# **Remote Sensing:** Garry Oak Species Detection

# What for and why now?

**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**: Access to public high resolution data is limited. Community organizations have limited information to advocate for Garry oak protection and stewardship.

# What for and why now?

**Where are Garry oaks?** On private property: we don’t know.

**Where are large Garry 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?** 537,000 of 742,000 Saanich trees (72%) are on private lands (SUFR 2023)

# Why GOMPS?

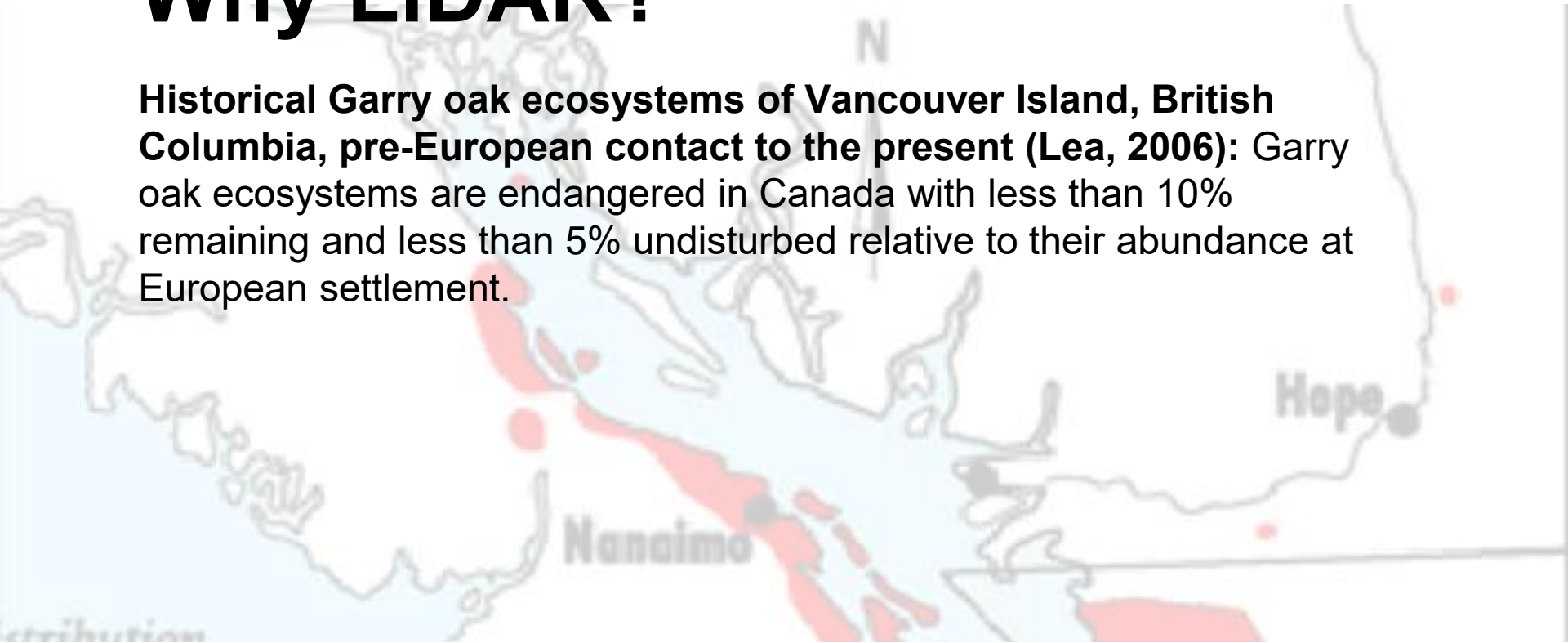
**Capacity**: GOMPS has the technical capacity to develop an urban forestry remote sensing project, and the ability to fundraise the project.

