

Developing tools to assess conservation values and biodiversity on family forests in the Pacific Northwest

A collaboration of FSC US, WWF Sweden and NNRG

NNRG, December 2012

Summary

Identifying areas and elements in a forest with high biological conservation value, or potential for biodiversity, is an important component of ecological forest management. This information allows land managers to plan and implement treatments that can protect and restore biodiversity while also earning revenue or achieving other management objectives. For family forest owners, this biological information can be difficult to obtain because of a lack biological knowledge, limited resources to hire professional consultants, or insufficient time and wherewithal to conduct an assessment. In Oregon and Washington, roughly 20 percent of forest land is held by family forest owners whose ownerships are typically in lower-elevation vegetation zones with a greater potential for biodiversity. To address these challenges and opportunities, family forest landowners need new tools to identify and manage for conservation and biodiversity.

Assessment of environmental impacts and monitoring of forest conditions are fundamental principles of managing forestland to Forest Stewardship Council (FSC) standards. Recognizing the value and need to develop and scale monitoring tools for family forests, FSC US arranged for biologists affiliated with World Wildlife Fund (WWF) Sweden and Northwest Natural Resource Group (NNRG) to develop a tool to assess Pacific Northwest forest conservation values and biodiversity. The one-page, 60-criteria questionnaire is a modified-version of a field form developed by Swedish forest biologists Börje Drakenberg and Anders Lindhe that has previously been adapted for use in Denmark, Latvia, Armenia, northern China, east Africa and coastal Brazil. In testing the field form, FSC assessors and forest owners immediately recognized its utility in identifying areas of high biological value, developing and monitoring management objectives and facilitating the FSC assessment process. NNRG plans to incorporate the field form as a multi-use management tool for its small forest landowner members by requiring the use of the form in pre-certification evaluation processes, and by encouraging landowners to incorporate the tool into regular monitoring efforts.

Field visit overview

In October 2012, FSC US, WWF Sweden biologists and NNRG staff and consultants convened to modify the Swedish-based nature value field form into a tool applicable to Pacific Northwest forests. Working in the south Puget Sound region, the team visited sites representative of the forest zones in western Washington and Oregon typically owned by family forest owners. Sites included rain shadow-influenced dry Douglas-fir forest, mixed Douglas-fir/western hemlock forests, Garry oak-Douglas-fir mixed woodland, Cascade foothills Douglas-fir forests managed or previously managed for industrial timber production, and an old-growth Douglas-fir forest

with history of fire disturbance. Three of these field visits occurred on FSC-certified ownerships participating in NNRG's FSC group certificate.

At each site the team observed elements of forest structure, species, and stand dynamics considered important characteristics of Pacific Northwest forests. The field form was continuously revised to incorporate important attributes and clarify intent of questions. Iterations of the form were tested in subsequent stands and amended as necessary. Site visits and team discussions resulted in a 1-page, 60-question form for three major forest types: Douglas-fir /Mixed coniferous forests west of the Cascades, Oak/Douglas-fir - Oak/pine woodlands, and early seral forest conditions. A fourth forest type, Ponderosa pine forests, is noted on the field form as a place holder for later development.

In November and December 2012, NNRG conducted six field visits to further test the utility and functionality of the field form. Site visits occurred on FSC-certified forests enrolled in NNRG's FSC group certificate. Three assessments were conducted in Oregon on Garry oak-Douglas-fir woodland in the northern Willamette Valley, Douglas-fir forest in the Cascade foothills east of Albany, and along the southern Oregon Coast in Langlois. The other three assessments were conducted in Washington on Douglas-fir forest along the Columbia River west of Longview, rain shadow-influenced dry Douglas-fir forest on Vashon Island, and Douglas-fir/western hemlock forest in the Puget lowlands east of Olympia. The Vashon Island and Olympia vicinity forests were part of the preliminary field form development process.

NNRG's director of member services conducted each of the 1-3 hour field visits with forest owners. During each field visit, the purpose of the form was discussed and 1-2 stands were walked and assessed by forest owners. Participants provided responses during the forest walks, in conversational interviews and through written questionnaires. Comments and suggestions were incorporated into the versions of the field form provided in the appendix of this report.

Adjustments made to field form

Through the development and testing stages of this project, the original Swedish field form was adapted to suit four types of Pacific Northwest forests and to improve ease of implementation by forest owners and consulting foresters. Adjustments to the form fall into two categories: 1) elements specifically relevant to the ecology of Pacific Northwest forests and 2) formatting to improve ease of use by those conducting the assessments.

