USGS-NPS VEGETATION MAPPING PROGRAM

Vegetation Classification of Great Smoky Mountains National Park (Cades Cove and Mount Le Conte Quadrangles)

Final Report
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The Nature Conservancy
Chapel Hill Satellite Office
101 Conner Dr. Suite 302
P.O. Box 2267 (mail)
Chapel Hill, NC 27515

The Nature Conservancy
International Headquarters
4245 N. Fairfax
Arlington, VA 22203

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I. VEGETATION SAMPLING AND CLASSIFICATION

INTRODUCTION

This report presents the results of the vegetation classification portion of the USGS-NPS Vegetation Mapping Program at the Great Smoky Mountains National Park (GRSM). This project was a pilot that focused on vegetation sampling and classification only on the Cades Cove and Mount Le Conte quadrangles. Sampling strategy, field methods, and data analysis are described and a vegetation classification, field key to the vegetation types, and descriptions of each type are presented. As a supplement to this report, the raw plot data are provided in the form of a Microsoft Access database.

METHODS

Sampling strategy

Vegetation sampling took place over two field seasons; the summers of 1997 and 1998. Plot sampling was done prior to the acquisition and interpretation of final aerial photography, so sampling locations had to be targeted by means other than photosignatures. The sampling strategy for the first field season targeted major vegetation types with high variation and in need of further conceptual resolution (approximately 40 samples) or vegetation that the photointerpreters anticipated would be problematic in future signature delineation (about 20 of the plot samples). During the second field season, sampling objectives for the remaining 160 plot samples focused on associations or ecological groups in need of further documentation, undersampled geographic areas, and polygons identified by the photointerpreters. For each association known to be on the pilot quadrangles, numbers of additional samples needed, and which quadrangles those sample should come from, were determined. Associations that were probable, but not yet documented on the two pilot quadrangles, were identified and teams were directed to areas where these associations were likely to occur. Another portion of samples were directed to five geographic areas that were undersampled in the previous field season and by historic sampling efforts. The photointerpreters identified 36 polygons on each pilot quadrangle that were in need of verification or characterization. Teams were instructed to collect plot samples at these polygons if the vegetation represented a type needing additional documentation for classification or a type not yet described in the classification.

Data collection and field methods

Vegetation samples were collected, as much as possible, in homogeneous stands of vegetation targeted by the sampling objectives. Sample plots were typically 20 X 50 meters (0.1 hectare). Occasionally plots were of smaller dimensions, where the spatial extent of homogeneous vegetation or topography could not accommodate a 0.1 ha plot. Each vegetation sample was georeferenced using a Global Positioning System (GPS), when possible. If a GPS unit was not available or a satellite reading could not be obtained, UTM coordinates were derived from the estimated position on a topographic quadrangle map. Where possible, the sample plot's center point was permanently marked with PVC pipe or iron reinforcement bar and a numbered aluminum tag provided by Twin Creeks Natural Resource Center. The distance and bearing from the plot center to tagged witness trees were recorded. Directions for relocating the sample plots were also recorded.

Environmental data, other site information, and data on vegetation structure and composition were collected according to the standards outlined in *Field methods for vegetation mapping: USGS BRD/NPS Vegetation Mapping Program (*TNC and ESRI 1994). Total coverage for each species (vertical projection onto the ground) was estimated visually, and recorded within ten cover classes: **1** (trace), **2** (0-1%), **3** (1-2%), **4** (2-5%), **5** (5-10%), **6** (10-25%), **7** (25-50%), **8** (50-75%), **9** (75-95%), and **10** (95-100%). The same ten cover classes were also used to estimate each species coverage by stratum. Additional vegetation information collected included the height and coverage of each stratum, the leaf type and leaf phenology of the dominant stratum, and the physiognomic class represented by the stand. The plot survey form used to collect quantitative vegetation samples is provided in Appendix I.

A total of 72 areas identified by the photointerpreters were visited by the field teams. A standard vegetation sample was collected if the polygon represented vegetation targeted by the sampling objectives. Otherwise, notes were made to describe the vegetation and environmental variation within the polygon and how the actual vegetation

compared to what the photointerpreters inferred from air photos.

All field data for 223 vegetation samples were entered into the PLOTS database (a Microsoft Access database developed for the BRD-NPS Vegetation Mapping Program) and are provided as a supplement to this report. The taxonomic nomenclature for this study follows Kartesz (1994).

Review and preparation of existing data

As part of an earlier task order (T.O. # 18, C.O.#1) all available vegetation data for Great Smoky Mountain National Park were assessed for compatibility with and usability in the BRD-NPS Vegetation Mapping Program. The most compatible data sets were some of those collected by researchers associated with the Great Smoky Mountains National Park Uplands Field Research Laboratory from 1977 to 1985 (hereafter Uplands data set). A Park Service technical report by P. S. White and R. T. Busing (White and Busing 1993) summarizes these studies and field methods used to collect these data. Digital data for the Uplands data set were acquired from Dr. Peter S. White (University of North Carolina, Chapel Hill). Digital data for an additional 32 vegetation samples, representing 1996 remeasures of the historic Uplands plots, were obtained from Bob Dellinger (GRSM). A total of 343 sample plots were evaluated and 151 samples were eliminated because they contained incomplete data or represented repeated measures of the same location.

In order to be compatible for quantitative analysis with the samples collected in 1997 and 1998, historic vegetation data were modified to include a single, complete, species list for a sample plot, with a single estimate of abundance for each species, expressed as a percentage cover. Data from a total of 192 historic sample plots were modified for use in quantitative analysis with the samples collected in 1997-98. Data modifications differed depending on the data set and the field measures used. Original data for these historic plots are on file at Twin Creeks Natural Resource Center, Great Smoky Mountains National Park.

Modification of 1996 Dellinger Data

Bob Dellinger (GRSM), sampled 32 vegetation plots using methodology similar to that of the North Carolina Vegetation Survey (NCVS) (Peet et al. 1998). Each 0.1hectare plot was subdivided into 10, 10x10 meter modules, and in the corner of each, a set of nested plots was established. In four of the 10x10 m modules, referred to as "intensive modules", he estimated percentage cover using a ten point cover class scale. The data were modified to obtain a single coverage for each species by summing the midpoints of each cover class, and dividing by 4, the number of intensive modules. Species not present in the four intensive modules, but found elsewhere in the plot, were originally recorded without a coverage value. Based on experience with this type of sample plot, species outside the intensive modules usually have a low cover, therefore, these species were assigned a coverage class of 1. Plant species nomenclature was resolved to follow Kartesz 1994.

Modification of 1977 – 1979 Uplands Data

Vegetation data supplied by Dr. White of UNC-Chapel Hill were collected in a variety of methods and by a variety of researchers (see White and Busing 1993). Samples used to help characterize vegetation associations on the two pilot quadrangles included plots from three studies conducted by researchers at the Great Smoky Mountains Uplands Field Research Laboratory from 1977 to 1979. Mark Harmon established plots in 1977 and 1978 to study to the effects of fire in the western portion of the Park (Harmon 1980; Harmon 1982; Harmon 1984; Harmon et al. 1983). Peter White and D. Kilgore established sample plots on Leadbetter and Davis Ridges (logged) and on Gregory Ridge (unlogged) to study logged and unlogged vegetation on ridges south of Cades Cove (1977-78). In 1979, Sue Bratton collected vegetation samples on the summit of Mount Le Conte to describe high elevation areas impacted by the Balsam Wooly Adelgid. The data from these studies were modified to allow comparison with data collected as part of the mapping project. No original data are presented here. The transformed, historic data were used in combination with the data collected in 1997-1998 to characterize vegetation types and to further explore the potential variation within vegetation types on the two pilot quadrangles.

The original Uplands data set contains diameter at breast height (DBH, cm) measurements for woody species greater than 1.0 cm diameter and percentage coverage for shrubs and herbs, estimated from 25, 1 m^2 subplots. Tree

stem diameter data were converted to a single percentage cover value for each species using regression models developed by Tom Wentworth and Chris Ulrey at North Carolina State University, Botany Department (Wentworth and Ulrey 1996; Newell 1997). The two-step regression model first relates stem diameter to crown diameter and then converts crown area to a ten-point cover class scale (C. Ulrey pers. comm.). Data used to develop the model to predict tree crown area from stem diameter came from areas of the southern Blue Ridge south of the Great Smoky Mountains. An assumption was made that stem diameter to crown area relationships are similar between the different geographic areas. Plant species nomenclature in the Uplands data set was resolved to follow Kartesz 1994.

When originally sampled, the Uplands plot locations were estimated and marked on topographic maps by the original researchers. UTM coordinates for these plot samples were acquired by digitizing the plot locations off copies of the original quadrangle maps. The 192 transformed plot samples were used to help develop a preliminary vegetation classification for GRSM and, later, in the final characterization of associations on the two pilot quadrangles. Considering the age, low precision georeferencing, and highly transformed nature of these data, it is not recommended that they be used as primary plots for mapping purposes.

Data analysis

Initial quantitative analysis used coverage data from the 1997-98 samples combined with the 1996 Dellinger data. These data were considered "high resolution" data because they are the least modified and the most likely to represent existing vegetation conditions. The modified 1977-79 Uplands data were considered "low resolution" and were introduced secondarily to refine the classification developed with the high resolution data and to explore potential variation within vegetation types on the two pilot quadrangles.

