Leopold Education Project

Interdisciplinary Land Ethic Curriculum

A Sand County Almanac

And Sketches Here and There

By Aldo Leopold
This curriculum guide is a consolidation of the best lessons from the wide array of Leopold Education Project resources developed over the years, and includes content adapted from *Lessons in a Land Ethic* (1994), *Exploring the Outdoors with Aldo Leopold* (2009), and the *Habitat Discovery Series* (2014). Aldo Leopold Foundation staff members Maria Kopecky and Jennifer Kobylecky led the consolidation project, which aimed to combine similar lessons located within the various resources, ensure that lessons are easy to implement in all environments, and strengthen ties to *A Sand County Almanac*, Aldo Leopold, and his style of teaching and learning. Lesson review was conducted by the following Leopold Education Project State Coordinators: Amanda Patrick (IL), Gail Luera (MI), Marc Hirrel (AR), Treva Breuch (WI), Luann Sewell Waters (OK), Kim Kaseman (OH), Beth Folta (NY), and Mike Jabot (NY). The following Coordinators assisted with standards correlations and curriculum connections, which are available on our website: Amanda Patrick (IL), Gail Luera (MI), Peggy Eppig (MD), and Melissa Arthur (KS).

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*Leopold Education Project © Aldo Leopold Foundation*
Lesson Title

Corresponding Essay from A Sand County Almanac

Target Audience:
Suggested grade level(s) for the lesson. However, instructors are encouraged to adapt content for participants of all ages.

Suggested Time:
Estimated time needed to complete the procedures of the lesson. Preparation and extension activity time are not included.

Topics:
Key topics and themes addressed in the lesson.

Materials Needed:
Suggested materials needed to facilitate the lesson.

Key Quote(s):
Notable Leopold quote(s) from the corresponding essay in A Sand County Almanac.

Objectives
Describes what students will learn and do. Objectives may be modified to fulfill instructor and student needs.

Background Information
Information to help the instructor implement the lesson and understand more about the corresponding essay.

Procedures
Instructor procedures for each lesson are outlined, beginning with a group reading of the corresponding essay. Suggested open-ended discussion questions to help guide individual and group reflection are bulleted. Many lessons incorporate student worksheets for instructors to print and take into the field to engage students in hands-on observation and participation activities. Variations from and adaptations to lesson procedures are encouraged.

Extension Activity
Instructor procedures for an extension activity are outlined.

Suggested time: Additional time needed to conduct the extension activity. Preparation time not included.

Additional materials needed: Suggested materials needed to facilitate the extension activity.
Landscape Scene Investigators

January Thaw

**Target Audience:**
Middle and High School

**Suggested Time:**
1.5 hours

**Topics:**
Data Collection, Ecosystems, Habitats, Wildlife

**Materials Needed:**
*A Sand County Almanac*, roll of caution tape (outdoors) or artificial landscape scene (additional materials listed in Indoor Scene Set-up Instructions), writing and drawing utensils, clipboards, wildlife field guides, Evidence Recording Worksheets

**Key Quotes:**
“…January observation can be almost as simple and peaceful as snow, and almost as continuous as cold. There is time not only to see who has done what, but to speculate why.”

“The skunk track leads on, showing no interest in possible food, and no concern over the rompings or retributions of his neighbors. I wonder what he has on his mind; what got him out of bed?”

**Objectives**
Students will be able to:
1. Identify and infer evidence of wildlife activity
2. Compare and contrast their findings to those of others

**Background Information**
In the essay “January Thaw,” Aldo Leopold describes observations he made in nature while tracking a skunk through the snow after a midwinter blizzard. Although he mentions that January is an ideal time to discover nature’s mysteries and speculate who has done what and why, Leopold did this type of studying year-round in all types of environments. Much like an investigator, he surveyed landscapes to find the evidence animals, and humans, had left behind.