The Swedish field form's six categories of site, dynamics, habitat, trees, structure and dead wood are retained in the Pacific Northwest version. However, the specific elements in each category were modified to reflect the type of terrain, resource use, tree species and characteristics, forest composition and forest dynamics found in Pacific Northwest forests. For example, the tree and structure categories are adjusted to suit the diversity of forage species, shrubs, tree species and size classes found in the Pacific Northwest where there are fewer hardwood and conifer species and trees grow significantly larger. Some elements, such as lime-rich soils, were removed from the form as they are not prevalent in the Pacific Northwest.

Other adjustments to the form are intended to ease implementation by forest owners and their consultants. These include converting measurements from metric units (hectares and centimeters) to U.S. standard units (acres and inches) and providing separate forms for each forest type. The latter format change was a request of landowners who tested the form and found they were distracted by having columns of rings for multiple stand types on the same form.

Utility of the biodiversity field form

Through this project, the collaborators sought to develop a tool that would facilitate evaluation and conformance to FSC management standards, identify areas of high biological value within a stand, and assist forest owners in recognizing important components of forest biodiversity. Aware of the needs of family forest owners, the form is intended to be easy to use, time-sensitive and require minimal equipment or background knowledge.

Due to its ease of use and comprehensive content, NNRG's director of Northwest Certified Forestry considers the field form useful in the pre-certification process and plans to encourage forest owners to use it in ongoing monitoring efforts. The form can be utilized by NNRG in the following ways:

- Requiring a landowner to proactively complete a biodiversity assessment as part of an audit or certification process will provide clues to an assessor regarding management compatibility to FSC, as well as potential incompatibilities. The assessment process is a low-cost means to highlight potential issues or provide initial indication that High Conservation Value Forest exists on the site.
- Developing a shared reference of forest conditions is beneficial in the certification process to the assessor and the landowner. The field form's detailed and comprehensive questions engage forest owners in self-evaluating their forests and developing some baseline observations about stand conditions.
- The categories and attributes of the field form serve as a menu for selecting desired management activities and outcomes. And overtime, conducting the field form assessment allows a forest owner or FSC assessor to monitor for specific outcomes.

The field form may supplement future FSC assessments as its content corresponds to FSC Principles and Criteria, particularly Principle 6 (Environmental impact) and Principle 8 (Monitoring and assessment). As a tool for monitoring efforts, the form supports Principle 8 (Monitoring and assessment) and can guide forest owners and FSC assessors in conducting monitoring to satisfy FSC Criteria 6.1, 6.3 and 6.4:

- *Criteria 6.1*-categories and characteristics provide scale-appropriate assessment of environmental impacts
- *Criteria 6.3*-evaluate ecological functions
- *Criteria 6.4*-identify important components of the forest systems for further protection
- *Principle 9*-High Conservation Value Forests

Family forest owners testing the field form immediately noted its value and utility. They found the assessment process easy and reasonable to conduct, and believed that the questions guided them to evaluate specific forest characteristics and taught them to look for important forest features. Forest owners readily saw the field form as a menu of forest attributes they could choose to model in their forests. For instance, while completing the assessments three landowners determined they need to leave more standing and down woody debris if they want to restore characteristic forest structure and processes that can enhance biodiversity.

Recommendations on use of protocol in FSC certification – applying the field form to small forest landowner certifications

The forest biodiversity assessment field form is an easy to use and comprehensive tool that can assist FSC assessors and family forest owners in developing a shared reference of forest conditions that is beneficial for the certification process and ongoing management and assessments. NNRG intends to incorporate the field form as a multi-use management tool for its members in the following ways:

- Encourage applicants in the pre-certification evaluation process to complete biodiversity assessments
- Encourage NCF members to use the tool as part of regular monitoring efforts and incorporate results into the development of management objectives

Continued application of the field form by family forest owners will inform NNRG in the refinement of field form criteria, format and guide content.

Appendix A

The field forms developed for the four Oregon and Washington forest types and original Pacific Northwest version 1.0 are included with this report.

