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GENERAL INFORMATION
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1. Title of Dataset

Contrasting Epiphytic and Ground Layer Macrolichen Communities along the Coast-to-inland Climatic Gradient in Oregon - Dataset

2. Author Information

Main Author Contact Information
Name: Abby Glauser
Institution: Oregon State University (as of 2018/07/01: University of Minnesota)
Address: 2701 SW Campus Way, 2082 Cordley Hall, Corvallis, OR 97331
(as of 2018/07/01: 1987 Upper Buford Circle, 100 Ecology Building, St. Paul, MN, 55108)
Email: abbyglauser@gmail.com

Principle Investigator Contact Information
Name: Bruce McCune
Institution: Oregon State University
Address: 2701 SW Campus Way, 2082 Cordley Hall, Corvallis, OR 97331
Email: mccuneb@science.oregonstate.edu

3. Date of data collection: 2016-2017, field seasons from ~May to November

4. Geographic location of data collection: Western and central Oregon

5. Information about funding sources that supported the collection of the data:

Funding for data collection was provided by the Portland Garden Club ($1500) and The American Bryological and Lichenological Society ($500).
The author's research assistantship was funded by NSF Award DBI-1458108 for three years.

ABSTRACT

Cyanolichens, lichens with a cyanobacterial photobiont, benefit our ecosystems by the fixation of atmospheric nitrogen into a usable form for other organisms. They are highly sensitive to air pollution and require liquid water for photosynthesis. Many cyanolichen species frequently occur on the ground in the Pacific Northwest, however, most macrolichen community studies in this region focus only on epiphytes above half a meter in height. Less is known about lichen communities at ground level, particularly those in western Oregon. To help broaden our understanding of cyanolichen ecology, the ground layer was incorporated into this study. We tested several hypotheses regarding how cyanolichens in the epiphyte and ground layers respond to both regional climate and site-level variables. We also examined how lichen diversity varied along this gradient in each sampling layer. Both epiphytic and ground-dwelling lichen communities were sampled in 38 plots along a climate gradient in Oregon. This gradient incorporated five climatic regions: the Pacific Coast, Coast Range, Willamette Valley, Cascade Range, and central Oregon. We drew many plots from the vast network of the Forest Service's Forest Inventory and Analysis (FIA) program, and combined community data from multiple sources to cover as wide a study area as possible. Lichen communities were analyzed using non-metric multidimensional scaling (NMS) and correlated with an array of climate variables. The community weighted averages of lichens containing cyanobacteria were calculated to compare lichen community composition to photobiont frequency. Split-plot ANOVAs were used to test for the significance of region, layer, and the interaction of region x layer in lichen community composition. Paired t-tests tested for significant differences in cyanolichen frequency between epiphyte and ground layers in each climatic region. We found that the ground macrolichen communities do not differ as strongly from one climatic region to the next in the wetter, western half of Oregon, as do the epiphytic communities. There is, however, a strong difference between the ground communities in western and central Oregon. There are proportionally about as many cyanolichens in the epiphyte layer as in the ground layer on the immediate coast, Coast Range, Willamette Valley, and Cascade Range. There are proportionally more cyanolichens in the ground layer than the epiphyte layer in central Oregon. The most prominent variables related to higher proportions of cyanolichens were lower elevation, less annual snowfall, warmer winter temperatures, higher annual precipitation, and a higher basal area of hardwood trees. On average, 76% of total plot diversity was captured by sampling epiphytes, and 39% by sampling the ground layer. Plots contained on average 18 species unique to the epiphyte layer and 7 unique to the ground layer. Lichen diversity was higher in the epiphyte layer than the ground layer in the wetter climatic regions in western Oregon, but higher in the ground layer in central Oregon. Total plot macrolichen diversity can be estimated fairly well from epiphytic lichen diversity. We propose our sampling protocol as a standardized method for the ground layer that can be used across studies and is directly comparable and complimentary to FIA sampling methodology. Both microclimate and substrate availability at ground level likely play key roles in the composition of these lichen communities and the abundance of cyanolichens at a site. Direct measurements of moisture sources and understory composition will help determine the mechanisms driving the observed patterns.

SHARING/ACCESS INFORMATION
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1. Licenses/restrictions placed on the data: Copyright, Creative Commons - CC0 (public domain)

2. Links to publications that cite or use the data: n/a

3. Links to other publicly accessible locations of the data: n/a

4. Links/relationships to ancillary data sets: n/a

5. Was data derived from another source? Some, yes.

United States Forest Service (FIA-Forest Inventory and Analysis Program; ARM-Air Resource Management Program): http://gis.nacse.org/lichenair/index.php?page=query&type=community

Dr. Eric Peterson (PhD Dissertation, files available from Dr. Bruce McCune, mccuneb@science.oregonstate.edu): http://ir.library.oregonstate.edu/concern/graduate_thesis_or_dissertations/t148fm95x

Dr. Heather Root (PhD Dissertation, files available from Dr. Bruce McCune, mccuneb@science.oregonstate.edu): http://ir.library.oregonstate.edu/concern/graduate_thesis_or_dissertations/rr172164f

