

# **Baseline survey of lichens at Great Basin National Park**

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## **Introduction**

Lichens are an interesting and attractive feature of many natural areas including our national parks. Visitors often notice them but few really know what they are and it is rare that interpretive resources are devoted to them. They also play essential but often overlooked roles in our natural ecosystems. Lichens are important in the breakdown of rock to soil and in many cases they contribute to overall soil fertility by fixing atmospheric nitrogen. They are also sensitive environmental indicators – changes in lichen communities often indicate degradation of air quality or point to a climate shift. In some arctic systems lichens provide an important source of forage for animals and, although they are rarely used as food by humans, they provide materials use in dyes or folk medicines.

Except for a survey of the lichens on Wheeler Peak, the lichen communities in Great Basin National Park are almost completely unstudied. This survey was done to provide a baseline inventory of the lichens found within the park.

## **Objectives**

This project had the following three objectives:

1. Determine lichen population structure within major park habitats using GPS-referenced plots.
2. Assess cryptic lichen diversity in the park by sampling selected microhabitats.
3. Create a permanent reference collection of park lichens along with photographs.

## **Methodology**

The structure of lichen populations within major park habitats was determined using GPS-referenced plots. Seven plots were laid out and assessed by doing an elevation-based transect along the road to Wheeler Peak campground and along the trail system to Wheeler Peak (Figure 1). Different types of plant communities were deliberately selected for each plot along this transect. The geological formations also varied between these plots but were somewhat limited along the transect. The range of plant communities sampled ranged from sagebrush/grassland on Alluvium (Oa) at the lowest elevation, through pinyon-juniper (on Alluvium - Oa) and *Cercocarpus* woodlands on Prospect Mountain Quartzite (Czpm), mixed conifers (on Czpm), aspen and spruce (both on Glacial deposits - Og), and finally alpine tundra Prospect Mountain Quartzite (Czpm) on Wheeler Peak. No permanent markers were left in the plots. However, the center of each plot was GPS-referenced so that future reassessments of the lichens in these plots can be done.

The method that was used to assess the plots was adapted from one that has been frequently used in the scientific lichenology literature. Sampling for each plot was begun by establishing a GPS-referenced point at plot center after which the margin of a 1/3 hectare circle was measured out using a tape and temporarily marked with flagging. Elevation, slope, aspect, and geological formation were noted for each of the plots and the structure of the dominant lichen community at each plot was assessed using a 30 x 2 meter transect laid out on the ground across the center of the plot. Epiphytic lichens, when present, were sampled along this transect to a height of

approximately 2 meters. Members of each of the most abundant lichen species found along the transect were tallied to determine which were most representative of the site. The plot was then intensively sampled for lichens by searching the entire area until two hours had passed or until a half hour had passed without finding anything new.

Additional or cryptic lichen diversity in the park was assessed by sampling seven more areas within the park (Figure 2). These areas were selected to include parts of the park, geological formations, or habitats such as riparian zones that had not been part of the Wheeler Peak transect. These extra habitats were the stream and meadows at Wheeler campground, Pole Canyon Limestone (Cpc) near Gray Cliffs, Pole Canyon Limestone D member on Mt. Washington (Cpcd), Fishhaven and Laketown Dolomite (Osfl) along Snake Creek, the undifferentiated Pognip formation (Op) along Snake Creek, a riparian zone with a granitic parent material at the top of the Snake Creek road, and Granite (Jg) along Strawberry Creek. Plots were not established at these sites like they had been along the Wheeler Peak transect. Instead, collecting was done for a period of about two hours at each site with an emphasis on locating species that had not yet been collected. Because of this, the more common species found at the other sites were not always collected at these sites.

The specimens collected during the fieldwork for this project make up a reference collection for the park. Digital photographs are being taken of the species that were collected during the fieldwork. The photography is still in progress and is expected to be done in time for the lichen bioblitz planned for summer 2017.

## **Findings**

This work gives a good basic overview of the lichen communities in Great Basin National Park. The lichens present at each of the plots or field locations sampled are listed in the tables below.

The majority of the lichens in the park occur on rock, either as crusts on rock surfaces or endolithically (ie living inside rock with fruiting structures appearing on the rock surfaces). Rock inhabiting lichens are not only the most abundant lichens in the park, they also represent the highest species diversity. Quite a few lichen species also occur on soil. Soil crust lichens are widespread in the park although they are somewhat irregularly distributed and do not form a continuous cover over the soil like they do in some places. These are particularly conspicuous in the lower elevation sites such as Plot 2 or the dolomite site sampled along Snake Creek (see the tables below). Two lichen species were found that are aquatic or semi-aquatic along with two additional species that live as parasites on other lichens.

Even though quite a few lichens were found growing on woody plants, there is a striking and somewhat surprising lack of epiphytic lichens within the park as a whole. A number of these were found on trees in relatively moist riparian zones but for the most part species of *Xanthomendoza* or *Melanohalea* are the predominant epiphytes. Lichens on trees are often abundant and contribute substantially to the overall species diversity of many ecosystems. However, the arid climate of this park is probably a major factor in suppressing epiphyte development.