**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?

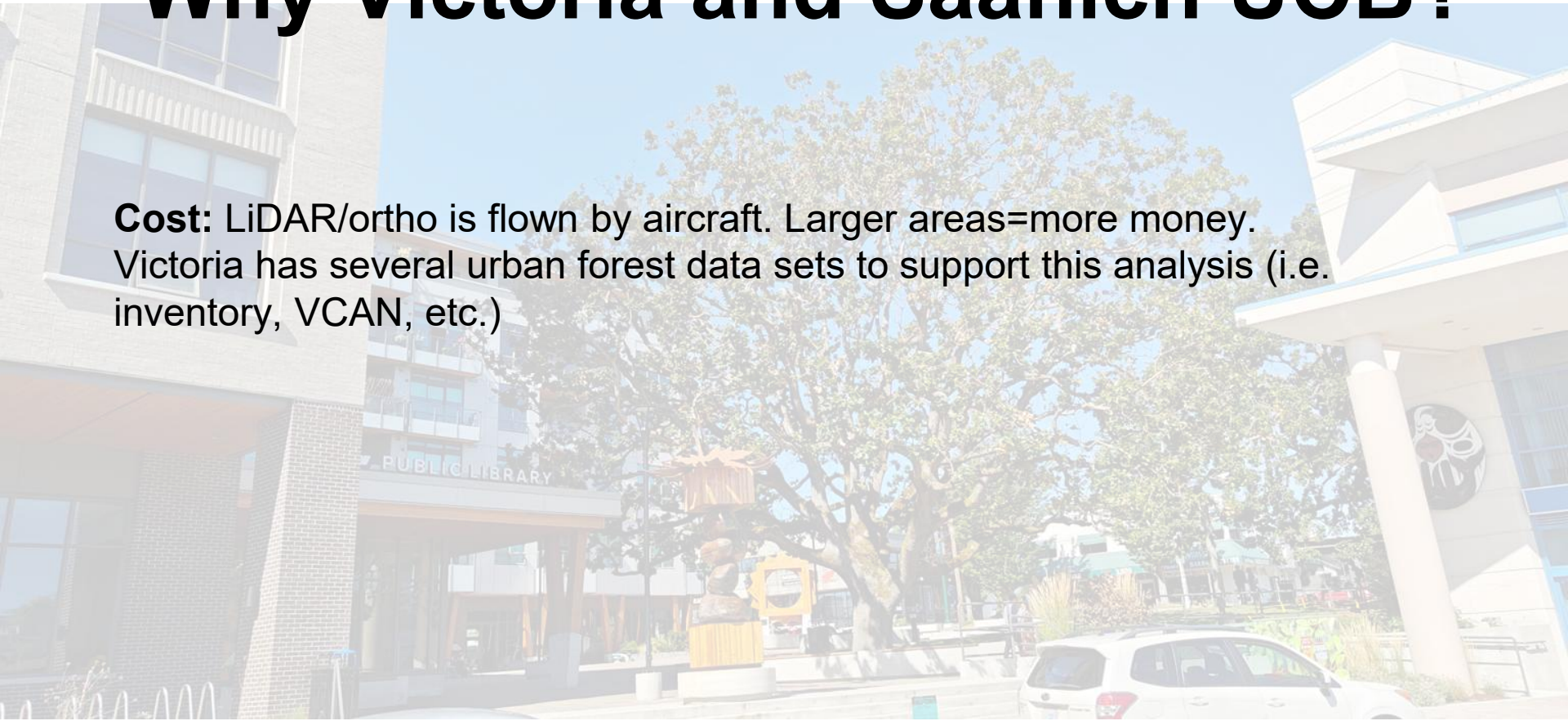
**Historical Garry oak ecosystems of Vancouver Island, British Columbia, pre-European contact to the present (Lea, 2006):** Garry oak ecosystems are endangered in Canada with less than 10% remaining and less than 5% undisturbed relative to their abundance at European settlement.



# Why LiDAR?

**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 and Saanich UCB?




**Cost:** LiDAR/ortho is flown by aircraft. Larger areas=more money. Victoria has several urban forest data sets to support this analysis (i.e. inventory, VCAN, etc.)

# Project specifications

***Project Location:***
City of Victoria and District of Saanich

- ***AOI size:*** **13,168 ha**
  - **City of Victoria:** 2,188 ha
  - **District of Saanich:** 10,981 ha

***Spatial Reference Details***

- **Geodetic Datum:** NAD83(CSRS)/CGVD2013
- **Map Projection**: UTM, Zone 10N
- **Geoid Model**: CGG2013a
- **Units**: Metric

***Lidar Data:***

- Proposed density: >/= 20 pt/$m^2$, meeting these specifications:
  - 18 cm absolute vertical accuracy at 95% confidence on impervious single return surfaces
  - 36 cm horizontally at 95% confidence
  - Minimum 50% FL sidelap
  - Average nominal point density per square meter
    - Minimum for understory segmentation: 16 pt/$m^2$
      Clearly demonstrable that the proposed altitude and laser rep / power settings would result in returns from bare earth, soil, vegetated surfaces based on sensor manufacturer specifications

***Imagery:***

- Proposed resolution: 10 cm
  - 4-band (RGB+NIR), stereo coverage
  - Optional RGB

# Goals

**Short term goal:** Acquire LiDAR and 4-band orthographic data, perform initial analysis, provide datasets to UBC MGEM students.

