

# Remote Sensing: Garry Oak Species Detection



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Level 1



What for and why now?

Why LiDAR?

Why Victoria?

Why GOMPS?

# What for and why now?

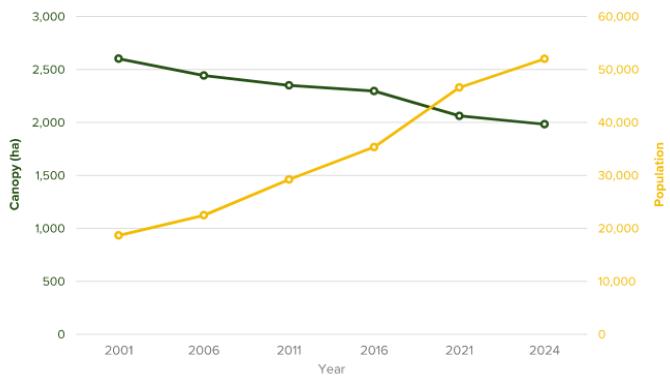


Figure 2-2. Canopy and population change in Langford between 2001 and 2024.

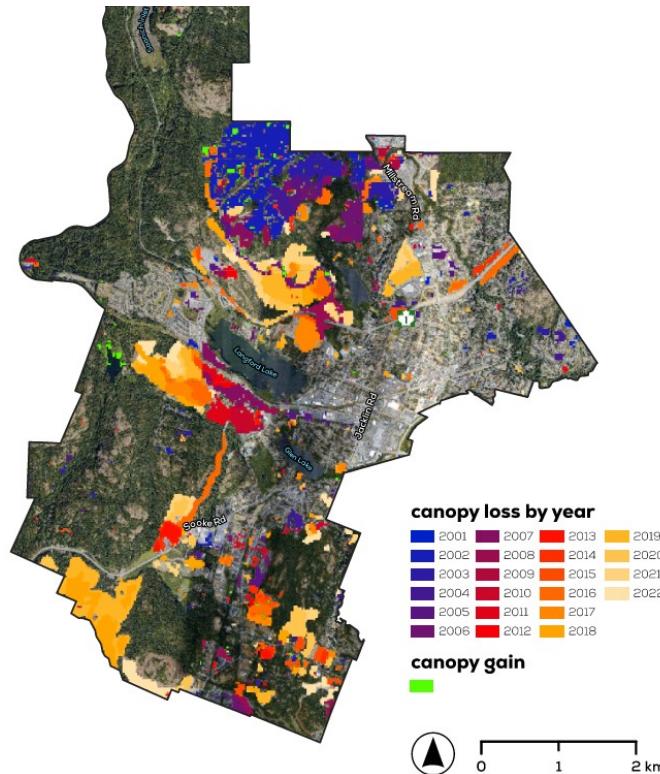


Figure 2-3. Canopy cover loss and gain in Langford between 2001 and 2022.

# What for and why now?

A large, mature Garry oak tree with a thick trunk and spreading branches, situated in a park-like setting. In the background, a white building with multiple windows is visible, and a paved path leads away from the tree.

**Age of mapping:** Garry oak ecosystems were last mapped in 2006

**Quality of mapping:** Methods and accuracy have improved since 2006

**Scale of land use change:** Environmental regulations have been weakened and development regulations strengthened. The built environment is targeted for building density across greater Victoria.

**Building strong evidence:** Community organizations have limited information to advocate for Garry oak protection and stewardship.

# What for and why now?

**Where are the oaks?** On private property: we don't know.

**Where are the large oaks?** On private property: we don't know.

**Is the population growing, or declining?** On private property: we don't know.

**Why the focus on private property?** 2/3 of the urban forest is on private lands in City of Victoria (Terra Remote Sensing)

# Why GOMPS?

**GOMPS Constitution** - The purposes of the Society are:

The preservation, protection, and restoration of Garry oak trees and their ecosystems to the greatest extent possible;

Protecting and maintaining these trees and ecosystems;

Restoring damaged representative Garry oak ecosystems;

Promoting and supporting research into these ecosystems;

Raising donations to support this mission;

Fostering a connection with nature through these endeavours.