A number of cyanolichens were also collected during the survey. These are lichens whose photobionts are entirely or partially Cyanobacteria rather than Algae. As a result, they fix nitrogen. One of these species (*Collema tenax* – usually considered to be one of the soil crust lichens) is widespread in the park whereas another species (*Peltigera rufescens*) is common in wooded sites. Because of their frequency and ability to fix nitrogen, these lichens potentially contribute significantly to the nitrogen economy of the plant communities in which they occur.

The plots along the Wheeler Peak transect were each typically dominated by one to several species of lichen even though each species is listed only once per site. There is also much overlap in the species composition of the lichen communities at most of the different sites and on different parent materials. Notably, *Aspicilia* and *Xanthomendoza* species were abundant at most locations. And some species such as *Aspicilia americana*, *Rhizoplaca melanophthalma*, or *Xanthoria elegans* transversed the entire elevation range in the park. However, in spite of overlapping components, the species composition of the lichen communities sampled along the transect did gradually change with elevation so that the community found in Plot 7 near the top of Wheeler Peak was sharply different from that in Plot 1 near the park entrance. Certain species such as the bright, greenish-yellow species, *Pleopsidium flavum*, or *Umbilicaria virginis* were found only on Wheeler Peak. Others such as *Anaptychia ulotrichoides* or *Heppia lutosa* were observed only at the top of Mt. Washington. Interestingly, the lichen communities on these two peaks are dramatically different in spite of their proximity to one another. This is likely due to the different parent materials occurring on these peaks (Pole Canyon Limestone D member on Mt. Washington and Prospect Mountain Quartzite on Wheeler Peak).

### **Future prospects**

Overall, 123 lichen species were found during this survey but there are undoubtedly more present. This work covered most of the plant communities and many of the geological formations in the park but a number of additional geological formations remain to be studied particularly at the southern end of the park where numerous formations intersect and road access is more limited.

# WHEELER PEAK TRANSECT

## **PLOT 1**

Location: N 39°00.825' W 114 °12.941'

Habitat and or Parent Material: sagebrush and grasses on Alluvium (Qa)

Elevation: 6755 ft    Slope: 4%    Aspect: E 120° S

Dominant lichens: *Xanthomendoza*, *Candelariella*, *Sarcogyne*

Lichen species by substrate

| <u>Plant</u>                                | <u>Rock</u>                      |
|---------------------------------------------|----------------------------------|
| <i>Candelariella antennaria</i>             | <i>Acarospora bullata</i>        |
| <i>Melanohalea elegantula</i>               | <i>Acarospora obpallens</i>      |
| <i>Xanthomendoza fulva</i>                  | <i>Adelolecia kolaensis</i>      |
|                                             | <i>Aspicilia contorta</i>        |
| <u>Soil or organic matter on the ground</u> | <i>Aspicilia desertorum</i>      |
| <i>Aspicilia reptans</i>                    | <i>Lecanora argopholis</i>       |
| <i>Caloplaca tominii</i>                    | <i>Rhizoplaca melanophthalma</i> |
| <i>Candelariella aggregata</i>              | <i>Sarcogyne similis</i>         |
| <i>Candelariella rosulans</i>               | <i>Verrucaria compacta</i>       |
| <i>Collema tenax</i>                        | <i>Xanthoria elegans</i>         |
| <i>Placidium</i> sp.                        |                                  |
| <i>Psora cerebriiformis</i>                 |                                  |
| <i>Psora globifera</i>                      |                                  |
| <i>Psora tuckermanii</i>                    |                                  |
| <i>Verrucaria</i> sp.                       |                                  |
| <i>Xanthoparmelia plitii</i>                |                                  |

## **PLOT 2**

Location: N 39°00.093' W 114°12.713'

Habitat and or Parent Material: pinyon-juniper and grass on Alluvium (Qa)

Elevation: 6765 ft    Slope: 3 %    Aspect: 345° NW

Dominant lichens: *Lecanora*, *Aspicilia*, *Collema*

Lichen species by substrate

| <u>Plant</u>                                | <u>Rock</u>                            |
|---------------------------------------------|----------------------------------------|
| <i>Caloplaca</i> aff <i>jungermanniae</i>   | <i>Acarospora bullata</i>              |
| <i>Melanohalea elegantula</i>               | <i>Adelolecia kolaensis</i>            |
| <i>Xanthomendoza fulva</i>                  | <i>Aspicilia americana</i>             |
| <i>Xanthomendoza montana</i>                | <i>Aspicilia desertorum</i>            |
|                                             | <i>Aspicilia</i> sp.                   |
| <u>Soil or organic matter on the ground</u> | <i>Lecidea tessellata</i>              |
| <i>Aspicilia hispida</i>                    | <i>Rhizoplaca melanophthalma</i>       |
| <i>Aspicilia reptans</i>                    | <i>Staurothele areolata</i>            |
| <i>Caloplaca tominii</i>                    | <i>Xanthoparmelia nigropsoromifera</i> |
| <i>Candelariella citrina</i>                | <i>Xanthoria elegans</i>               |
| <i>Candelariella rosulans</i>               |                                        |

|                                                                                                                                                                                          |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <i>Collema tenax</i><br><i>Diploschistes muscorum</i><br><i>Peltigera rufescens</i><br><i>Placidium squamulosum</i><br><i>Psora cerebriiformis</i><br><i>Verrucaria aff sphaerospora</i> |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

