



LICHEN MONITORING

Langley Environmental Partners Society invites you to do a Citizen Science survey of lichens growing on trees in local parks, or in your own backyard.

This booklet includes information about how to do a Lichen Monitoring survey, sample data collection sheets, fun facts about lichens, and why LEPS is interested in monitoring lichen.

Several types
of lichens
found in
McLeod Park,
Langley.



Lepraria pacifica
on Western Red Cedar



Usnea species (on an Alder twig)



Phlyctis argena (whitewash lichen)
on Alder

BENEFITS to YOU

- Get outside and explore.
- Learn something new about your local ecosystems.
- Be part of a community effort to learn more about air quality in our area.
- Celebrate the great outdoors!

Why survey lichens?

Certain types of lichens are sensitive to air pollution and are excellent bio-indicators of air quality. Some lichen stop growing in areas where air quality is reduced. Other lichen are tolerant of air pollution and tend to grow better where there is more air pollution. Monitoring needs to take place over a number of years to notice trends.



Lobaria pulmonaria
Photo by Fred Bunnell



Cladonia carneola

Where do lichens grow?

Once you begin to notice lichen, you see them everywhere! They grow in deserts, the sub arctic, and everywhere in between. They can be found on soil, rocks, tombstones, trees, decaying wood, on old cars and even on some insects! For the purposes of this **Lichen Monitoring Survey** we will focus on lichen growing on living trees.

What are lichen anyway?

Lichens are organisms that are not actually plants. They are a combination of a **fungus** and an **algae** working together to form an entirely unique life form. There are over 14,000 identified lichens in the world. Lichens range in colour from bright yellow, orange, pink, and red, to gray, green, brown, and black. Some are crusty (Crustose), some dusty (Dust lichen); others are leafy (Foliose) and some types of lichen are hairy or bushy (Fruticose).



Photo by Tuzen, Flickr

DID YOU KNOW?

- Lichens provide nesting material for hummingbirds and other birds.
- They are a food source for deer and some types are survival food for humans!
- Certain lichens 'fix' the scent of perfumes; while some are used to make dyes.

Four common growth forms of Lichen are: **Crustose** (crusty), **Dust Lichen** (dusty), **Foliose** (leafy), and **Fruticose** (hairy or bushy)



Crustose (crusty)
Graphis scripta



Dust Lichen (dusty) are a form of Crustose. *Lepraria species*



Foliose (leafy)
Parmelia sulcata

How do I identify lichen in the field?

- Begin by observing whether the lichen is crusty , dusty, leafy, bushy or hairy.
- Follow our **Lichen Identification Key** (page 5) in this booklet



Fruticose (bushy/hairy)
Usnea species



Photo by NH53, Flickr

Fruticose (hairy)
Usnea longissima

DID YOU KNOW?

- A person who studies lichen is a **lichenologist**.
- The oldest fossil of a lichen is around 400 million years old!
- Lichen **DO NOT** harm the trees on which they grow.
- The Lichen Collection at the UBC Herbarium within the Beaty Biodiversity Museum in Vancouver has over 35,000 specimens of lichen.
- The only way to accurately identify lichens is from samples.

The Lichen

For the purpose of this survey we are looking for 4 species of lichen which are most **sensitive** to air pollution; and 2 which are most **tolerant** of air pollution in the Lower Mainland.

The lichen species below are considered **sensitive** to air pollution; finding them can be an indication of good air quality.



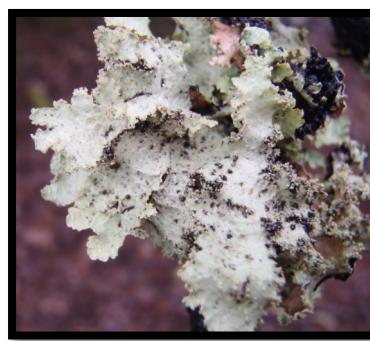
1. *Bryoria fremontii* (horsehair, tree-hair)

Photo by Curtis Bjork



2. *Lobaria pulmonaria* (lungwort)

Photo by Fred Bunnell



3. *Platismatia glauca* (ragbag)



4a. *Usnea longissimi* (Methuselah's beard)

Photo by Curtis Bjork

Look for various *Usnea* species. *Usnea* has a distinctive stretchy central cord.