# Why GOMPS?

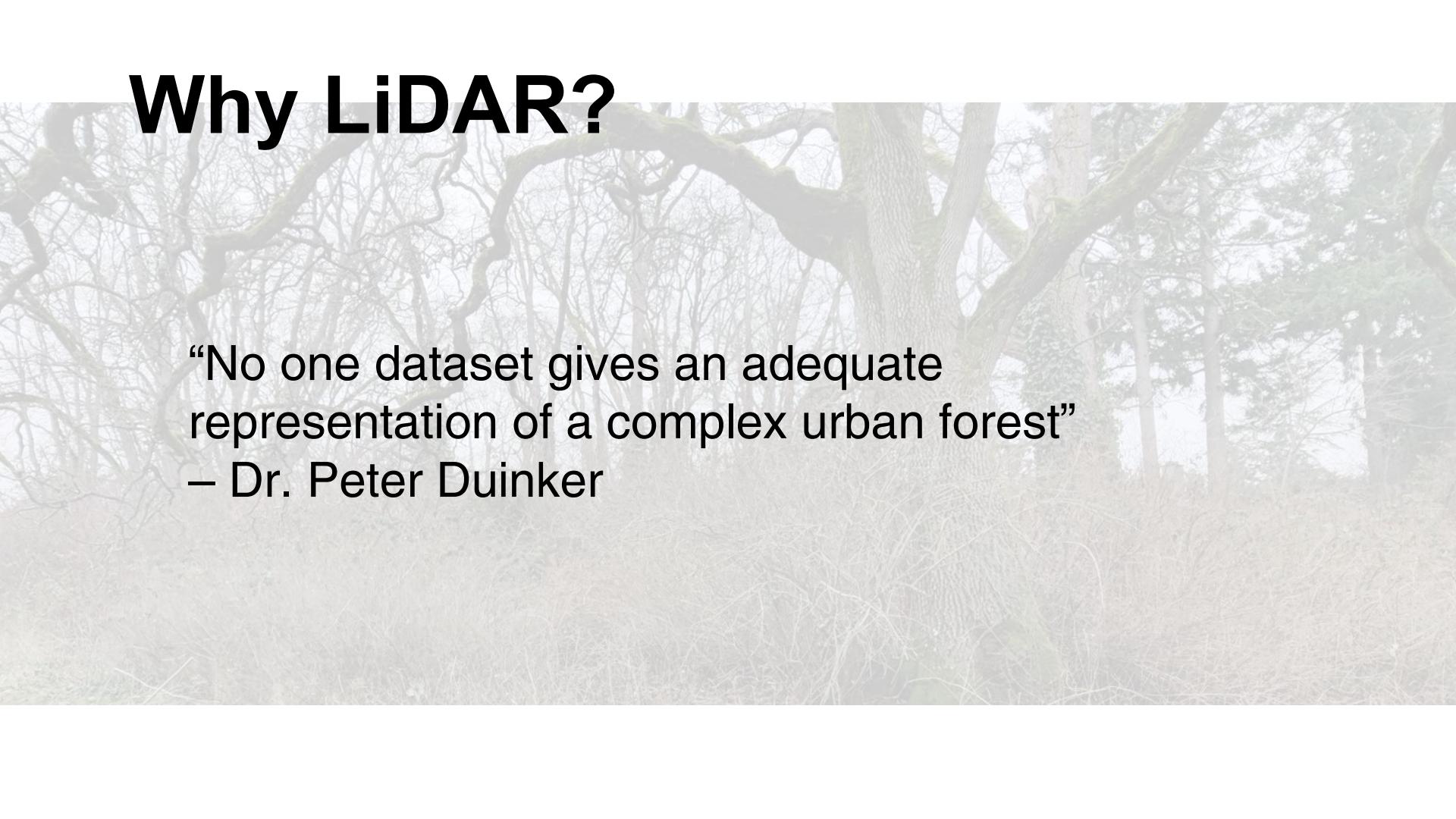
A close-up photograph of a Garry oak tree's leaves. The leaves are large, with prominent veins and some yellowing or browning along the edges, suggesting natural aging or seasonal change. The background is slightly blurred, showing more of the tree and possibly a garden or natural setting.