### **PLOT 3**

Location: N 39°01.314' W 114°16.417'

Habitat and or Parent Material: *Cercocarpus* on Prospect Mountain Quartzite (Czpm)

Elevation: 9238 ft    Slope: 12 %    Aspect: E 120° S

Dominant lichens: *Adelolecia*, *Aspicilia*, *Rhizoplaca*

Lichen species by substrate

| <u>Plant</u>                                | <u>Rock</u>                      |
|---------------------------------------------|----------------------------------|
| <i>Caloplaca cerina</i>                     | <i>Adelolecia kolaensis</i>      |
| <i>Candelariella xanthostigma</i>           | <i>Aspicilia americana</i>       |
| <i>Melanohalea elegantula</i>               | <i>Aspicilia contorta</i>        |
| <i>Physcia adscendens</i>                   | <i>Caloplaca arenaria</i>        |
| <i>Physcia dimidiata</i>                    | <i>Lecanora muralis</i>          |
| <i>Xanthomendoza fulva</i>                  | <i>Lecanora noxomexicana</i>     |
|                                             | <i>Lecanora sp.</i>              |
| <u>Soil or organic matter on the ground</u> | <i>Lecidea atrobrunnea</i>       |
| <i>Acarospora aff terricola</i>             | <i>Physcia dubia</i>             |
| <i>Candelariella rosulans</i>               | <i>Rhizoplaca melanophthalma</i> |
| <i>Verrucaria sphaerospora</i>              | <i>Xanthoria elegans</i>         |

### **PLOT 4**

Location: N 39°01.843' W 114°17.165'

Habitat and or Parent Material: Mixed conifers on Prospect Mountain Quartzite (Czpm)

Elevation: 9462 ft    Slope: 7.5 %    Aspect: N 30° E

Dominant lichens: *Aspicilia*, *Lecidea*, *Melanohalea*

Lichen species by substrate

| <u>Plant</u>                                | <u>Rock</u>                      |
|---------------------------------------------|----------------------------------|
| <i>Buellia chloroleuca</i>                  | <i>Adelolecia kolaensis</i>      |
| <i>Candelariella xanthostigma</i>           | <i>Aspicilia americana</i>       |
| <i>Lecanora albellula</i>                   | <i>Aspicilia sp.</i>             |
| <i>Melanohalea elegantula</i>               | <i>Caloplaca arenaria</i>        |
| <i>Physcia adscendans</i>                   | <i>Fuscidea aff kockiana</i>     |
| <i>Physcia dimidiata</i>                    | <i>Lecanora muralis</i>          |
| <i>Trapeliopsis granulosa</i>               | <i>Lecidea atrobrunnea</i>       |
| <i>Xanthomendoza montana</i>                | <i>Physcia dubia</i>             |
| <u>Soil or organic matter on the ground</u> | <i>Rhizocarpon macrosporum</i>   |
| <i>Cladonia fimbriata</i>                   | <i>Rhizoplaca melanophthalma</i> |

|                            |  |
|----------------------------|--|
| <i>Peltigera rufescens</i> |  |
|----------------------------|--|

**PLOT 5**

Location: N 39°01.157' W 114°18.287'

Habitat and or Parent Material: Aspen with conifers on Glacial Deposits (Qg)

Elevation: 10249 ft Slope: 6 % Aspect: N 50° E

Dominant lichens: *Aspicilia*, *Staurothele*

Lichen species by substrate

|                                                                                                                                                     |                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Plant</u><br><i>Aspicilia cyanescens</i><br><i>Melanohalea elegantula</i><br><i>Melanohalea subolivacea</i><br><i>Xanthomendoza galericulata</i> | <u>Rock</u><br><i>Adelolecia kolaensis</i><br><i>Aspicilia americana</i><br><i>Caloplaca arenaria</i><br><i>Candelariella sp</i><br><i>Rhizoplaca melanophthalma</i><br><i>Staurothele sp</i> |
| <u>Soil or organic matter on the ground</u><br><i>Peltigera rufescens</i><br><i>Physcia dimidiata</i>                                               |                                                                                                                                                                                               |

**PLOT 6**

Location: N 39°00.507' W 114°18.525'

Habitat and or Parent Material: spruce and limber pine on Glacial Deposits (Qg)

Elevation: 10129 ft Slope: Aspect: N 40° E

Dominant lichens: *Peltigera*, *Aspicilia*, unidentified squamulose soil crust probably *Cladonia*

