that they may get dirty. Also warn them of "Head Banger Rock" which is at the end of the cave as they exit. Station an adult/chaperone at

the end of the cave to take candid photos and warn participants about “Head Banger Rock”.

- iii. Devil’s Elbow and the Narrows (photos): Devil’s Elbow or the Narrows refer to this two-mile-long gorge on the Wisconsin River, which is also the narrowest part of the entire river. Due to geologic activity, it is also one of the most notoriously dangerous stretches of the river, with sharp rocks and steep, fast rapids. The 90 degree turn also creates a giant whirlpool at high water flow, colloquially called the “Grand Eddy”. Using the Wisconsin River as a highway for log rafts during the lumber industry’s heyday, raftsmen were weary of this section. They would tie up their larger rafts above the narrows and run smaller rafts through the “elbow”. Even with smaller more nimble rafts, the rocks and currents still broke up many rafts, and numerous raftsmen lost their lives. It is said that surviving raftsmen would hang the boots of their fallen comrades in the trees on Blackhawk Island in memorial.

b. Cultural and Historical Stops

- i. Logging (photo): As white settlers moved west and towns expanded, the demand for lumber for homes, barns and businesses increased. Lumber became Wisconsin’s leading industry. White and Red pines dominated the landscape and were prized because of how easily they floated down the river after being cut. In 1852 prospectors bragged that “there are indeterminate forests of pine, sufficient to supply all the wants of the citizens for all time to come” throughout Wisconsin. This statement kicked off a flurry of logging activity; however, within 50 years, nearly all the large pines from southern to northern Wisconsin had been clear-cut and the logging industry began to dwindle in the state.

The Wisconsin River proved to be a pivotal “water- highway” to float logs from northern and central Wisconsin to markets in further downriver. Remember that this was before the wide spread use of railroads, or even modern roads. The Wisconsin River, however, has three main impediments along its course: wicked rapids at Grand Rapids, the narrow passage through the Narrows with the 90 degree turn at Devil’s Elbow, and the precipitous drop over the dam at Kilbourn City (now Wisconsin Dells). See Life of a Logger lesson for more information on the historical logging industry’s challenges.

During the process of floating lumber rafts over rapids, some logs inevitably break from their rafts. Many locals living along the Wisconsin River were able to pirate these logs to build their own houses. By law, loose lumber was still the property of the mill owners for one year and could be claimed because it was stamped before the rafting process. However, clever locals got away with it by chopping off the end of the log with the stamp on it. The area now known as the Lower Dells dock (just below the Kilbourn dam) was once known as Pirates Eddy due to the excessive amount of pirating that occurred there.

H.H. Bennett was a photographer, traveler, and lover of nature. He was fascinated by the loggers and raftsmen way of life, using his camera to capture their lives and the natural beauty of the Wisconsin Dells area. His photos of the natural beauty of the Wisconsin Dells helped to inspire the influx of visitors to the area. Many of his photographs of the raftsmen way of life are highlighted in the Lodge.

- ii. Dells House: (photos): In 1838, Robert Allen, Amasa Wilson and C.B. Smith built a crude cabin on Blackhawk Island near this spot. In 1839, they began to clear-cut the pines and float them down the river. Once all the prime timber from the area had been logged, Robert Allen remained in the area. Familiar with the needs of loggers who were now running rafts of logs from farther north using the Wisconsin River “highway”, Allen decided to use his cabin as a place for the rivermen to eat, drink, sleep and amuse themselves after the difficult trip through Devil’s Elbow. By the early 1850’s, his simple cabin was enlarged into a three story structure, with a grand fireplace on the ground floor. This structure was considered an inn, aptly named the Dell House, and offered food, lodging, gambling, and woman for entertainment.

Robert Allen also operated a ferry across the Narrows for stagecoach traffic. The ferry operated until Allen and his business partner, Hugh MacFarlane, gained a charter to construct a bridge. As business declined with the decline of the logging industry in the area, Allen continued to operate the Dell House for stagecoach travelers, ultimately selling the Dell House in 1879. In 1899, vandals burned down the large building, leaving only remnants of the foundation.