Making direct observations of animal behavior can be challenging. Wildlife biologists often rely on indirect observations (inferences) and animal signs to learn about wildlife behavior. Frequently visible signs include tracks, browse marks, urine stains, scat, tunnels, fur, feathers, and more. The fun of being a “Landscape Scene Investigator” is that sometimes you can solve nature’s mysteries and sometimes you can’t—the excitement lies in the guessing and wondering.
**Procedures**

1. If possible, identify a nearby natural area with evidence of animal activity and interactions and, using caution tape, designate mystery areas for students to investigate. You may want to plant additional evidence on the site to create a more complete mystery for students to solve. To conduct this lesson indoors or to introduce students to the activity via an indoor “warm-up,” create one or more mystery landscapes using the Indoor Scene Set-Up Instructions.

2. As a group, read the essay “January Thaw.” Ask students the following discussion questions:
   - What clues does Leopold describe that allowed him to paint a picture of wildlife activity?
   - What wildlife might frequent your area and what types of evidence might they leave behind?
   - What evidence might humans leave behind when they visit a natural area?

3. Split students into small groups. Explain that they are Landscape Scene Investigators and they have a case to solve. Their goal is to read the landscape from the clues provided, then create a logical story about what happened there. They should record their observations on the Evidence Recording Worksheet by listing all observable data and their inferences.

4. Provide groups adequate time to investigate their landscape scene. If more than one scene is present, you may choose to rotate groups after they have finished assessing their initial scene.

5. Have each group report their inferences of the scene(s) they investigated. Instruct groups to compare and contrast their findings to the inferences made by others.

6. Ask students the following discussion questions:
   - What was challenging about being a Landscape Scene Investigator? What was enjoyable?
   - Is there only one correct inference for what occurred at each scene? Why or why not?
   - Why is it important to be able to read the evidence wildlife leave on the landscape?
   - What evidence do you regularly leave on the landscape? What impacts, if any, do you make?

**Extension Activity**

Ask students to brainstorm and draw their own mystery landscape scene for others to decipher. Encourage them to include a variety of evidence left by more than one animal, as well as at least one interaction between animals.

Suggested time: 30 minutes
Additional materials needed: Paper
Landscape Scene Investigators

Evidence Recording Worksheet

Date: ______________ Time: ______________ Location: ______________________________

Landscape Scene Investigators on site:____________________________________________________

Sketch your landscape scene and all its clues. Using a field guide, label the wildlife evidence present.
Create a list of evidence present at your scene. Use the questions below to help guide your search:
- How many kinds of tracks do you see and what animals made them?
- What can you tell about the animals’ movements based on the direction of and distance between tracks?
- What purposes might the animals have had for their movements?
- If evidence of multiple animals is present, were all the animals here at the same time or did they take turns entering the scene? What evidence led you to your answer?

Based on your landscape observations, develop a theory that interprets the evidence found.

How else could this scene be interpreted? Identify the strongest and weakest pieces of evidence for each theory.
To conduct this lesson indoors or to introduce students to the activity via an indoor “warm-up,” create one or more mystery landscapes by drawing, painting, and/or stamping evidence of wildlife activity on a bedsheet, tarp, or poster board. Add natural artifacts and three-dimensional embellishments to help make the scene come alive. Use these three example mystery scenes for inspiration, and have fun!

Materials needed:
- Light-colored bedsheet, tarp, or poster board
- Permanent markers, paint, and/or wildlife track stamps
- Assortment of natural artifacts (e.g. beaver-gnawed sticks, rodent-chewed bones, hollow logs, twigs, leaves, owl pellets, skulls, scat, seeds, nuts, antlers, fur, feathers, etc.)

Adding a variety of three-dimensional embellishments can help make a scene more complex and life-like.
This scene shows evidence left on the landscape by both wildlife and humans. After a duck walks away from its nest, a crow comes by and eats the egg. Later, a goose is shot by a hunter as it leaves the water.

A raccoon travels from one berry patch to another and startles a mouse, which runs into a field and is preyed upon by a hawk.

A bobcat leaves its rocky den, crosses the creek, and preys upon a mouse that intersects its path.