Lichen species by substrate

|                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Plant</u><br><i>Buellia chloroleuca</i><br><i>Melanohalea elegantula</i><br><i>Xanthomendoza montana</i>                                                                                                                                                                         | <u>Rock</u><br><i>Adelolecia kolaensis</i><br><i>Aspicilia americana</i><br><i>Aspicilia sp.</i><br><i>Caloplaca arenaria</i><br><i>Candelariella citrina</i><br><i>Lecanora polytropa</i><br><i>Lecidea atrobrunnea</i><br><i>Lecidea tessellata</i><br><i>Schaeraria aff fuscocinerea</i><br><i>Staurothele fissa</i> |
| <u>Soil or organic matter on the ground</u><br><i>Cladonia cariosa</i><br><i>Cladonia chlorophaea</i><br><i>Cladonia fimbriata</i><br><i>Peltigera rufescens</i><br><i>Physcia dimidiata</i><br><i>Placidium squamulosum</i><br><i>Psoroma hypnorum</i><br><i>Verrucaria eleina</i> |                                                                                                                                                                                                                                                                                                                         |

## **PLOT 7**

Location: N 38°59.602' W 114°19.299'

Habitat and or Parent Material: alpine tundra on Prospect Mountain Quartzite (Czpm)

Elevation: 11937 ft   Slope: 4%   Aspect: W 345° N

Dominant lichens: *Pleopsidium*, *Umbilicaria*, *Xanthoria*

Lichen species by substrate

| <u>Plant</u>                                       | <u>Rock</u>                          |
|----------------------------------------------------|--------------------------------------|
| <i>Caloplaca epithallina</i> (parasitic on lichen) | <i>Acarospora elevata</i>            |
| <i>Muellerella pygmaea</i> (parasitic on lichen)   | <i>Adelolecia kolaensis</i>          |
|                                                    | <i>Aspicilia americana</i>           |
|                                                    | <i>Aspicilia sp</i>                  |
| <u>Soil or organic matter on the ground</u>        | <i>Candelariella rosulans</i>        |
| <i>Candelariella aggregata</i>                     | <i>Lecanora argopholis</i>           |
|                                                    | <i>Lecidea atrobrunnea</i>           |
|                                                    | <i>Physcia dimidiata</i>             |
|                                                    | <i>Pleopsidium flavum</i>            |
|                                                    | <i>Rhizocarpon geographicum</i>      |
|                                                    | <i>Rhizoplaca melanophthalma</i>     |
|                                                    | <i>Sporastatia testudinea</i>        |
|                                                    | <i>Umbilicaria krascheninnikovii</i> |
|                                                    | <i>Umbilicaria virginis</i>          |
|                                                    | <i>Xanthoparmelia coloradoensis</i>  |
|                                                    | <i>Xanthoria elegans</i>             |

## **WHEELER CAMPGROUND**

Location : N 39°00.66.1' W 114°18.198'

Habitat and or Parent Material: conifers, aspen, meadow on Glacial Deposits (Qg)

Elevation: 9814 ft

Lichen species by substrate

| <u>Plant</u>                                | <u>Rock</u>                      |
|---------------------------------------------|----------------------------------|
| <i>Letharia vulpina</i>                     | <i>Adelolecia kolaensis</i>      |
| <i>Xanthomendoza galericulata</i>           | <i>Aspicilia americana</i>       |
| <i>Xanthomendoza montana</i>                | <i>Lecanora polytropia</i>       |
|                                             | <i>Physcia dubia</i>             |
| <u>Soil or organic matter on the ground</u> | <i>Placidium squamulosum</i>     |
| <i>Cladonia cariosa</i>                     | <i>Rhinodina olivaceobrunnea</i> |
| <i>Cladonia chlorophaea</i>                 | <i>Staurothele areolata</i>      |
|                                             | <i>Thelidium aff minimum</i>     |
|                                             | <i>Verrucaria aff hydrela</i>    |

## GRAY CLIFFS LIMESTONE

Location: N 38°59.471' W 114°13.071'

Habitat and or Parent Material: junipers, mixed brushy species on Pole Canyon Limestone (Cpc)

Elevation: 7048 ft

Lichen species by substrate

| <u>Soil or organic matter on the ground</u> | <u>Rock</u>                      |
|---------------------------------------------|----------------------------------|
| <i>Aspicilia hispida</i>                    | <i>Acarospora strigata</i>       |
| <i>Caloplaca lactea</i>                     | <i>Aspicilia contorta</i>        |
| <i>Collema tenax</i>                        | <i>Aspicilia desertorum</i>      |
| <i>Psora decipiens</i>                      | <i>Buellia</i> sp.               |
| <i>Psora tuckermanii</i>                    | <i>Caloplaca luteominea</i>      |
| <i>Rinodina olivaceobrunnea</i>             | <i>Dermatocarpon miniatum</i>    |
|                                             | <i>Heteropladidium congestum</i> |
|                                             | <i>Lecania</i> sp.               |
|                                             | <i>Lecidella stigmatea</i>       |
|                                             | <i>Sarcogyne</i> sp              |
|                                             | <i>Staurothele areolata</i>      |
|                                             | <i>Staurothele orispruniosa</i>  |
|                                             | <i>Verrucaria fuscella</i>       |