- iii. As you may have passed on your way into town, a 55 foot dam dominates the Wisconsin River in the middle of Wisconsin Dells. People had been trying to build a dam in that area since 1909, and after many failures, this permanent large structure was finally completed in the 1930’s. In response to this large dam, the water level upriver – where we are – rose 15 to 17 feet. This rise in water level buried the rapids at Devil’s Elbow and flooded a new channel around the land, officially cementing this land as an island and burying what remained of the foundations of the Dell House. Today, only the root cellars remain to be explored. Schuyler and Leroy Gates (Bridge over the narrows photo)

Around 1849, Schuyler Gates arrived in the Wisconsin Dells area and acquired land along the east bank of Blackhawk Island. With Robert Allen, Hugh MacFarlane and his son Leroy Gates, Schuyler designed, financed and constructed a 53- foot pine bridge across the Narrows. The bridge was completed in 1850, becoming a popular place to watch the lumber rafts and allowed travelers to begin traveling by stagecoach across Blackhawk Island. In 1866, the river flooded and washed the bridge out. By that time, however, most of the traffic had already moved to the toll-free bridge that the railroad had constructed in 1857, closer to what is now the Kilbourn dam.

Perhaps inspired by the audiences that gathered on his father’s bridge, Leroy Gates began to give guided tours to visitors of the Dells area. He can be credited with inaugurating the tradition of aggressive advertising due to his act of carving the message “Leroy Gates, Dells and River Pilot from 1849 – 1858” into the cliffs near Devil’s Elbow. This message can only be seen from the water, but is still clear to this day. Leroy Gates piloted rafts through the narrows for audiences and offered cave and river tours. In 1860, Leroy tried his hands at being a portrait photographer. Only five years later, he sold his downtown portrait studio to H.H. Bennett, who went on to take it into local fame. The studio is still downtown and is a great place to visit for historical context of the Wisconsin Dells area.

- iv. Snyder Homestead (family photo): Not many people chose to live on this land. What might be some reasons why? The poor sandy soil, steep inclines and rolling hills, and inaccessibility to places due to water are just a few of the main reasons that deterred settlers to this land. Sometime around 1862, the Snyder (or Snider) family gained ownership of the land known as Blackhawk Island and attempted to farm for an unknown number of years. A picture of the family, taken by H.H. Bennet in 1891, shows their small shack. Only this photo and the root cellar are all that remains today. The site of the Snyder Homestead is also a great educational stop as both a picture post and a trail camera have been installed there. See those sections of this lesson plan for more information.
- c. Citizen Science Stops
 - i. Picture Posts and Trail Cams (large panoramas and trail cam highlight pictures)

In 2016, trail cameras and pictures posts were installed on the Island. Picture posts are a way to monitor changes in the environment through pictures of the same space throughout the seasons. There are three picture posts on Blackhawk Island: one at the Snyder homestead site, one at the Dell House site and one near the intersection of the Overland and Narrows trails. How do these work? Following the numbers on the post, nine photos are taken. These photos are then strung together into a panorama; photos are taken during different seasons to monitor how the land changes throughout time. Ask participants how the land might change between seasons and show the Snyder Homestead panorama. Discuss factors that affect seasonal changes.

In 2014, trail cameras were installed on the island. These cameras take a photo whenever something activates a sensor on the front of the camera. Blackhawk Island has three trail cameras: one at the Snyder Homestead, one near the caves on the way to Serpent Cave and one facing a small pond on the Moccasin Flower trail. Show participants the photos of trail cam highlights and discuss how trail cameras can help scientists study wildlife.
 - ii. DOTS and Water Quality

Blackhawk Island provides Upham Woods with a stunning natural laboratory open for exploration. Participants are able to explore and inquire deeper about the landscape, microclimates, and water quality of the Island through use of the DOTS and DOTS: Water Quality kits. The beaches on both the north and south end of the Island are also great natural laboratories to incorporate the DOTS Water Quality inquiries. See the DOTS and DOTS: Water Quality lesson plans for more details on incorporating these great inquiry tools.
 - iii. iNaturalist

iNaturalist is an online network of citizen scientists. Participants submit photos of plants, animals, insects, or tracks that they find via a mobile device such as a phone or iPad, geotagging the location of the photo. Other citizen scientists on the network help to identify the organism or track in the photo. Participants are able to explore organisms in their area, and scientists are able to monitor sightings for study. Organizations such as Upham Woods are able to set up “Activities” such as a BioBlitz to better organize collected observations.
 - iv. Deer Enclosures

There are three deer enclosures on Blackhawk Island, two along the Narrows Trail and one just north west of the intersection of the Overland and Whitetail trails. Two large deer

exclosures were built in 1985 and the smaller one built in 2016. Their goal is to keep deer out of the specific area, so that the natural flora can thrive. During a study conducted in 1996, researchers found 44 species of plants inside the exclosures that were not found outside the exclosure. In an effort to control the impacts of the excessive deer population, controlled hunting began and continues to this day. Full Deer Exclosure lesson plan is included in Appendix C: Additional Background Information.

