

## Chapter 4: Looking for Patterns and Making Predictions

*At certain points in his journals and letters, Leopold moves beyond descriptive ecology to search for patterns and make inferences based on his observations. The following journal entries, as well as the gray highlighted portions of the included letters, provide examples of this important aspect of his thought process. Many of these occasions have to do with ornithology, Leopold's first love as a naturalist. There are, however, other subject matters such as geology that he speculates about (see page 30). For comparison's sake, a 1942 phenology chart compiled at the Leopold Shack in Wisconsin is included on page 29. This is included to show that Leopold kept up his interest in phenology, an interest from childhood that was so evident from his Lawrenceville letters and other documents.*

*This section includes an essay from his 1904 ornithological journal titled "Notes on the Habits of Phoebe In early Spring." In this writing sample (see page 28), he speculates about the cause of the association between a species of bird called a Phoebe and a plant species called Skunk Cabbage for the peculiar odor of its flower. Here he notes the connection between a type of pollinating fly attracted to the Skunk Cabbage's flower and the insectivorous diet of Phoebes.*

*Finally, the two letters included in this section (pages 30-33) not only demonstrate Leopold's observational skills, but also his ability to analyze his observations and look for patterns and make predictions. Gray highlighted areas indicate the parts of these letters where Leopold demonstrates this ability. The most common type of prediction is forecasting the arrival of migratory birds species based on data from past years, such as his April 6th 1904 search for Hermit Thrushes. That he spotted most of the birds he predicted is confirmed in his migratory list in his ornithology journal.*

		5
		Migrations, 1904
March		
5	Robin	
8	Purple Grackle	
9	Herring Gull	
9	Killdeer	
10	* Red-winged Blackbird	
10	Field Sparrow	
10	Savanna Sparrow	
12	Fox Sparrow	
13	Phoebe	
13	Rusty Blackbird	
13	Mourning Dove	
15	Swarop Sparrow	
16	* Bald Eagle	
19	Sharp-shinned Hawk	
22	* White-throated Sparrow	
28	* Cowbird	
29	Vesper Sparrow	
29	Jacknife	
29	Chipping Sparrow	
29	American Bittern	

Notes on the Habits of Phoebe  
In early Spring.

Phoebes arrived at this locality on March 13. From that time until April they inhabited wooded land almost exclusively. Their favorite haunts were the sunny, sheltered, slopes grown with young deciduous trees, and closely bordering low bogs and springheads. Fully ninety-five per cent of the individuals observed throughout March were in such places.

The reason for this complete divergence from usual habits was evidently as follows. Nearly all these bogs abounded in blooming Skunk Cabbage, which attracted several species of early insects in considerable numbers. The Phoebes, perching on the lower growth at the edges of the bogs, could snap up the visiting insects; several were, in fact, observed feeding on a small black fly in such places. The same species of fly was the one most frequently found entrapped in the Skunk Cabbage flowers.

Besides obtaining these insects on the way to the bogs, the Phoebes also fed near the Cabbages themselves, and one was detected perching on the tip of a flower, greedily eating its contents of imprisoned flies.



Later document from 1942 journal kept at the Leopold Shack near the University of Wisconsin-Madison

Aldo Leopold		Wildlife Ecology 118			
Observer		SPRING PHENOLOGY OF <u>Sauk</u> COUNTY, WIS., YEAR 1942 (Shack)			
Species	Leaf buds : opening	Flower : open	Pollen : shed	Fruit : mature	Remarks
(A) Trees and Shrubs					
alder		Apr 5		x	
acer		Apr 3			
American elm	Apr 3			5/17-5/23 Apr 25	last seen Apr 25 seeds were not out
amelanchier	Apr 25	4/25			Flowers last only one weekend
lilac	3/8 ('1/2")	May 1		x	Last flowers May 23
wild plum		May 15			
choke cherry	Apr 12	May 1			
thornapple		May 1			
wild crab					
wild rose		May 23			
red dogwood					
wild grape		May 23			
(B) Herbs & grasses					
Sandfoot violet		Apr 25			Last bloom May 23
pasque	Apr 5: 1 1/2 in	Apr 12 ✓	x	x	
hepatica			x	x	
dandelion		5/23	x		no flowers left May 23
Dutchman's breeches		Apr 18 ✓	x	x	
cowslip		Apr 22 ✓	x	x	Last only a week
bloodroot			x	x	
Jack-in-pulpit	May 23	Apr 18	x		
mandrake		May 17	x		
June grass	x	x	in head May 1		no pollen yet May 23
quack grass	x	x			
columbine		May 16	x	x	