## SNAKE CREEK : BELOW TRAILHEAD

Location: N 38°55.524' W 114°15.081'

Habitat and or Parent Material: low lying sheltered wet area in stream bottom on Granite (Jg))

Elevation: 8301 ft

Lichen species by substrate

| <u>Plant</u>                     | <u>Rock</u>                     |
|----------------------------------|---------------------------------|
| <i>Lecidella tumidula</i>        | <i>Aspicilia aff arizonica</i>  |
| <i>Melanohalea subelegantula</i> | <i>Aspicilia</i> sp             |
| <i>Melanohalea subolivacea</i>   | <i>Dermatocarpon miniatum</i>   |
| <i>Physcia stellaris</i>         | <i>Phaeophyscia orbicularis</i> |
| <i>Usnea hirta</i>               | <i>Physcia caesia</i>           |
| <i>Usnea lapponica</i>           | <i>Physconia isidiigera</i>     |
|                                  | <i>Xanthoria elegans</i>        |

## SNAKE CREEK : DOLOMITE

Location :

Habitat and or Parent Material : mostly junipers on Fishhaven and Laketown Dolomite (Osfl)

Elevation : 6432 ft

| <u>Soil or organic matter on the ground</u> | <u>Rock</u>                    |
|---------------------------------------------|--------------------------------|
| <i>Aspicilia hispida</i>                    | <i>Acarosopra elevata</i>      |
| <i>Collema tenax</i>                        | <i>Acarospora strigata</i>     |
| <i>Peccania subnigra</i>                    | <i>Caloplaca atroalba</i>      |
| <i>Placidium squamulosum</i>                | <i>Caloplaca crenulatella</i>  |
| <i>Psora cerebriiformis</i>                 | <i>Caloplaca lactea</i>        |
| <i>Psora decipiens</i>                      | <i>Candelariella rosulans</i>  |
| <i>Psora sp</i>                             | <i>Dermatocarpon sp</i>        |
| <i>Toninia sedifolia</i>                    | <i>Lichinella nigritella</i>   |
|                                             | <i>Placynthium subradiatum</i> |

## SNAKE CREEK : OP

Location : N 38°55.034' W 114°08.813'

Habitat and or Parent Material : mostly junipers on Pognip group undifferentiated (Op)

Elevation : 6391 ft

| <u>Soil or organic matter on the ground</u> | <u>Rock</u>                    |
|---------------------------------------------|--------------------------------|
| <i>Aspicilia hispida</i>                    | <i>Acarospora bullata</i>      |
| <i>Placidium squamulosum</i>                | <i>Acarospora socialis</i>     |
|                                             | <i>Buellia sp</i>              |
|                                             | <i>Caloplaca biatorina</i>     |
|                                             | <i>Dermatocarpon sp</i>        |
|                                             | <i>Lobothallia praeradiosa</i> |

## STRAWBERRY CREEK : RIPARIAN PLUS GRANITE

Location : N 39°03.493' W 114°17.189'

Habitat and or Parent Material : aspen, conifers, some birch along stream with some granite (Jg)  
on opposite side of the road.

Elevation : 7422 ft

| <u>Plant</u>                    | <u>Rock</u>                      |
|---------------------------------|----------------------------------|
| <i>Lecanora albellula</i>       | <i>Acarospora bullata</i>        |
| <i>Melanohalea elegantula</i>   | <i>Adelolecia kolaensis</i>      |
| <i>Melanohalea exasperatula</i> | <i>Dermatocarpon miniatum</i>    |
| <i>Melanohalea subolivacea</i>  | <i>Lecanora polytropia</i>       |
| <i>Phaeophyscia hirtella</i>    | <i>Lecidea tessellata</i>        |
| <i>Physcia dimidiata</i>        | <i>Rhizocarpon disporum</i>      |
| <i>Physciella chloantha</i>     | <i>Rhizoplaca melanophthalma</i> |
| <i>Xanthomendoza fulva</i>      | <i>Xanthoparmelia plittii</i>    |
| <i>Xanthomendoza montana</i>    | <i>Xanthoria elegans</i>         |

## MOUNT WASHINGTON: SUMMIT

Summit and a stop on the road up (summit = Pole Canyon Limestone D member (Cpcd)), alpine tundra at the summit with junipers lower down.

|                                                                                                                                                                                           |                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Plant</u><br><i>Melanohalea subelegantula</i>                                                                                                                                          | <u>Rock</u><br><i>Acarospora elevata</i><br><i>Adelolecia kolaensis</i><br><i>Anaptychia ulotrichoides</i><br><i>Caloplaca atroalba</i><br><i>Dermatocarpon miniatum</i><br><i>Dermatocarpon reticulatum</i><br><i>Sarcogyne similis</i><br><i>Xanthoria elegans</i> |
| <u>Soil and or organic matter on the ground</u><br><i>Collema tenax</i><br><i>Endocarpon pusillum</i><br><i>Heppia lutosa</i><br><i>Leptogium gelatinosum</i><br><i>Psora tuckermanii</i> |                                                                                                                                                                                                                                                                      |