Questions for participants: What do you see inside the exclosure? What do you see outside the exclosure? Why is there a difference? Discuss what the island might look like if all deer were excluded? Would this be a healthy forest? Justify your answer. Predict what soil, forest and underbrush changes would occur if all deer were excluded from the island.

d. Ecological Stops

- i. Allen Spring Gulch: This area is immediately up the Overland Trail from the barge landing. It includes the area of the boardwalk and the small creek that runs under the boardwalk during wet seasons. This is a good opportunity to ask the participants to become detectives to help solve the natural mysteries of the island. Have the participants look for clues on these ledges of what might live here, what might have caused these ledges and overhangs to form, and forces that change the shape now. Participants should stay on the boardwalk to prevent further erosion.
Once the group reaches the top of the boardwalk, ask the participants why the boardwalk was built even though the Upham sisters wanted to keep the land undeveloped? Explain that the boardwalk was built to help prevent erosion on this fragile area.

j. Windfalls and Root Mounds

One of these areas is on the Overland trail headed toward the Snyder homestead. Too many trees fell over that section of the trail; it was decided to just move the path around the mess of trees instead of clear cutting a path. Explain that Upham's land management plan for the Island does not include cutting down any trees. Only trees that are too big and impeding the pathways are cut and rolled off the path; all other trees have fallen on their own.

Any root mound or windfall is a good place to stop and talk about the orientation of the majority of windfall or windthrows on the island. Explain to the participants that riverways are not just funnels for water, they are also funnels for air masses. The cliffs along the Narrows push and funnel air masses that travel with the Wisconsin River southward. Meeting the opening forming the channel around the island, the winds are redirected up the north cliffs, gathering strength and blowing over the top of the island. This funneling of wind pushes weak or dead trees over, causing the tops of the trees to point south and the root mounds to orient north. As participants continue the hike, have them discuss or observe this phenomenon. Interpret factors that might cause windfalls to orient other directions.

Root Mounds: There are many large dead trees along the Overland Trail that can be used to demonstrate the concept of root mounds. Explain to the participants what a root mound is. A root mound occurs when a large tree falls over as a whole tree, pulling up the roots, often with hard soil and rocks caught in the tangles of the roots. Over many years, the root mound sticking up over the ground will collect detris, soil, and smaller plants. A mound will form, with the inner space of the mound filled with decaying roots. By the time the mound forms, the original tree has already decomposed and is no longer visible. A tree can be more valuable to it's environment when it is down on the ground and decomposing rather than

when it is standing upright. Dead, down and decaying trees provide habitat for decomposers, renew the soil and allow for the growth of young trees and plants. Walking along the Overland trail and looking to the east, root mounds can be seen around areas with lots of windfalls.

k. Forest Types

Blackhawk Island and the Wisconsin Dells area are at the bottom part of the Wisconsin tension zone. A tension zone is a geographic area that marks the change from one vegetation type to another. In Wisconsin, the tension zone marks the difference between mostly prairie habitats and mostly boreal habitats; plants and animals representing each habitat type can be found in this zone.

Ecological communities flourish or perish depending on their environmental conditions, and the types of plants and animals that make up the community may also change through a process called succession. On Blackhawk Island, the evidence of forest succession can be seen by the studying the variation in trees and tree ages. The island was once home to towering red and white pines. Once those were all clear-cut, oaks were given the opportunity to germinate in the open sunlight, creating the towering oaks you see now. Soon, however, shade-tolerant white pines and mixed hardwoods began to grow beneath the canopy of oak leaves. The pines began to take over in some areas, and as the oaks begin to fall and decompose are given a chance to thrive. These changes in the flora and fauna will continue until a climax community is established. A climax community is community of plants, animals, fungi etc. that will be able to replace themselves with a new generation of the same species.

l. Biotic Communities of Blackhawk Island

As participants hike around Blackhawk Island, be sure to note the different forest types. Differences in forest types on the Island can be observed when following the Overland or Narrows Trail to the north and northeast side of the Island, where the habitat changes from Dry-Mesic forest to Hemlock Moist Forest.