**Capacity:** GOMPS has the technical capacity to develop an urban forestry remote sensing project, and the ability to fundraise the project.

**Strengthening partnerships:** GOMPS can contribute this dataset as high accuracy evidence to support other community organizations in their important work around Garry oaks.

**Organizational stability:** Enhancing our advocacy effort supports the recruitment of members, volunteers, donors, and draws attention to our nursery trees. It builds capacity to access grants.

# Why LiDAR?



“No one dataset gives an adequate representation of a complex urban forest”

– Dr. Peter Duinker

# Why LiDAR?

Garry oak is **not** considered an endangered species in B.C., there are several ecological communities on the provincial Red and Blue List where Garry oak is a dominant tree species (Province of BC, 2024)

The Garry oak range is situated over areas already developed, and areas desirable for development

Less than 5% of the original Garry oak ecosystem habitat range remains in a near-natural condition.



# Why LiDAR?

**City of Victoria Public Tree Inventory:** There are 5125 Garry oaks on public property in September 2024. There were 4630 Garry oaks on public property in 2021.

**Historical Garry oak ecosystems of Vancouver Island, British Columbia, pre-European contact to the present (Lea, 2006):** Garry oak ecosystems are endangered in Canada with less than 10% remaining and less than 5% undisturbed relative to their abundance at European settlement.

# Why LiDAR?

**CRD / HAT Urban Forest Canopy Mapping (Ortho):** shows Victoria urban forest canopy loss of 2 hectares, or 0.1% between 1986-2011.

**CRD Urban Forest Canopy Mapping (LiDAR)** shows canopy cover net loss of 42.5 hectares (-2.2%) of from 2005-2011, and a gain of 38.5 hectares (+2%) from 2011-2019.

**City of Victoria Vegetation Change Detection Analysis:** shows urban forest canopy net gain of 47 hectares (+2.37%) between 2013-2019.

