FRIENDS OF ROAN MTN

Volume 5, No. 1 **Winter 2001**

The X Rocks

If asked what "X" rocks are, there are probably those who would imagine that "X" rocks are slightly blurred copies of an original. Others may come to the conclusion that they are rocks that defy classification. And, there are perhaps a few who would assume "X" rocks are those kept under lock and key until a critical mass is achieved. Well, the answer is "none of the above", but on Roan Mountain, especially on the Cloudland to Carver's Gap segment of the Appalachian Trail, the old hack line traverses several thousand feet of these mysterious X rocks. So, what are they, and how did they earn this intriguing designation?

In order to read, discuss, and even think effectively about geology, you must first familiarize yourself with what amounts to a new foreign language. If we endeavor to stay away from technical terms, we are obliged to re-quote the definition of those terms every time we arrive at them in the process of writing or conversing. The most recent edition of the Dictionary of Geology contains 37,000 terms. With a vocabulary like that, it is possible to write reams and not be understood by anyone. Without this vocabulary, however, even the simplest geology reports would cure the most extreme cases of insomnia.

This prodigious technical vocabulary does not mean that the field of geology necessarily attracts susquapedalianists. On the contrary, those types are generally referred to the SSS (the Susquapedalianist Support Society) where most of them are found to be suffering from a mild case of Xanthogasterodyslexiterraphobia; but you probably knew that already (but to save you the trouble of looking it up, that particular phobia is the fear of mispronouncing a word).

In the early days of what would become the study of geology, one of the most pressing issues to be addressed by those first few earth scientists was, what is the age of the rocks they were studying? This, of course, was part of a broader issue, that being, how old is the Earth? Various theories were tested, ranging from counting cyclical sediment layers to calculating the salinity of the ocean, but no two methods converged. Failing to come up with a sure-fire determination, a preliminary classification was devised by simply using Roman numerals to designate the major divisions of rock. To avoid confusion, sequences of rock were numbered from the oldest to the youngest. As road building, tunneling, and mining gradually exposed more and fresher rocks to study, it became apparent that subdivisions were needed, so units within larger units were assigned letters for identification. Moreover, some major units did not match up with similar rocks when efforts were made to correlate them over long distances. It was soon obvious that the system was unwieldy and growing ever more confusing. A better system was needed.

For some time, miners had followed the custom of naming the main pay zones of minerals, and numbering the splits, as in "Pocahontas Number Nine Coal" or "the Great Gossan Lead" for example. This method seemed to allow more flexibility, so it worked its way into use by the scientific community, and is now known as the Geological Time Scale.

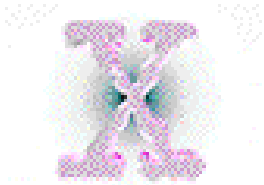
Once a consistent standard of practice for designating rock units had been established, geoscientists began to correlate units across great expanses using such features as fossils, ash layers, and discontinuities. Fossils were, and probably still are the most reliable tool for determining the relative age of a given rock unit. This is especially true if the rock unit in question is bound on all sides by fault contacts. Fossils, however, may only be used to correlate sedimentary rock units, and then only sedimentary rocks that were deposited in, or very near, an environment that would support life. Igneous and metamorphic rocks rarely contain true fossils, so these would have to await the perfection of radioisotope dating methods. With these sophisticated procedures, it would be possible to determine the "absolute" age of rocks. We enclose *absolute* in quotes, because as laboratory methods and equipment improved, the age determinations were often fine-tuned.

Now, the age determination of rocks is not without its pitfalls. Most sedimentary rocks cannot be dated by radioisotope procedures, because they are made of pieces of older rocks. Igneous rocks generally yield more reliable results, since they are less likely to be contaminated. Some metamorphic rocks have been re-heated, not enough to melt the rock, but hot enough to drive off the products of isotopic decay and re-set the atomic count-down clock, so to speak. For this reason, the age determinations on metamorphic rocks generally record a metamorphic event; the rocks themselves are much older. Conversely, metamorphic rocks may contain some fairly stubborn ingredients -- zircons, for example -- that may skew the results in the opposite direction. These zircons could have originated in an igneous provenance, separated from its parent rock by weathering and erosion, then transported to a beach environment, later to be submerged and become grains incorporated into a sedimentary rock which, in turn, underwent a metamorphosis into gneiss.

