

Toward a Natural Resources Asset Management Plan for Kitsap County Workshop Agenda

Date: July 27, 2021, 9:00-11:30 am PT

Goals: Share, discuss, and collaboratively refine the preliminary level of services (LOS) for forest assets. Discuss concepts for natural resource asset management implementation and project next steps.

9:00 AM	<p>Welcome and Introductions - Elizabeth McManus (Ross Strategic, Facilitator) and Mindy Roberts (WEC)</p>
9:10 AM	<p>Level of Service for Forest Assets - Charlotte Dohrn (WEC), Matthew Medina (Kitsap County)</p> <ul style="list-style-type: none"> • Provide an overview of management units and understand current approach, methods, and limitations for evaluating upland forest level of service. • Share feedback on approach and create clear understanding of revisions/next steps. • Discussion: <ul style="list-style-type: none"> ○ Sharing initial reactions and clarification questions. Are there any surprises? ○ What should we keep and what should we not include moving forward? How do we prioritize? ○ Are there any revisions that the group would like to see? ○ Are there any missed data sources that we should review? <p><i>Materials:</i></p> <ul style="list-style-type: none"> • <i>Summary document on development of levels of services for forest assets</i> • <i>Web map with levels of services for forest assets with layer capability</i>
10:15 AM	<p>Break</p>
10:30 AM	<p>Updates from partners - Paul McCollum (Port Gamble S’Klallam Tribe), Sam Phillips (Port Gamble S’Klallam Tribe), Tom Ostrom (Suquamish Tribe), Kitsap County</p> <ul style="list-style-type: none"> • Updates from Port Gamble S’Klallam Tribe • Updates from Suquamish Tribe • Updates from Kitsap County
10:45 AM	<p>Discussion on the assessment and planning phases of implementing natural resource asset management – Charlotte Dohrn (WEC)</p> <ul style="list-style-type: none"> • Present exercise testing out the natural resource asset management framework with examples. • Discussion about identifying possible management and policy interventions: <ul style="list-style-type: none"> ○ What types of interventions would be effective for these examples? ○ What information or analysis is needed to identify possible interventions? Are there information gaps? ○ How do we make decisions to prioritize and select interventions?
11:20 AM	<p>Wrap-up and Next Steps</p>
11:30 AM	<p>Adjourn</p>

Forests Workshop: Level of Service Concepts

This document summarizes the preliminary approach for assessing baseline level of service (LOS) for upland forest areas in Kitsap County. The approach described here is a starting point; we expect to revise many aspects of these methods based on feedback during the workshop and future updates. The sections below include an overview of management units, a description of each attribute that is currently included in the assessment of upland forest LOS, and a description of how attribute condition ratings are combined to calculate an overall LOS for each management unit.

Natural asset level of service definition: A ranked metric that provides information about the condition of a natural asset and the quality or amount of ecosystem services the asset provides. Level of service metrics are usually used for capital facilities to define the kind and level of service that is required for meeting the needs of residents at current and projected demand. LOS metrics can guide Kitsap County's investments in activities, such as restoration, monitoring, and maintenance of natural assets.

Kitsap County Forest Inventory and Upland Management Units

Kitsap County is approximately 400 square miles, of which 40% is classified as forested (NLCD 2019). The Kitsap Peninsula is located in the Puget Trough ecoregion, which was historically dominated by extensive conifer forests. Much of this region is classified as the Western Hemlock Zone vegetation zone. Prior to industrial logging, forests within the Kitsap Peninsula were typical of Pacific Coastal forests, known for supporting massive trees and high productivity. Kitsap County itself owns over 6500 acres of forest land, of which 60% is comprised of forest stands that are dense, second and third growth Douglas fir plantations. Restoration of many areas is needed to improve the ecological condition and ecosystem services. County-owned forest lands are managed under the county's Integrated Forest Stewardship Policy, which describes desired future conditions that protect water resources, provide connected wildlife habitat, protect endangered species and habitat, demonstrate a diversity of age, densities, and ecotypes, enhance recreational opportunities, and other objectives (Kitsap County 2012). In addition to county-owned forest lands, forestlands on the Kitsap Peninsula are owned by small forest landowners, private/Tribal industrial owners, Washington Department of Natural Resources (DNR), other state agencies, the US federal government, local government, and private conservation entities (Figure 1; NRSIG 2019) – all of which contribute to the provisioning of forest ecosystem services in the County. Kitsap County has a policy of managing forests at a landscape scale, including partnering with other landowners to achieve forest stewardship goals (Kitsap County 2012).