Groups of compositionally similar samples were identified by cluster analysis. The Bray-Curtis Dissimilarity (Bray and Curtis, 1957) measure was used in conjuction with the Lance-Williams Flexible Beta linkage method (Lance and Williams, 1967) to achieve a hierarchical, agglomerative, polythetic clustering technique. Cluster analysis was implemented using the program PC-ORD v3.18 (McCune and Medford 1995). Samples representing non-forested vegetation or spatially small ecological communities were removed after initial exploratory analyses because they were compositional outliers and had an undesirable influence on the clustering results. These samples were later analyzed qualitatively and placed within the National Classification framework. Coverage data for compositionally similar groups of samples were further analyzed using indirect ordination techniques implemented by the program DECODA v3.00 (Minchin 1998). Results from applying the ordination method Non-metric Multidimensional Scaling (global), with Bray-Curtis dissimilarity as a distance measure, were used to generate ordination diagrams. Ordination diagrams are useful for detecting compositional variation and trends that are otherwise obscured in cluster analysis and were used to further examine compositional patterns within the data set.

Using the ordination diagrams, the results of the cluster analysis, and prior experience with ecological communities in the southern Blue Ridge region, samples were placed into compositionally similar groups approximating the scale of the community association. Where possible, historic samples were assigned to groups based on an additional cluster analysis (with all samples) and qualitative review. Coverage data from samples within each group were used to create ordered stand tables and constancy tables that listed each species' average cover and frequency within the group. Environmental data were also summarized for these groups of samples. After evaluating the compositional and environmental summaries, each group was either placed within an existing type in the National Vegetation Classification or a new association was defined from the available data.

RESULTS AND SUMMARY

The vegetation classification for the GRSM describes 42 alliances and 68 associations, including 48 Forests, 2 Woodlands, 6 Shrublands, 10 Herbaceous Vegetation types, and 2 Sparsely Vegetated types. The classification includes natural and semi- natural vegetation as well as vegetation dominated by (or resulting from) exotic and/or invasive species. Fifty-two of these associations are documented on the two pilot quadrangles, while the other 16 described types are either known to occur in the Park or are probable in other areas of the Park. The classification is the result of literature review, expert interview, and analysis of over 400 vegetation samples from the GRSM. It focuses on the Cades Cove and Mount Le Conte quadrangles and should not be considered a comprehensive vegetation classification for the Park, although it does cover the major vegetation types expected in the Park. Additional inventory and analyses will undoubtedly document additional vegetation types, especially in areas with

elevations and geologies different from the pilot quadrangles. In particular, the vegetation on the North Carolina portion of the Park is expected to be quite different from that on the pilot quadrangles.

The vegetation classification of GRSM follows later in this section. A field key to the vegetation on the Cades Cove and Mount Le Conte quadrangles is presented in section II of this report. Descriptions of all vegetation types are included in section III. An index to these descriptions, by database code and by major ecological group, is also provided. The format of the vegetation descriptions with field definitions and field values is outlined in Appendix II.

CONTRIBUTORS
The following individuals contributed to this report.

Jim Drake (Project Manager)
The Nature Conservancy
Midwest Regional Office
1313 Fifth St. SE, Suite 314
Minneapolis, MN 55414

Karen D. Patterson (Ecologist)
The Nature Conservancy
Southeast Regional Office
101 Conner Dr., Suite 302
Chapel Hill, NC 27515

Chris Ulrey (Ecologist)
North Carolina State University
Botany Department
Box 7612
Raleigh, NC 27695

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VEGETATION CLASSIFICATION

I **Forest**
I.A **Evergreen forest**
I.A.8 **Temperate or subpolar needle-leaved evergreen forest**

I.A.8.N **Natural/Semi-natural**
I.A.8.N.b **Rounded-crowned temperate or subpolar needle-leaved evergreen forest**

I.A.8.N.b.5 PINUS ECHINATA FOREST ALLIANCE (A.119)
[Pinus echinata / Vaccinium (pallidum, stamineum) - Kalmia latifolia Forest (CEGL007078)]

I.A.8.N.b.13 PINUS STROBUS - TSUGA CANADENSIS FOREST ALLIANCE (A.127)
Pinus strobus - Tsuga canadensis / Rhododendron maximum - Leucothoe fontanesiana Forest (CEGL007102)

I.A.8.N.b.14 PINUS STROBUS FOREST ALLIANCE (A.128)
[Pinus strobus / Kalmia latifolia - (Vaccinium stamineum, Gaylussacia ursina) Forest (CEGL007100)]

I.A.8.N.b.17 PINUS VIRGINIANA FOREST ALLIANCE (A.131)
Pinus virginiana - Pinus (rigida, echinata) - (Quercus prinus) / Vaccinium pallidum Forest (CEGL007119)
Pinus virginiana Successional Forest (CEGL002591)

I.A.8.N.c **Conical-crowned temperate or subpolar needle-leaved evergreen forest**

I.A.8.N.c.1 ABIES FRASERI - PICEA RUBENS FOREST ALLIANCE (A.136)
[Abies fraseri / (Rhododendron catawbiense, Rhododendron carolinianum) Forest (CEGL006308)]
Abies fraseri / Viburnum lantanoides / Dryopteris campyloptera - Oxalis montana / Hylocomium splendens Forest (CEGL006049)
Picea rubens - (Abies fraseri) / (Rhododendron catawbiense, Rhododendron maximum) Forest (CEGL007130)
Picea rubens - (Abies fraseri) / Vaccinium erythrocarpum / Oxalis montana - Dryopteris campyloptera / Hylocomium splendens Forest (CEGL007131)

I.A.8.N.c.3 PICEA RUBENS FOREST ALLIANCE (A.138)
Picea rubens - Tsuga canadensis / Rhododendron maximum Forest (CEGL006272)

I.A.8.N.c.8 TSUGA CANADENSIS FOREST ALLIANCE (A.143)
Tsuga canadensis / Rhododendron maximum - Leucothoe fontanesiana Forest (CEGL007136)

I.B **Deciduous forest**
I.B.2 **Cold-deciduous forest**
I.B.2.N **Natural/Semi-natural**
I.B.2.N.a **Lowland or submontane cold-deciduous forest**

I.B.2.N.a.9 AILANTHUS ALTISSIMA FOREST ALLIANCE (A.221)
[Ailanthus altissima Forest (CEGL007191)]

I.B.2.N.a.104 BETULA ALLEGHANIENSIS - FAGUS GRANDIFOLIA - AESCULUS FLAVA FOREST ALLIANCE (A.266)
Aesculus flava - Betula alleghaniensis - Acer saccharum / Acer spicatum / Caulophyllum thalictroides - Laportea canadensis Forest (CEGL004973)
Betula alleghaniensis - Fagus grandifolia - Aesculus flava / Viburnum lantanoides / Aster chlorolepis - Dryopteris intermedia Forest (CEGL007285)
Betula alleghaniensis / Acer spicatum / Hydrangea arborescens - Ribes cynosbati / Dryopteris marginalis Forest (CEGL004982)
Betula alleghaniensis / Ribes glandulosum / Polypodium appalachianum Forest (CEGL006124)
[Fagus grandifolia / Ageratina altissima var. roanensis Forest (CEGL006246)]
Fagus grandifolia / Carex pensylvanica - Carex brunnescens Forest (CEGL006130)

I.B.2.N.a.107 JUGLANS NIGRA FOREST ALLIANCE (A.1932)
Juglans nigra / Verbesina alternifolia Forest (CEGL007879)

I.B.2.N.a.23 LIRIODENDRON TULIPIFERA - TILIA AMERICANA VAR. HETEROPHYLLA - AESCULUS FLAVA - ACER SACCHARUM FOREST ALLIANCE (A.235)
Aesculus flava - Acer saccharum - (Fraxinus americana, Tilia americana) / Hydrophyllum canadense - Solidago flexicaulis Forest (CEGL007695)
Liriodendron tulipifera - Aesculus flava - (Fraxinus americana, Tilia americana var. heterophylla) / Cimicifuga racemosa - Laportea canadensis Forest (CEGL007710)
[Liriodendron tulipifera - Tilia americana var. heterophylla - (Aesculus flava) / Cimicifuga racemosa Forest (CEGL007291)]

I.B.2.N.a.24 LIRIODENDRON TULIPIFERA FOREST ALLIANCE (A.236)
Liriodendron tulipifera - Acer rubrum - Robinia pseudoacacia Forest (CEGL007219)

I.B.2.N.a.27 QUERCUS ALBA - (QUERCUS RUBRA, CARYA SPP.) FOREST ALLIANCE (A.239)
Quercus alba - Quercus (rubra, prinus) / Rhododendron calendulaceum - Kalmia latifolia - (Gaylussacia ursina) Forest (CEGL007230)
[Quercus alba - Quercus rubra - Quercus prinus / Collinsonia canadensis - Podophyllum peltatum - Sanguinaria canadensis Forest (CEGL007692)]
Quercus rubra - Acer rubrum / Calycanthus floridus - Pyrularia pubera / Thelypteris noveboracensis Forest (CEGL006192)
Quercus rubra - Tilia americana var. heterophylla - Halesia tetraptera var. monticola / Collinsonia canadensis – Tradescantia subaspera Forest (CEGL007878)

I.B.2.N.a.103 QUERCUS ALBA MONTANE FOREST ALLIANCE (A.271)
[Quercus alba / Kalmia latifolia Forest (CEGL007295)]