**Medium term goal:** Support community science, Indigenous governments and local governments' analysis and decision making, and build on academic research of Garry oak and Garry oak ecosystems with this open-access, high quality dataset.

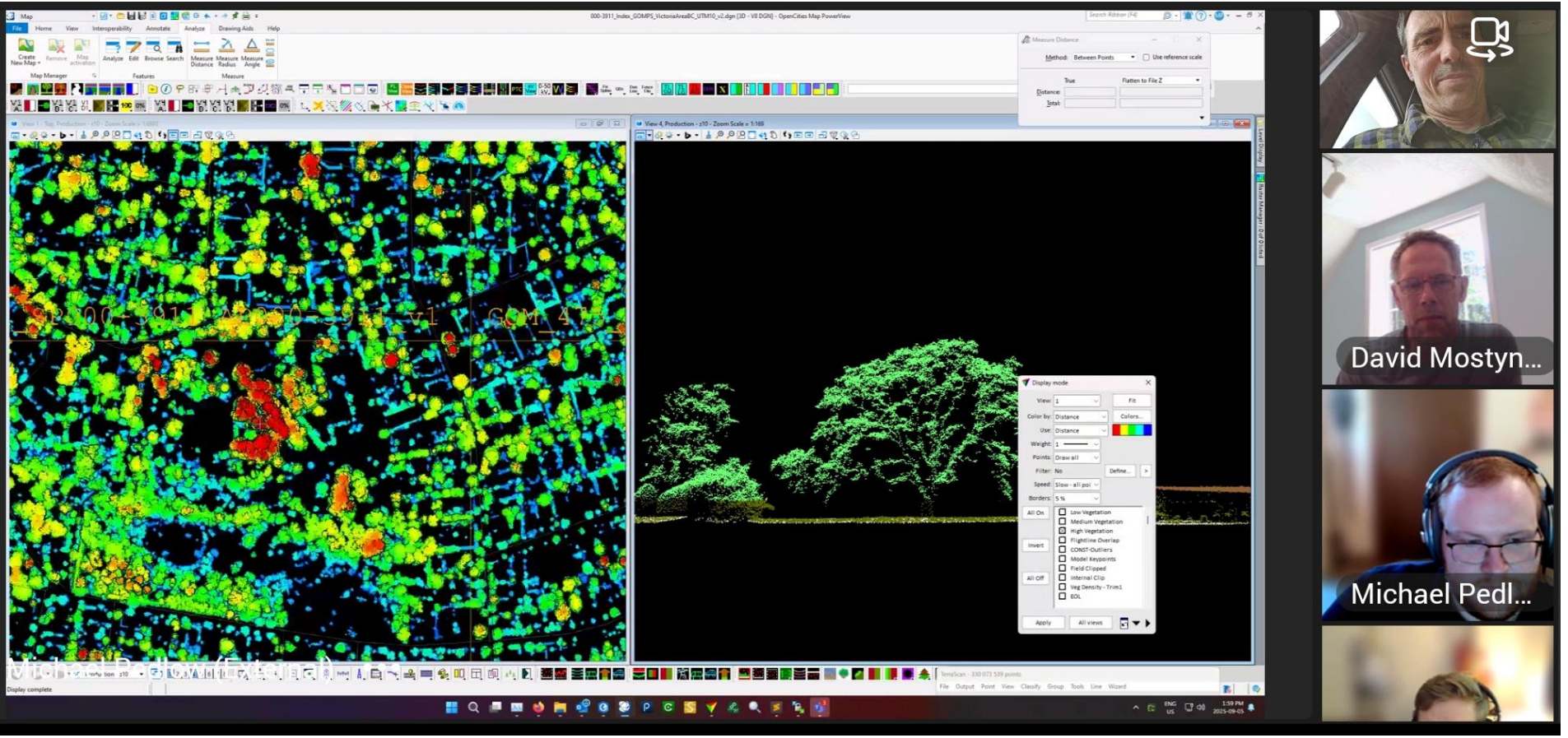
**Long term goal:** Establish this method as a standard for municipalities across the CRD to run on their ongoing urban forest analysis, and share with other regions.

# What's next?

**Phase 1:** Fundraising, developing scope of work, selecting a contractor, and executing the scope of work for acquisition and baseline analysis *COMPLETE*.