In western Greenland, rocks from the Isua group have been dated at 3.8 billion years. These are among the oldest rocks in the world, yet there is essentially nothing on the surface to indicate their profound age. When such rocks are discovered, it always creates a sensation. We mention it here, however, to stress the point that in the abyss of time, the advent of calcareous fossils only covers the last 10 or 12 percent of the age of the earth, as science has determined it to be. Since there are no known fossils in the rocks of Roan Mountain, the isotopic ages will be all we have.

The following table chronicles the historical high spots in the events leading up to the glory days of Roan Mountain. Wherever applicable, the radioisotope age as well as the geological epoch are given. Bear in mind that, as rocks are deposited younger upon older, geological data are typically presented in the same form -- oldest on the bottom, youngest on the top -- so as you read a column, you read top to bottom as though you were going backwards in time. Since this convention could be highly confusing to a casual reader, the following chronology is presented in the order of oldest to most recent. (Mya = million years ago.)

1815 mya	(Read, one point eight billion). A metamorphic event involving Carver's Gap Gneiss.
1000 mya	(One billion years ago). Grenville Orogeny -- the east coast of North America welded by collision to another continent.
820 mya	Grenville land mass breaks up; Iapetus Ocean forms where the Atlantic Ocean would be someday.
807 mya	Metamorphic event that yielded the Cloudland Gneiss, located today on the lower slopes of Roan Mountain.
734 mya	Iapetus Ocean continues to grow, terrane extends and ruptures. Bakersville Gabbro, a dark, heavy basaltic rock fills ruptures as magma.
680 mya	Beech Granite is emplaced as a pluton in the extensional terrane.
650 mya	Inland basin opens to west, detrital material from the Blue Ridge provides sediment to form clastic rocks of the lower Chilhowee group.
544 mya	Cambrian Period -- First calcareous fossils occur. Clastic rocks give way to limestones and dolomites of local East Tennessee valleys.
450 mya	Ordovician Period -- Iapetus Ocean begins to close. Limestones end



abruptly, deposition of black shales dominates.

425 mya Silurian Period -- Coarse sandstones deposited to west.

380 mya Devonian Period -- Pegmatite bodies emplaced around Spruce Pine.

250 mya Permian Period -- Iapetus Ocean gone.

200 mya Triassic Period -- Continents split apart again, Atlantic Ocean formed. Dinosaurs ruled.

Moving forward in time as we do, it is much easier to establish a beginning and an end, that end of course is the present. Going back in time, however, does not lend itself as well to developing a constrained scale, since the beginning of , say, rocks is an open-ended matter. So, it seemed logical at some point to assign letters to major identifiable age divisions that took place prior to the Cambrian Period. So the latest pre-Cambrian rocks are known as "Z" rocks, those immediately older are "Y" rocks, and then come the "X" rocks, and so on. The Bakersville Gabbro, at 734 mya, qualifies as a "Z" rock.

In 1982, Gerald Lee Gulley, Jr., wrote his Master's thesis on the petrology of the rocks of Roan Mountain. His research area included Roan High Bluff as well as Roan High Knob. A map of his findings accompanied the text. The map shows two patches of Cloudland Gneiss; one at the site of the old Cloudland Hotel parking lot, and another one just east of Carver's Gap. According to the map legend, the Cloudland Gneiss widens to the north, but beyond that, geological reconnaissance is scarce. According to Gulley's text, the Cloudland Gneiss is a "Y" rock, somewhere around 0.8 to 1.0 billion years ago.

In 1983, the Carolina Geological Society published a compendium of field trip notes in their fall field trip guidebook. One of the articles was authored by John R. Monrad and Gerald L. Gully, Jr. It included age and pressure-temperature conditions during a metamorphic event at Roan Mountain. In the abstract, they claim that five whole-rock samples were dated with the Rb-Sr isochron age of 1815 million years, + or - 31 million years, which would qualify the Cloudland Gneiss as a genuine "X" rock. Although later attempts to repeat these results cast doubt upon the initial findings, it was only temporary, as more recent samplings have vindicated the original figures.