Appendix A: Field Forms
Original Biodiversity Field Form

FOREST NATURE VALUE ASSESSMENT
 Pacific Northwest Version 1.0

SITE	W	O	E	P
1. Site on SE - SW facing slope steeper than 20 % (1:5)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Site on NE - NW facing slope steeper than 20 % (1:5)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Forested slope steeper than 60 % (3:5)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Conspicuous gorge / ravine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Conspicuous cliff / scree- / talus slope	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Large boulder / boulders / rocky outcrop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DYNAMICS				
7. Several small canopy gaps (< 0.25 ac)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Medium canopy gap / gaps (0.25-1 ac)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Larger canopy opening / openings created by wind / fire (1-5 ac)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Open / semi-open canopy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Substantial amounts of naturally regenerating tree saplings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Ground vegetation conspicuously patchy and heterogenous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Exotic shrubs and trees absent / nearly absent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Recently burnt trees with conspicuously scorched bark	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Living tree / trees with fire-scars	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Living tree / trees with scars from more than one fire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Forest area / areas remaining / retained after fire / storm / logging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Substantial amounts of trees / tree tops broken by ice / snow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Tree / trees felled by beaver / beaver dam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HABITAT				
20. Conspicuous bald / balds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Open / semi-open prairie / native grassland / meadow area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Forested wetland area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Open wetland area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Forested spring / seep area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Riparian forest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Streambed with substantial amounts of large woody debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Stream with section / sections of cascades	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Streambed with section / sections of cobble / gravel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Large hollow and internally decayed tree / trees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Tree / trees with nest of coarse twigs / nesting cavity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Site score	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

W = Douglas-fir /Mixed coniferous forests west of the Cascades
 O = Oak/Douglas-fir - Oak/pine woodlands
 © FSC US, NNRG, Drakenberg / Lindhe 2012

TREES	W	O	E	P
31. Several or more native fruit- / nut-bearing trees / shrubs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Substantial amounts of native fruit- / nut-bearing trees / shrubs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Canopy composed of 3 or more tree species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Canopy composed of 5 or more tree species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Substantial amounts of hardwood trees > 10" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Several or more hardwood trees > 20" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Substantial amounts of trees > 20" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Several or more trees > 30" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Substantial amounts of trees > 30" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Several or more trees > 40" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Substantial amounts of trees > 40" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
STRUCTURE				
42. Substantial amounts of understory and subcanopy trees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Overlapping shrub & tree crowns from forest floor to upper canopy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Several or more veteran / large trees from previous forest generation/s	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Substantial number of large trees from previous generations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Several trees with conspicuously thick branches or stem forks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Several trees with conspicuously thick cover of mixed mosses & lichens	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DEAD WOOD				
48. Several standing dying trees / snags > 10" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Several standing sun-exposed dying trees / snags > 10" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. Several or more dying trees / snags > 20" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Substantial amounts of dying trees / snags > 20" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Several dying trees / snags > 30" dbh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. Conspicuous signs of woodpecker activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. Several down logs > 20" at mid-log	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. Several down logs > 20" in open sun-exposed conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. Several down logs > 30" at mid-log	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. Several down logs > 40" at mid-log	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58. Several down logs in various stages of decay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59. Several down logs with conspicuously thick moss cover	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60. Several down logs / snags with shelf fungi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stand score	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TOTAL SCORE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E = early seral reference condition
 P = Ponderosa and Lodgepole pine forests east of the Cascades

Appendix A: Field Forms
FSC Principles to Guide Biodiversity Field Form

General FSC Principles and Criteria Encompassed in Field Form - Specific criteria noted below in the corresponding rows.

- 6.1 Assessment of Environmental Impacts
- 6.3 Ecological functions and values shall be maintained
- 6.4 Representative samples of existing ecosystems within the landscape shall be protected
- Principle 8 Monitoring

FOREST NATURE VALUE ASSESSMENT
 Pacific Northwest Version 1.0

SITE	W	O	E	P
1. Site on SE - SW facing slope steeper than 20 % (1:5)				
2. Site on NE - NW facing slope steeper than 20 % (1:5)				
3. Forested slope steeper than 60 % (3:5)	6.5.c			
4. Conspicuous gorge / ravine				
5. Conspicuous cliff / scree- / talus slope				
6. Large boulder / boulders / rocky outcrop	9.1			
DYNAMICS				
7. Several small canopy gaps (< 0.25 ac)				
8. Medium canopy gap / gaps (0.25-1 ac)				
9. Larger canopy opening / openings created by wind / fire (1-5 ac)				
10. Open / semi-open canopy				
11. Substantial amounts of naturally regenerating tree saplings				
12. Ground vegetation conspicuously patchy and heterogenous				
13. Exotic shrubs and trees absent / nearly absent				
14. Recently burnt trees with conspicuously scorched bark				
15. Living tree / trees with fire-scars				
16. Living tree / trees with scars from more than one fire				
17. Forest area / areas remaining / retained after fire / storm / logging				
18. Substantial amounts of trees / tree tops broken by ice / snow				
19. Tree / trees felled by beaver / beaver dam				
HABITAT				
20. Conspicuous bald / balds	9.1			
21. Open / semi-open prairie / native grassland / meadow area	9.1			
22. Forested wetland area	6.5.e.1			
23. Open wetland area	6.5.e.1			
24. Forested spring / seep area	6.5.e.1.e			
25. Riparian forest	6.5.e.1			
26. Streambed with substantial amounts of large woody debris	6.5.e.1			
27. Stream with section / sections of cascades	6.5.e.1.a			