I.B.2.N.a.36 QUERCUS PRINUS - (QUERCUS COCCINEA, QUERCUS VELUTINA) FOREST ALLIANCE
(Quercus prinus, Quercus coccinea) / Kalmia latifolia / Galax urceolata Forest (CEGL006271)

I.B.2.N.a.38 QUERCUS PRINUS - QUERCUS RUBRA FOREST ALLIANCE (A.250)
Quercus prinus - (Quercus rubra) - Carya spp. / Oxydendrum arboreum - Cornus florida Forest (CEGL007267)
Quercus prinus - Quercus rubra / Rhododendron maximum / Galax urceolata Forest (CEGL006286)

I.B.2.N.a.8 QUERCUS RUBRA MONTANE FOREST ALLIANCE (A.272)
Quercus rubra / (Kalmia latifolia, Rhododendron maximum) / Galax urceolata Forest (CEGL007299)
Quercus rubra / (Vaccinium simulatum, Rhododendron calendulaceum) / (Dennstaedtia punctilobula, Thelypteris noveboracensis) Forest (CEGL007300)
Quercus rubra / Carex pensylvanica - Ageratina altissima var. roanensis Forest (CEGL007298)

I.B.2.N.d.13 PLATANUS OCCIDENTALIS - (FRAXINUS PENNSYLVANICA, CELTIS LAEVIGATA, ACER SACCHARINUM) TEMPORARILY FLOODED FOREST ALLIANCE (A.288)
Platanus occidentalis - Fraxinus pennsylvanica - Acer negundo / Boehmeria cylindrica Forest

I.B.2.N.d.14 PLATANUS OCCIDENTALIS - (LIQUIDAMBAR STYRACIFLUA, LIRIODENDRON TULIPIFERA) TEMPORARILY FLOODED FOREST ALLIANCE (A.289)
[Platanus occidentalis - Liriodendron tulipifera - Betula (alleghaniensis, lenta) / Alnus serrulata - Leucothoe fontanesiana Forest (CEGL004691)]
Liquidambar styraciflua - Liriodendron tulipifera (Platanus occidentalis) / Carpinus caroliniana – Halesia tetraptera var. monticola / Amphicarpaea bracteata Forest (CEGL007880)

I.B.2.N.e Seasonally flooded cold-deciduous forest

I.B.2.N.e.2 ACER RUBRUM SEASONALLY FLOODED FOREST ALLIANCE (A.317)
Acer rubrum Seasonally Flooded Forest [Provisional] (CEGL006347)

I.B.2.N.e.6 LIQUIDAMBAR STYRACIFLUA - (ACER RUBRUM) SEASONALLY FLOODED FOREST ALLIANCE (A.321)
Liquidambar styraciflua / Sphagnum spp. Forest (CEGL007388)

I.C Mixed evergreen-deciduous forest
I.C.3 Mixed needle-leaved evergreen - cold-deciduous forest
I.C.3.N Natural/Semi-natural
I.C.3.N.a Mixed needle-leaved evergreen - cold-deciduous forest

I.C.3.N.a.4 PICEA RUBENS - BETULA ALLEGHANIENSIS FOREST ALLIANCE (A.384)
Picea rubens - (Betula alleghaniensis, Aesculus flava) / Rhododendron (maximum, catawbiense) Forest (CEGL004983)
Picea rubens - (Betula alleghaniensis, Aesculus flava) / Viburnum lantanoides / Oxalis montana - Solidago glomerata Forest (CEGL006256)

I.C.3.N.a.21 PINUS STROBUS - QUERCUS (ALBA, RUBRA, VELUTINA) FOREST ALLIANCE (A.401)
[Pinus strobus - Quercus alba - (Carya alba) / Gaylussacia ursina Forest (CEGL007517)]

I.C.3.N.a.22 PINUS STROBUS - QUERCUS (COCCINEA, PRINUS) FOREST ALLIANCE (A.402)
Pinus strobus - Quercus (coccinea, prinus) / (Gaylussacia ursina - Vaccinium stamineum) Forest (CEGL007519)

I.C.3.N.a.28 PINUS VIRGINIANA - QUERCUS (COCCINEA, PRINUS) FOREST ALLIANCE (A.408)
[Pinus virginiana - Quercus prinus - Quercus rubra / Vaccinium pallidum - Kalmia latifolia Forest (CEGL007539)]

I.C.3.N.a.32 TSUGA CANADENSIS - BETULA ALLEGHANIENSIS FOREST ALLIANCE (A.412)
Tsuga canadensis - Betula alleghaniensis - Prunus serotina / Rhododendron maximum Forest (CEGL007861)

I.C.3.N.a.33 TSUGA CANADENSIS - LIRIODENDRON TULIPIFERA FOREST ALLIANCE (A.413)
Tsuga canadensis - Halesia tetraptera - (Fagus grandifolia, Magnolia fraseri) / Rhododendron maximum / Dryopteris intermedia Forest (CEGL007693)
Tsuga canadensis - Liriodendron tulipifera / Rhododendron maximum / Tiarella cordifolia Forest (CEGL007543)

II Woodland
II.A Evergreen woodland
II.A.4 Temperate or subpolar needle-leaved evergreen woodland
II.A.4.N Natural/Semi-natural
II.A.4.N.a Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

II.A.4.N.a.17 PINUS ECHINATA WOODLAND ALLIANCE (A.515)
[Pinus echinata / Schizachyrium scoparium Appalachian Woodland (CEGL003560)]

II.A.4.N.a.23 PINUS PUNGENS - (PINUS RIGIDA) WOODLAND ALLIANCE (A.521)
Pinus pungens - Pinus rigida (Quercus prinus) / Kalmia latifolia - Vaccinium pallidum Woodland (CEGL007097)

II.B Deciduous woodland
II.B.2 Cold-deciduous woodland
II.B.2.N Natural/Semi-natural
II.B.2.N.a Cold-deciduous woodland

II.B.2.N.a.9 PAULOWNIA TOMENTOSA WOODLAND ALLIANCE (A.609)
[Paulownia tomentosa Woodland (CEGL003687)]

III Shrubland
III.A Evergreen shrubland
III.A.2 Temperate broad-leaved evergreen shrubland
III.A.2.N Natural/Semi-natural
III.A.2.N.b Hemi-sclerophyllous temperate broad-leaved evergreen shrubland

III.A.2.N.b.4 RHODODENDRON (CATAWBIENSE, CAROLINIANUM) - KALMIA LATIFOLIA SHRUBLAND

ALLIANCE (A.744)
Kalmia latifolia - Rhododendron catawbiense – (Gaylussacia baccata, Pieris floribunda, Vaccinium corymbosum) Shrubland (CEGL003814)
Rhododendron carolinianum - Rhododendron catawbiense - Leiophyllum buxifolium Shrubland (CEGL007876)

III.A.2.N.g Temporarily flooded temperate broad-leaved evergreen shrubland

III.A.2.N.g.1 ARUNDINARIA GIGANTEA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.795)
Arundinaria gigantea ssp. gigantea Shrubland (CEGL003836)

III.B Deciduous shrubland
III.B.2 Cold-deciduous shrubland
III.B.2.N Natural/Semi-natural
III.B.2.N.a Temperate cold-deciduous shrubland

III.B.2.N.a.18 VITIS AESTIVALIS VINE-SHRUBLAND ALLIANCE (A.911)
Vitis aestivalis Vine-Shrubland (CEGL003890)

III.B.2.N.b Subalpine or subpolar cold-deciduous shrubland

III.B.2.N.b.2 RUBUS ALLEGHENIENSIS - RUBUS CANADENSIS SHRUBLAND ALLIANCE (A.930)
Rubus canadensis - (Rubus idaeus ssp. strigosus) / Solidago glomerata Shrubland (CEGL003893)

III.B.2.N.d Temporarily flooded cold-deciduous shrubland

III.B.2.N.d.2 ALNUS SERRULATA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.943)
[Alnus serrulata - Xanthorhiza simplicissima Shrubland (CEGL003895)]

V.A.5.N.c Medium-tall sod temperate or subpolar grassland

V.A.5.N.c.8 FESTUCA SPP. HERBACEOUS ALLIANCE (A.1213)
Festuca spp. Herbaceous Vegetation (CEGL004048)

V.A.5.N.e.7 DANTHONIA COMPRESSA HERBACEOUS ALLIANCE (A.1280)
Danthonia compressa - (Sibbaldiopsis tridentata) Herbaceous Vegetation (CEGL004242)

V.A.5.N.j Temporarily flooded temperate or subpolar grassland

V.A.5.N.j.4 CAREX TORTA TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1340)
Carex torta Herbaceous Vegetation (CEGL004103)

V.A.5.N.k Seasonally flooded temperate or subpolar grassland

V.A.5.N.k.14 JUNCUS EFFUSUS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1375)
Juncus effusus Seasonally Flooded Herbaceous Vegetation [Provisional] (CEGL004112)

V.A.5.N.m. Saturated temperate or subpolar grassland

V.A.5.N.m.101. CAREX RUTHII – CAREX GYNANDRA SATURATED HERBACEOUS ALLIANCE (A.1898)
Carex gynandra - Platanthera clavellata - Drosera rotundifolia - Carex ruthii - Carex atlantica / Sphagnum spp. Herbaceous Vegetation (CEGL007697)
Calamagrostis cainii – Carex ruthii – Parnassia asarifolia / Sphagnum spp. Herbaceous Vegetation (CEGL007877)

