Forest Ecosystem Assessment

Progress Report 2025

Assessing the Potential for Ecosystem Services & Carbon Product Development in Algonquin Park

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Project Team

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Document History

Version	Date	Description	Author	Reviewer
1.0	[Current Date]	Initial Draft	Johan Karlsson	Alexander Watson

Abbreviations and Acronyms

- **GIS:** Geographic Information System
- **ES:** Ecosystem Services
- **WL:** Wildlands League
- **OF:** OpenForests
  [To be expanded as needed]

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1. Executive Summary

Project Overview

[In Progress]

Key Findings to Date

[In Progress]

Current Status

[In Progress]

Next Steps

[In Progress]

2. Pre-Assessment Analysis

2.1 Historical Land-use Assessment

Deforestation Trends (Updated 22.04.2025)

Key Findings:

1. **Total Forest Loss (2001-2023):**
   - Cumulative loss: 23,573 hectares

- Average annual loss: 1,025 hectares
- Peak loss year: 2020 (1,575 hectares)
- Minimum loss year: 2003 (225 hectares)

2. **Loss Patterns by Period:**

- 2001-2005: 3,749 hectares
- 2006-2010: 4,398 hectares
- 2011-2015: 5,817 hectares
- 2016-2020: 6,648 hectares
- 2021-2023: 3,961 hectares

3. **Trend Analysis:**

- Increasing trend in annual forest loss
- Average increase of approximately 35 hectares per year
- Most significant losses observed in the 2016-2020 period

Visualization Analysis:

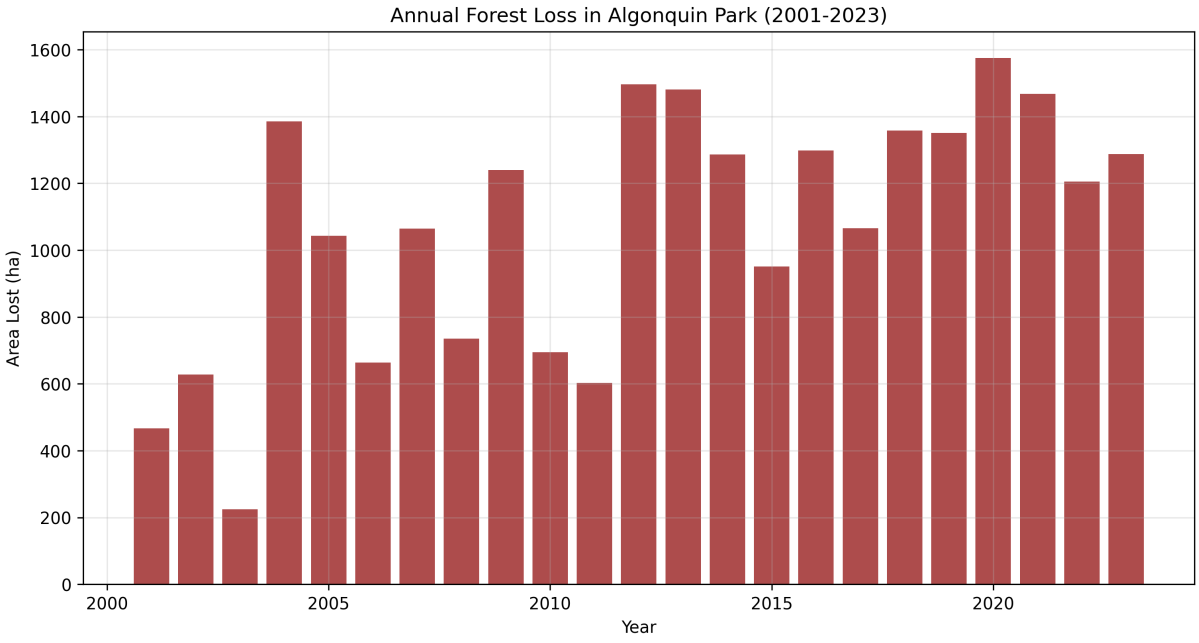

Figure 1: Annual forest loss in Algonquin Park from 2001 to 2023, showing the year-by-year variation in forest loss area (hectares). The bar chart reveals significant fluctuations in annual loss rates, with notable peaks in 2020 (1,575 ha) and 2012 (1,496 ha), and the lowest loss recorded in 2003 (225 ha).

