Fact Sheet: Structurally Complex Forest Detector & Landscape Assessment

Forest Resources Division, Washington State Department of Natural Resources

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Overview

This document summarizes the methodology and datasets used in Landscape Assessment to support the Washington Department of Natural Resources (DNR)'s forest management goals. The analysis estimates the extent of structurally complex forests on Habitat Conservation Plan (HCP) lands by integrating spatial datasets, geospatial models, and standardized analysis techniques. The approach emphasizes consistency, transparency, and alignment with state policy frameworks, including the Policy for Sustainable Forests and procedure PR 14-004-046: Identifying and Managing Structurally Complex Forests to Meet Older Forest Targets (Westside).

Key Components

- Predictions of structurally complex forest (SCF) using remotely sensed forest inventory (RS-FRIS) and field-collected data stand development stage data
- Estimations of SCF extent by HCP unit in western Washington
- Integration of Areas Managed for Ecological Value (AMEV) areas and their contribution to SCF distribution
- Consolidation of results into a data summary report and spatial datasets.

Structurally Complex Forest (SCF) Detector

The SCF Detector was developed to classify western Washington HCP lands as either SCF or not SCF. The SCF Detector leverages DNR's remotely sensed forest inventory (RS-FRIS) and field-sampled stand development stage data. The SCF Detector performs with a mean accuracy of 81 ± 1% in the sampled data. This model was applied across all westside HCP lands, specifically within each RS-FRIS stand (Resource Inventory Unit), where it assessed all forested pixels in a 2.5-acre circle, and classified the center pixel as SCF or not. For additional details, see the SCF Detector technical report.

Landscape Assessment Background

The Landscape Assessment supports long-term forest policy goals by summarizing structurally complex forest detections across AMEV within each western Washington HCP planning unit. These results align with DNR's *Policy for Sustainable Forests* and the *Structurally Complex Forests* procedure, which call for identifying suitable SCF for managing 10–15% of each unit for older forest conditions over a 70- to 100-year period.

The SCF Detector screens HCP planning units for structurally complex conditions, while the Landscape Assessment summarizes these detections, especially within AMEV areas in each HCP unit, to support

larger landscape-scale planning. However, this analysis does not address finer-scale operational decisions, such as evaluating a specific harvest unit's forest condition.

Protocol for Field-Level Integration

To bridge the gap between landscape-scale analysis and operational planning, DNR's Product Sales and Forest Informatics Programs are developing a protocol for incorporating SCF detections into field planning. This includes collecting stand development stage data in units flagged by the Detector or field observations. The protocol will support SEPA documentation and ensure consistency with policy objectives at the site level, while also refining future SCF Detector updates.

Landscape Assessment Analysis Area

The Areas Managed for Ecological Value (AMEV) are the core focus of this assessment. These lands are managed primarily for ecological functions, not timber revenue, and include:

- Climate Commitment Act – Directed through legislative provisos, lands that were previously in Areas Managed for Timber Value and were adjacent to AMEV that were estimated to have structurally complex forests
- Gene Pool Reserves
- Marbled Murrelet Occupied Sites
- Marbled Murrelet Occupied Site Buffers
- Marbled Murrelet Special Habitat Areas
- Natural Area Preserves
- Natural Resources Conservation Areas
- Old Growth
- Northern Spotted Owl Habitat that overlaps Murrelet P-Stage
- Northern Spotted Owl – Nest Patches
- Riparian Areas

Areas Managed for Timber Value (AMTV) are also analyzed in this assessment. These lands are primarily managed for timber revenue. They consist of lands that are not specifically identified in the AMEV grouping.

The SCF Detector was used to identify potential SCF within these areas to guide management toward older forest targets.

Landscape Assessment Key Metrics and Outputs

The Landscape Assessment provides spatial summaries and tabular outputs for each western Washington HCP unit, including:

- Total acres of HCP lands in each HCP unit
- Acres designated as Areas Managed for Ecological Values (AMEV)
- Acres and percentage within AMEV modeled as SCF

- Acres designated as Areas Managed for Timber Value (AMTV)
- Acres and percentage within AMTV modeled as SCF
- Total acres and percentage of SCF vs. non-SCF

These metrics help inform landscape-scale planning while supporting future refinements to SCF detection models and operational decision-making.

Frequently Asked Questions (FAQs)

Why do the map viewer colors look different where layers overlap in the Map Viewer?

Because the layers have transparency applied, overlapping areas will display blended colors resulting from the underlying symbology.

How are 'forested stands' assessed with the SCF Detector?

DNR ecologists indicated that a 'stand' is larger than the size of the RS-FRIS inventory pixels, which provide forest inventory estimates at the 1/10th acre. DNR ecologists in discussion with Dr. Robert Van Pelt, an Affiliate Assistant Professor at the University of Washington, who contracted with DNR to create the first widely used dichotomous key of stand development stages for western Washington, in a field guide he authored called, "Identifying Mature and Old Forests in Western Washington", indicated that 2.5- or 5- acres should be the minimum size for field stand development stage assessments. In the DNR Detector project, data within both 2.5- and 5-acre areas were tested in the SCF Detector model design and the model variables and performance were not significantly different. The project opted to use the 2.5-acre scale moving forward as a 'forested stand' as the ground truth stand development stage data was collected at this scale. The 2.5-acre scale stand was used throughout the SCF Detector project in how the model was designed, trained and then applied within each forested RS-FRIS inventory stand, across each western WA HCP unit.

How are the western WA HCP lands classified as SCF or not SCF by the Detector?

The Detector classifies all forested areas within each RS-FRIS inventory stand as SCF or not SCF. The classification is done using a sliding-window that moves within each RS-FRIS inventory stand, assessing all forested pixels within a 2.5-acre circle. For all forested pixels in the 2.5-acre circle, forest inventory information is tallied and averaged and then the center pixel is denoted as SCF or not SCF.

Why use the center pixel? Why not account for all pixels that contributed in each 2.5-acre circle?

Summarizing just the center pixel acres for the landscape assessment ensures the acre summary, like the model design, is balanced. We are currently summarizing at the pixel level to avoid the cases where SCF and not SCF meet. This case would bring up the question "who" (which class) gets the overlapping acres? Decisions to satisfy the edge cases could lead to biasing the resulting numbers in the landscape assessment. By summarizing at the pixel level, we are ensuring to a reasonable degree of certainty that the numbers at the landscape level are true to how the detector was fit and evaluated. There will be false positives and false negatives, so tallying the acres the way we have for

the landscape assessment doesn't bias us towards over or under predicting SCF or not SCF. This tool is not currently designed for stand delineation.