1. Hemlock Relict Forest: This forest types is associated with moist sandstone cliffs and ravines with eastern or northern exposure. Plant life typically includes eastern hemlocks, white pine, yellow birch and paper birch. Ferns and club mosses are dominate ground layer, although often sparse due to the lack of light reaching the ground because of dense hemlock shade.
2. Southern Dry-Mesic Forest: This forest type is associated with loamy soils and is considered an upland forest community dominated by Red Oak, White Oak, Basswood, Sugar Maples and Red Maples. Characterized by a diverse understory including ferns and spring ephemerals.
3. Northern Dry- Mesic Forest: This forest type is associated with glacial topography with sandy or loam soils. Dominated by White Pine and Red Pine, with occasional mixing with Red Oak, Red Maple, Sugar Maple, Paper Birch, and Aspens. Shrubby understory. Historically considered the “great pineries”, this forest type’s biggest factor of change is logging disturbances.
4. Dry Cliff Communities: This community is found on the exposed Cambrian sandstone gorges flanking the Wisconsin River. It includes ferns, mosses, and lichens covering the moist rock faces. This diversity of smaller fauna helps to create small microclimates to support spring ephemeral and rare plant communities.

Additional/Optional Activities

Orienteering

Some groups choose to do Orienteering on Blackhawk Island as part of a hike. For this, adapt the Orienteering 1 lesson plan; finding an open area to do the shapes game, measure out paces and practice navigating with a compass. Materials needed include: compasses, 100 foot measuring tape, shapes game instructions, flags or other markers. See the Orienteering 1 and 2 lesson plans for more information.

Tree ID

The variety of forest communities provides a natural laboratory for participants to begin to identify trees. Participants can discuss the difference between gymnosperms and angiosperms, deciduous versus coniferous trees and forest communities on Blackhawk Island.

Trees that can be found on Blackhawk Island: Quick Guide	
White Pine	Bundles of 5 needles (W-H-I-T-E) White/grey bark compared to other pines Shade tolerant, prefers well-drained soil and cool humid climates
Red Pine	Bundles of 2 or 3 needles (R-E-D) Orange- Red bark Shade intolerant, prefers windy slopes and well-drained soils
Hemlock	Grows in cool, wet soil with a northern exposure
Oaks	Pointy leaves with many lobes with dense crown
Maples	Three lobed pointy leaves

“Ghost of Blackhawk Island” with school group

Some school groups incorporate the book “Ghost of Blackhawk Island” by August Derleth into their curriculum prior to their visit to Upham Woods. This book was written in 1961, and describes many places on the island in great detail. The leaders of the school groups will mention if they are incorporating the book into their Island Hike, and may have some special treat or prize for participants. More information about specific sites mentioned in the book can be found in the “Ghost of Blackhawk Island book” folder in the share drive. Included here is the book description:

“Trouble always seems to find Steve Grendon and Sim Jones. This time, they are far from home on an island right smack in the middle of the Wisconsin Dells they thought was deserted. Sim is practical, logical, and doesn’t like surprises. Steve is imaginative, carefree and—truth be told—the one who typically invites the trouble. They just wanted to get away for some camping and fishing, to do something besides let their summer vacation slip away from them. But they didn’t expect to encounter the ghost of an Indian chief who made it very clear he did not want them on his island! Undeterred, the boys quickly find themselves on the trail of the ghost and, before they know it, discover they are the ones being hunted. Fire Bear, a young Winnebago Indian the boys meet on their trip, may be able to help them solve the mystery. But whom do you trust so far from home when being hunted by a ghost?”

Appendix A: Materials and Maps

Materials in Naturalist Backpack:

- Maps
 - Upham Woods/Blackhawk Island 11 x 17 GIS map
- Early Vegetation and Land/Use Cover
- Glacial Deposits and Bedrock Geology
- Picture Post Panorama and Trail Camera Highlights
- Upham Woods and Blackhawk Island Timeline
- Photos
 - Snyder family
 - Dells House
 - Leroy Gates Bridge over Narrows
 - River Raft
 - Upham Family

Appendix B: Standards Alignment

Next Generation Science Standards

2-ESS2-1	*5-LS2-1	MS- LS2-5
3-LS4-3	MS-LS1-5	MS- ESS2-1
3-LS4-4	MS-LS2-1	MS-ESS3-3
*4-ESS2-1	MS- LS2-4	HS-LS4-5

Wisconsin Academic Standards

Agriculture, Food and Natural Resources

ESS2.b.9.m	NR1.b.1.e	NR2.d.12.m
ESS2.b.4.e	NR2.c.2.e	NR2.d.19.h
NR1.a.2.e	NR2.c.8.m	
NR1.a.6.h	NR2.d.5.e	

