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# Living Lab Program for Climate Change and Conservation - Final Report

## Documenting structural land cover change and disturbance across Provincial BC Parks for Biodiversity Assessment

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## Research findings

- Ecological integrity variables were compared between the protected area and greater park ecosystem
    - Forest height, aboveground biomass, mean forest patch size, % of area harvested per year, forest proportion of landscape were significantly different between the parks and their surroundings
- The dominant land cover class in British Columbian parks and protected areas is coniferous forest cover at approximately 56% land cover (Table 1).
- Harvesting was found to be significantly more common ($p < 0.01$) in greater park ecosystem than parks and protected area, while fire is not significantly different (Table 2).
- Human development was uncommon in both parks and protected areas and greater protected ecosystems.
    - Parks with nearby development are frequently located near cities (Garabaldi Complex, Goldstream Park), or have winter sport infrastructure (Cypress Park, Mount Seymour Park)
- Forest height ($p < 0.01$), biomass ($p < 0.01$), forest proportion of landscape ($p < 0.01$) and mean forest patch size ($p < 0.01$) were significantly higher in the forested regions of protected areas when compared to the greater protected ecosystem (Table 3.
- Information on individual parks can be found in the set of report cards

*Table 1 Average land cover proportions for parks and protected areas and greater park ecosystems.*

| *Land cover class* | *Parks and protected areas* | *Greater park ecosystem* |
|---|---|---|
| *Broadleaf Forest* | 4.62 | 6.02 |
| *Bryoid* | 0.550 | 0.726 |
| *Coniferous Forest* | 59.5 | 53.3 |
| *Exposed/Barren Land* | 5.96 | 5.84 |
| *Herbs* | 6.77 | 10.0 |
| *Mixed Wood Forests* | 5.52 | 5.18 |
| *Rock/Rubble* | 1.51 | 1.42 |
| *Shrubland* | 8.90 | 10.8 |
| *Snow/Ice* | 1.59 | 1.75 |
| *Wetland* | 1.52 | 1.52 |
| *Wetland-Treed* | 3.61 | 3.41 |

*Table 2 Average disturbances for parks and protected areas and greater park ecosystems.*

| *Disturbance* | *Parks and protected areas* | *Greater park ecosystems* |
|---|---|---|
| *Fire (%)* | 0.110 | 0.118 |
| *Harvesting (%)* | 0.085 | 0.506 |

*Table 3 Other significant ($p < 0.01$) variables compared between parks and protected areas and their greater park ecosystems.*

| *Variable* | *Parks and protected areas* | *Greater park ecosystems* |
|---|---|---|
| *Forest Height (m)* | 20.9 | 20.5 |
| *Aboveground biomass (t/ha)* | 180 | 176 |
| *Forest proportion of landscape (%)* | 73.2 | 67.9 |
| *Mean Forest Patch Size* | 83.7 | 55.8 |

## Methods summary

- Utilized freely available open access datasets covering key attributes for assessing ecological integrity.
- Suitable parks determined as those greater than 100ha and in IUCN protected area categories Ia, Ib, II, or IV
- Park complexes were also examined as spatially merged protected areas
- Greater park ecosystems were delineated for all suitable parks and protected area complexes
    - Accomplished by buffering into the surrounding BEC zones of the park until an area of equal size to the protected area was generated.
    - Other protected areas and marine areas were removed from the buffer
- Compared ecological integrity metrics between the protected area and greater park ecosystem
- Generated report cards with information on land cover, forest cover, disturbance, and forest structure for 533 parks/complexes
- Summarized the distribution of the metrics for all parks across British Columbia to get a sense of the range of ecological integrity indicators inside and outside parks

## Key outcomes and relevance for BC Parks

- Summary by park of each open access layer
    - Layers available publicly and can be provided to BC parks upon request
    - Additionally in report card pdf form
- Overarching understanding of distribution of these variables across BC
- Peer review paper being prepared.
- Work forms the primary basis of a master's thesis which is currently underway at UBC
    - Stephen Ban is a committee member to ensure that BC park's values and resources are being managed effectively using remote sensing

## Project's challenges/opportunities

- There were no computational challenges due to the publicly available data

- The ability to integrate this type of large open data into parks management continues to be problematic, as these datasets are large, both temporally and spatially, making data manipulation challenging.
- Expertise is needed in order to ingest these datasets into parks management workflows, and is also needed to be able to manage and analyze the data
- Effective ways to allow these datasets to be used by on the ground management needs to be considered by BC parks.

## Conclusions/next steps

- Potential for discussions around the most effective ways to get this data to park managers.
    - Report cards offer a static representation of these layers
    - Potential for integration into digital solutions.
- This project has been effective at demonstrating the use of these valuable public datasets
    - We hope that park managers continue to reach out to UBC researchers to continue to access and analyze this data
- Key next step is to use remote sensing to examine snow conditions
    - Sister project commencing in 2021 focusing on availability and permanence of snow in the landscape, focused on areas with high amounts of tourists and winter recreation areas

## References and links

### Data

https://opendata.nfis.org/mapserver/nfis-change_eng.html

https://eogdata.mines.edu/products/vnl/

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