4b. *Usnea* species

The 2 species of lichen below are most **tolerant** of air pollution.



1. *Candelaria concolor* (candelflake or lemon lichen)

Both are **Crustose** in their growth form.

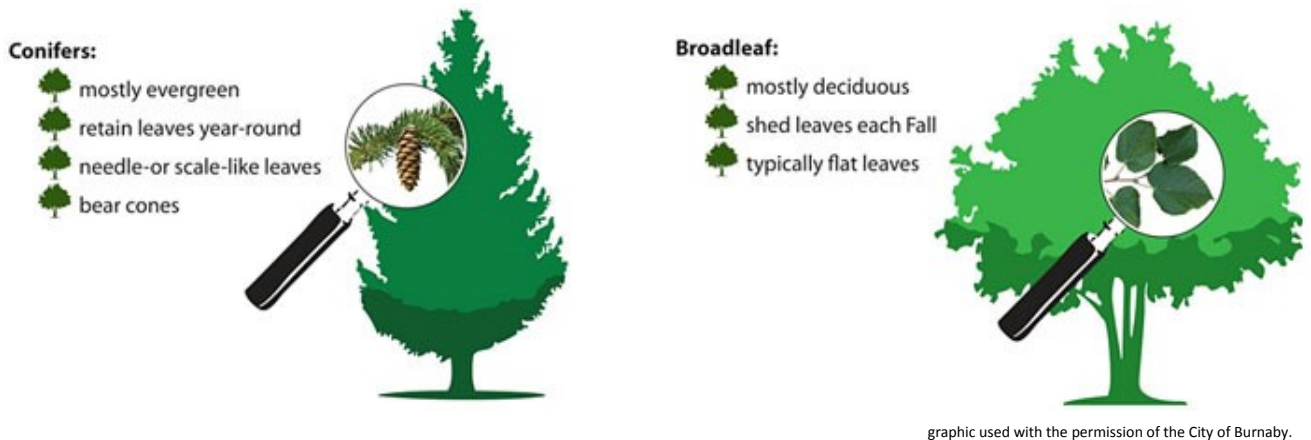
photos by Curtis Bjork, UBC campus
(All C. Bjork photos from
'Ways of Enlichenment' website).



2. *Lecanora conizaeoides* (a Rim Lichen)

The Trees

In this survey we are focusing on lichen growing on living trees. Lichen grow on both **Conifers** and **Broadleaf** trees in our area.



Conifer trees you may see are:
Western Red Cedar, Douglas-Fir, Hemlock, Pine,
and Spruce.

Broadleaf trees you may see are:
Alder, Birch, Cottonwood and Maple.

Lichen Identification Key

You'll probably see many different lichen while you are out looking for the **pollution sensitive** and **tolerant** ones for this survey. The Lower Mainland is rich in bio-diversity with many species of lichen making their homes here.

We encourage you to notice all lichen and include them on the data collection sheet. If you'd like to create names for them, or guess what their scientific name is, include that with your observations.

This key may assist you in differentiating various lichen. A guide book is also helpful. See titles by Pojar and Vitt at back of this brochure.

1. Crusty (crustose)?

Does it have squiggles or lines? If yes, it may be *Graphis scripta* (pencil script)

Is it **dusty /powdery**? If yes, is it on a **Cedar tree**? It may be a species of *Lepraria sp.*

If yes, is it round? It may be a species of *Phylctis* (possibly *Phylctis argena*).

If yes, is it pale greenish gray, with undefined shape and bumps? It may be the pollution tolerant, *Lecanora Conizaeoides**

If yes, is it yellow? It may be *Candelaria concolor** one of the pollution tolerant species.

2. Leafy (Foliose)?

Does it have wider or narrower leaf shape?