V.B Perennial forb vegetation
V.B.2 Temperate or subpolar perennial forb vegetation
V.B.2.N Natural/Semi-natural
V.B.2.N.b Low temperate or subpolar perennial forb vegetation

V.B.2.N.b.10 SAXIFRAGA MICHAUXII HERBACEOUS ALLIANCE (A.1621)
Saxifraga michauxii - Carex misera - Calamagrostis cainii Herbaceous Vegetation (CEGL004278)

V.B.2.N.f Saturated temperate perennial forb vegetation

V.B.2.N.f.7 DIPHYLLEIA CYMOSA - SAXIFRAGA MICRANTHIDIFOLIA SATURATED HERBACEOUS ALLIANCE (A.1688)
Diphylleia cymosa - Saxifraga micranthidifolia - Laportea canadensis Herbaceous Vegetation

V.B.2.N.f.9 IMPATIENS (CAPENSIS, PALLIDA) - MONARDA DIDYMA SATURATED HERBACEOUS ALLIANCE (A.1690)
[Impatiens (capensis, pallida) - Monarda didyma - Rudbeckia laciniata var. humilis Herbaceous Vegetation (CEGL004293)]

V.B.2.N.f.15 VITTARIA APPALACHIANA - HEUCHERA PARVIFLORA SATURATED HERBACEOUS ALLIANCE (A.1696)
Vittaria appalachiana - Heuchera parviflora var. parviflora - Houstonia serpyllifolia / Plagiochila spp. Herbaceous Vegetation (CEGL004302)

VII Sparse Vegetation
VII.A Consolidated rock sparse vegetation
VII.A.1 Sparsely vegetated cliffs
VII.A.1.N Natural/Semi-natural
VII.A.1.N.a Cliffs with sparse vascular vegetation

VII.A.1.N.a.1 ASPLENIUM MONTANUM SPARSELY VEGETATED ALLIANCE (A.1831)
Asplenium montanum - Heuchera villosa Felsic Cliff Sparse Vegetation (CEGL004980)

VII.A.1.N.a.2 ASPLENIUM RUTA-MURARIA - PELLAEA ATROPURPUREA SPARSELY VEGETATED ALLIANCE (A.1832)
[Asplenium ruta-muraria - Pellaea atropurpurea Sparse Vegetation (CEGL004476)]

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GREAT SMOKY MOUNTAINS NATIONAL PARK VEGETATION MAPPING: PLOT SURVEY FORM

PAGE _____ of _____

IDENTIFIERS/LOCATORS

Plot Code GRSM._____ ☐ Primary Plot (Plot length_____ m Plot width_____ m) ☐ Secondary Plot

*Provisional Community Name_____

*Site Name (Sublocation) _____ *Quad. ☐Cades Cove ☐ Mount LeConte

Aerial photo # _____ Polygon code _____ *Extent of occurrence (acres) _____

*Date:___-_____-_1998 *Surveyor(s): _____

*Plot Photos (y/n) ___ Roll Number _____ Frame Number(s) _____ Plot Permanent (y/n) ____

WITNESS TREE SPECIES	DBH	Bearing/Distance to plot center
1.		
2.		
3.		

Diagram (include azimuth of center line):

Directions to Plot:

*GPS Techniques/Equipment _____ GPS file name ___ ___ ___ ___ ___ ___ ___ ___

*Field UTM X ___ ___ ___ ___ ___ ___ m E *Field UTM Y ___ ___ ___ ___ ___ ___ ___ m N

ENVIRONMENTAL / SITE INFORMATION

*Elevation _____ ft./ _____ m

Via: ■: topo map ■: altimeter ■: DEM

■ : GPS

Topographic Postion

- ☐ Interfluve (crest, summit, ridge)
- ☐ High Slope (upper slope, convex slope)
- ☐ Midslope (middle slope)
- ☐ Lowslope (lower slope, footslope)
- ☐ Toeslope (alluvial toeslope)
- ☐ Low level (terrace)

Slope

Measured Slope _____ ° _____ %

☐ Flat	0 °	0 %
☐ Gentle	0-5 °	1-9%
☐ Moderate	6-14 °	10-25%
☐ Somewhat steep	15-25 °	26-49%
☐ Steep	27-45 °	50-100%
☐ Very steep	45-69 °	101-275%
☐ Abrupt	70-100 °	276-300%
☐ overhanging/sheltered	>100 °	>300%

Aspect

Measured Aspect _____ ° (N = 0 °)

☐ Flat	
☐ Variable	
☐ N	338-22 °
☐ NE	23-67 °
☐ E	68-112 °
☐ SE	113-157 °
☐ S	157-202 °
☐ SW	203-247 °
☐ W	248-292 °
☐ NW	293-337 °

*Landform (check most applicable)

- ☐ Alluvial flat
- ☐ Alluvial terrace
- ☐ Bald
- ☐ Bank
- ☐ Bar
- ☐ Bench
- ☐ Cliff
- ☐ Colluvial Slope
- ☐ Cove
- ☐ Debris slide
- ☐ Depression
- ☐ Draw
- ☐ Floodplain
- ☐ Gap
- ☐ Hanging valley
- ☐ Knob
- ☐ Midslope
- ☐ Mountain Valley
- ☐ Nose slope
- ☐ Periglacial boulderfield
- ☐ Ridge
- ☐ Ridgetop bedrock outcrop
- ☐ Saddle
- ☐ Scour
- ☐ Seep
- ☐ Toe slope
- ☐ Slope
- ☐ Streambed
- ☐
- ☐
- ☐
- ☐

GREAT SMOKY MOUNTAINS NATIONAL PARK VEGETATION MAPPING : PLOT SURVEY FORM PAGE _____ of _____

Plot Code GRSM._____ Date:___-_____-_1998 ☐ Primary Plot ☐ Secondary Plot*

*Cowardin System	*Hydrologic Regime	*Unvegetated Surface with > 5% cover
☐ Upland ☐ Riverine ☐ Palustrine ☐ Lacustrine _____ Soil Depth ____ cm (ave.) 1. _____ 2. _____ 3. _____ 4. _____	☐ Temporarily Flooded (e.g. floodplains) ☐ Seasonally Flooded (e.g. seasonal ponds) ☐ Saturated (e.g. bogs, perennial seeps) ☐ Unknown ☐ Not a wetland	(20 m X 20 m) _____% Bedrock _____% Wood (> 1 cm) _____% Litter, duff _____% Large rocks (cobbles, boulders > 10cm) _____% Small rocks (gravel, 0.2-10 cm) _____% Sand (0.1-2 mm) _____% Bare soil _____% Other _____

Hydrologic evidence

Environmental comments

Landscape Comments

*Natural and Anthropogenic Disturbance

Comments:

☐ logging	☐ fire
☐ erosion	☐ trails/roads
☐ grazing/browsing	☐ wind/ice damage
☐ pine bark beetle	☐ exotic plants
☐ dogwood anthracnose	☐ adelgid
☐ chestnut blight	☐ ferral hogs

Animal Use

*Other Comments
(If plot objective is to characterize a polygon -- include Plot Representativeness)

GREAT SMOKY MOUNTAINS NATIONAL PARK VEGETATION MAPPING : PLOT SURVEY FORM

PAGE _____ of _____

Plot Code GRSM._____ Date:___-_____-_1998 ☐ Primary Plot ☐ Secondary Plot

*VEGETATION DESCRIPTION

STRATA	HEIGHT	% COVER	DIAGNOSTIC SPECIES (if known)
T2 Canopy	_____	_____	_____
T3 Sub-canopy	_____	_____	_____
S1 Tall shrub (2-5m)	_____	_____	_____
S2 Short Shrub (<2m)	_____	_____	_____
H Herbaceous	_____	_____	_____
N Non-vascular	_____	_____	_____
V Vine/liana	_____	_____	_____
E Epiphyte	_____	_____	_____

Height scale	Strata	
01 <0.5 m	1	5%
02 0.5-1 m	2	10%
03 1-2 m	3	20%
04 2-5 m	4	30%
05 5-10 m	5	40%
06 10-15 m	6	50%
07 15-20 m	7	60%
08 20-35 m	8	70%
09 35-50 m	9	80%
10 >50 m	10	90%
	11	100%

*Leaf type (dominant stratum)	*Leaf phenology (dominant stratum)	*Physiognomic class
☐ Broadleaf	☐ Evergreen	☐ Forest
☐ Needleleaf	☐ Deciduous	☐ Woodland
☐ Microphyllous	☐ Mixed Evergreen / Cold deciduous	☐ Shrubland
☐ Graminoid	☐ Herb - _Perennial	☐ Dwarf-shrubland
☐ Broadleaf Herbaceous	☐ Herb - Annual	☐ Herbaceous Vegetation
☐ Pteridophyte		☐ Nonvascular Vegetation
		☐ Sparse Vegetation

Provisional Community Name_____

Plot length _____ m Plot width_____ m

*SPECIES COMPOSITION AND COVER/ABUNDANCE CLASS BY STRATUM
(for secondary plots, list dominant species and coverage for each stratum -- up to five for each stratum)

SPECIES	C	**Total**	T2	T3	S1	S2	H	N	V	E

Cover cls (mdpt)		
1	trace	0.05
2	0.1-1%	0.55
3	1-2%	1.5
4	2-5%	3.5
5	5-10%	7.5
6	10-25%	17.5
7	25-50%	37.5

8 50-75% 62.5

9 75-95% 85

10 >95% 97.5

INFORMATION IN VEGETATION DESCRIPTIONS

GLOBAL NAME
Association name based on Latin names of dominant or characteristic plant species. The association (or plant association) is the finest level of the classification system. It is the level at which community inventory and conservation action are aimed.