TREES	W	O	E	P
31. Several or more native fruit- / nut-bearing trees / shrubs				
32. Substantial amounts of native fruit- / nut-bearing trees / shrubs				
33. Canopy composed of 3 or more tree species				
34. Canopy composed of 5 or more tree species				
35. Substantial amounts of hardwood trees > 10" dbh				
36. Several or more hardwood trees > 20" dbh				
37. Substantial amounts of trees > 20" dbh				
38. Several or more trees > 30" dbh	6.3.f, 6.3.g			
39. Substantial amounts of trees > 30" dbh	6.3.f, 6.3.g			
40. Several or more trees > 40" dbh	6.3.f, 6.3.g			
41. Substantial amounts of trees > 40" dbh	6.3.f, 6.3.g			
STRUCTURE				
42. Substantial amounts of understory and subcanopy trees				
43. Overlapping shrub & tree crowns from forest floor to upper canopy				
44. Several or more veteran / large trees from previous forest generation-/s				
45. Substantial number of large trees from previous generations	6.3.f, 6.3.g			
46. Several trees with conspicuously thick branches or stem forks				
47. Several trees with conspicuously thick cover of mixed mosses				
DEAD WOOD				
48. Several standing dying trees / snags > 10" dbh				
49. Several standing sun-exposed dying trees / snags > 10" dbh				
50. Several or more dying trees / snags > 20" dbh				
51. Substantial amounts of dying trees / snags > 20" dbh				
52. Several dying trees / snags > 30" dbh				
53. Conspicuous signs of woodpecker activity				
54. Several down logs > 20" at mid-log				
55. Several down logs > 20" in open sun-exposed conditions				
56. Several down logs > 30" at mid-log	6.3.f, 6.3.g			
57. Several down logs > 40" at mid-log	6.3.f, 6.3.g			

Appendix A: Field Forms
Westside Biodiversity Field Form

FOREST BIODIVERSITY ASSESSMENT

Douglas-fir/Mixed coniferous forests west of the Cascades - Pacific Northwest Version 1.0

Date: _____ Stand: _____

TOPOGRAPHY & SITE CHARACTERISTICS	W
1. Site on SE - SW facing slope steeper than 20 % (1:5)	<input type="radio"/>
2. Site on NE - NW facing slope steeper than 20 % (1:5)	<input type="radio"/>
3. Forested slope steeper than 60 % (3:5)	<input type="radio"/>
4. Conspicuous gorge or ravine	<input type="radio"/>
5. Conspicuous cliff, scree or talus slope	<input type="radio"/>
6. Large boulder(s) or rocky outcrop(s)	<input type="radio"/>
FOREST DYNAMICS	
7. Small (< 0.25 ac) canopy gaps	<input type="radio"/>
8. Medium (0.25-1 ac) canopy gap(s)	<input type="radio"/>
9. Larger (1-5 ac) canopy opening(s) created by wind or fire	<input type="radio"/>
10. Open or semi-open canopy	<input type="radio"/>
11. Numerous naturally regenerating tree saplings	<input type="radio"/>
12. Ground vegetation very patchy and heterogeneous	<input type="radio"/>
13. Exotic shrubs and trees absent or nearly absent	<input type="radio"/>
14. Trees with bark charred by recent fire	<input type="radio"/>
15. Living tree(s) with wounds or scars from fire	<input type="radio"/>
16. Living tree(s) with wounds or scars from more than one fire	<input type="radio"/>
17. Numerous trees or tree tops broken by ice or snow	<input type="radio"/>
18. Tree(s) felled by beaver or areas inundated by beaver	<input type="radio"/>
HABITAT IN THE FOREST	
19. Conspicuous bald(s)	<input type="radio"/>
20. Open or semi-open prairie, native grassland or meadow area	<input type="radio"/>
21. Forested wetland area	<input type="radio"/>
22. Open wetland area	<input type="radio"/>
23. Forested spring or seep area	<input type="radio"/>
24. Riparian forest	<input type="radio"/>
25. Streambed with substantial amounts of large woody debris	<input type="radio"/>
26. Stream with section(s) of cascades	<input type="radio"/>
27. Streambed with section(s) of cobble or gravel	<input type="radio"/>
28. Large hollow and internally decayed tree(s)	<input type="radio"/>
29. Tree(s) with twig nests	<input type="radio"/>
30. Nesting holes in trees or snags	<input type="radio"/>
<i>Site total</i>	<input type="radio"/>