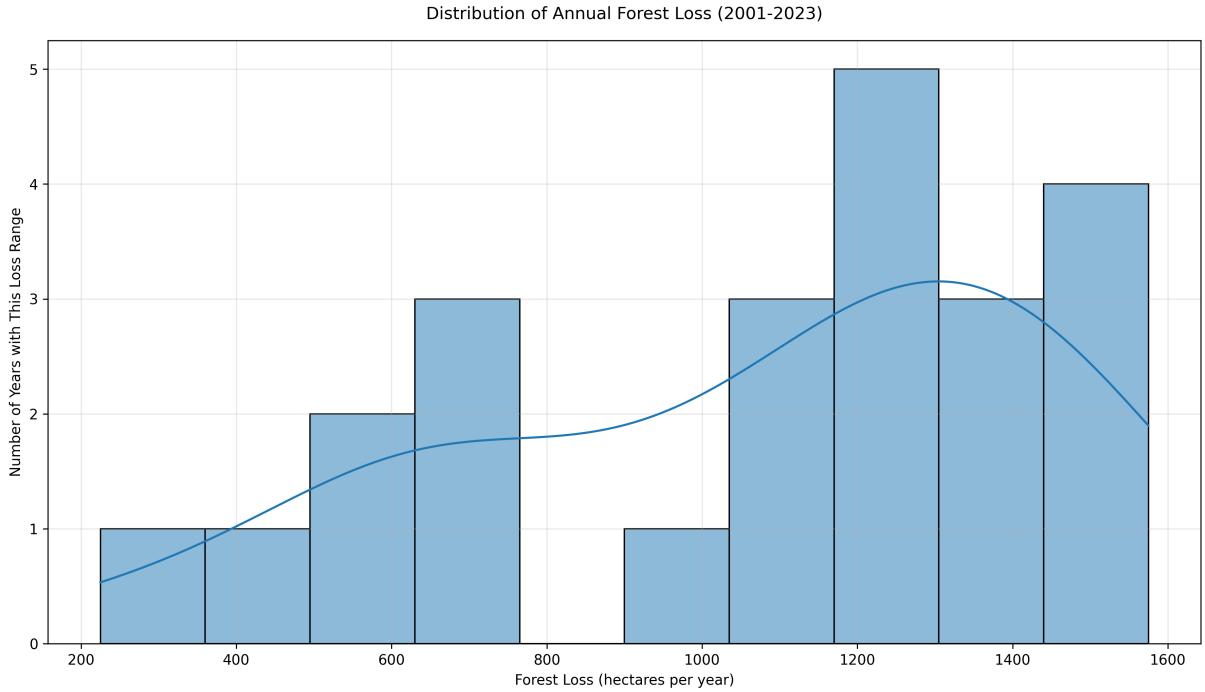

Figure 2: Statistical distribution of annual forest loss rates (2001-2023). The histogram and density curve illustrate the frequency of different loss ranges, showing that most years experienced losses between 800-1,400 hectares, with fewer instances of extreme low (<400 ha) or high (>1,500 ha) annual losses.