Walking the old hackline trail between the Cloudland parking lot and Carvers Gap, it is easy to forget about radioisotopes. The ravens are far more engaging at this altitude and in this environment. The fragrance of the evergreens wafting on the cool, pleasant air seems more deserving of one's immediate attention. Along this section of trail is a side path to the Roan Mountain AT shelter. Just beyond the shelter is a large outcropping of rock, and on top of that is a USGS survey marker proclaiming the altitude at this point to be 6285 feet above sea level. My friend, V. Collins Chew who wrote the book, "Underfoot; the Geology of the Appalachian Trail", located all of the full-sized AT shelters, and concluded that the one atop Roan Mountain is the highest shelter on the trail, with the possible exception of some of the "emergency only" shelters around the Mount Washington area of New Hampshire.

Continuing beyond the shelter, we encounter the outcropping with the USGS marker. As we relax here among the evergreens, perhaps it is a good time to reflect and let our minds wander; or, we could review our list of superlatives associated with Roan Mountain. First of all, there is the renown circular rainbow. Then there are the lightning storms viewed from above. In a previous issue of this newsletter, I explained the pink snowflakes that do not melt, even in the summer. Now we can add (but not unequivocally) to our list, the Roan High Knob shelter, as the highest non-emergency shelter on the Appalachian Trail. And, while we muse at the summit of Roan High Knob, we can add one more item -- the "X" rocks -- established for now with an age of 1.8 billion years, and quite possibly the oldest rocks on the entire Appalachian Trail.

Bob Whittemore is a geologist employed by General Shale Brick in Johnson City, Tennessee. Bob has been leading hikes at the Naturalists' Rallies for several years.

Oh, those sweet vi-o-lets!

— Anne Whittemore

One of our earliest and most familiar spring wildflower, violets suggest tiny pansies and are found in a variety of habitats. Two garden varieties are pansies and a small one, locally called Johnny Jump-ups or Tennessee Volunteers! Most violets bloom from March through June or July depending on the species as well as the altitude or latitude.

During a hike up the Doe River Gorge 3-4 years ago under the auspices of the Spring Wildflower Walks, Ed Schell showed a group of hikers a small, white violet growing in the flood plain of the Doe River. He called the flower, Lucy's Violet. Why so named, I don't know, for I have never seen the violet since nor have I found this species listed in the various wildflower identification books. Thus, I thought that by having a list of all the violet species together, identification would be easier. Perhaps the industrious searcher will find a new species of violet! Violets are known for hybridization so it is quite likely that one could find a previously unknown species.

The purpose of this article is to acquaint the reader with the wonderful variety of violets. Accompanying each violet species will be identifying information so that the reader can take this list to the field to assist in making identification. The asset of having all the violet species listed in one place will, I hope, make identification easier.

Violets are low growing plants. The flowers have five nearly equal petals, the lowest often wider/larger, heavily veined, and extending back into a spur; the lateral petals are usually bearded. Violets have a distinctive pistil with a thickened head and a short bear. The Green violet does not look like a violet but can be recognized as one by its pistil. There are two categories of violets:

(1) "stemless" violets with leaves and flowers arising on separate stalks; and

(2) "stemmed" violets, who erect stems bear both leaves and flowers.

Species not likely to be found in our area are not included in the following list.

WHITE OR CREAM-COLORED VIOLETS

LEAVES AND FLOWERS ON SAME STALK:

1. Canada Violet (Viola canadensis) - Leafy-stemmed white-flowered violet may attain height of 18-20 inches. The leaves are broadly oval or heart-shaped with pointed tips and toothed margins. The lower petal

is striped with fine dark lines; usually tinge of bluish or violet on the back of the upper petals. Stems purplish with scattered hairs. Relatively short flower stalks, small stipules. S. Canada; northern edge of U.S.; south in mountains. Rich woods. April-July

2. Pale or Cream Violet (V. striata) - Differs from Canada Violet by absence of yellow at base of petals and absence of purplish on the back. Note large deeply cut stipules and much longer flower stalks. Stems green, smooth. 6-12 inches. Low woods, streambanks, moist meadows. Minnesota, Wisconsin, s. Ontario, New York south. April-June.

3. Field Pansy (V. kitaibelliana) - Note the small spoon-shaped leaves with their very large, lobed blunt-tipped stipules. Flowers cream-colored or pale blue. 3-8 inches. Fields, roadsides, streambanks. Michigan, Ohio, New York, south. April-May.

LEAVES BASAL, FLOWERS ON SEPARATE STALKS:

1. Northern White Violet (*V. pallens*) - Very small leaves, nearly round or bluntly heart-shaped, about as wide as they are long; seed capsule green. 1-5 inches. Flowers fragrant; under ½ inch long. Wet woods, clearings, brooks, springs. Canada, n. U.S., south in mountains. April-July.