## MOUNT WASHINGTON: ROADSIDE

|                                                                                                                                     |                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <u>Plant</u><br><i>Melanohalea subelegantula</i>                                                                                    | <u>Rock</u><br><i>Acarosopra elevata</i><br><i>Buellia</i> sp<br><i>Endocarpon schisticola</i><br><i>Xanthoria elegans</i> |
| <u>Soil and or organic matter on the ground</u><br><i>Collema tenax</i><br><i>Melanelia panniformis</i><br><i>Psora tuckermanii</i> |                                                                                                                            |

## BIOBLITZ 2017

|                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Aquatic</u><br><u>Teresa Spring</u><br><i>Dermatocarpon rivularum</i><br><u>Baker Creek</u><br><i>Dermatocarpon rivularum</i>                | <u>Wheeler Peak Summit</u><br><i>Aspicilia</i> sp<br><i>Aspicilia</i> cf <i>brucei</i><br><i>Dermatocarpon polyphyllizum</i><br><i>Lecidea atrobrunnea</i> subsp<br><i>saxosa</i><br><i>Physcia dimidiata</i><br><i>Rhizocarpon geographicum</i><br><i>Rhizoplaca melanophthalma</i><br><i>Sporostatia testudinea</i><br><i>Umbilicaria kraschennikovii</i><br><i>Umbilicaria virginis</i><br><i>Xanthoria elegans</i><br><i>Xanthoria soorediata</i> |
| <u>Visitor Center on Soil</u><br><i>Caloplaca jungermanniae</i><br><i>Caloplaca tominii</i><br><i>Collema tenax</i><br><i>Peccania subnigra</i> |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## **LICHEN SPECIES LIST FOR GBNP**

*Acarospora aff terricola*

*Acarospora bullata*

*Acarospora elevata*

*Acarospora obpullens*

*Acarospora socialis*

*Acarospora strigata*

*Adelolecia kolaensis*

*Anaptychia ulotrichoides*

*Aspicilia aff arizonica*

*Aspicilia americana*

*Aspicilia aff brucei*

*Aspicilia contorta*

*Aspicilia cyanescens*

*Aspicilia desertorum*

*Aspicilia hispida*

*Aspicilia reptans*

*Aspicilia sp*

*Buellia chloroleuca*

*Buellia sp.*

*Caloplaca aff jungermanniae*

*Caloplaca arenaria*

*Caloplaca atroalba*

*Caloplaca biatorina*

*Caloplaca cerina*

*Caloplaca crenulatella*

*Caloplaca epithallina*

*Caloplaca lactea*

*Caloplaca luteominea*

*Caloplaca tominii*

*Candelariella aggregata*

*Candelariella antennaria*

*Candelariella citrina*

*Candelariella rosulans*

*Candelariella sp*

*Candelariella xanthostigma*

*Cladonia cariosa*  
*Cladonia chlorophaea*  
*Cladonia chlorophaea*  
*Cladonia fimbriata*  
*Collema tenax*  
*Dermatocarpon miniatum*  
*Dermatocarpon polyphyllizum*  
*Dermatocarpon rivulorum*  
*Dermatocarpon reticulatum*  
*Dermatocarpon sp*  
*Diploschistes muscorum*  
*Endocarpon pusillum*  
*Endocarpon schisticola*  
*Fuscidea aff kockiana*  
*Heteroplacidium congestum*  
*Heppia lutosa*  
*Lecania sp.*  
*Lecanora albellula*  
*Lecanora argopholis*  
*Lecanora muralis*  
*Lecanora noxomexicana*  
*Lecanora polytropa*  
*Lecanora sp.*  
*Lecidea atrobrunnea*  
*Lecidea atrobrunnea subsp*  
*saxosa*  
*Lecidea tessellata*  
*Lecidella stigmatea*  
*Lecidella tumidula*  
*Letharia vulpina*  
*Leptogium gelatinosum*  
*Lichinella nigritella*  
*Lobothallia praeradiosa*  
*Melanelia panniformis*  
*Melanohalea elegantula*  
*Melanohalea exasperatula*  
*Melanohalea subelegantula*  
*Melanohalea subolivacea*  
*Muellerella pygmaea*  
*Peccania subnigra*  
*Peltigera rufescens*  
*Phaeophyscia hirtella*  
*Phaeophyscia orbicularis*  
*Physcia adscendans*  
*Physcia caesia*  
*Physcia dimidiata*  
*Physcia dubia*  
*Physcia stellaris*  
*Physciella chloantha*