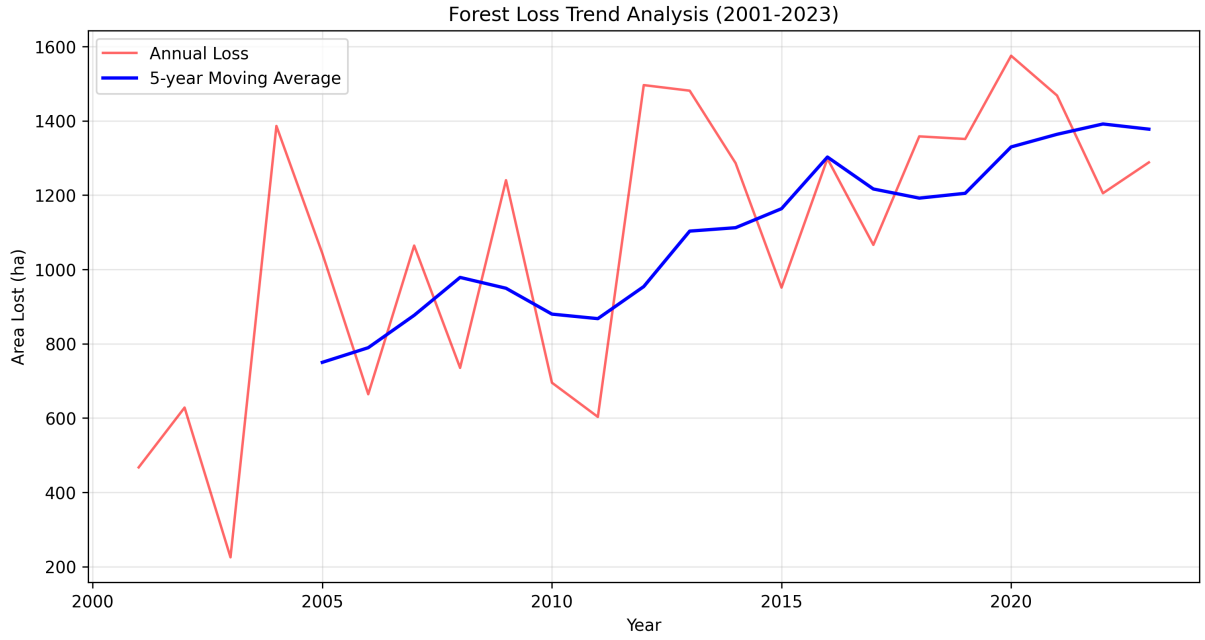

Figure 3: Trend analysis of forest loss (2001-2023) with 5-year moving average. The red line shows annual variations while the blue line (moving average) reveals the underlying trend,

demonstrating a gradual increase in forest loss rates over the study period, particularly after 2010.

Analysis Implications:

1. The temporal pattern shows considerable year-to-year variability in forest loss rates.
2. There is a discernible upward trend in forest loss over the study period, as evidenced by the moving average.
3. The distribution analysis reveals that while extreme loss events are rare, there is a consistent pattern of annual forest loss averaging around 1,025 hectares.
4. Recent years (2016-2023) show higher and more consistent loss rates compared to earlier periods.

These findings suggest a need for:

- Enhanced forest protection measures, particularly in recent high-loss areas
- Investigation of factors driving increased loss rates in recent years
- Development of targeted interventions for areas showing consistent loss patterns

2.2 Initial Feasibility Assessment

Carbon Credit Development Potential

Based on the forest cover analysis:

- Stable forest area: 635,643 hectares (83.5% of total area)
- Disturbed forest: 18,651 hectares (2.4%)
- Recent loss areas: 2,739 hectares (0.4%)
- Gain areas: 2,771 hectares (0.4%)

This distribution suggests significant potential for:

1. Forest conservation credits (REDD+)
2. Forest restoration in disturbed areas
3. Enhanced forest management in stable forest areas

3. Carbon Forest Mapping

3.1 Methodology

Data Sources

1. **Hansen Global Forest Change v1.11 (2000-2023)**

- 30m resolution
- Annual forest loss
- Forest gain (2000-2012)
- Tree cover (2000)

2. **GLAD Forest Type Classification (2000-2020)**

- Stable forest extent
- Forest dynamics
- Disturbance patterns

Analysis Framework

1. **Pre-processing:**

- Projection: EPSG:3161 (Chile Zone 3)
- Resolution: 30 meters
- Water body masking
- Land area calculation

2. **Forest Definition Criteria (Canadian Standard):**

- Minimum canopy cover: 25%
- Minimum area: 1 hectare
- Minimum height potential: 5 meters

3. **Classification System:**

- Stable Forest
- Forest Loss
- Forest Gain
- Disturbed Forest
- Non-Forest
- Water Bodies

4. **Analysis Tools:**

- Google Earth Engine (primary analysis)
- Python (statistical analysis)
- QGIS (spatial visualization)

3.2 Land Cover Classification

Current Forest Status (2020)

1. **Stable Forest:**
    - Area: 635,643 hectares
    - Percentage: 83.5%
    - Characteristics: Continuous forest cover since 2000
2. **Disturbed Forest:**
    - Area: 18,651 hectares
    - Percentage: 2.4%
    - Types: Partial canopy loss, degradation
3. **Forest Dynamics:**
    - Loss areas: 2,739 hectares (0.4%)
    - Gain areas: 2,771 hectares (0.4%)
    - Net change: +32 hectares