TREES	W
31. Some (native) nut-, berry- or fleshy fruit trees or shrubs	<input type="radio"/>
32. Numerous (native) nut-, berry- or fleshy fruit trees or shrubs	<input type="radio"/>
33. Canopy composed of 3 or more tree species	<input type="radio"/>
34. Canopy composed of 5 or more tree species	<input type="radio"/>
35. Numerous hardwood trees > 10" dbh	<input type="radio"/>
36. Some hardwood trees > 20" dbh	<input type="radio"/>
37. Numerous trees > 20" dbh	<input type="radio"/>
38. Some trees > 30" dbh	<input type="radio"/>
39. Numerous trees > 30" dbh	<input type="radio"/>
40. Some trees > 40" dbh	<input type="radio"/>
FOREST STRUCTURE	
41. Substantial amounts of understorey and subcanopy trees	<input type="radio"/>
42. Canopy and sub-canopy trees of different diameters	<input type="radio"/>
43. Some large (veteran) trees from previous forest generation(s)	<input type="radio"/>
44. Numerous large (veteran) trees from previous forest generation(s)	<input type="radio"/>
45. Forest area(s) remaining or retained after fire, storm or logging	<input type="radio"/>
46. Some trees with thick branches or stem forks	<input type="radio"/>
47. Some tree trunks and branches covered by mosses and lichens	<input type="radio"/>
DEAD TREES, SNAGS AND DOWN LOGS	
48. Some standing dead or dying trees or snags > 10" dbh	<input type="radio"/>
49. Some standing sun-exposed dead or dying trees or snags > 10" dbh	<input type="radio"/>
50. Some standing dead or dying trees or snags > 20" dbh	<input type="radio"/>
51. Numerous standing dead or dying trees or snags > 20" dbh	<input type="radio"/>
52. Some standing dead or dying trees or snags > 30" dbh	<input type="radio"/>
53. Some down logs > 20" diameter at mid-log	<input type="radio"/>
54. Some sun-exposed down logs > 20" diameter at mid-log	<input type="radio"/>
55. Some down logs > 30" diameter at mid-log	<input type="radio"/>
56. Some down logs > 40" diameter at mid-log	<input type="radio"/>
57. Down logs in various different stages of decay	<input type="radio"/>
58. Some down logs covered by mosses	<input type="radio"/>
59. Some trees, snags or logs with shelf fungi	<input type="radio"/>
60. Signs of woodpecker foraging on trees, snags or logs	<input type="radio"/>
<i>Stand total</i>	<input type="radio"/>
SITE & STAND TOTAL	<input type="radio"/>

W = Douglas-fir /Mixed coniferous forests west of the Cascades
 O = Oak/Douglas-fir - Oak/pine woodlands
 © FSC US, NNRG, Drakenberg / Lindhe 2012

E = early seral reference condition
 P = Ponderosa and Lodgepole pine forests east of the Cascades

Appendix A: Field Forms
Oak Woodland Biodiversity Field Form

FOREST BIODIVERSITY ASSESSMENT

Oak/Douglas-fir and Oak/pine woodlands - Pacific Northwest Version 1.0

Date: _____ Stand: _____

TOPOGRAPHY & SITE CHARACTERISTICS	O
1. Site on SE - SW facing slope steeper than 20 % (1:5)	
2. Site on NE - NW facing slope steeper than 20 % (1:5)	
3. Forested slope steeper than 60 % (3:5)	
4. Conspicuous gorge or ravine	<input type="radio"/>
5. Conspicuous cliff, scree or talus slope	<input type="radio"/>
6. Large boulder(s) or rocky outcrop(s)	<input type="radio"/>
FOREST DYNAMICS	
7. Small (< 0.25 ac) canopy gaps	
8. Medium (0.25-1 ac) canopy gap(s)	
9. Larger (1-5 ac) canopy opening(s) created by wind or fire	
10. Open or semi-open canopy	<input type="radio"/>
11. Numerous naturally regenerating tree saplings	<input type="radio"/>
12. Ground vegetation very patchy and heterogeneous	
13. Exotic shrubs and trees absent or nearly absent	<input type="radio"/>
14. Trees with bark charred by recent fire	<input type="radio"/>
15. Living tree(s) with wounds or scars from fire	<input type="radio"/>
16. Living tree(s) with wounds or scars from more than one fire	<input type="radio"/>
17. Numerous trees or tree tops broken by ice or snow	
18. Tree(s) felled by beaver or areas inundated by beaver	<input type="radio"/>
HABITAT IN THE FOREST	
19. Conspicuous bald(s)	
20. Open or semi-open prairie, native grassland or meadow area	
21. Forested wetland area	<input type="radio"/>
22. Open wetland area	<input type="radio"/>
23. Forested spring or seep area	<input type="radio"/>
24. Riparian forest	<input type="radio"/>
25. Streambed with substantial amounts of large woody debris	<input type="radio"/>
26. Stream with section(s) of cascades	<input type="radio"/>
27. Streambed with section(s) of cobble or gravel	<input type="radio"/>
28. Large hollow and internally decayed tree(s)	<input type="radio"/>
29. Tree(s) with twig nests	<input type="radio"/>
30. Nesting holes in trees or snags	<input type="radio"/>
<i>Site total</i>	