Science

LS2.C.3	LS4.D.2	ESS2.E.4
LS2.C.m	LS4.D.3	ESS1.C.m

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C1.b.i	C1.C.m	EX4.A
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Appendix C: Additional Background Information

Additional Cultural and Historical information

Indigenous Peoples

- *Native Americans of South-Central Wisconsin*

Native people have inhabited the Dells area for more than 2,000 years. Many tribes have played a considerable part in the history of the Dells. The Menominee and Ho-Chunk (Winnebago) played significant roles in the Wisconsin fur trade. The Sauk Indians also left their legacy in the Baraboo Hills near Sauk City.

- *Chief Black Hawk, 1775-1838*

In 1832, Chief Black Hawk led a faction of Sauk, Fox, Kickapoo and Ho-Chunk Indians in a fight to regain their ceded lands. Forced to move to Iowa after the War of 1812, Black Hawk's fighters and their families re-crossed the Mississippi, defying government orders. Black Hawk's band was pursued by the U.S. army, state militia, and their Winnebago allies throughout southern, central and southwest Wisconsin, northern Illinois and the northeast corner of Iowa. Unfortunately his faction was all killed and Chief Blackhawk was captured, becoming a prisoner.

Wisconsin River and Kilbourn/Wisconsin Dells City History

- *H.H. Bennett 1843-1908*

Henry H. Bennett, a carpenter and Civil War soldier, returned to the area in 1865 with a wounded right hand and an interest in photography. After purchasing a portrait studio from Leroy Gates, H.H. Bennett began to spend

his time taking stereoscopic views of the distinctive Dells scenery and became responsible for naming a number of the rock formations. As Bennett's affordable photos were circulated, many visitors began to arrive by train to see the Dells for themselves. Bennett played a large role in the tourist industry by showing lantern slide shows in the evenings and photographing steamboat passengers for souvenirs.

By 1886, Bennett perfected the instantaneous shutter and could take stop-action photographs. He was able to join a rafting company to photograph all aspects of the raftmen's lives and captured his son, Ashley, jumping over to Stand Rock. The studio that H.H. Bennett founded has been continuously owned and operated by successive generations of his family. It is the oldest family-owned photographic studio in the United States. Many of H.H. Bennett's photographs can also be found in the Lodge.

- *The Wisconsin "Dells"*

Although the Wisconsin Dells area was used by French explorers as geographical reference points as early as the 1700s, the first city, Kilbourn City was founded with the arrival of the railroad in 1857. Although the city was named after the railroads' president, locals never stopped referring to the town as the "Dells" and the name was officially changed to the Wisconsin Dells in 1931. The word *Dells* comes from the French word *dalles*, meaning a rough or narrow passage, or the rapids of a river that runs between the steep precipices of a gorge or narrow valley.

- *The Kilbourn Dam*

Known as the most dangerous dam on the Wisconsin River, the dam at Kilbourn City was first built in 1855 and underwent a series of modifications and reconstructions until 1897. Originally slated to be built in Newport, the location and building of the dam was surrounded by intrigue, violence and financial misdeeds. Due to the location of the Milwaukee and La Crosse railroads, a site was chosen in Kilbourn City where the river was 350 feet across and 15 feet deep. Construction in these conditions was a formidable task for men working with draft animals and hand tools. The dam would power a mill and by law had a 60-foot wide chute to allow lumber rafts to pass over the drop without damage. Although the chute was built to make up for the hazard that the dam created, many raftsmen lost their lives and the dam height was soon lowered. Battles continued as lumber companies lost lives and lumber to the dam.

At the turn of the 20th century, the river that had carried lumber rafts and powered sawmills was transformed into a generator of electric power. A proposal for a 55 foot high dam that would flood the rapids and raise water levels was met with opposition. Many opposed the dam because properties would be flooded, navigation of the area would be limited, and the beauty of the Dells would be threatened. The strongest opposition came from a handful of individuals including H.H. Bennett who wished to turn the Dells into a state park. However, the promise of jobs and profits from the hydropower dam won out and work began on the dam in 1906. Upon completion of the dam in 1909, the Wisconsin River rose 15-17 feet in the Upper Dells region, burying the rapids and carving a new channel around Black Hawk Island. Though many take for granted that there has always been a dam in Kilbourn, during the 47 year period prior to 1906, Kilbourn had a working dam for only 11 years.