If wider with ragged edges, and loosely attached to the bark or twig, does it have black rhizines (root like parts) on the underside? It may be *Parmelia sulcata*.

If wider with lighter coloured underside and light rhizines, also loosely attached, growing on conifers, it may be *Platismatia glauca**

If very wide with a wrinkly leaf surface and loosely attached to bark or twig, it may be the pollution sensitive, *Lobaria pulmonaria**

3. Bushy/Hairy (Fruticose)

Does it have a stretchy central cord when you pull it? It may be an *Usnea sp.**

Note that lichen with an * are pollution sensitive or tolerant ones we are focusing on identifying for this Lichen Monitoring Survey.

Where to 'do' Lichen Monitoring? Take yourself for a walk! Look for trees in your backyard, on a hike, in a local park. Look for lichen on **living** trees and twigs. Aim to spend less than 10 minutes per tree (unless you want to spend longer).

What You'll Need:

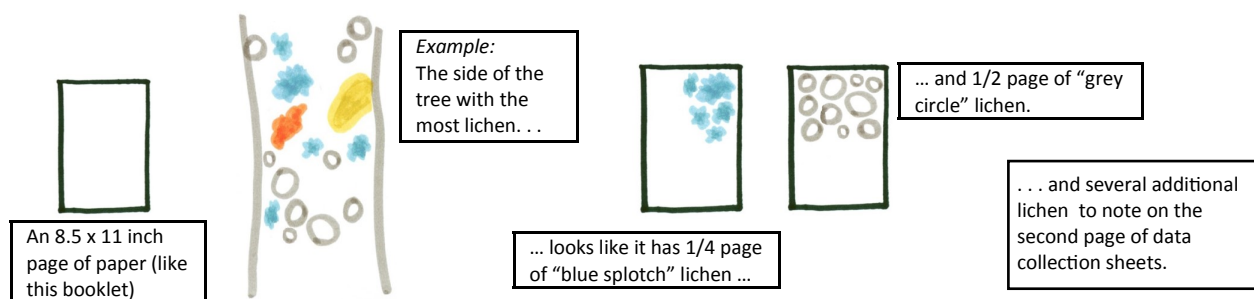
- This booklet
- Data Collection sheets
- Pen or pencil
- Measuring tape

Safety Notes:

- Be aware of your surroundings; watch out for uneven ground, roots and low branches.
- Take a lichen buddy along. If you go out by yourself, let someone know where you are going.
- Dress for the weather and bring a first aid kit.

How to fill out Data Collection sheets:

1. Choose a number of trees at least 30 cm around (at least 10 cm across) with no ivy; notice if lichen are present. Each data collection sheet has space to record information for three trees. Choose which will be Tree 1, 2, or 3.
2. Identify whether each tree is **Broadleaf** or **Conifer** (see **Tree guide page**).
3. Measure the circumference (around the tree); at chest height.
4. Walk around the tree and select the side of the trunk with the most lichen growing (at the height between your knee and your neck). If known, indicate which side of the tree this is (East, South, West, or North). Or if lichen present on all sides, note that.
5. Identify the pollution sensitive or pollution tolerant pollution sensitive or pollution tolerant lichen and record information. (see **Lichen Identification Key**).
6. Record the amount of surface area of the tree bark covered in lichen on the side of the tree you chose; using a 8.5 by 11 inch sized paper as a measuring guide as portrayed below:



7. There is space to record any other types of lichen you observe. There may be several to note.
8. Look at the branches and twigs on the tree. Notice if there are lichen present. Record on second page of data collection sheets, for **living twigs** still on the tree.
9. Note any additional observations in the space provided.
10. Send in collected data to www.LEPS.bc.ca/stewardship/citizen-science

Data collection sheets and copies of this booklet are available at:
[www.LEPS .bc.ca/stewardship/citizen-science](http://www.LEPS.bc.ca/stewardship/citizen-science)

Optional:

- Cellphone
- Camera (take photos; submit with your data sheets)
- Magnifying glass; hand lens
- GPS
- clipboard