**Detailed Analysis (Phase 2):** Take delivery of pre-classified raw datasets, provide datasets to UBC MGEM students, and begin technical meetings between contractor, GOMPS, and UBC MGEM for the geoprocessing tool development (project completion in late 2026)

**Outreach (Phase 3)**: GOMPS will evaluate approaches to disseminate results beginning in early 2026.

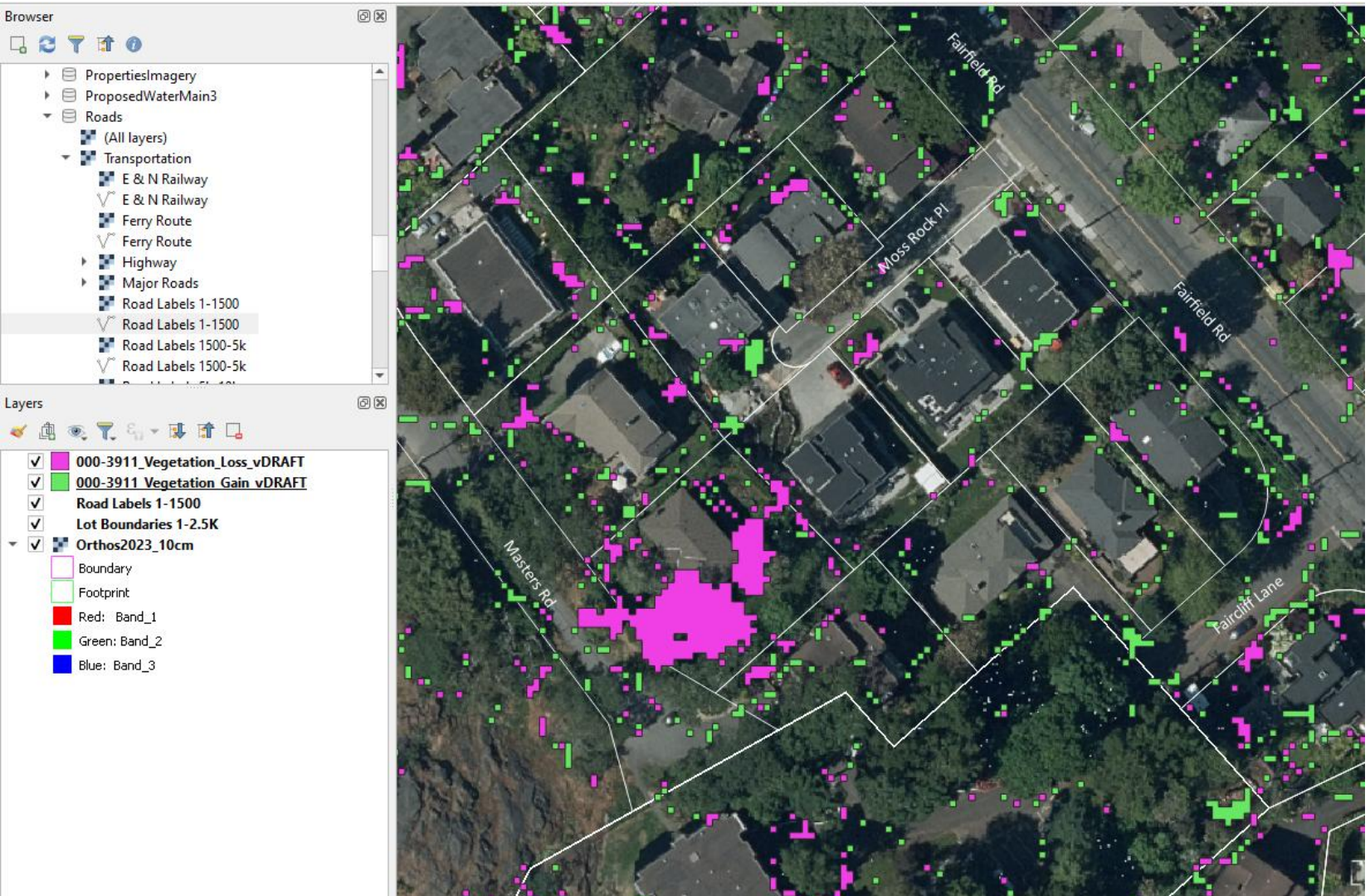

David Mostyn...
Michael Pedl...

# What’s next?

**TRS:** Urban forest analysis (City-wide, zoning modernization, neighbourhood), gain/loss LiDAR classification, land cover and height classified LiDAR, 10cm aerial imagery.