COMMON NAME
Association common name; same as the GNAME, but with common names instead of scientific names for the species.

SYNONYM
A unique name by which the community may be more easily recognized or described.

PHYSIOGNOMIC CLASS
The second level of National Vegetation Classification System which is a vegetation structural classification adapted from UNESCO 1973 and Driscoll et al. 1984. This level is based on the structure of the vegetation. This is determined by the height and relative percentage of cover of the dominant life-forms: tree, shrub, dwarf-shrub, herbaceous and nonvascular.

PHYSIOGNOMIC SUBCLASS
The third level of National Vegetation Classification System. This level is determined by the predominant leaf phenology of classes defined by a tree, shrub or dwarf-shrub stratum, the persistence and growth form of herbaceous and nonvascular vegetation, and particle size of the substrate for sparse vegetation (e.g., consolidated rocks, gravel/cobble).

PHYSIOGNOMIC GROUP
The fourth level of National Vegetation Classification System. The group generally represents a grouping of vegetation units based on leaf characters, such as broad-leaf, needle-leaf, microphyllous, and xeromorphic. These units are identified and named with broadly defined macroclimatic types to provide a structural-geographic orientation, but the ecological climate terms do not define the groups *per se*.

PHYSIOGNOMIC SUBGROUP
The fifth level of National Vegetation Classification System represents a distinction between natural vegetation, including natural, semi-natural and some modified vegetation, and cultural vegetation (planted/cultivated).

FORMATION
The six level of National Vegetation Classification System; represents a grouping of community types that share a definite physiognomy or structure and broadly defined environmental factors, such as elevation and hydrologic regime.

ALLIANCE: Level of National Vegetation Classification System reflecting a physiognomically uniform group of plant associations sharing one or more diagnostic species (dominant, differential, indicator, or character), which (generally) are found in the uppermost stratum of the vegetation.

CLASSIFICATION CONFIDENCE LEVEL: the degree of confidence associated with the classification of the Element. This confidence is based on the quality and type of data used in the analysis as well as the extent to which the entire (or potential) range of the Element was considered

1 STRONG
Classification based on recent field data. Information is based on Element Occurrences or other data based on occurrences that can be relocated. Classification considers information collected across the entire range or potential range of the Element. Classification may be based on quantitative or qualitative data

2 MODERATE
Classification is based on data that is of questionable quality, limited numbers of sample points, or data from a limited range.

3 WEAK
Classification is based on secondary or anecdotal information. Or a new type for which data have only been collected at a very small number of sites.

USFWS WETLAND SYSTEM:
USFWS Wetland Classification System, if applicable. (Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* United States Fish and Wildlife Service. Washington, DC.).

RANGE:
Globally
Description of the association's present range, including states of occurrence

Great Smoky Mountains National Park
Description of where the community is found on the two pilot quadrangles, or elsewhere in the Park (if known)

ENVIRONMENTAL DESCRIPTION
Globally
Most important environmental determinants of the biological composition or structure of this association and/or its subtypes.
Great Smoky Mountains National Park
Important environmental determinants of the biological composition or structure of this association within the two pilot quadrangles, or in other area of the Park (if known).

MOST ABUNDANT SPECIES
Globally
Stratum Species
Most abundant species by stratum
Great Smoky Mountains National Park
Stratum Species
Most abundant species by stratum, based on the two pilot quadrangles.

CHARACTERISTIC SPECIES
Globally
Latin names of plant species not necessarily most abundant, but which are characteristic or diagnostic of the association when taken singly or in combination with other species.
Great Smoky Mountains National Park
Characteristic species for the association on the two pilot quadrangles, if different from global species.

VEGETATION DESCRIPTION
Globally
Additional comments on vegetation attributes of the association including species richness, diversity, physiognomic structure, spatial distribution of vegetation, strata height, dominant life-forms, coverage of unvegetated substrate, and additional compositional comments.
Great Smoky Mountains National Park
Vegetation description for the association on the two pilot quadrangles, if different from global concept.

OTHER NOTEWORTHY SPECIES
High ranked species, animals, endemics, disjuncts, exotics that are found within occurrences of this association.

CONSERVATION RANK
Global Element rank which characterizes the relative rarity or endangerment of the association worldwide.

RANK JUSTIFICATION
Reason for assigning the Global Element Rank, such as number of occurrences, number of hectares, total area reduction from original, threats, degradation, etc.

DATABASECODE
Element Code from the National Community Database.

COMMENTS
Globally
Any other comments about this association not covered in the fields above such as landscape relationships, inclusion communities, etc.
Great Smoky Mountains National Park
Any other comments about this association specific to the Park, including notes about possible problems in photointerpretation.

REFERENCES
Sources of information used to define or describe the association

ELCODE	*CONF.	PLOT #	SUBLOCATION	QUAD.	UTMX	UTMY
CEGL003814	?	GRSM.71	Alum Cave Trail	Mt. Leconte	278850	3946080
CEGL003814		GRSM.73	Brushy mtn.	Mt. Leconte	280059	3950753
CEGL003814		GRSM.135	Western Ridge off Balsam Point	Mt. Leconte	275307	3947672
CEGL003814		GRSM.76	Gap East of Bull Head	Leconte	275258	3948870
CEGL003814		GRSM.74	Brushy Mtn	Mt. Leconte	279960	3950625
CEGL003814		GRSM.153	Razorback ridge on Alum Cave Trail	Mt. Leconte	278473	3946293
CEGL003814		GRSM.AA6	Chimneys	Mount LeConte	275559	3945472
CEGL003814		GRSM.AA2	Brushy Mountain	Mount LeConte	280028	3950737
CEGL003836		GRSM.243	Abrams Creek	Cades Cove	242905	3942550
CEGL003890		GRSM.220	Rowans Branch	Cades Cove	248047	3941411
CEGL003890		GRSM.139	North of Mt. Winnesoka	Mt. Leconte	279082	3953056
CEGL003890		GRSM.131	North of Potato Ridge	Mt. Leconte	282971	3952793
CEGL003890		GRSM.132	North of Potato Ridge	Mt. Leconte	282863	3952824
CEGL003890		GRSM.125	South of Pond Knob	Cades Cove	248828	3935099
CEGL003890	?	3002	Davis Ridge	Thunderhead Mtn.	259730	3943682
CEGL003893		GRSM.93	Gap between Cliff top and High top	Mt Leconte	279089	3947997
CEGL003893		GRSM.94	East of Cliff Top	Mt Leconte	278965	3948012
CEGL003893		GRSM.95	North of Cliff Top	Mt Leconte	278863	3948059
CEGL004103		GRSM.81	Little Pigeon River	Mt Leconte	283945	3955264
CEGL004103		GRSM.113	Greenbrier	Mt. Leconte	281651	3957206
CEGL004112		GRSM.244	Inside Cades Cove loop on the west end.	Cades Cove	242937	3942265
CEGL004242		GRSM.213	Russell Field Bald	Cades Cove	248883	3939009
CEGL004242		GRSM.247	Gregory Bald	Cades Cove	240111	3934328
CEGL004242		GRSM.248	Gregory Bald	Cades Cove	240224	3934381
CEGL004278		GRSM.91	Upper Alum Cave Trail	Mt Leconte	278966	3947771
CEGL004278		GRSM.146	Boulevard Trail	Mt. Leconte	279977	3948060
CEGL004278		GRSM.151	Alum Cave Trail	Mt. Leconte	279205	3946653
CEGL004296		GRSM.250	Rich Gap	Cades Cove	241448	3934670
CEGL004296		GRSM.232	Pole Knob Branch	Cades Cove	248425	3939610
CEGL004296		GRSM.62	Baskins Creek	Mt. Leconte	274880	3952950
CEGL004296		GRSM.105	Leconte creek	Mt Leconte	276717	3949141
CEGL004302		GRSM.141	Place of a thousand drips	Mt. Leconte	275492	3954461
CEGL004302		GRSM.150	Grotto Falls	Mt. Leconte	278280	3950390
CEGL004302		GRSM.159	Rainbow Falls	Mt. Leconte	277030	3949080
CEGL004476	?	GRSM.239	Gregory's Cave	Cades Cove	245846	3944094
CEGL004691		GRSM.215	Forge Creek Road and Mill Creek	Cades Cove	242880	3941272
CEGL004973	?	2040		Cades Cove	249761	3939048
CEGL004973	?	2135		Cades Cove	240246	3934985
CEGL004973	?	3016		Thunderhead Mtn.	261677	3939399
CEGL004973	?	2130		Cades Cove	241177	3935007
CEGL004973	?	2134	North of Gregory Bald	Cades Cove	240174	3934634
CEGL004973	?	2151		Cades Cove	241165	3934615
CEGL004973		GRSM.231	Upper ploe knob Ranch	Cades Cove	248475	3939375
CEGL004973		2042	Ledbetter Ridge	Cades Cove	249678	3938777
CEGL004973		2043	Ledbetter Ridge	Cades Cove	250549	3938813
CEGL004973		2054	Ledbetter Ridge	Cades Cove	249464	3938908
CEGL004973		2133	Gregory Ridge	Cades Cove	240103	3934974
CEGL004973		3006	Davis Ridge	Thunderhead Mtn.	260376	3940682
CEGL004973		GRSM.29	Cove below Chimney tops	Mount LeConte	275553	3945217
CEGL004973		GRSM.30	Beech Flats	Mount LeConte	276391	3945464
CEGL004973		GRSM.58	Devils Tater Patch	Cades Cove	248017	3937562