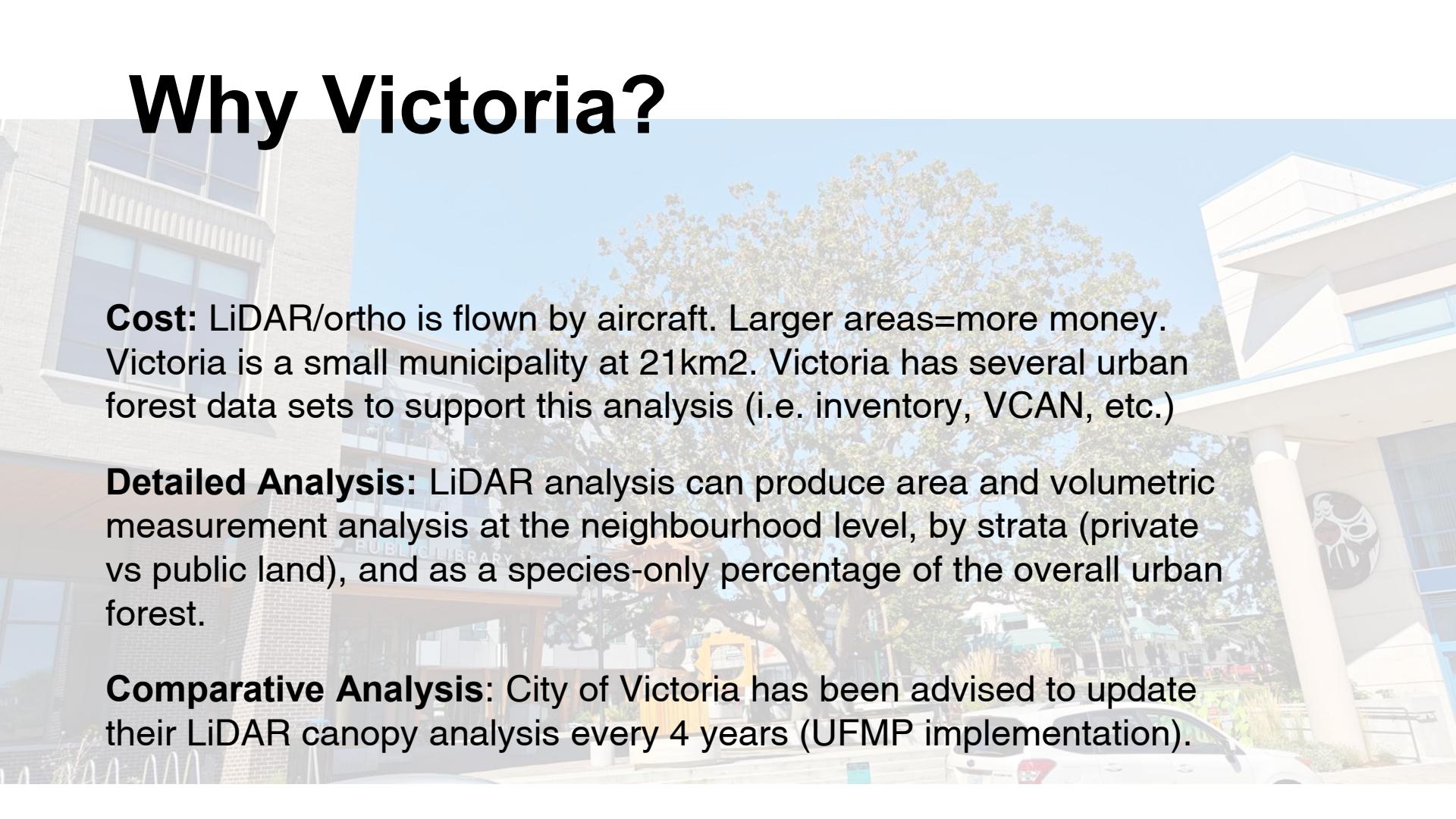
# Why LiDAR?

**Why more LiDAR?** Garry oak distribution is not known on private property, and LiDAR can locate it at a high accuracy.

**Detailed Analysis:** LiDAR analysis can produce a measured analysis at the neighbourhood level, by strata (e.g. private vs. public land), and as a percentage of the overall urban forest.

**Proof of concept:** GOMPS can develop a model of high accuracy species detection analysis for measuring an individual species that can be repeated in other jurisdictions (local and regional).

# Why Victoria?



**Cost:** LiDAR/ortho is flown by aircraft. Larger areas=more money. Victoria is a small municipality at 21km<sup>2</sup>. Victoria has several urban forest data sets to support this analysis (i.e. inventory, VCAN, etc.)

**Detailed Analysis:** LiDAR analysis can produce area and volumetric measurement analysis at the neighbourhood level, by strata (private vs public land), and as a species-only percentage of the overall urban forest.

**Comparative Analysis:** City of Victoria has been advised to update their LiDAR canopy analysis every 4 years (UFMP implementation).

# What's next?

**Phase 1:** Donors have funded the cost of the LiDAR/Ortho flight and data deliverables. Aiming to fly in late spring 2025.

**Detailed Analysis (Phase 2):** Capable species detection remote sensing contractors have been identified, and we are fielding the capabilities through other sectors (non-profit and academic).

**Discussions with partners:** GOMPS has initiated conversations with other ENGOs indicating our intent to produce and circulate the data from this project. We have requested their feedback on methods.

# What's next?

Goal: Expand this method to municipalities across the CRD and beyond, for regional analysis opportunity.

Goal: Support community science and academic research on Garry oak and Garry oak ecosystems with this open-access, high quality dataset.

Fund the periodic updating of LiDAR to enable temporal comparative analysis.

# Questions?