TREES	O
31. Some (native) nut-, berry- or fleshy fruit trees or shrubs	<input type="radio"/>
32. Numerous (native) nut-, berry- or fleshy fruit trees or shrubs	<input type="radio"/>
33. Canopy composed of 3 or more tree species	
34. Canopy composed of 5 or more tree species	
35. Numerous hardwood trees > 10" dbh	<input type="radio"/>
36. Some hardwood trees > 20" dbh	<input type="radio"/>
37. Numerous trees > 20" dbh	<input type="radio"/>
38. Some trees > 30" dbh	<input type="radio"/>
39. Numerous trees > 30" dbh	<input type="radio"/>
40. Some trees > 40" dbh	<input type="radio"/>
FOREST STRUCTURE	
41. Substantial amounts of understorey and subcanopy trees	
42. Canopy and sub-canopy trees of different diameters	
43. Some large (veteran) trees from previous forest generation(s)	
44. Numerous large (veteran) trees from previous forest generation(s)	
45. Forest area(s) remaining or retained after fire, storm or logging	
46. Some trees with thick branches or stem forks	<input type="radio"/>
47. Some tree trunks and branches covered by mosses and lichens	
DEAD TREES, SNAGS AND DOWN LOGS	
48. Some standing dead or dying trees or snags > 10" dbh	<input type="radio"/>
49. Some standing sun-exposed dead or dying trees or snags > 10" dbh	<input type="radio"/>
50. Some standing dead or dying trees or snags > 20" dbh	<input type="radio"/>
51. Numerous standing dead or dying trees or snags > 20" dbh	
52. Some standing dead or dying trees or snags > 30" dbh	
53. Some down logs > 20" diameter at mid-log	<input type="radio"/>
54. Some sun-exposed down logs > 20" diameter at mid-log	<input type="radio"/>
55. Some down logs > 30" diameter at mid-log	
56. Some down logs > 40" diameter at mid-log	<input type="radio"/>
57. Down logs in various different stages of decay	
58. Some down logs covered by mosses	
59. Some trees, snags or logs with shelf fungi	<input type="radio"/>
60. Signs of woodpecker foraging on trees, snags or logs	<input type="radio"/>
<i>Stand total</i>	
SITE & STAND TOTAL	

W = Douglas-fir /Mixed coniferous forests west of the Cascades
 O = Oak/Douglas-fir - Oak/pine woodlands
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E = early seral reference condition
 P = Ponderosa and Lodgepole pine forests east of the Cascades

Appendix A: Field Forms
Early Seral Biodiversity Field Form

FOREST BIODIVERSITY ASSESSMENT

Early seral - Pacific Northwest Version 1.0

Date: _____ Stand: _____

TOPOGRAPHY & SITE CHARACTERISTICS	E
1. Site on SE - SW facing slope steeper than 20 % (1:5)	<input type="radio"/>
2. Site on NE - NW facing slope steeper than 20 % (1:5)	<input type="radio"/>
3. Forested slope steeper than 60 % (3:5)	<input type="radio"/>
4. Conspicuous gorge or ravine	<input type="radio"/>
5. Conspicuous cliff, scree or talus slope	
6. Large boulder(s) or rocky outcrop(s)	<input type="radio"/>
FOREST DYNAMICS	
7. Small (< 0.25 ac) canopy gaps	
8. Medium (0.25-1 ac) canopy gap(s)	
9. Larger (1-5 ac) canopy opening(s) created by wind or fire	
10. Open or semi-open canopy	
11. Numerous naturally regenerating tree saplings	
12. Ground vegetation very patchy and heterogeneous	
13. Exotic shrubs and trees absent or nearly absent	<input type="radio"/>
14. Trees with bark charred by recent fire	
15. Living tree(s) with wounds or scars from fire	
16. Living tree(s) with wounds or scars from more than one fire	<input type="radio"/>
17. Numerous trees or tree tops broken by ice or snow	<input type="radio"/>
18. Tree(s) felled by beaver or areas inundated by beaver	
HABITAT IN THE FOREST	<input type="radio"/>
19. Conspicuous bald(s)	
20. Open or semi-open prairie, native grassland or meadow area	<input type="radio"/>
21. Forested wetland area	
22. Open wetland area	<input type="radio"/>
23. Forested spring or seep area	<input type="radio"/>
24. Riparian forest	<input type="radio"/>
25. Streambed with substantial amounts of large woody debris	<input type="radio"/>
26. Stream with section(s) of cascades	<input type="radio"/>
27. Streambed with section(s) of cobble or gravel	<input type="radio"/>
28. Large hollow and internally decayed tree(s)	<input type="radio"/>
29. Tree(s) with twig nests	<input type="radio"/>
30. Nesting holes in trees or snags	<input type="radio"/>
<i>Site total</i>	<input type="text"/>