*CONF = Confidence in classification attribution; ?= low confidence

ELCODE	*CONF.	PLOT #	SUBLOCATION	QUAD.	UTMX	UTMY
CEGL004973		GRSM.53	North of Ekaneetlee Gap	Cades Cove	245370	3936745
CEGL004973		GRSM.59	Upper Anthony Creek Trail	Cades Cove	249188	3939332
CEGL004973		GRSM.45	Forge Knob West	Cades Cove`	242149	3934425
CEGL004973		GRSM.46	Mud Gap	Cades Cove	244729	3935366
CEGL004973		GRSM.7	"Grassy Patch" above Alum Cave Creek	Mount LeConte	278610	3945506
CEGL004973		GRSM.108	Walker Camp Prong	Mt. Leconte	277274	3945402
CEGL004980		GRSM.223	Rowans Branch	Cades Cove	248014	3941603
CEGL004980		GRSM.241	Crooked Arm Branch	Cades Cove	248930	3944721
CEGL004980		GRSM.156	Bullhead Trail	Mt. Leconte	274306	3949153
CEGL004980		GRSM.160	Above 441 in the Fort Harry vicinity	Mt. Leconte	275280	3946970
CEGL004982		GRSM.251	Forge Knob Branch headwaters	Cades Cove	242380	3934610
CEGL004982		GRSM.17	Bull Head Trail-Southwest of Balsam Point	Mount LeConte	275676	3947577
CEGL004982		GRSM.75	Ravine West of Trillium Gap	Mt. Leconte	279420	3949840
CEGL004982		GRSM.104	LeConte Creek	Mt Leconte	276649	3948774
CEGL004982		GRSM.106	Leconte Creek	Mt Leconte	276735	3949039
CEGL004983		GRSM.70	Alum cave trail	Mt. Leconte	278530	3946580
CEGL004983		GRSM.152	Below Alum Cave	Mt. Leconte	278600	3946371
CEGL006049	?	6133		Mt. LeConte	278512	3948296
CEGL006049	?	6134		Mt. LeConte	279157	3948510
CEGL006049	?	6139		Mt. LeConte	278457	3948611
CEGL006049	?	6136		Mt. LeConte	279181	3948403
CEGL006049	?	6135		Mt. LeConte	278737	3948173
CEGL006049	?	6137		Mt. LeConte	279624	3948169
CEGL006049		GRSM.92	Mt. Leconte Summit	Mt Leconte	279090	3948090
CEGL006049		GRSM.147	Boulevard Trail -- past Myrtle Point	Mt. Leconte	279480	3948120
CEGL006124		GRSM.98	North slope of Leconte, on Rainbow Falls trail.	Mt Leconte	277974	3949264
CEGL006130		GRSM.12	Trillium Gap	Mount LeConte	279742	3950290
CEGL006192	?	2056		Cades Cove	249131	3940817
CEGL006192	?	2124		Cades Cove	242540	3936531
CEGL006192	?	2058		Cades Cove	248714	3941054
CEGL006192	?	3019		Thunderhead Mtn.	258921	3943378
CEGL006192	?	1029		Calderwood	237077	3937542
CEGL006192		2052	Ledbetter Ridge	Cades Cove	249432	3940474
CEGL006192		2127	Gregory Ridge	Cades Cove	241998	3935553
CEGL006192		2106	Gregory Ridge	Cades Cove	243384	3936580
CEGL006192		2109	Gregory Ridge	Cades Cove	242681	3937697
CEGL006192		2129	Gregory Ridge	Cades Cove	243119	3936122
CEGL006192		3003		Thunderhead Mtn.	259252	3944201
CEGL006192		GRSM.4	Horseshoe Cove-North Porter's Mountain	Mount LeConte	283947	3952076
CEGL006192		GRSM.14	Baskin's Creek Trail South	Mount LeConte	275814	3950843
CEGL006192		GRSM.16	Piney Mountain-Northwest	Mount LeConte	276452	3951274
CEGL006192		GRSM.120	Eagle Creek	Cades Cove	250283	3934399
CEGL006192		GRSM.31	Boring Ridge-Rabbit Creek Road	Cades Cove	240775	3941436
CEGL006192	?	GRSM.266	McCampbell Gap	Cades Cove	249725	3938310
CEGL006192	?	3028	Davis Ridge	Thunderhead Mtn.	259983	3943705
CEGL006192	?	2100		Cades Cove	243068	3937139
CEGL006192	?	2115		Cades Cove	243063	3937560
CEGL006256		GRSM.25	Boulevard Trail	Mount LeConte	283222	3945572
CEGL006256		GRSM.142	Above Trillium Gap	Mt. Leconte	279321	3949601
CEGL006256		GRSM.145	Boulevard Trail	Mt. Leconte	280622	3946799
CEGL006256		GRSM.157	Bullhead Trail -- Balsam Point	Mt. Leconte	275883	3947646

*CONF = Confidence in classification attribution; ?= low confidence

ELCODE	*CONF.	PLOT #	SUBLOCATION	QUAD.	UTMX	UTMY
CEGL006271	?	1028		Calderwood	237448	3936898
CEGL006271	?	2053		Cades Cove	249280	3941762
CEGL006271	?	2123		Cades Cove	243689	3936052
CEGL006271	?	2167		Cades Cove	244384	3936473
CEGL006271	?	2122		Cades Cove	243198	3936196
CEGL006271	?	2154		Cades Cove	244988	3937113
CEGL006271	?	1015		Calderwood	235941	3938085
CEGL006271	?	1058		Cades Cove	241943	3944955
CEGL006271	?	1056		Cades Cove	241742	3944964
CEGL006271	?	1085		Calderwood	238407	3945493
CEGL006271	?	2157		Cades Cove	245093	3937383
CEGL006271	?	2160		Cades Cove	244609	3937494
CEGL006271	?	2158		Cades Cove	243962	3937420
CEGL006271		GRSM.212	Russell Field trail	Cades Cove	249464	3940315
CEGL006271		3014	Davis Ridge	Thunderhead Mtn.	260298	3941657
CEGL006271		2114	Gregory Ridge	Cades Cove	243099	3937559
CEGL006271		2110	Gregory Ridge	Cades Cove	242719	3937449
CEGL006271		GRSM.122	Nuna Ridge	Cades Cove	250514	3936281
CEGL006271		GRSM.54	Mollies Ridge - Lonesome Branch	Cades Cove	245572	3937070
CEGL006271		GRSM.128	Paw Paw Ridge	Cades Cove	250116	3932738
CEGL006271		GRSM.35	Anthony Creek Trail-West Cooper Branch	Cades Cove	249036	3942128
CEGL006271		GRSM.42	Forge Creek	Cades Cove	243058	3937122
CEGL006271		GRSM.80	Grapeyard Trail	Mt Leconte	284099	3953800
CEGL006271		GRSM.18	Lower Rainbow Falls Trail	Mount LeConte	275632	3949796
CEGL006271		GRSM.109	Cherokee Orchard	Mt Leconte	275429	3951090
CEGL006271		GRSM.111	Cherokee Orchard	Mt. Leconte	275231	3951113
CEGL006271		GRSM.9	Baskin's Creek Trail	Mount LeConte	276235	3952777
CEGL006271		GRSM.99	Hills Creek	Mt Leconte	280340	3956530
CEGL006271		GRSM.22	High South Slope -- Potato Ridge	Mount LeConte	282538	3952503
CEGL006271		GRSM.130	Potato Ridge	Mt. Leconte	283162	3952697
CEGL006271		GRSM.124	Big Grill Ridge	Cades Cove	248650	3934840
CEGL006271		GRSM.110	Cherokee Orchard	Mt. Leconte	275392	3951176
CEGL006272		GRSM.11	Trillium Gap-LeConte Trail	Mount LeConte	279661	3950053
CEGL006272		GRSM.72	Alum Cave Trail	Mt Leconte	279030	3946375
CEGL006286		GRSM.100	Hills Creek	Mt Leconte	280320	3956385
CEGL006347		GRSM.240	Abrams Creek	Cades Cove	242112	3942433
CEGL007097	?	1001		Calderwood	23462	393942
CEGL007097	?	1014		Calderwood	235274	3937758
CEGL007097	?	1068		Cades Cove	239514	3938362
CEGL007097	?	1026		Calderwood	234355	3935797
CEGL007097	?	1064		Cades Cove	240156	3938298
CEGL007097	?	1069		Cades Cove	239487	3938282
CEGL007097	?	1065		Cades Cove	240108	3938523
CEGL007097	?	1067		Cades Cove	239577	3938427
CEGL007097	?	2103		Cades Cove	242606	3936942
CEGL007097	?	2119		Cades Cove	242609	3936026
CEGL007097	?	2155		Cades Cove	244581	3937267
CEGL007097	?	2156		Cades Cove	245184	3937270
CEGL007097	?	2159		Cades Cove	244608	3937425
CEGL007097	?	2153		Cades Cove	243783	3937394
CEGL007097	?	1009		Calderwood	237766	3941811