2. Sweet White Violet (*V. blanda*) - Smaller, but more fragrant. Deeper lobes at base of leaves; stems reddish; upper petals twisted, narrow & bent backwards; seed capsule purple. Flowers ½ inch long. Rich woods. Across Canada, n. US, south in mountains. April-May.

3. Large-Leaved Violet (*V. incognita*) - Similar to *V. blanda* but leaves with broader notch (sinus) between lobes. Leaf/flower stalks are downy, upper petals are egg-shaped, not reflexed. Leaves are larger, more erect than *V. blanda.* Moist woods. Canada and south in mountains to Tennessee. April-May.

YELLOW VIOLETS

"STEMLESS" YELLOW VIOLETS:

1. Round-Leaved Yellow Violet (*V. rotundifolia*) - In spring flowering stage our only "stemless" yellow violet. Note small size, roundish, heart-shaped leaves with scalloped teeth. At flowering time flowers are about 1 inch long, by summer they are 2-4 inches long. 2-5 inches. Rich woods. Minnesota, s. Ontario, Maine south. April-May.

"STEMMED" YELLOW VIOLETS:

1. Downy Yellow Violet (*V. pubescens*) - Note the downy stems (especially along veins, margins); leaves heart-shaped; occasionally 1 basal leaf. Stipules toothed. 6-16 inches. Dry woods. Minnesota Ontario, N. Scotia to Virginia. April-May. prairies, plains. W. Minnesota, w. Missouri west to Rockies. April-May.

2. Three-Part-Leaved Violet (*V. tripartita*) - The only yellow violet with cut leaves in our area. Leaves variable; some little-cut. 6-10 inches. Rich, wooded slopes. S. Ohio, West Virginia and south in mountains. April-May.

3. Halberd-Leaved Violet (*V. hastata*) - The stem leaves are about twice as long as wide in triangular or arrow-shaped form. Backs of petals are tinged with violet. The deep buried rootstock is long, white, and brittle. 4-10 inches. Deciduous woods, ravines, rich woods. Ohio, Pennsylvania and south in mountains. April-May

VIOLET, BLUE VIOLETS

(Hybrids frequent)
White forms of blue violets also occur.

"STEMMED" VIOLETS (leaves, flowers on same stalk)

1. Long-Spurred Violet (*V. rostrata*) - Note the extremely long spur (about 1/2 inch long)and toothed stipules in the leaf axils. Petals pale lavender, lower 3 with darker lines; all petals beardless. 4-8 inches. Rich woods, limy soil. Wisconsin, sw Quebec, Vermont south to Pennsylvania, n. New Jersey, Connecticut, in mountains to Georgia. April-June.
2. Dog Violet (*V. conspersa*) - Similar to *V. rostrata* but spur shorter (1/4 inch long), lateral petals bearded. Pale violet in color. 2-6 inches. Meadows, low woods, streambanks. Minnesota, e. Canada, ne US and south in mountains. May-July.

"STEMLESS" VIOLETS (leaves, flowers on separate stalks):

A. Flower stalks soft - hairy or downy:

1.Woolly blue Violet (*V. sororia*) - Wide-leaves, downy or woolly throughout. Lateral petals bearded. (*V. septentrionalis* and *V. novae-angliae*, below are also downy but have lower petal bearded.) Woods, meadows. Minnesota, w. Quebec to New England, south in mountains. March-June.
2. Northern Blue Violet (*V. septentrionalis*) - Similar to *V. papilionacea* but down and all 3 lower petals bearded at base. Leaves often purplish beneath. Open conifer woods. Canada south to Wisconsin, Michigan, new York, New England, in mountains to Virginia. May-June.

B. Flower stalks smooth:

1. Common Blue Violet (*V. papilonacea*) - Smooth, 2 lateral petals bearded, lower petal longer, unbearded; all 3 lower petals strongly veined. Flowers only slightly surmount leaves. 3-8 inches. Damp woods, meadows. Often found in dooryards. N. Dakota, s. Quebec, Maine south. March-June
2. Broad-Leaved Wood Violet (*V. latiuscula*) - Similar to *V. papilionacea* but grows in dry soil. The early leaves (and mature) are generally tinged with purple beneath, while the mature leaves are mostly wider than long. Lower petal has tuft of hairs at the base. Dry woods. Vermont and New York south.
3. Le Conte's Violet or Pale Early Violet (*V. affinis*) - Similar to *V. papilionacea* but lowest petal also bearded. Leaves narrower with more tapering tips. Meadows, moist woods. Wisconsin to w. New England and south in mountains. April-May.
4. Marsh Blue Violet (*V. cucullata*) - Differs from *V. papilionacea* in having lower petal shorter. Lateral petals darker toward throat; beards clavate (like small clubs), not hairlike. Flower stalks longer than leafstalks. 5-10 inches. Wet meadows, springs, bogs. Mountains southward. April-June.