Geological History

- *Bedrock*

During the Cambrian era, around 570 million years ago, a shallow sea covered much of the landmass that became North America. This created layered formations of sedimentary sandstone. Some of the sandstone has ripples in it; this was caused by the wind and wave currents at the time, creating dunes which were compacted as ripples.

- *Glaciation (Figure 1)*

Starting around 30,000 years ago, parts of Wisconsin were covered under the Laurentide Ice Sheet. These glaciers, up to two miles thick in some places, covered much of Canada and the northern United States. Glaciers are heavy and alter the landscape as they move across it, carving down hills, leaving piles of rocks and debris, and even altering watersheds as they retreat. Over Wisconsin, the Laurentide Ice sheet had multiple lobes. Around 20,000 years ago, the western margin of the Green Bay lobe advanced to the area known as the Baraboo Hills. Here it dammed a river, forming Glacial Lake Wisconsin (Figure 2). Lakes have sandy bottoms and edges; the presence of Glacial Lake Wisconsin explains why the area including Wisconsin Rapids to Wisconsin Dells is called the “Central Sand Plains”. Around 18,000 years ago, the ice dam failed and the lake drained very rapidly. The sheer force of the water sliced through the sandstone bedrock, carving out the formations around the Wisconsin Dells and Baraboo Hills area and forming the broad steep valley of the lower Wisconsin River.

- *How geologic history determines flora and fauna*
Rocks break down into minerals; minerals join the detritus to form soil. The type of rocks present in an area help to determine the soil type of that area; soil type helps to determine what plants can grow. Thus nearly everything in nature you see today can be explained by the geology of the area. For instance, the Wisconsin Dells area is comprised of sandstone cliffs and formations. Sandstone erodes as sand particles, causing the soil underfoot to be primarily sand. Many plants have a difficult time growing in sandy soil because of water drainage and soil compactness profiles.



Figure 1 Wisconsin Glaciation

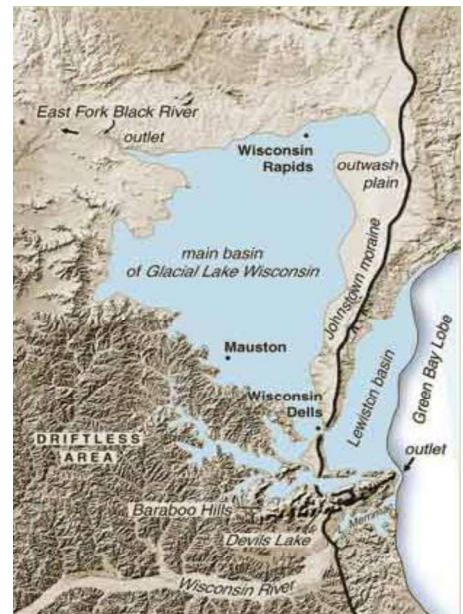


Figure 2 Glacial Lake Wisconsin



Soil characteristics of Blackhawk Island and the surrounding area. The following describes the symbols and soil characteristics of the map.

- 1224F: Boone – Elevasil complex, 15 – 50% slope
- 1233F: Boone- Tarr sands, 15 – 50% slopes
- 202B2 Lambeau silt loam, 2 – 6% slope, moderately eroded
- 213B2: Hixton silt loam, 2-6% slope, moderately eroded
- 213C2: Hixton soil loam, 6 – 12% slope, moderately eroded
- 224B: Elevasil sandy loam, 2 – 6% slope
- 228A: Partridge loam, 0 – 3% slopes
- 244B: Elkmound loam, 2 – 6% slope
- 561B: Tarr sand, 1 – 6% slope
- WiFoA: Winterfield-Fordum complex, river valleys, 0 – 3% slope, frequently floods
 - Boone – Elevasil complex: sand and weathered bedrock that drains excessively, medium runoff class
 - Boone- Tarr sands: sand and weathered bedrock that drains excessively, high runoff class
 - Lambeau silt loam: Silt and sand at the tops of hills, well drained
 - Hixton Silt loam: Silt, well drained
 - Elevasil sandy loam: sandy loam, well drained, low runoff class
 - Partridge loam: depressions on hills, loam over sand, poorly drained, very low runoff class
 - Elkmound loam: Ridges, loam, well drained
 - Tarr sand: sand, excessively drained, found as pediments near other formations
 - Winterfield- Fordum complex: Flood plains, backwaters and related sediments, loamy sand over sand, poorly drained

Appendix D: Additional Lesson Plans

- Life of a Logger
- DOTS
- Deer Exclosure and Picture Posts

Appendix E: Additional Resources

Curry, Ross Milo. *Dells area history and other stories: Volume II*. 1995.