*CONF = Confidence in classification attribution; ?= low confidence

ELCODE	*CONF.	PLOT #	SUBLOCATION	QUAD.	UTMX	UTMY
CEGL007097		GRSM.224	Cobb Butt	Cades Cove	246500	3940132
CEGL007097		GRSM.226	Allnight Ridge	Cades Cove	250012	3942584
CEGL007097		2057	Ledbetter Ridge	Cades Cove	249472	3940581
CEGL007097		GRSM.84	Below Turkey Rock	Leconte	280651	3951923
CEGL007097		GRSM.140	Grapeyard Trail	Mt. Leconte	277218	3952618
CEGL007097		GRSM.102	Cobbs Butt	Cades Cove	246760	3940141
CEGL007097		GRSM.77	Bull Head	Mt Leconte	274987	3949005
CEGL007097		GRSM.34	Anthony Cr. Trail-East Cooper Branch	Cades Cove	249191	3942104
CEGL007097		GRSM.AA3	Baskin's Creek Trail	Mount LeConte	275761	3950959
CEGL007097		GRSM.39	North of Tater Ridge	Cades Cove	245366	3945346
CEGL007097		GRSM.86	Ridge N. of Copeland Creek	Mt Leconte	283505	3957058
CEGL007097		GRSM.103	Injun Creek	Mt Leconte	281357	3954550
CEGL007102	?	1052		Cades Cove	240249	3943501
CEGL007102	?	1050		Cades Cove	240811	3941927
CEGL007102		GRSM.209	Arbutus branch	Cades Cove	241115	3942910
CEGL007102		GRSM.217	Wildcat Branch	Cades Cove	242892	3939255
CEGL007102		GRSM.33	Coon Butt Ravine	Cades Cove	239920	3940939
CEGL007102		GRSM.69	Slope of Little Pigeon River	Mt Leconte	282238	3956800
CEGL007119	?	1073		Calderwood	235056	3943456
CEGL007119	?	1088		Blockhouse	238879	3946003
CEGL007119	?	1027		Calderwood	238947	3950315
CEGL007119	?	1036		Calderwood	238440	3949973
CEGL007119	?	1035		Calderwood	238250	3949880
CEGL007119	?	1070		Calderwood	235172	3943829
CEGL007119	?	1072		Calderwood	235100	3943788
CEGL007119	?	1080		Calderwood	230351	3938972
CEGL007119	?	1082		Calderwood	230688	3939174
CEGL007119	?	1062		Cades Cove	241278	3941389
CEGL007119	?	1089		Cades Cove	240596	3945671
CEGL007119	?	1033		Calderwood	234931	3940288
CEGL007119		GRSM.200	Tater Ridge	Cades Cove	244622	3944415
CEGL007119		GRSM.216	Forge Creek Road	Cades Cove	242488	3939187
CEGL007119		GRSM.38	Rich Mountain Road	Cades Coves	243842	3944541
CEGL007119		GRSM.32	Boring Ridge	Cades Cove	240741	3941109
CEGL007130		GRSM.154	Alum Cave Trail	Mt. Leconte	279060	3947078
CEGL007130		GRSM.144	Boulevard trail	Mt. Leconte	283032	3946124
CEGL007130		GRSM.158	Above Rocky Spur on Rainbow Falls Trail	Mt. Leconte	278426	3948804
CEGL007131		GRSM.24	Boulevard trail	Mount LeConte	283308	3945930
CEGL007131		GRSM.26	Boulevard Trail	Mount LeConte	283483	3945315
CEGL007131		GRSM.155	Alum Cave Trail	Mt. Leconte	278836	3947803
CEGL007136		GRSM.205	Abrams Creek	Cades Cove	240875	3942547
CEGL007136		GRSM.43	Tipton's Sugar Cove Branch	Cades Cove	242054	3937979
CEGL007219		GRSM.222	Rowans Branch	Cades Cove	248119	3941369
CEGL007219		GRSM.79	Rhododendron Creek	Mt Leconte	281910	3953510
CEGL007219		GRSM.AA1	Porter's Creek Flats	Mount LeConte	283714	3952086
CEGL007219		GRSM.119	Eagle Creek	Cades Cove	250214	3934579
CEGL007219		GRSM.67	Lower little pigeon river	Mt Leconte	281080	3956870
CEGL007230	?	1031		Calderwood	235107	3940838
CEGL007230	?	1008		Calderwood	238068	3941945
CEGL007230	?	1083		Calderwood	239763	3946042
CEGL007230	?	1060		Cades Cove	241340	3941466

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CEGL007230	?	1025		Calderwood	233638	3935979
CEGL007230	?	1077		Calderwood	230510	3938538
CEGL007230	?	1078		Calderwood	230292	3938826
CEGL007230	?	1081		Calderwood	230573	3938726
CEGL007230	?	2136		Cades Cove	239847	3935647
CEGL007230	?	2144		Cades Cove	243179	3934717
CEGL007230	?	2162		Cades Cove	245639	3936605
CEGL007230	?	2164		Cades Cove	245863	3936539
CEGL007230		GRSM.261	Big Grill Ridge	Cades Cove	247217	3936792
CEGL007230		GRSM.257	Greer knob	Cades Cove	245230	3933520
CEGL007230		GRSM.260	Greer Knob South	Cades Cove	245050	3933125
CEGL007230		GRSM.127	West of Paw Paw Ridge	Cades Cove	249946	3932586
CEGL007230		GRSM.65	Dudley creek	Mt Leconte	279010	3956680
CEGL007230		GRSM.118	Copeland Creek	Mt. Leconte	282880	3958085
CEGL007230		GRSM.85	Copeland Creek	Mt Leconte	282921	3957896
CEGL007230		GRSM.88	Cades Cove Loop	Cades Cove	246143	3943768
CEGL007230		GRSM.47	Appalachian Trail south of Doe Knob	Cades Cove	244336	3934529
CEGL007230		GRSM.52	North of Ekaneetlee Gap	Cades Cove	245581	3936327
CEGL007230		GRSM.48	Brier Lick Gap	Cades Cove	243317	3934621
CEGL007230	?	GRSM.37	Rich Mountain Road Gate	Cades Cove	244120	3944144
CEGL007230?		GRSM.256	Ridge south of Doe Knob	Cades Cove	244280	3934220
CEGL007267	?	1003		Calderwood	235314	3939679
CEGL007267	?	1007		Calderwood	237803	3941930
CEGL007267	?	1087		Calderwood	238594	3945702
CEGL007267	?	1047		Calderwood	235527	3943005
CEGL007267	?	1084		Calderwood	239103	3945901
CEGL007267	?	1063		Cades Cove	240174	3941673
CEGL007267	?	1061		Cades Cove	241204	3941328
CEGL007267	?	1055		Cades Cove	241807	3944856
CEGL007267	?	1057		Cades Cove	241338	3944866
CEGL007267	?	2152		Cades Cove	243464	3937769
CEGL007267		GRSM.21	East slope of Potato Ridge	Mount LeConte	283697	3952779
CEGL007267		GRSM.23	Copeland Divide	Mount LeConte	282980	3956426
CEGL007267		GRSM.40	Cooper Road-Stony Ridge	Cades Cove	240974	3945388
CEGL007267		GRSM.41	Cooper Road-Arbutus Ridge	Cades Cove	241550	3944677
CEGL007267		GRSM.66	Lower Little Pigeon River	Mt Leconte	281480	3957003
CEGL007267	?	GRSM.237	Anthony Creek	Cades Cove	249775	3942110
CEGL007267	?	GRSM.238	Green Branch adjacent to the Cades Cove loop road	Cades Cove	249555	3943570
CEGL007285	?	3022		Thunderhead Mtn.	260582	3941043
CEGL007285	?	2132		Cades Cove	240330	3934701
CEGL007285	?	2140		Cades Cove	240040	3934524
CEGL007285	?	2141		Cades Cove	240224	3934475
CEGL007285	?	2147		Cades Cove	240711	3934431
CEGL007285	?	3011		Thunderhead Mtn.	261257	3939375
CEGL007285	?	3012		Thunderhead Mtn.	261198	3939482
CEGL007285	?	2139		Cades Cove	239868	3934357
CEGL007285	?	2145		Cades Cove	242357	3934395
CEGL007285		GRSM.214	North slope of McCampbell Knob	Cades Cove	249054	3939042
CEGL007285		2142	Gregory Ridge	Cades Cove	242125	3934384
CEGL007285		GRSM.49	Upper Gregory Ridge Trail	Cades Cove	241038	3934703
CEGL007285		GRSM.51	Mollies Ridge Shelter	Cades Cove	246780	3936970