*Physconia isidiigera*  
*Placidium sp.*  
*Placidium squamulosum*  
*Placynthium subradiosum*  
*Pleopsidium flavum*  
*Psora cerebriiformis*  
*Psora decipiens*  
*Psora globifera*  
*Psora sp.*  
*Psora tuckermanii*  
*Psoroma hypnorum*  
*Rhinodina olivaceobrunnea*  
*Rhizocarpon disporum*  
*Rhizocarpon geographicum*  
*Rhizocarpon macrosporum*  
*Rhizoplaca melanophthalma*  
*Rinodina olivaceobrunnea*  
*Sarcogyne similis*  
*Sarcogyne sp*  
*Schaeraria aff fuscocinerea*  
*Sporastatia testudinea*  
*Staurothele areolata*  
*Staurothele fissa*  
*Staurothele orispruniosa*  
*Staurothele sp*  
*Thelidium aff minimum*  
*Toninia sedifolia*  
*Trapeliopsis granulosa*  
*Umbilicaria krascheninnikovii*  
*Umbilicaria virginis*  
*Usnea hirta*  
*Usnea lapponica*  
*Verrucaria aff hydrela*  
*Verrucaria compacta*  
*Verrucaria eleina*  
*Verrucaria fuscella*  
*Verrucaria sp.*  
*Verrucaria sphaerospora*  
*Xanthomendoza fulva*  
*Xanthomendoza galericulata*  
*Xanthomendoza montana*  
*Xanthoparmelia coloradoesis*  
*Xanthoparmelia nigropsoromifera*  
*Xanthoparmelia plitii*  
*Xanthoria elegans*  
*Xanthoria soorediata*

## **GBNP LICHENS BY SUBSTRATE**

### **1) Aquatic or semi-aquatic**

*Dermatocarpon rivulorum*

*Staurothele fissa*

*Verrucaria aff hydrela*

### **2) Rock**

#### **a. endolithic**

*Adelolecia kolaensis*

*Caloplaca arenaria*

*Caloplaca crenulatella*

*Caloplaca lactea*

*Caloplaca luteominea*

*Sarcogyne similis*

*Sarcogyne sp*

#### **b. rock surfaces**

*Acarospora bullata*

*Acarospora elevata*

*Acarospora obpallens*

*Acarospora socialis*

*Acarospora strigata*

*Adelolecia kolaensis*

*Anaptychia ulotrichoides*

*Aspicilia aff arizonica*

*Aspicilia Americana*

*Aspicilia cf brucei*

*Aspicilia contorta*

*Aspicilia desertorum*

*Aspicilia sp.*

*Buellia sp.*

*Caloplaca atroalba*

*Caloplaca crenulatella*

*Caloplaca biatorina*

*Candelariella citrina*

*Candelariella rosulans*

*Candelariella sp*

*Dermatocarpon miniatum*

*Dermatocarpon polyphyllizum*

*Dermatocarpon reticulatum*

*Dermatocarpon sp*

*Endocarpon schisticola*

*Fuscidea aff kockiana*

*Heteroplacidium congestum*

*Lecania sp.*

*Lecanora argopholis*

*Lecanora muralis*

*Lecanora noxomexicana*

### **3) Epiphytic**

*Aspicilia cyanescens*

*Buellia chloroleuca*

*Caloplaca aff jungermanniae*

*Caloplaca cerina*

*Candelariella aggregata*

*Candelariella antennaria*

*Candelariella xanthostigma*

*Lecanora albellula*

*Lecidella stigmatea*

*Lecidella tumidula*

*Letharia vulpina*

*Melanohalea elegantula*

*Melanohalea exasperatula*

*Melanohalea subelegantula*

*Melanohalea subolivacea*

*Phaeophyscia hirtella*

*Physcia adscendans*

*Physcia dimidiata*

*Physcia stellaris*

*Physciella chloantha*

*Trapeliopsis granulosa*

*Usnea hirta*

*Usnea lapponica*

*Xanthomendoza fulva*

*Xanthomendoza galericulata*

*Xanthomendoza montana*

### **4) Lichen parasites**

*Muellerella pygmaea*

*Caloplaca epithallina*

### **5) Soil or organic matter on ground**

*Acarospora aff terricola*

*Aspicilia hispida*

*Aspicilia reptans*

*Caloplaca lactea*

*Caloplaca tominii*

*Candelariella aggregata*

*Candelariella citrina*

*Candelariella rosulans*

*Cladonia cariosa*

*Cladonia chlorophaea*

*Cladonia fimbriata*

*Lecanora polytropa*  
*Lecanora sp.*  
*Lecidea atrobrunnea*  
*Lecidea atrobrunnea*  
*subsp saxosa*  
*Lecidea tessellata*  
*Lecidella stigmathea*  
*Lichinella nigritella*  
*Lobothallia praeradiosa*  
*Phaeophyscia orbicularis*  
*Physcia caesia*  
*Physcia dimidiata*  
*Physcia dubia*  
*Physconia isidiigera*  
*Placidium squamulosum*  
*Placynthium subradiatum*  
*Pleopsidium flavum*  
*Rhinodina olivaceobrunnea*  
*Rhizocarpon dispersum*  
*Rhizocarpon geographicum*  
*Rhizocarpon macrosporum*  
*Rhizoplaca melanophthalma*  
*Sarcogyne similis*  
*Schaeraria aff fuscocinerea*  
*Sporastatia testudinea*  
*Staurothele areolata*  
*Staurothele orispruniosa*  
*Staurothele sp*  
*Thelidium aff minimum*  
*Umbilicaria krascheninnikovii*  
*Umbilicaria virginis*  
*Verrucaria compacta*  
*Verrucaria fuscella*  
*Xanthoparmelia coloradoensis*  
*Xanthoparmelia nigropsoromifer*  
*Xanthoparmelia plittii*  
*Xanthoria elegans*  
*Xanthoria soorediata*