Kennedy  
March 20

My Dear Papa:

Yours of the 17<sup>th</sup> received. Concerning our steel boats, if I remember rightly, they were in good condition when last put away. I might say, however, that two oarlocks are missing from the larger boat, having been lost or mislaid during the summer. They are of a special kind and as far as I know ordinary oarlocks will not replace them.

The birds' feeding place must have been very interesting during the late snow. I think that the Sparrows you describe in your letter may be included in the two species which you mention. The Song Sparrow is the one with stripes on the sides and the prominent dark spot on the upper breast the Fox Sparrow is the large one with the grayish unstriped head, bright rufous wings, back, and tail, and rows of spots on the sides of the same color. There are good pictures of both in my former bird book of which Carl has probably already made use. He will find it a very good book to begin with, as it includes only those species which one is liable to see commonly, and is free from technical terms etc.

I notice that you think that one of the sparrows seen might have a female Fox Sparrow and different from the male. There is no appreciable difference in this species.

I suppose the bad weather of which you speak has changed by this time. The snowfall of last Thursday is now entirely gone, and today the weather is perfect, although the wind is heavy in some places. I had a very pleasant walk this morning, although I did not get very far. About a mile north of here is a considerable creek, and at its headwaters several tracts of young oak and hickory timber. The stand is well mixed and even, averaging about five inches in diameter, the ground well covered with leaf mould and free from brambles and underbrush. In fact, it is a most promising crop, and at the same time is a favorite haunt of many birds. I spent considerable time in looking for a Hermit Thrush, as they like such timber early in the season, but found none. Three different Phoebees were seen, and each served to corroborate my statement of last week, namely: Early in the Spring they haunt sunny and open second growths near spring heads and bogs, which both produce the earliest insects from wintering aquatic or mud-burrowing larvae, and draw the same by the odor of the Skunk Cabbages which they generally contain.

There are many small spring-heads along this creek owing to the nature of the rock formation. This is a kind of red sandstone shingle which slants downward at about 45° going toward the head of the creek. For the same reason the creek itself is a succession of pools, damns, and waterfalls. It seems that the shingle is not easily eroded, so the water, flowing over the jagged or rather grooved surface at right angles to the ridges fills the grooves making deep pools and falls as waterfalls over the ridges.

Wherever the surface of the first stratum is thus exposed, there are no indications that the jagged surface was ever formed by the erosion of water, but it is very plain that by some volcanic disturbance the stratum was turned partly on edge, and then afterwards ground down by the great glaciers of the ice-sheet period, and changed, at the same time, from solid unbroken sandstone with an inclination at cleavage parallel to the surface to the split shingle of today. There is an endless profusion of glacial boulders in this region, many of them, especially those of yellow quartz rock, ground down to great smoothness from the friction in and under the old moraines. The majority of these boulders are of various exotic granites and resemble those of Michigan. "The Boulders", which I have described before are of the granite kind, and both from their situation and position are without doubt part of an old moraine. Even in this comparatively flat country I find there is much of Geological interest.

Flickers and Blue Jays are beginning to increase in number as the weather grows warmer. Song Sparrows and Meadowlarks are singing constantly, while Robins and Fox Sparrows are just beginning to try a few notes. Several migrants, such as Cowbirds, Winter Wrens, Hermit Thrushes and Kingfishers are about due. I also hope to see some Woodcock by examining all spring heads and bogs from time to time. Swamp Sparrows are now seen almost daily, while Killdeer and Rusty Blackbirds occur regularly at the school pond and down at the swamp. Near the swamp is a large area of low meadow covered with bunch-grass and interspersed with reed-grown ditches. This is a favorite resort of Marsh Hawks, which I see now quite often. I also am in hopes that it may contain some Henslow's Sparrows later in the season.