Lichen Monitoring Data Collection Sheets

(p 1 of 2)

(Please refer to full instructions in booklet)

SAMPLE
(condensed)



Name: Lovely Langley and family Date: Feb 29, 2016
Contact Info: ll@langley.bc.ca #of People present: 5
Location: Walnut Grove Community Park

Dominant land use of location:

- Urban/Residential ____
- Rural/Agricultural ____
- Park/Nature Reserve X
- Industrial/Commercial ____
- Parking lot ____
- Other _____

We are interested in knowing what other types of lichen you notice. A diversity of lichen can be an indication of ecosystem health.

Record the number of **different** lichen you notice on both the tree and twigs

Tree 1: [or for Trees 2 & 3]

Broadleaf X or Conifer ____

What kind of tree (if known) Alder

Position of tree: Single ____ Small clump ____

In forest X Other _____

Circumference at chest height 48cm

Directional side of tree with **most** lichen

E ____ S ____ W X N ____ On all sides ____

Tree 1	Amount				
	None	1/4 page	1/2 page	3/4 page	1 whole or more
Pollution Sensitive Lichen					
<i>Bryoria</i>	0				
<i>Lobaria</i>	0				
<i>Platismatia</i>					1-2
<i>Usnea</i>		✓			
Pollution Tolerant Lichen					
<i>Candelaria concolor</i>	0				
<i>Lecanora conizaeoides</i>	0				

Lichen Growth Form	Tree 1 including twigs	Tree 2 including twigs	Tree 3 including twigs
Dusty (Dust)	//		/
Crusty (Crustose)	/	///	
Leafy (Foliose)		////	////
Hairy and Bushy (Fruticose)	/		//
Total	4	7	8

Additional Observations: (What was the weather like? What else did you notice?)

It is cloudy and damp; around 10 C. There are so many different kinds of lichen! I never realized that's what they were. We see more and more kinds, as we look for them. This is more fun than we expected. It is like a scavenger hunt! A great family activity.

References and Acknowledgements



What do you think this one is?

References and sites of interest

- **E-Flora BC**; <http://ibis.geog.ubc.ca/biodiversity/eflora/lichens.html>
- **Good Neighbour Campaign**, Hamilton, OT: <http://www.goodneighbourcampaigns.ca/>
- "Lichen Bioindication of Biodiversity, Air Quality and Climate: Baseline Results from Monitoring in Washington, Oregon, and California" US Forest Service, PNW-GTR-737, March 2008. Jovan, Sarah.
- Lichens of North America. 2001. Brodo and Sharnoff
- Macrolichens of the Pacific Northwest. 2009, 2nd ed. McCune
- Mosses, Lichens, and Ferns of Northwest North America. 1988. Vitt
- **Open Air Laboratories (OPAL)** ; <http://www.airsurvey.org/airsurvey>
- **Oregon State University**. Dr. Bruce McCune
- Plants of the Pacific Northwest. 1994. Pojar and MacKinnon

For informative viewing:

- Hands on the Land "Lichens are so Awesome" <http://www.handsontheland.org/environmental-monitoring/lichen-monitoring.html>. **Short and fun!**
- YouTube: Natural History Museum, "Lichen Expert Pat Wolseley takes part in the air survey with a local group" (UK)
- YouTube: Harvard Museum of Natural History, "Lichen Biology"
- YouTube: NY Botanical Gardens "Our Native Lichens, A Hidden World in Peril" (Southeastern US)
- YouTube: University of Oregon, "Lichen Identification Methods"

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Langley Field Naturalists

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Olivia Lee, UBC Herbarium

OPAL, Open Air Laboratories, UK



Cladonia ochrochlora,
McLeod park

Thank you for participating in LEPS Citizen Science Lichen Monitoring Project.

Your feedback is welcome: www.LEPS.bc.ca/stewardship/citizen-science

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Canada



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Local lichen identification done to the best of our abilities, without laboratory confirmation.

*Lichen photos by LEPS staff
except where otherwise noted.*