A rabbit makes its way toward the river.
Target Audience:
Elementary, Middle, and High School

Suggested Time:
1 hour

Topics:
Birds, Creative Arts, Phenology

Materials Needed:
A Sand County Almanac, Bird Sound Cards, Digital Time Cards, recordings of common bird calls (optional)

Key Quote:
“At 3:30 a.m., with such dignity as I can muster of a July morning, I step from my cabin door, bearing in either hand my emblems of sovereignty, a coffee pot and notebook. I seat myself on a bench, facing the white wake of the morning star… I get out my watch, pour coffee, and lay notebook on knee. This is the cue for proclamations to begin.”

Objectives
Students will be able to:
1. Imitate and identify the calls of common birds
2. Consider changes in soundscapes over time

Background Information
In the essay “Great Possessions,” Aldo Leopold describes his experience listening to birds as they awaken and begin calling from pre-dawn through sunrise. Leopold was an early riser, often waking as early as 3:00 a.m. in the summer. With coffee cup and notebook in hand, he would sit on his favorite bench and listen. As the sun rose, he would observe the activities of birds he heard. With practice, he was able to identify birds by call and understand their behavior.

While humans divide land by acres, states, property lines, and fences, animals delineate their boundaries or territories using sound, scent, and other behaviors. When arising before our human neighbors, we are more likely hear our non-human neighbors as they awaken and observe evidence of their nighttime activities.

While humans cannot duplicate bird calls exactly, we can make up imitating words and phrases, called mnemonics, to help us remember the rhythm, pitch, and tone of calls. Examples of mnemonics for common birds calls include “caw, caw” for a crow and “cheerup, cherrily, cherrily” for a robin.
Leopold’s morning observations were made many years ago. He was able to recognize that daily patterns of animal activity changed seasonally and sometimes from year to year. These patterns of seasonal change are called phenology. Historical records of seasonal plant and animal activity, such as those kept by the Leopold family, are used by some scientists to understand climate change and its effect on flora and fauna. For example, the timing of the robin’s return, or the male redwing blackbird establishing its territory in the cattail marsh earlier than in the past, may be a response to our warming climate.

**Procedures**

1. As a group, read the essay “Great Possessions.” Ask students the following discussion questions:
   - What birds did Leopold hear and why were they singing?
   - How do the sounds Leopold describes compare to what you usually hear in the morning?
   - What kinds of bird sounds do you typically hear at home or at school?

2. Introduce students to bird calls and mnemonics by asking them to imitate the sound of a common bird, such as a crow (caw, caw) or duck (quack, quack).

3. Divide students into small groups. Provide each group with a Bird Sound Card and instruct them to practice simulating their bird call using the mnemonic printed on the card. After practicing, ask each group to share the name of their bird, its physical characteristics, and its mnemonic call with the whole group. If possible, play a recording of each bird’s call for reference.

4. Using your Digital Time Cards, hold up times for groups to see and begin singing. As you hold up the 3:35 a.m. time card, signal the field sparrow group to begin and continue singing. As time cards are shown, additional bird groups join in, creating a crescendo. All birds sing continually until the full dawn chorus is achieved at 4:15 a.m. If time allows, rotate Bird Sound Cards among groups and repeat the dawn chorus procedure.

5. Ask students the following discussion questions:
   - Which call was your favorite and why?
   - Leopold recorded hearing these bird songs in the 1940s – do you think he would hear the same sounds today? What might be the same? What might be different?
   - Why might it be important to listen to and record the morning calls of birds?

**Extension Activity**

Listen to a re-creation of a morning at the Shack, produced in 2012 using Leopold’s detailed journals, by searching the keyword “soundscape” at www.aldoleopold.org. Identify prominent birds heard. Have students create a hypothesis about what a soundscape of your location would have sounded like in the past, currently sounds like today, and will sound like in the future.

  Suggested time: 15 minutes
  Additional materials needed: Device with internet access and speakers
Wake Up Little Birdie

*Digital Time Cards and Bird Sound Cards*

**Directions:** Photocopy Digital Time Cards and Bird Sound Cards. Cut along the dotted lines. Distribute the Bird Sound Cards to students during the activity. Keep the Digital Time Cards for your use as you “conduct” the dawn chorus.