George Orr has unearthed a large aquarium for his fish which he now has in his room, I took mine down to the brook which supplies the pond and liberated them between two rudely made wicker fences of my own manufacture, where I think at least the larger ones can stay until the pond is again filled when I will let them out. While wading about in the shingle creek this morning I noticed a number of small fish in the pools, one a large shiner as long as my hand.

The Robinsons gave a party for everyone in the house last night. We played various games of cards, sewing, etc. and had a very pleasant time.

Well, my expectations for my last essay were not disappointed. I have had first group on every essay of the last half term. (There have been seven.)

I heard from Edwin Hunger yesterday. He told all about your trip to Lone Tree and the Evening Grosbeaks which Carl showed him. He appreciated the latter very much.

I hope that Tante Anna may soon recover from her illness, probably some good weather will help her. With best wishes to all of you, I remain

Your Aldo

P.S. Mama's candied dates received. There are, or rather were, very good.

Kennedy, April 6

Dear Carl:

Received Papa's letter of the 4<sup>th</sup> today.

School begins tomorrow, but I must tell you of my trips today and yesterday.

Yesterday I saw a Tree Swallow before I had left the school grounds. In the evening, I went through the tract of woods about half a mile up the trolley, in search of Hermit Thrushes. I have been through it for that purpose at least six times, as I guessed it to be an ideal place for them. Sure enough, I had hardly entered it, when two of them flushed and alit in the trees. Needless to say I was much pleased. Today I went out to Stony Brook, intending to come back for dinner, but you will see why I did not. On the way out I saw a large number of Vesper and Savanna Sparrows. When I came to the brook I examined a small patch of timber where I obtained the Boston fern, and found what do you think, A Blue-headed Vireo! He was very tame, and fed in the lower branches, so I had a good look at him. This is at least five days ahead of the regular time for this bird's appearances.

While following the Vireo down the creek, I was struck dumb by seeing another bird in a bush looking much like a Yellow-throated Vireo. But soon he came out into the open, and I had a good look at him. It was obviously a new bird, and I carefully wrote out a description of his plumage and habits. When I came home I found him to be the Yellow Palm Warbler. He stayed near the ground and often on it, was very tame, and gave no note.

Spent the rest of the morning in looking for a Kingfisher, but found none. They are much overdue. Later saw a small flock of Golden Crowned Knights but no ruby crowns. Found another crow's nest, and after a hard job of "shinnying" up a branchless tree, found it empty. Near it is a fine lot of timber on some very broken land, which I have named Fern Woods on account of several acres green with five kinds of ferns. It is of considerable extent and I will soon explore it more thoroughly. A small brook flows through it which I think is turbulent and rocky enough for Louisiana Water Thrushes, will examine it more carefully soon.

Only two overdues so far, Kingfisher and Winter Wren, pretty good, I think for in a new country.

The smell of summer was in the air today, a host of birds will be due in the next few weeks, from present evidence the climax of migration will occur about May 12. Farmers are beginning to plow on the hills.

Soft Maple and Catkin Hazel are now blooming. Skunk cabbage is developing leaves. My pansies are beginning to come up.

Some more White-throated Sparrows are arriving. Field, Chipping, and Vesper Sparrows are singing a great deal.

Most of the fellows are back tonight, the house sounds very noisy after the long interval of quiet. I have had a fine vacation, and am ready to go to work anew. Exam percents will probably be posted tomorrow.

I have made a fine wren box out of the box which contained my opera glasses, and will put it up outside my window.

Have not heard from you lately, but hope to soon. How are the dogs.

Remember me to the rest

Your brother

Aldo

Did you have to stretch the lynx hide again? I will write to Clarence Gilbert soon.