**MGEM:** Course work and capstone proposals are underway.

Deliverables:
-Garry oak species detection overall area
-Garry oak species detection individual polygons
-Garry oak species individual tree inventory
-Accuracy assessments
-Open source methods (ArcGIS Pro)


Browser
PropertiesImagery
ProposedWaterMain3
Roads
(All layers)
Transportation
E & N Railway
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Ferry Route
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Highway
Major Roads
Road Labels 1-1500
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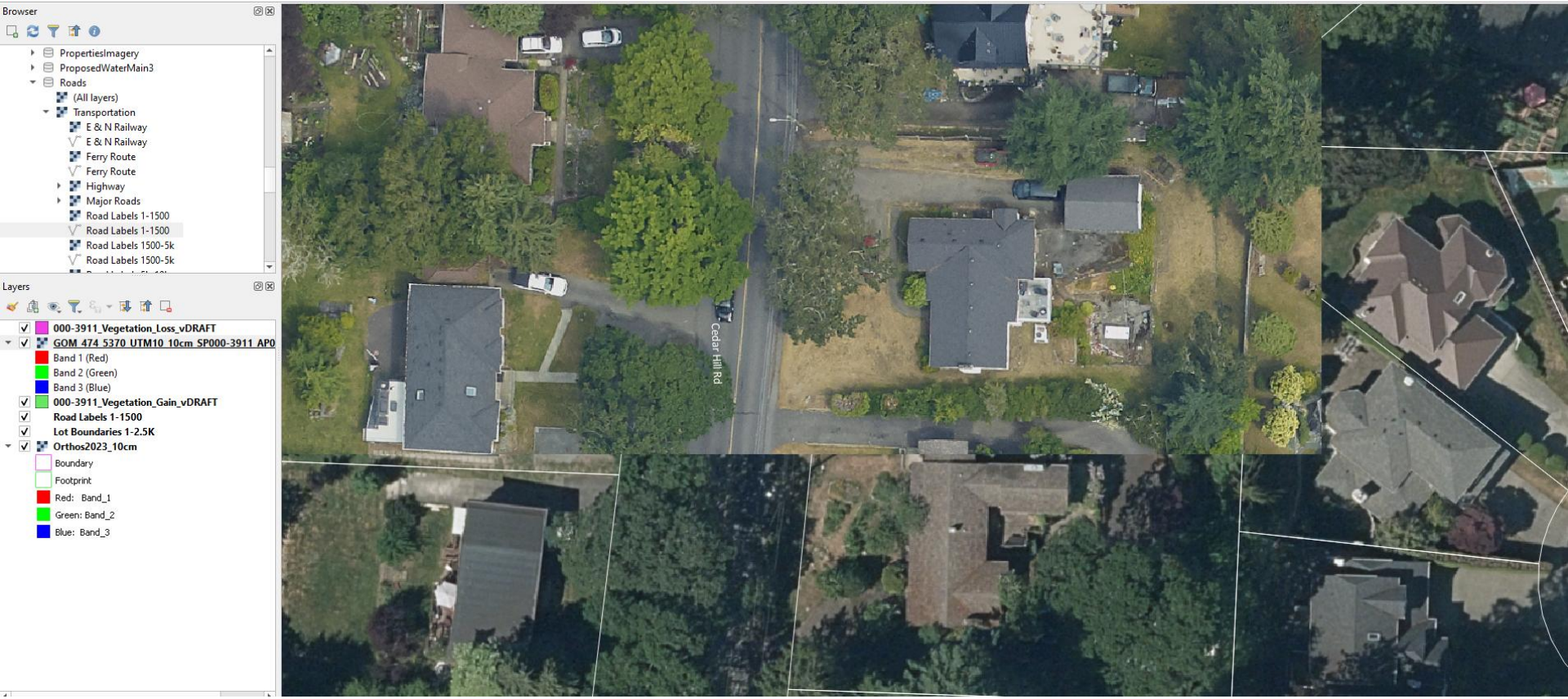
Road Labels 1-1500
Lot Boundaries 1-2.5K
Orthos2023_10cm
Boundary
Footprint
Red: Band_1
Green: Band_2
Blue: Band_3
Fairfield Rd
Moss Rock Pl
Fairfield Rd
Masters Rd
Faircliff Lane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Band 1 (Red)
Band 2 (Green)
Band 3 (Blue)