5 PETALS AND A SPUR: VIOLETS LOBED OR ARROWHEAD LEAVES

1. Pansy Violet or Birdfoot Violet or Crowfoot Violet (*V. pedata*) - Leaves deeply segmented. One variety is bicolored (upper 2 petals deep violet, 3 lower ones pale), another is uniformly colored. Upper petals flare backward; all petals beardless. Tips of orange stamens protrude conspicuously in center. The leaves have 3 main divisions, but the lateral ones are divided again into slender or widened segments accounting for the last two names. 4-10 inches. Sandy fields, slopes, sunny rocks. Minnesota, Michigan, s. Ontario, New York,

Massachusetts south. April-June.

2. Coast Violet (*V. brittoniana*) - Leaves similar to *V. pedata* but middle lobe often wider. A form with broad uncleft leaves often grows with it. Flowers deep reddish violet, with a conspicuous white throat, 3 lower petals densely bearded. 4-8 inches. Sandy or peaty soil. Coast from s. Maine south; in south, also in mountains. April-June

3. Three-lobed Violet (*V. triloba*) - Hairy, similar to *V. palmata* but most leaves less deeply cut; some 3-lobed, others heart-shaped suggesting V. sororia. All 3 lower petals bearded. Woods, limestone ledges. Illinois, s. Indiana, Pennsylvania south. April-May.

4. Stone's Violet (*V. stoneana*) - Very similar to *V. triloba* but comparatively smooth and with longer leafstalks. Lowest petal smooth. Woods. Pennsylvania, New Jersey south to Kentucky, Virginia. April-June.

5. Arrow-Leaved Violet (*V. sagittata)* - Early leaves may be heart-shaped, later ones longer, lance-shaped often deeply lobed at base, often purplish beneath. Flower stalks as long as leaf stems. Open woods, prairies. Minnesota to Massachusetts and south. April-June.

6. Triangle-Leaved Violet (*V. emarginata*) - Similar to *V. sagittata*, with narrowly triangular leaves that usually lack the deeply jagged back-flaring basal points. Petals often notched. Open woods, clearings. Missouri, Ohio, New York, Massachusetts south. March-May.

7. Ovate-leaved Violet, Northern Downy (*V. fimbriatula*) - The narrowly arrow-shaped leaves are more ovate, less triangular in contour than in preceding two; leaves are also hairy, with much shorter leafstalks. Dry woods, clearings, fields. Minnesota to Nova Scotia and south. April-May.

GREEN VIOLET

(*Hybanthus concolor*) This flower is hardly recognizable as a violet except for the clublike pistil, which is distinctive of the violet family. Flowers are small, greenish-white, about 1/4 inch long, drooping in 1-3 flower clusters from the leaf axils. Leaves are elliptical, long pointed, sometimes toothed. The plant is coarse and somewhat downy. 1-2 feet. Rich woods, bottomlands. Wisconsin, Michigan, s. Ontario, New York, Connecticut south. April-June

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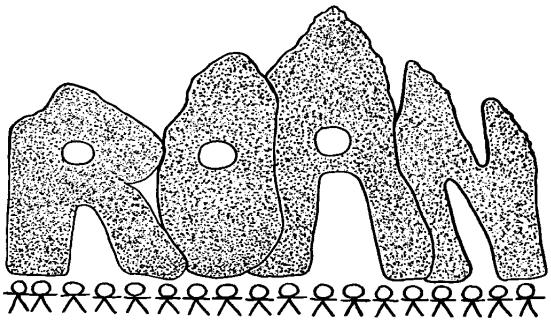
Anne Whittemore serves as the treasurer for Friends of Roan Mountain.