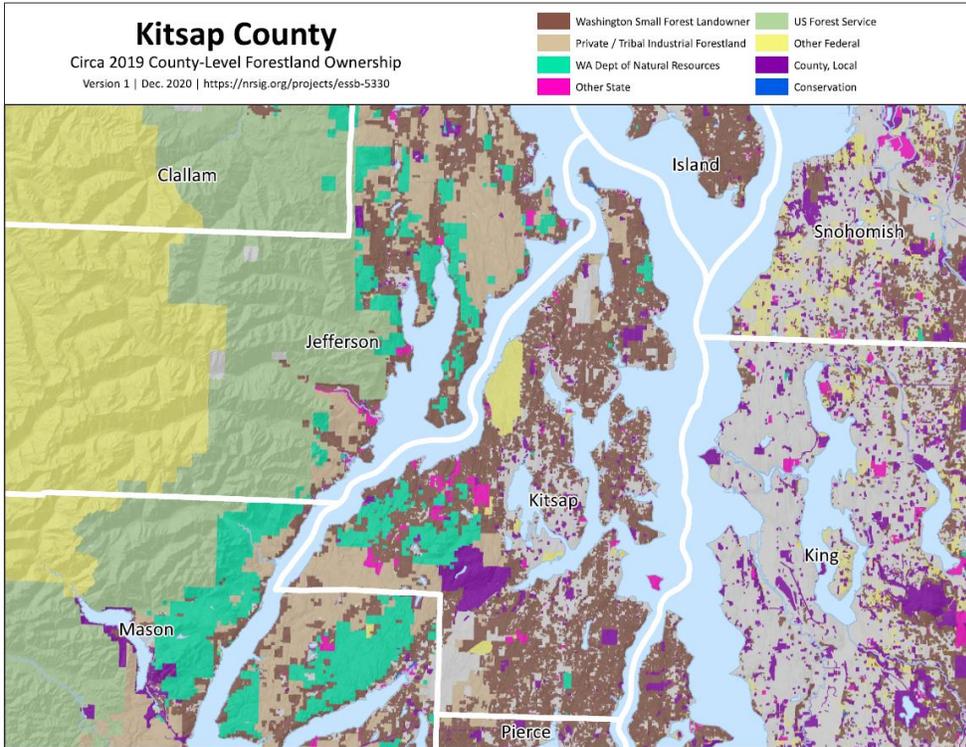


Figure 1. 2019 County-Level Forestland ownership (Natural Resource Spatial Informatics Group, 2019)

Management units are the spatial foundation of the asset management system and provide the spatial “container” for analysis and results. We developed temporary management unit polygons for forests using National Hydrography Data (NHD) catchments (Figure 2 below). Catchment sizes vary widely and are numerous; so we grouped catchments to create a more manageable number of units. However, the management units developed from grouped catchments remain a wide range of sizes and have irregular boundaries. For this initial analysis, we generated upland forest management units and assessed LOS across the whole county. The core team could consider removing units that are predominantly urban/developed landcover types and considering these “urban” forests and city trees should be managed as a different asset type than upland forests. The management units used in this preliminary LOS analysis are temporary, and will be refined as we determine preferred methods for working with NHD data.

Temporary upland management units:

- Number of units: 1085
- Mean area: 244 acres
- Area range: 2 to 2189 acres



Figure 2. Screenshot of upland forest management units.

Attributes Included in Upland Forest Level of Service Analysis

The current approach for assessing LOS uses three attributes to provide information about the condition of forest natural assets and the ecosystem services they provided. This is slightly different from the list discussed during the March 2021 workshop. The following sections include a brief overview of the science, ecosystem services linked to the attribute, condition ratings, and considerations for each attribute. Fewer or additional attributes, different data sources, or different condition rating approaches may be identified through core team work and additional input. The three forest attributes included in this analysis are:

- F1: Forest cover
- F2: Successional stage
- F3: Disturbance

F1. Forest cover

Indicator: % forest cover in the management unit

Proposed condition rating:

Condition rating	0	1	2	3	4
% forest cover	<40%	40%-59%	60%-79%	80-89%	≥90%
Description	Low forest cover	Low-moderate cover	Moderate cover	Moderate - high forest cover	High forest cover

Science summary: Healthy forests are fundamentally important for clean air, clean water, climate resilience, and healthy habitat for salmon, birds, large mammals, and other animals. Temperate forests, like those in Kitsap County, provide habitat for many “species of greatest conservation need” (SGCN) in Washington (SWAP 2015). Forests play a critical role in the water cycle by capturing, storing, and transferring water, regulating flow and discharge and supporting infiltration (Smith 2011). Forests support climate resilience by providing shade and lowering temperature and capturing and storing carbon. Harvest, clearing for development, roads, and other land use types have reduced the extent and changed the composition of forests in Kitsap County. Intact and undisturbed forest are critical to

support salmon habitat; research has linked loss of forest cover and fragmentation to salmon population decline in the Pacific Northwest (Andrew et al., 2011). Attribute F1 uses percent canopy cover in the management unit as an indicator to provide basic information about how forested an area is. Using a measure such as percent canopy cover does not provide information about habitat connectivity, forest structure/composition, or forest condition, which influence the ecosystem service provisioning. However, tracking percent forest cover helps assess generally if some forest ecosystem services are being provided or not, and also track forest conversion and restoration activities.