000-3911_Vegetation_Gain_vDRAFT
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Orthos2023_10cm
Boundary
Footprint
Red: Band_1
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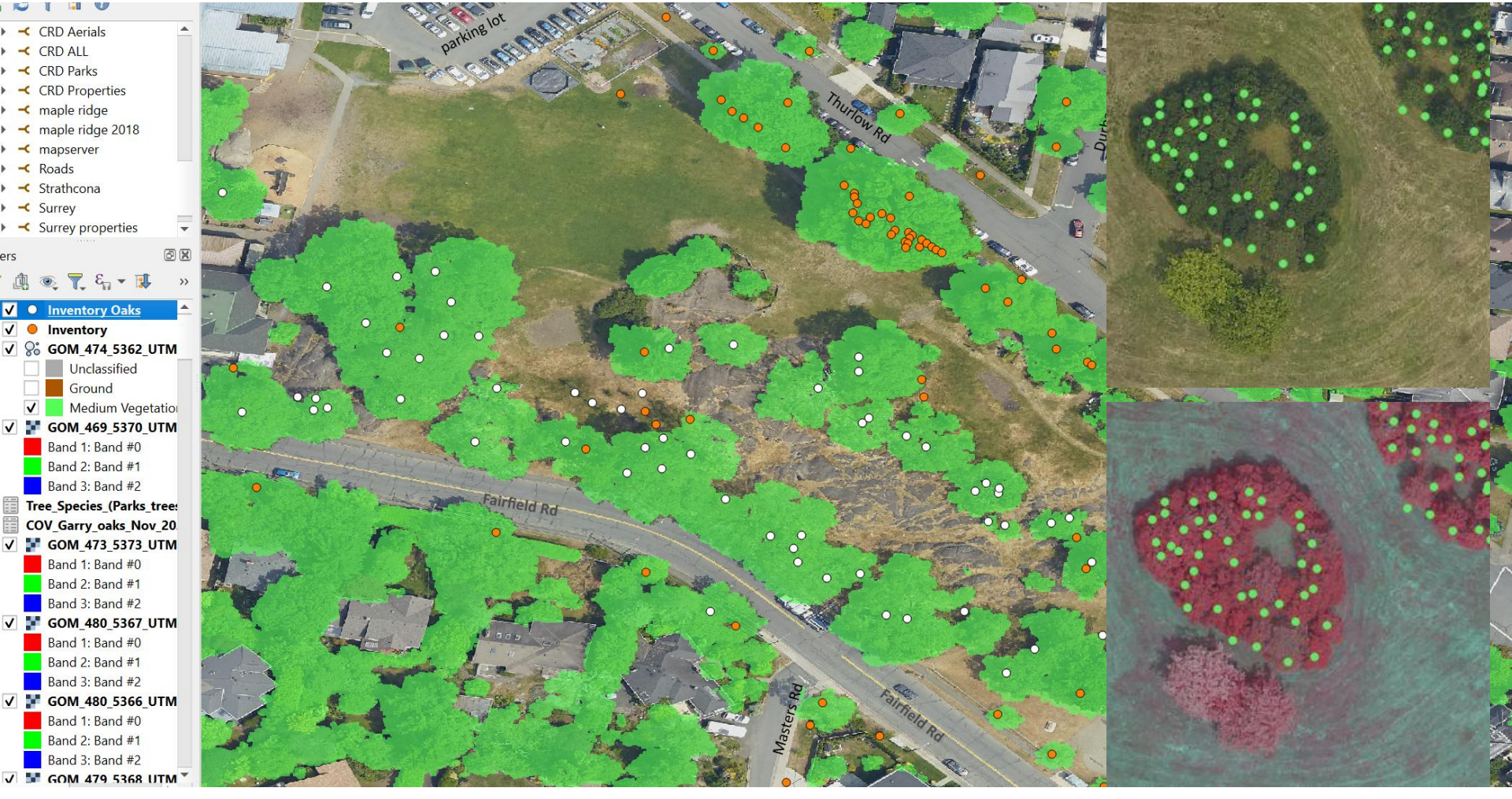
Cedar Hill Rd


CRD Aerials
CRD ALL
CRD Parks
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Roads
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Surrey
Surrey properties
Inventory Oaks
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Band 2: Band #1
Band 3: Band #2
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COV_Garry_oaks_Nov_20
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Band 3: Band #2
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Band 3: Band #2
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Band 1: Band #0
Band 2: Band #1
Band 3: Band #2
GOM_479_5368_UTM
parking lot
Thurlow Rd
Fairfield Rd
Masters Rd
Fairfield Rd

# Questions?