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ELCODE	*CONF.	PLOT #	SUBLOCATION	QUAD.	UTMX	UTMY
CEGL007285		GRSM.56	Devils Tater Patch	Cades Cove	247382	3937227
CEGL007285		GRSM.57	Devils Tater Patch	Cades Cove	247776	3937451
CEGL007285		GRSM.114	Masa Knob	Mt. Leconte	284806	3945831
CEGL007285		GRSM.143	Trillium Gap Trail	Mt. Leconte	279142	3949123
CEGL007298		GRSM.137	Western Ridge of Balsam Point	Mt. Leconte	274878	3947563
CEGL007299		GRSM.228	MacCampbell Knob	Cades Cove	249189	3939063
CEGL007300	?	2148		Cades Cove	241138	3934723
CEGL007300	?	3013		Thunderhead Mtn.	261207	3939205
CEGL007300	?	2146		Cades Cove	240957	3934430
CEGL007300	?	2149		Cades Cove	240461	3934324
CEGL007300		GRSM.249	Gregory Bald, south slope	Cades Cove	234697	3934190
CEGL007300		GRSM.262	Lower Big Grill Ridge near Pond Knob	Cades Cove	248539	3935473
CEGL007300		GRSM.44	Moore Spring Camp	Cades Cove	240792	3934208
CEGL007300		GRSM.55	Mollies Ridge	Cades Cove	246052	3937105
CEGL007388		GRSM.242	Gum pond	Cades Cove	242762	3941875
CEGL007519	?	1076		Calderwood	235431	3943758
CEGL007519		GRSM.206	Crooked Arm Ridge	Cades Cove	248810	3944240
CEGL007519		GRSM.204	Abrams Creek	Cades Cove	241028	3942320
CEGL007519		GRSM.208	Abrams Creek	Cades Cove	241282	3942703
CEGl007519		GRSM.218	Wildcat Branch	Cades Cove	242788	3939197
CEGL007519		GRSM.36	Laurel Creek	Cades Cove	250172	3943368
CEGL007519		GRSM.AA5	Tipton's Sugar Cove Branch	Cades Cove	241970	3937995
CEGL007543	?	1002		Calderwood	235017	3940269
CEGL007543	?	1051		Cades Cove	241387	3941854
CEGL007543	?	1005		Calderwood	236953	3942612
CEGL007543	?	1022		Calderwood	237072	3943689
CEGL007543	?	1030		Calderwood	235308	3940881
CEGL007543	?	1034		Calderwood	234612	3939304
CEGL007543	?	2046		Cades Cove	250024	3940882
CEGL007543	?	2113		Cades Cove	243030	3937558
CEGL007543	?	3027		Thunderhead Mtn.	261124	3943049
CEGL007543	?	3004		Thunderhead Mtn.	261463	3942286
CEGL007543	?	3018		Thunderhead Mtn.	259694	3942139
CEGL007543		GRSM.201	Streamside north of Tater Ridge	Cades Cove	244709	3944931
CEGL007543		GRSM.254	Ekaneetlah confluence	Cades Cove	246200	3934710
CEGL007543		2101		Cades Cove	243166	3936813
CEGL007543		2116		Cades Cove	242844	3935721
CEGL007693	?	3023		Thunderhead Mtn.	260886	3941127
CEGL007693	?	2041		Cades Cove	250022	3939454
CEGL007693	?	2047		Cades Cove	249431	3939332
CEGL007693	?	3015		Thunderhead Mtn.	260671	3939352
CEGL007693	?	2117		Cades Cove	242557	3935412
CEGL007693	?	3024		Thunderhead Mtn.	260359	3941324
CEGL007693	?	3026		Thunderhead Mtn.	260887	3941772
CEGL007693		2105	Gregory Ridge	Cades Cove	243252	3936606
CEGL007693		3007	Davis Ridge	Thunderhead Mtn.	260664	3941009
CEGL007693		2055	Ledbetter Ridge	Cades Cove	249125	3939414
CEGL007693		3008		Thunderhead Mtn.	260499	3940748
CEGL007693		GRSM.5	Upper Porter's Creek	Mount Guyot	285325	3947414
CEGL007693		GRSM.6	Porter's Creek-Horseshoe Branch	Mount LeConte	283944	3948849
CEGL007693		GRSM.148	North watershed of Rocky Spur	Mt. Leconte	277519	3949904

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CEGL007693		GRSM.60	Left prong Anthony Creek.	Cades Cove	250000	3940690
CEGL007693		GRSM.1	Cherokee Orchard-Rainbow Falls Trailhead	Mount LeConte	240775	3941436
CEGL007693		GRSM.10	Trillium Gap-Grotto Falls Connector	Mount LeConte	277222	3950974
CEGL007693	?	3025	Davis Ridge	Thunderhead Mtn.	260426	3941520
CEGL007695	?	2163		Cades Cove	245675	3936663
CEGL007695	?	1011		Calderwood	235686	3938387
CEGL007695	?	2104		Cades Cove	242675	3936750
CEGL007695	?	2131		Cades Cove	242476	3936200
CEGL007695		GRSM.246	Pine Ridge north slope	Cades Cove	240762	3937934
CEGL007695		GRSM.207	Scotts Mountain Trail	Kinzel Springs	249742	3945539
CEGL007695		GRSM.225	Cove below Cobb Butt	Cades Cove	246648	3940369
CEGL007695		GRSM.236	Upper Fanny Branch	CAdes Cove	248938	3941657
CEGL007695		GRSM.50	Mid- Gregory Ridge Trail	Cades Cove	242303	3935956
CEGL007695		GRSM.3	Porter's Creek	Mount LeConte	283032	3950858
CEGL007695		GRSM.27	Chimineys Picnic area - Nature trail	Mount LeConte	274021	3946118
CEGL007695		GRSM.78	Lower Bullhead Trail	Mt Leconte	274290	3949450
CEGL007695		GRSM.138	N. of Mt. Winnesoka	Mt. Leconte	279187	3952352
CEGL007695		GRSM.101	Bunting Branch	Cades Cove	246851	3940480
CEGL007695		GRSM.2	Cherokee Orchard-LeConte Creek	Mount LeConte	275010	3949896
CEGL007695		GRSM.15	Piney Mountain-Northeast	Mount LeConte	276571	3951285
CEGL007695		GRSM.133	Fort Harry	Mt. Leconte	275700	3946770
CEGL007695		GRSM.134	Ravine E and S of Balsam Point	Mt. Leconte	274949	3947237
CEGL007695		GRSM.19	Rainbow Falls Trail-Below Falls	Mount LeConte	276144	3949314
CEGL007695		GRSM.83	Long Branch	Mt Leconte	281152	3951500
CEGL007695		GRSM.149	N.watershed below Rocky Spur	Mt. Leconte	277343	3950480
CEGL007697		GRSM.115	Icewater Springs	Mt. Leconte	283846	3945381
CEGL007710		GRSM.210	Abrams creek	Cades Cove	240325	3943196
CEGL007710		GRSM.211	Russell Field Trail before it gets steep	Cades Cove	250195	3941350
CEGL007710		GRSM.221	Cork Branch/Rowans Branch junction	Cades Cove	248148	3941140
CEGL007710		GRSM.63	Lower Baskins Ck	Mt.Leconte	273883	3953564
CEGL007710		GRSM.87	Indian Creek	Mt Leconte	278152	3953003
CEGL007710	?	GRSM.258	Birch Springs Shelter	Cades Cove	244830	3932125
CEGL007861	?	2138		Cades Cove	240406	3935346
CEGL007861		3010		Thunderhead Mtn.	261605	3940939
CEGL007861		GRSM.107	Alum Cave Creek	Mt Leconte	278143	3945476
CEGL007861		GRSM.28	Alum Cave Creek/Walker Camp Prong	Mount LeConte	277750	3945410
CEGL007861		GRSM.13	East Limb of Rocky Spur Branch	Mount LeConte	278095	3950478
CEGL007861		GRSM.136	Cove off Balsam Ridge	Mt. Leconte	275272	3947463
CEGL007861		GRSM.116	Chimney's Trailhead	Mt. Leconte	276153	3946090
CEGL007861		GRSM.8	Alum Cave Creek-Steep Rhodo Pass	Mount LeConte	278565	3945484
CEGL007861		GRSM.117	Trout Branch	Mt. Leconte	277452	3945920
CEGL007876	?	6138		Mt. LeConte	278630	3948184
CEGL007876		GRSM.96	Rocky Spur	LeConte	278036	3949089
CEGL007876		GRSM.97	Rocky Spur	Mt Leconte	278032	3949078
CEGL007876		GRSM.AA4	Jumpoff	Mount LeConte	283635	3945783
CEGL007877		GRSM.90	Alum Cave trail	Mt Leconte	279013	3947786
CEGL007878		GRSM.252	Upper Big Tommy Creek	Cades Cove	244717	3934660
CEGL007878		GRSM.255	Ekaneetlah Creek	Cades Cove	246025	3935111
CEGL007878		GRSM.265	Big Abrams Gap (south slope in NC.)	Cades Cove	248801	3938219
CEGL007878		2045	Ledbetter Ridge	Cades Cove	249241	3941084
CEGL007878		GRSM.121	West of Nuna Ridge	Cades Cove	250399	3936091

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CEGL007879		GRSM.61	Baskins Creek	Mt Leconte	275295	3952910
CEGL007880		GRSM.219	Rowan Branch	Cades Cove	247485	3942354
CEGL007880		GRSM.20	Greenbrier Flats	Mount LeConte	284326	3955018
CEGL007880		GRSM.64	Dudley Creek	Mt. LeConte	279030	3956360
CEGL007880		GRSM.82	Lower Little Pigeon River	Mt Leconte	281570	3957420
CEGL007880		GRSM.89	Alluvial flat along Abrams Creek	Cades Cove	241779	3941993
CEGL007880		GRSM.112	Greenbrier - Little Pigeon River	Mt. Leconte	283114	3955789

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