Example linked ecosystem services: Water regulation, wildlife habitat, climate resilience, species and plant presence

Notes and considerations:

- Percent cover may not provide information about the connectivity or fragmentation of forest habitat. Particularly over larger scales, units with higher percent cover may still have patchy or discontinuous forests that provide a lower level of service.
- Canopy cover data does not provide information about the type of trees, forest composition, understory plant communities, invasive species, or other important elements.
- The dataset currently used to assess percent cover in the management units does not include a different classification for bodies of water; analysis needs refining to exclude lakes from calculations. This update will not likely affect a high number of the management units, but will change results to some degree.
- Condition rating scale is generalized based on the assumed relationship of higher percent cover corresponding to higher ecosystem service delivery and percentage “breaks” are not based on research or modeling.

Data source: Washington Department of Fish and Wildlife (WDFW) [High Resolution Change Detection \(HRCDC\)](#) 2017 tree cover

F2. Successional Stage

Indicator: % late succession (Class E) forest in the management unit

Proposed condition rating:

Condition rating	0	1	2	3	4
% late succession	<1%	1-25%	26-50%	51-75%	>75%
Description	No late succession	Low % late succession	Moderate % late succession	Moderate-high % late succession	High % late succession

Science summary: Late successional forests are characterized by higher biodiversity and complexity and provide important habitat for species dependent on these structures. Succession class data characterizes current vegetation conditions with respect to the vegetation species composition, cover, and height ranges of the successional states that are expected occur in the region. Mid-aged, high-density forests are overrepresented in western Washington relative to historical conditions. Late successional stage, older forests generally have higher biodiversity which supports diverse ecosystem services, compared to younger, more homogenous forests (DellaSalla 2015). Older, structurally complex

forests provide unique habitat for birds and other wildlife. Older forests in some cases use less water than younger forest stands (Moore 2004), which may help protect in-stream flows, particularly as climate change accelerates. Older, larger trees may be more resilient to climate driven disturbance, including drought and fire. The data used to assess F2 comes from the USGS LANDFIRE project, which has developed extensive models of the biophysical setting of North American forests, which allow them to assess succession class in the context of that biophysical setting. The condition rating applied here uses the percentage of late development, closed canopy forests in the management unit. For the biophysical setting most common on the Kitsap Peninsula, class “E” are areas where the model predicts mature, old-growth forest stands dominated by large individuals of Douglas-fir and western hemlock, with advanced regeneration of western hemlock, and understories of shrubs including salal and others (USGS, n.d.).

Linked ecosystem services: Water regulation, wildlife habitat, climate resilience, species and plant presence

Notes and considerations:

- LANDFIRE uses 30m resolution data, which is lower resolution than HRCD tree cover data and may be less accurate at finer scales.
- Succession class is derived from modeling forest structure and accuracy specifically for forests in Kitsap County needs more research, as there may be other data products and models that assess forest structure and are more tailored to west of the Cascades/coastal forests.
- Data is derived from different years of aerial and satellite imagery compared to F1 and F3.
- Methods may need because succession class may be modeled differently for different biophysical settings; maritime western red cedar-western hemlock settings use a different rating scale. However, many of these areas are now urbanized, so results may not shift considerably with these updates.
- Condition rating scale is generalized based on the assumed relationship of higher percent late succession corresponding to higher ecosystem service delivery and percentage “breaks” are not based on research or modeling.

Data source: [USGS LANDFIRE 2016](#)

F3. Disturbance

Indicator: Observed tree death caused by pest and disease over two years

Proposed condition rating:

Condition rating	0	1	2	3	4
Tree death present	NA	Yes	NA	NA	No
Description	NA	Tree death/defoliation from pests & disease observed in unit	NA	NA	Tree death/defoliation from pests & disease not observed in unit

Science summary: Disturbance (e.g., fire, pests, disease) alter forest structure, community composition, and ecosystem processes. Pests and disease cause tree mortality, and thus impact the ability of the forest to provide ecosystem services. DNR and the Forest Service conduct aerial surveys of forests in Washington each year and record dead and defoliated trees and the suspected cause. This attribute may be important to track to proactively manage pests and disease in Kitsap forests across all landowner types, especially as many stressors are expected to increase as climate continues to change. To assess this attribute, we used only the past two years of disturbance data, and simply considered if tree death/defoliation was present or absent in the management unit. Several types of beetle as well as cedar and maple decline are observed in Kitsap forests. The impacts of pests and disease are expected to accelerate with climate change in many forest systems.