Dells County Historical Society. *Others before you: the History of the Dells Country*. New Past Press, 1995.

Dells County Historical Society. *The Dells: an illustrated history of Wisconsin Dells*. New Past Press, 1999.

Durban, Richard D. *The Wisconsin River: an odyssey through time and space*. Spring Freshet Press, 1997.

H.H. Bennett Studio. *Dells of the Wisconsin River, yesterday and today*. 1978.

Kricher, John and Gordon Morrison. *Peterson Field Guides: Eastern Forests*. 1988.

The following resources can be found in the Upham Woods Library or in the Black Hawk Island Resources Folder:

Biotic Communities of the Wisconsin Dells State Natural Area, provided by Tom Meyer.

Black Hawk Island Hike.

Blackhawk Island Botanical List 1994.

Carlson, Stephan P. and Shan Woeste. *Afield with Ranger Mac: History Hike of Black Hawk Island, Upham Woods*. University of Wisconsin-Extension. 1984.

Clayton, Lee and John W. Attig. Glacial Lake Wisconsin.
Wisconsin Geological and Natural History Survey.
1989.

Hanson, Marvin C. *Camp Upham Woods - Black Hawk
Island Trail Guide*. 1965.

Upham Woods Master Plan. University of Wisconsin-
Extension. 1985.

Spotlight on Upham Woods: A Trail Guide.

Blackhawk Island Botanical List 8/15/94

Deer Enclosure 1 – Fenced off area (1/10 acre) on the White-tailed Trail just off the Overland Trail

Red Maple	Point-Leaved tick trefoil	Smooth Solomon's Seal
Maidenhair fern	Fern	White Lettuce
Hog peanut	Bedstraw	Bracken fern
Wild sarsaparilla	Wild Geranium	Red Oak
Jack-in-the-pulpit	Witch-hazel	Red Oak
Sapling staged ash	Spotted St. John's Wort	Raspberry
Large leaved aster	Canada Mayflower	Bristly greenbrier
Pennsylvania sedge	Partridgeberry	Rosy twisted stalk
Ironwood	Indian pipes	Basswood
Blue cohosh	Interrupted fern	Elm seedling
Yellowbud Hickory	Wood sorrel	Wild oat
Enchanter's nightshade	Panicum grass	Yellow Violet
Dogwood	Woodbine	
Honewort	White Pine	

Deer Enclosure 2 – Fenced off area (1/10 acre) on the Narrows Trail

Red Maple	Hickory	Orchid species
Sugar Maple	Blue cohosh	Clearweed
Baneberry	Enchanter's nightshade	Red oak
Maidenhair fern	Large coralroot	Buttercup
Hog Peanut	High bush honeysuckle	Black raspberry
Wild sarsaparilla	Fern species	Common elder
Jack-in-the-pulpit	Bedstraw species	Nodding pogonia
Ash Seedling	Wild geranium	Nettles
Grass	Witch-hazel	Violet
Pennsylvania Sedge	Round-lobed hepatica	

Boat Landing/ Allen Spring Gulch

Red Maple	Poverty grass	Jack pine
Silver Maple	Flowering spurge	Red pine
Sugar Maple	Black huckleberry	White pine
Lyre-leaved rock cress	Frostweed	Wild basil
Yellow birch	Hawkweed	Gray goldenrod
River birch	Round-headed bush clover	Spiderwort
Harebell	Panicum grass	

Dell House Area

Common ragweed	Indian tobacco	Common cinquefoil
Pussytoes	Wood sorrel	Heal-all
Calico aster	Panicum grass	Prickly ash
White snakeroot	Lopseed	Burnweed
Rattlesnake plantain	Plantain	Red-topped grass

Understory and Overstory of Black Hawk Island

Red maple	Pennsylvania sedge	Oak (variety)
Sugar maple	Ironwood	Basswood
Japanese barberry	Indian pipes	Hemlock
Yellow birch	Hophornbeam	