Dr. Bruce McCune's Lichenology Classes (files available from Dr. Bruce McCune, mccuneb@science.oregonstate.edu)

6. Recommended citation for the data:

Glauser, A. L. (2018). Contrasting Epiphytic and Ground Layer Macrolichen Communities along the Coast-to-inland Climatic Gradient in Oregon - Dataset [Data set]. Oregon State University. https://doi.org/10.7267/WJS6-TZ59

DATA & FILE OVERVIEW

The number of variables (columns) and plots (rows) in each file is given in this table.
A list of all variables, abbreviations, and units is included in "Variables_List.csv".
A list of all species names corresponding to the column hea
A list of additional explanations of terms in these data files follows this table.

TABLE: List of archived files used in Chapters 2 and 3. All are in Comma Separated Values file format.

File Name	**Contents**
Epi_Abund_conf.csv	Matrix of 38 plots x 158 species. Abundance scores (1-4) for every species found in the epiphyte layer in each plot. Row headings are confidential plot names. Column headings are 6 letter acronyms for lichen species – these are all explained in "Species_List.csv".
Ground_Abund_conf.csv	Matrix of 38 plots x 117 species. Abundance scores (1-4) for every species found in the ground layer in each plot. Row headings are confidential plot names. Column headings are 6 letter acronyms for lichen species – these are all explained in "Species_List.csv".
TotalPlot_Abund_conf.csv	Matrix of 38 plots x 188 species. Abundance scores (1-4) for every species found in each plot (epiphyte and ground layers combined). Row headings are confidential plot names. Column headings are 6 letter acronyms for lichen species – these are all explained in "Species_List.csv".
Layer_Diversity_andCWM.csv	List of plots with the number of species, the number of cyanolichen species, and the community weighted mean (CWM) of cyanolichens in each layer. Species Richness = the number of species. CWM is described in thesis chapter 2 Methods (starting on page 17).

Traits_Epi.csv	Matrix of 158 species x 3 traits. Cyano = contains cyanobacteria (CyanoOnly and Tripartite), CyanoOnly = contains only cyanobacteria and no green algae, Tripartite = contains both cyanobacteria and green algae. Row headings are 6 letter acronyms for lichen species – these are all explained in "Species_List.csv". Column headings are traits.
Traits_Ground.csv	Matrix of 117 species x 3 traits. Cyano = contains cyanobacteria (CyanoOnly and Tripartite), CyanoOnly = contains only cyanobacteria and no green algae, Tripartite = contains both cyanobacteria and green algae. Row headings are 6 letter acronyms for lichen species – these are all explained in "Species_List.csv". Column headings are traits.
Traits_TotalPlot.csv	Matrix of 188 species x 3 traits. Cyano = contains cyanobacteria (CyanoOnly and Tripartite), CyanoOnly = contains only cyanobacteria and no green algae, Tripartite = contains both cyanobacteria and green algae. Row headings are 6 letter acronyms for lichen species – these are all explained in "Species_List.csv". Column headings are traits.
Environmental_conf.csv	List of plots and associated environmental variables used in analyses. Matrix of 38 plots x 19 environmental variables. Plot names are generic labels (i.e. WV01, WV02) established by the author - some correspond to official FIA plots that have official names - some of which are confidential 7-digit HEX ID numbers. Generic plot names are used instead of confidential plot numbers in all files labeled "_conf". Row headings are confidential plot names. Column headings are environmental variable abbreviations – each of these variables is explained in "Variables_List.csv".

Plot_Details.csv	List of all plots, with raw plot data and directions to any non-confidential plots. Column headings are described in detail in "Plot_Details_HeadingsKey.csv".
Plot_Details_HeadingsKey.csv	Detailed decriptions of all column headings and corresponding data listed in "Plot_Details.csv".
Species_List.csv	List of all species and abbreviations used in community matrices.
Variables_List.csv	List of all environmental and trait variables with explanations and units. Asterisk (*) indicates values obtained from 30 year normals, 1961-1990, using ClimateNA software.
Voucher_List.csv	List of all voucher specimens submitted to the OSU Herbarium (OSC): 2701 SW Campus Way, 2082 Cordley Hall, Corvallis, OR 97331 Column headings: Species = species name, Coll. # = collection number, Plot # = confidential plot number specimen was collected from, Layer = sampling layer specimen was collected from, Notes = notes on reproductive structures and chemistry (for descriptions see Macroclichens of the Pacific Northwest, McCune and Geiser, 2009).

METHODOLOGICAL INFORMATION

For all methods see thesis chapter 2, methods section (starting on page 17).

For the names of all people involved with sample collection, data processing, and analyses, see thesis acknowledgements and contribution of authors sections (pre-text pages).

Glauser A. 2018. Contrasting epiphytic and ground layer macrolichen communities along the coast-to-inland climatic gradient in Oregon. Oregon State University, Corvallis, OR. Master's Thesis.