TREES	E
31. Some (native) nut-, berry- or fleshy fruit trees or shrubs	<input type="radio"/>
32. Numerous (native) nut-, berry- or fleshy fruit trees or shrubs	<input type="radio"/>
33. Canopy composed of 3 or more tree species	
34. Canopy composed of 5 or more tree species	
35. Numerous hardwood trees > 10" dbh	<input type="radio"/>
36. Some hardwood trees > 20" dbh	<input type="radio"/>
37. Numerous trees > 20" dbh	<input type="radio"/>
38. Some trees > 30" dbh	<input type="radio"/>
39. Numerous trees > 30" dbh	
40. Some trees > 40" dbh	<input type="radio"/>
FOREST STRUCTURE	
41. Substantial amounts of understory and subcanopy trees	
42. Canopy and sub-canopy trees of different diameters	
43. Some large (veteran) trees from previous forest generation(s)	
44. Numerous large (veteran) trees from previous forest generation(s)	<input type="radio"/>
45. Forest area(s) remaining or retained after fire, storm or logging	<input type="radio"/>
46. Some trees with thick branches or stem forks	<input type="radio"/>
47. Some tree trunks and branches covered by mosses and lichens	
DEAD TREES, SNAGS AND DOWN LOGS	
48. Some standing dead or dying trees or snags > 10" dbh	<input type="radio"/>
49. Some standing sun-exposed dead or dying trees or snags > 10" dbh	<input type="radio"/>
50. Some standing dead or dying trees or snags > 20" dbh	<input type="radio"/>
51. Numerous standing dead or dying trees or snags > 20" dbh	
52. Some standing dead or dying trees or snags > 30" dbh	<input type="radio"/>
53. Some down logs > 20" diameter at mid-log	<input type="radio"/>
54. Some sun-exposed down logs > 20" diameter at mid-log	<input type="radio"/>
55. Some down logs > 30" diameter at mid-log	<input type="radio"/>
56. Some down logs > 40" diameter at mid-log	<input type="radio"/>
57. Down logs in various different stages of decay	<input type="radio"/>
58. Some down logs covered by mosses	<input type="radio"/>
59. Some trees, snags or logs with shelf fungi	<input type="radio"/>
60. Signs of woodpecker foraging on trees, snags or logs	<input type="radio"/>
<i>Stand total</i>	<input type="text"/>
SITE & STAND TOTAL	<input type="text"/>

W = Douglas-fir /Mixed coniferous forests west of the Cascades
 O = Oak/Douglas-fir - Oak/pine woodlands
 © FSC US, NNRG, Drakenberg / Lindhe 2012

E = early seral reference condition
 P = Ponderosa and Lodgepole pine forests east of the Cascades