*Collema tenax*  
*Diploschistes muscorum*  
*Endocarpon pusillum*  
*Heteroplacidium congestum*  
*Heppia lutosa*  
*Leptogium gelatinosum*  
*Melanelia panniformis*  
*Peccania subnigra*  
*Peltigera rufescens*  
*Physcia dimidiata*  
*Placidium sp.*  
*Placidium squamulosum*  
*Psora cerebriformis*  
*Psora decipiens*  
*Psora globifera*  
*Psora sp.*  
*Psora tuckermanii*  
*Psoroma hypnorum*  
*Rinodina olivaceobrunnea*  
*Toninia sedifolia*  
*Verrucaria eleina*  
*Verrucaria sp.*  
*Verrucaria sphaerospora*  
*Xanthoparmelia plittii*

#### **6) Cyanolichens**

*Collema tenax*  
*Heppia lutosa*  
*Leptogium gelatinosum*  
*Lichinella nigritella*  
*Peccania subnigra*  
*Peltigera rufescens*  
*Placynthium subradiosum*

Figure 1

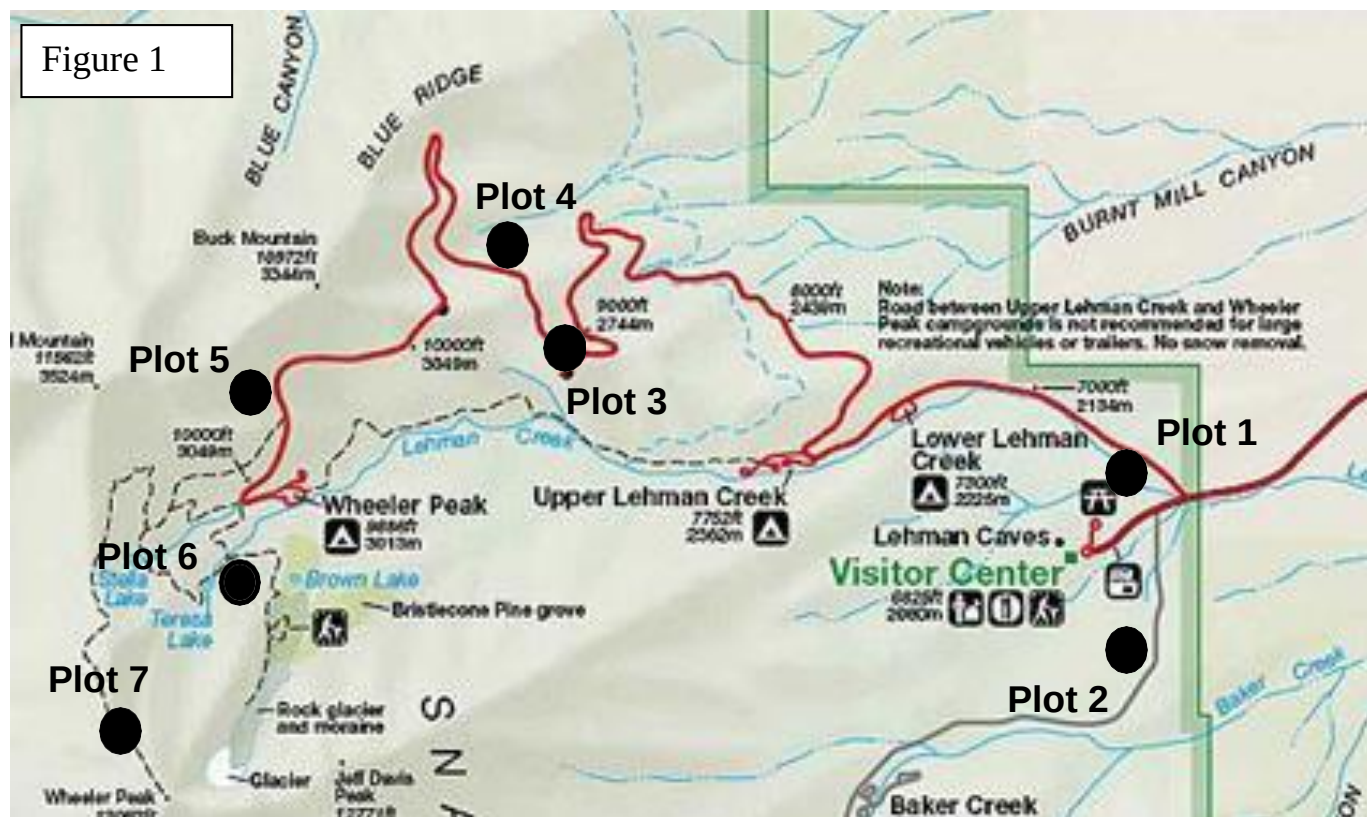


Figure 2