Graphic: J.C. Mills and Becky Kiehna

State Park Happenings

Winter has been an exciting time, I have spent the greatest portion planning a myriad of activities for 2001! Our Special Events and Activities brochure for 2001 is now available, and includes a schedule of musical and dancing entertainment on the stage, programs at the Miller Homestead, our traditional arts workshops, and much, much more. Please call Roan Mountain State Park at 423-772-0190 to have a copy of our calendar mailed to you!

This year we have greatly expanded our Traditional Arts Workshops to offer a session almost every month of the year. Workshops will include basketry, spinning, papermaking, nature writing, felting, weaving, flintnapping, primitive pottery, natural dying, stained glass, and beading. Classes are limited to 15 participants each, so please call early if you wish to sign up or would like additional information. There will be a small fee for each workshop to cover the cost of materials and to help pay our expert instructors.

The Spring Roan Mountain Naturalists' Rally is now in the heated stages of planning with lots of new and exciting activities in the works! We are pleased to announce our speakers for this year, Dr. Peter Weigl of Wake Forest University on Friday night, and Mr. Ed Schell of Johnson City on Saturday night. There are also several new workshops planned for lunch and in the morning. City Market will be serving our special meal on Friday night, bag lunches for Saturday, and an evening meal for Saturday night. Brochures will be available with all the intriguing details by mid March.

Following is a listing of activities planned from January through May of 2001:

Sat., March 17	Nature Writing Workshop
Sat., April 7	Easter Egg Hunt and Bonnet Contest
Fri. – Sun., May 4–6	43rd Annual Roan Mountain Spring Naturalists Rally
Sat., May 12	**20th** Annual Junior Trout Tournament

For additional information please call or write Jennifer Laughlin at Roan Mountain State Park, 1015 Hwy 143, Roan Mountain, TN 37687; 1-423-772-0190, Extension 108.

FRIENDS INFO

All members are encouraged to attend our annual members' meeting during the Fall Rally, where you may give your input, ask questions, and vote for officers, as well as volunteer your talents to the organization.

The dues you pay to Friends of Roan Mountain are mainly used to pay the expenses of the rallies (i.e. fees and honorariams to the speakers, refreshments, name tags, paper supplies, etc.), and to pay for the printing and mailing of newsletters and other correspondence.

Current Membership: 141
(68 Family, 65 Individual, 6 Student, 2 Corporation)

Balance: $3,148.00
(This does not include the cost of this current newsletter.)

Membership Renewal

If your membership in Friends of Roan Mountain is about to expire, we hope you will choose to renew. Please take a moment to complete the information below and mail it in.

Name_____

Phone (_____)_____

Address _____

_____

Check ✓ appropriate membership category:
Individual ($10) ____ Family ($15)_____
Student ($5) _____ Corporate ($45) _____

Dues:$_____ Contribution: $ _____

Total Enclosed: $ _____

Please make check payable to
Friends of Roan Mountain and return to:
Anne Whittemore, 208 Mark Dr., Gray, TN 37615

Roan Mountain Christmas Bird Count

The annual Roan Mountain Christmas Bird Count was begun in 1950. This year's count was conducted on January 5, 2001 by Fred Alsop and Rick Knight. Forty (40) species were tallied as shown below. If you are interested in looking at the counts from other areas or comparing the results from previous years, log onto the National Audubon Society's website at www.birdsource.org/cbc

2000 ROAN MOUNTAIN CHRISTMAS BIRD COUNT

Pied-billed Grebe: 1
Mallard: 4
Turkey Vulture: 1
Sharp-shinned Hawk: 1
Red-tailed Hawk: 4
American Kestrel: 1
American Woodcock: 1
Mourning Dove: 30
Great Horned Owl: 1
Belted Kingfisher: 3
Downy Woodpecker: 8
Hairy Woodpecker: 3
Northern Flicker: 2
Pileated Woodpecker: 1
Blue Jay: 30
American Crow: 93
Common Raven: 10
Carolina Chickadee: 28
Tufted Titmouse: 15
White-breasted Nuthatch: 11
Brown Creeper: 3
Carolina Wren: 9
Winter Wren: 3
Golden-crowned Kinglet: 11
Eastern Bluebird: 9
American Robin: 15
Northern Mockingbird: 6
Cedar Waxwing: 34
European Starling: 79
Northern Cardinal: 9
Eastern Towhee: 5
Field Sparrow: 4
Song Sparrow: 84
Swamp Sparrow: 2
White-throated Sparrow: 39
Dark-eyed Junco: 95
House Finch: 8
American Goldfinch: 11