Linked ecosystem services: Water regulation, climate resilience, species and plant presence

Notes and considerations:

- More research needed to understand if all types of pests/disease causes should be included. In the current version, tree death from black bears is not included.
- Damage caused by fire and other types of disturbance not included in these data.
- Need to understand if one year of observation, two years, or more years of data is most representative.
- Current method does not quantify area of damage, simply presence/absence.
- This attribute was not calculated for management units with low forest cover.

Data source: [DNR/Forest Service Forest Health Aerial Survey Data](#)

Calculating LOS

The overall LOS for each riparian management unit is calculated by taking an average of the condition ratings for F1, F2, and F3. For forest attributes, the maximum possible score is 4, and the minimum possible score is 0. The LOS score reflects the condition of forest assets. In this approach, we assume that degraded condition (low scores) corresponds with a low level of service and reduced ecosystem services. In addition to the numerical LOS score (i.e., the mean of the condition ratings across attributes), we assign a qualitative LOS rating according to the table below.

Qualitative LOS	Overall LOS Score (max4)
Very Low	0-1
Low	≥1-2
Medium	≥2-3
High	≥3-4

References

Andrew, M.E. and Wulder, M.A. 2011. Idiosyncratic responses of Pacific salmon species to land cover, fragmentation, and scale, *Ecography*, 34: 780-797.

DellaSalla, D. et al. and sources within. (2015). Building on Two Decades of Ecosystem Management and Biodiversity Conservation under the Northwest Forest Plan, USA. *Forests* 2015, 6(9), 3326-3352; <https://doi.org/10.3390/f6093326>

Kitsap County Parks Department, 2012. Integrated Forest Stewardship Policy. https://www.kitsapgov.com/parks/Documents/ForestStewardship_Reso169-2012.pdf

Moore, G. et al. 2004. Structural and compositional controls on transpiration in 40- and 450-year-old riparian forests in western Oregon, USA. *Tree Physiology*, Volume 24, Issue 5, May 2004, Pages 481–491, <https://doi.org/10.1093/treephys/24.5.481>

Natural Resource Spatial Informatics Group. 2019. Circa 2019 County-Level Forestland Ownership. https://nrsig.org/projects/small-forest-landowner-regulatory-impacts/files/Circa-2019-County-Level-Forestland-Ownership_V1_202012_web.pdf

Smith, N. et al. (2011). Ecosystem Services as a Framework for Forest Stewardship: Deschutes National Forest Overview. https://www.fs.fed.us/pnw/pubs/pnw_gtr852.pdf

USGS LANDFIRE reference information:

- <https://landfire.gov/bps-models.php>
- https://landfire.gov/documents/UsingBpSDescriptors_2009_03_25.pdf
- <https://landfire.gov/sclass.php>

Washington Department of Fish and Wildlife. 2015. Washington's State Wildlife Action Plan: 2015 Update. Washington Department of Fish and Wildlife, Olympia, Washington, USA. <https://wdfw.wa.gov/sites/default/files/publications/01742/wdfw01742.pdf>

ForestsWorkshop: Definitions of Web App Attribute Fields

The table below provides detailed information of the attributes that are found in the Web App: [KNRAMP – Preliminary Level of Service Results](#).

Attribute Name	Description
SU_ID	Stream management unit ID
AU_ID2	Intermediate ID
Prm_IDs	Intermediate NHD ID
NHDPIDs	NHD ID
Count_l	Count of stream segments in unit
Trm_pth	NHD Terminal Path Identifier
S_name	Stream name
Est_length	Estimated total length of stream segments in unit
Per_for	Percent of the management unit forested
Md_Hght	Median height of modeled tree canopy in the management unit
S1	Condition rating for S1, Riparian vegetation
Per_imp	Percent impervious surface cover in the sub-watershed
S2	Condition rating for S2, imperviousness
Mn_BIBI	Average aggregated B-IBI for stream system
S3	Condition rating for S3, biotic condition
Meets1	Meets first WQ standard
Meets2	Meets second WQ standard
S4	Condition rating for S4, water quality
fpb	Presence (1)/Absence (0) of barriers to fish passage
S5	Condition rating for S5, fish passage
los	Level of service, mean of S1-S5
Los_qual	Qualitative level of service