Temporal Patterns

1. **Annual Loss Trends:**
    - Early period (2001-2005): Lower loss rates
    - Middle period (2006-2015): Moderate increase
    - Recent period (2016-2023): Highest loss rates
    - Notable peaks: 2012, 2013, 2020
2. **Spatial Distribution:**
    - Loss patterns vary by region
    - Clustered disturbance areas
    - Edge effects visible

4. Reference Area Analysis

4.1 Reference Area Definition

- Selection Criteria: [In Progress]
- Comparative Analysis: [In Progress]
- Ecological Similarities: [In Progress]

4.2 Leakage Belt Assessment

- Delineation Methodology: [In Progress]

- Risk Assessment: [In Progress]
- Monitoring Strategy: [In Progress]

5. Infrastructure Analysis

5.1 GIS Infrastructure

- Established QGIS project structure (07.04.2025)
  - Created organized directories for vector and raster data
  - Set up output folders for maps, analysis results, and reports
  - Added comprehensive documentation for project organization
  - Project file name: `wildlands_league_ecosystem_analysis.qgz`

5.1 Current Infrastructure

- Forest Roads: [In Progress]
- Skid Trails: [In Progress]
- Buildings and Facilities: [In Progress]

5.2 Planned Infrastructure

- Development Plans: [In Progress]
- Impact Assessment: [In Progress]
- Mitigation Strategies: [In Progress]

6. Carbon Stock Assessment

6.1 Current Carbon Stocks

- Above-ground Biomass: [In Progress]
- Below-ground Biomass: [In Progress]
- Total Carbon Storage: [In Progress]

6.2 Carbon Sequestration Potential

- Future Scenarios: [In Progress]
- Growth Projections: [In Progress]
- Enhancement Opportunities: [In Progress]

7. Certification Strategy

7.1 Standard Selection

- Methodology Comparison: [In Progress]
- Selection Criteria: [In Progress]
- Recommended Approach: [In Progress]

7.2 Certification Requirements

- Documentation Needs: [In Progress]
- Baseline Requirements: [In Progress]
- Monitoring Plans: [In Progress]

8. Economic Analysis

8.1 Financial Viability

- Cost-Benefit Analysis: [In Progress]
- Revenue Projections: [In Progress]
- Investment Requirements: [In Progress]

8.2 Market Analysis

- Carbon Credit Market Overview: [In Progress]
- Price Trends: [In Progress]
- Buyer Interest: [In Progress]

9. Implementation Plan

9.1 Project Timeline

- Key Milestones: [In Progress]
- Critical Path: [In Progress]
- Resource Requirements: [In Progress]

9.2 Stakeholder Engagement

- Communication Strategy: [In Progress]
- Consultation Process: [In Progress]
- Partnership Development: [In Progress]

10. Monitoring and Reporting

10.1 Monitoring Framework

- Key Performance Indicators: [In Progress]
- Measurement Protocols: [In Progress]
- Data Collection Methods: [In Progress]

10.2 Reporting Structure

- Regular Updates: [In Progress]
- Stakeholder Reports: [In Progress]
- Certification Requirements: [In Progress]

11. Risk Management

- Identified Risks: [In Progress]
- Mitigation Strategies: [In Progress]
- Contingency Plans: [In Progress]
- Monitoring Protocols: [In Progress]

12. Conclusions and Recommendations

- Key Findings: [In Progress]
- Strategic Recommendations: [In Progress]
- Next Steps: [In Progress]
- Long-term Vision: [In Progress]

Appendices

A. Detailed Maps

[To be added as analysis progresses]

B. Technical Analysis Results

[To be added as analysis progresses]

C. Stakeholder Consultation Records

[To be added as consultations occur]

D. Methodology Documentation

[To be added as methodologies are implemented]

E. Raw Data and Analysis Files

[To be added as data is collected and analyzed]

Document Control

Confidentiality Statement

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Quality Assurance

This document has been prepared in accordance with OpenForests' Quality Management System and has undergone appropriate review and approval processes.

Reference Documents

1. Project Proposal (Version 1.0: 05.03.2025)
2. [Other relevant reference documents to be added]

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