Appendix A: Field Forms
Ponderosa/Eastside Biodiversity Field Form

FOREST BIODIVERSITY ASSESSMENT
Ponderosa forests - Pacific Northwest Version 1.0

Date: _____ Stand: _____

TOPOGRAPHY & SITE CHARACTERISTICS	P
1. Site on SE - SW facing slope steeper than 20 % (1:5)	<input type="checkbox"/>
2. Site on NE - NW facing slope steeper than 20 % (1:5)	<input type="checkbox"/>
3. Forested slope steeper than 60 % (3:5)	<input type="checkbox"/>
4. Conspicuous gorge or ravine	<input type="checkbox"/>
5. Conspicuous cliff, scree or talus slope	<input type="checkbox"/>
6. Large boulder(s) or rocky outcrop(s)	<input type="checkbox"/>
FOREST DYNAMICS	
7. Small (< 0.25 ac) canopy gaps	<input type="checkbox"/>
8. Medium (0.25-1 ac) canopy gap(s)	<input type="checkbox"/>
9. Larger (1-5 ac) canopy opening(s) created by wind or fire	<input type="checkbox"/>
10. Open or semi-open canopy	<input type="checkbox"/>
11. Numerous naturally regenerating tree saplings	<input type="checkbox"/>
12. Ground vegetation very patchy and heterogeneous	<input type="checkbox"/>
13. Exotic shrubs and trees absent or nearly absent	<input type="checkbox"/>
14. Trees with bark charred by recent fire	<input type="checkbox"/>
15. Living tree(s) with wounds or scars from fire	<input type="checkbox"/>
16. Living tree(s) with wounds or scars from more than one fire	<input type="checkbox"/>
17. Numerous trees or tree tops broken by ice or snow	<input type="checkbox"/>
18. Tree(s) felled by beaver or areas inundated by beaver	<input type="checkbox"/>
HABITAT IN THE FOREST	
19. Conspicuous bald(s)	<input type="checkbox"/>
20. Open or semi-open prairie, native grassland or meadow area	<input type="checkbox"/>
21. Forested wetland area	<input type="checkbox"/>
22. Open wetland area	<input type="checkbox"/>
23. Forested spring or seep area	<input type="checkbox"/>
24. Riparian forest	<input type="checkbox"/>
25. Streambed with substantial amounts of large woody debris	<input type="checkbox"/>
26. Stream with section(s) of cascades	<input type="checkbox"/>
27. Streambed with section(s) of cobble or gravel	<input type="checkbox"/>
28. Large hollow and internally decayed tree(s)	<input type="checkbox"/>
29. Tree(s) with twig nests	<input type="checkbox"/>
30. Nesting holes in trees or snags	<input type="checkbox"/>
<i>Site total</i>	<input type="checkbox"/>

W = Douglas-fir /Mixed coniferous forests west of the Cascades
O = Oak/Douglas-fir - Oak/pine woodlands
© FSC US, NNRG, Drakenberg / Lindhe 2012

TREES	P
31. Some (native) nut-, berry- or fleshy fruit trees or shrubs	<input type="checkbox"/>
32. Numerous (native) nut-, berry- or fleshy fruit trees or shrubs	<input type="checkbox"/>
33. Canopy composed of 3 or more tree species	<input type="checkbox"/>
34. Canopy composed of 5 or more tree species	<input type="checkbox"/>
35. Numerous hardwood trees > 10" dbh	<input type="checkbox"/>
36. Some hardwood trees > 20" dbh	<input type="checkbox"/>
37. Numerous trees > 20" dbh	<input type="checkbox"/>
38. Some trees > 30" dbh	<input type="checkbox"/>
39. Numerous trees > 30" dbh	<input type="checkbox"/>
40. Some trees > 40" dbh	<input type="checkbox"/>
FOREST STRUCTURE	
41. Substantial amounts of understorey and subcanopy trees	<input type="checkbox"/>
42. Canopy and sub-canopy trees of different diameters	<input type="checkbox"/>
43. Some large (veteran) trees from previous forest generation(s)	<input type="checkbox"/>
44. Numerous large (veteran) trees from previous forest generation(s)	<input type="checkbox"/>
45. Forest area(s) remaining or retained after fire, storm or logging	<input type="checkbox"/>
46. Some trees with thick branches or stem forks	<input type="checkbox"/>
47. Some tree trunks and branches covered by mosses and lichens	<input type="checkbox"/>
DEAD TREES, SNAGS AND DOWN LOGS	
48. Some standing dead or dying trees or snags > 10" dbh	<input type="checkbox"/>
49. Some standing sun-exposed dead or dying trees or snags > 10" dbh	<input type="checkbox"/>
50. Some standing dead or dying trees or snags > 20" dbh	<input type="checkbox"/>
51. Numerous standing dead or dying trees or snags > 20" dbh	<input type="checkbox"/>
52. Some standing dead or dying trees or snags > 30" dbh	<input type="checkbox"/>
53. Some down logs > 20" diameter at mid-log	<input type="checkbox"/>
54. Some sun-exposed down logs > 20" diameter at mid-log	<input type="checkbox"/>
55. Some down logs > 30" diameter at mid-log	<input type="checkbox"/>
56. Some down logs > 40" diameter at mid-log	<input type="checkbox"/>
57. Down logs in various different stages of decay	<input type="checkbox"/>
58. Some down logs covered by mosses	<input type="checkbox"/>
59. Some trees, snags or logs with shelf fungi	<input type="checkbox"/>
60. Signs of woodpecker foraging on trees, snags or logs	<input type="checkbox"/>
<i>Stand total</i>	<input type="checkbox"/>
SITE & STAND TOTAL	<input type="checkbox"/>

E = early seral reference condition
P = Ponderosa and Lodgepole pine forests east of the Cascades