<table>
<thead>
<tr>
<th>Order</th>
<th>Time</th>
<th>Bird</th>
<th>Mnemonic</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>3:35 a.m.</td>
<td>Field Sparrow</td>
<td>Tew……tew….tew, tew, tew, tew, tew</td>
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<tr>
<td>2</td>
<td>3:40 a.m.</td>
<td>American Robin</td>
<td>Cheerup, cherrily, cherrily</td>
</tr>
<tr>
<td>3</td>
<td>3:45 a.m.</td>
<td>Baltimore Oriole</td>
<td>Here, here, come right here, dear</td>
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<td>4</td>
<td>3:50 a.m.</td>
<td>Indigo Bunting</td>
<td>Fire, fire! Where, where? Here, here!</td>
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<td>5</td>
<td>4:00 a.m.</td>
<td>House Wren</td>
<td>Churff chrff chrff chrff</td>
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<td>6</td>
<td>4:05 a.m.</td>
<td>Rose-breasted Grosbeak</td>
<td>Think Think Think</td>
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<td>Brown Thrasher</td>
<td>What’s Up What’s Up (x2)</td>
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<td>Yellow Warbler</td>
<td>Sweet, sweet, sweet, I’m so sweet</td>
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<td>7</td>
<td>4:10 a.m.</td>
<td>Eastern Bluebird</td>
<td>Cheer, cheerful charmer</td>
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<td>White-eyed Vireo</td>
<td>Chick-per-a-weeo-chick</td>
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<td>8</td>
<td>4:15 a.m.</td>
<td>Rufous-sided Towhee</td>
<td>Drink your tee-e-e-e-e (x2)</td>
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<td></td>
<td>Northern Cardinal</td>
<td>Birdie birdie birdie</td>
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3:35 a.m.  
**FIELD SPARROW**
Tew......tew....tew, tew, tew, tew, tew

3:45 a.m.  
**BALTIMORE ORIOLE**
Here, here, come right here, dear

3:40 a.m.  
**AMERICAN ROBIN**
Cheerup, cherrily, cherrily

3:50 a.m.  
**INDIGO BUNTING**
Fire, fire! Where, where? Here, here!

4:00 a.m.  
**HOUSE WREN**
Churff chrff chrff chrff

4:05 a.m.  
**ROSE-BREASTED GROSBEAK**
Think Think Think
4:05 a.m.
**Brown Thrasher**

What’s Up What’s Up (x2)

4:05 a.m.
**Yellow Warbler**

Sweet, sweet, sweet, I’m so sweet

4:10 a.m.
**Eastern Bluebird**

Cheer, cheerful charmer

4:10 a.m.
**White-eyed Vireo**

Chick-per-a-weeo-chick

4:15 a.m.
**Rufous-sided Towhee**

Drink your tee-e-e-e-e (x2)

4:15 a.m.
**Northern Cardinal**

Birdie birdie birdie
Our deepest gratitude goes to the following individuals and organizations for their contributions to the content of the Leopold Education Project since its first publication in 1994:

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Ted Cable              Benji Kohn            Cheryl Riley
Curt Carter            Janine Kohn            Teri Rogoway
Anne Donnellan         Gary Laib              Susie Ruby
Laura Downey           Ron Leathers           Carole Saurers
Kari Erkkila           Kathy Luczynski        Russell Sewell
Ken Forman             Carson Main            Malcolm Swan
Vince Gresham          Ann McCarthy           Robert Usgaard
Teresa Higgins         Jan Mittendorf         Shari Wilson
Marc Hirrel            Carolyn Mohr

Boone County Soil and Water Conservation District
Bull Shoals Field Station of Missouri State University
DeKalb County Soil & Water Conservation District
Heartland Water Resources
Kansas Association for Conservation & Environmental Education
Kansas State University Horticulture, Forestry & Recreation Resources
Kansas State University Office of Educational Innovation & Evaluation
Northern Illinois University
Papio-Missouri River Natural Resources District
Pheasants Forever & Quail Forever
Rum Village Nature Center
Shaker Lakes Nature Center
Texas Freshwater Fisheries Center
Treasure Lake Job Corps
United States Fish & Wildlife Service
“The objective is to teach the student to see the land, to understand what he sees, and to enjoy what he understands.”

–Aldo Leopold