



**DEPARTMENT OF
NATURAL RESOURCES**

Forest Practices Division
1111 Washington St SE
Olympia, WA 98504

360-902-1400
WWW.DNR.WA.GOV

April 25, 2023

TO: Forest Practices Board

FROM: Marc Engel, Senior Policy Planner, Forest Regulation

SUBJECT: Marbled Murrelet Assessment and Rule Making

A handwritten signature in blue ink, appearing to read "ME", is placed over the "FROM:" line of the memo.

Background

The Forest Practices Board (Board) in response to the federal listing of the Marbled Murrelet as a Threatened Species under the US Endangered Species Act in 1992, adopted permanent rules for the protection of the species effective in August, 1997.

In February 2017, the Washington State Fish and Wildlife Commission approved the Washington Department of Fish and Wildlife (WDFW) recommendation to up-list the Marbled Murrelet from state threatened to state endangered. With this status change, the Board supported the DNR and WDFW recommendation to identify and avoid forest practice activities that are likely to have a significant adverse impact on the species, and approved the WDFW request to assemble a Wildlife Working Group to initiate a Marbled Murrelet rules assessment to determine whether non-federal habitat is being adequately protected and if any rule amendments, changes, or clarifications are warranted.

In February 2018, WDFW convened a Marbled Murrelet Wildlife Working Group (WWG) with stakeholders representing Washington Association of Counties, Washington Forest Protection Association, Washington Farm Forestry Association, Washington Conservation Caucus, U.S. Fish and Wildlife Service, DNR, and WDFW. The results of the working group process including their objectives, conclusions, and recommendations are attached in the following documents: *Washington Forest Practices Rules Stakeholder Assessment and Recommendations for the Marbled Murrelet* and the *Executive Summary of the Report*; and the *Washington Forest Practices Rules for Marbled Murrelet Issues and Recommendations*.

Recommendation

The Washington Departments of Fish and Wildlife and Natural Resources recommend the Board:

- Accept the draft forest practices rules and board manual guidance recommendations as documented in attachment 1; and
- Initiate the expedited rule adoption process, and direct board staff to amend Board Manual Section 15 to add recommended language.

Rule Making Considerations

The manner in which WDFW assembled the Marbled Murrelet Wildlife Working Group and structured the development of recommended rule changes has made possible the opportunity for the Board under the

Administrative Procedures Act, Chapter 34.05 RCW, to adopt the amended Marbled Murrelet rules through the expedited rule making process.

A description of how the Marbled Murrelet rule may be adopted through an Expedited rule making:

1. Negotiated rule development. To encourage agencies to reach agreement among interested parties in the development of rules, the Legislature established the opportunity for negotiated rulemaking. RCW 34.05.310(2) (a). The development of the draft rules was accomplished by a WDFW facilitated process where the WWG stakeholders participated in “Negotiated rule making by which representatives of an agency and of the interests that are affected by a subject of rulemaking, including, where appropriate, county . . . representatives, seek to reach consensus on the terms of the proposed rule and on the process by which it is negotiated.” *Id.*
2. Expedited rule making. The Legislature established the ability for the Board to adopt rules through expedited rule making. RCW 34.05.353 (1) (e). “An agency may file notice for the expedited adoption of rules . . . for rules meeting . . . negotiated rule making . . . that involved substantial participation by interested parties before the development of the proposed rule.” *Id.*
 - a. The expedited rule-making process must follow the requirements for a standard rule making with some exceptions. RCW 34.05.353. The Board “is not required to prepare a small business economic impact statement . . . , a statement indicating whether the rule constitutes a significant legislative rule . . . , or a significant legislative rule analysis (CBA) . . . An agency is not required to . . . conduct a hearing for the expedited rule making.” *Id.*
 - b. There are specific requirements the Board must consider before initiating expedited rule making. RCW 34.05.353. An expedited rule making is made available for public review through the Washington State register, during this time “Any person may file a written objection to the expedited rule making. The objection must be filed with the agency rules coordinator within forty-five days . . . A person who has filed a written objection to the expedited rule making may withdraw the objection. . . If no written objections to the expedited rule making are filed with the agency within forty-five days after the notice of proposed expedited rule making is published, or if all objections that have been filed are withdrawn by the persons filing the objections, the agency may enter an order adopting . . . the rule without further notice or a public hearing . . . If a written notice of objection to the expedited rule making is timely filed with the agency and is not withdrawn . . . the agency may initiate further rule-making proceedings.” *Id.*

DNR and WDFW will provide a summary of the Marbled Murrelet habitat and forest practices rules assessment; proposed rule and board manual guidance changes; and recommended rule making process for the Board’s consideration at the May meeting. If you have any questions please contact Marc Engel at 360 628-1107 or marc.engel@dnr.wa.gov ; or, Darric Lowery at 360 628-7137 or Darric.Lowery@dfw.wa.gov .

ME/

Attachments: 1-Rule Proposal / 2-Stakeholder Assessment and Recommendations Report / 3-Executive Summary of Stakeholder Assessment and Recommendations Report / 4-Issues and Recommendations

DRAFT
Rule Proposal for Marbled Murrelet
FOREST PRACTICES BOARD
May 2023

WAC 222-10-042 Marbled murrelets. The following policies shall apply to forest practices subject to SEPA where the forest practices may cause adverse impacts to marbled murrelets.

(1) **Within an occupied marbled murrelet site,** forest practices that will adversely impact this habitat will likely have a probable significant adverse impact on the environment except where the department determines, in consultation with the department of fish and wildlife, that the applicant’s proposal will actually have no significant adverse impact.

(2) **Within marbled murrelet detection areas:**

(a) ~~Suitable marbled murrelet habitat with at least a 50% probability of occupancy is assumed to have a high likelihood of marbled murrelet occupancy. It is currently assumed that 5 platforms per acre meets the 50% probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment.~~

~~(b)~~ Suitable marbled murrelet habitat with at least a 30% ~~but less than 50%~~ probability of occupancy has a sufficiently high likelihood of marbled murrelet occupancy to warrant a survey. ~~This additional information is necessary for the department to evaluate the environmental impact of the forest practice.~~ It is currently assumed that 2 platforms per acre meets the 30% probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment.

——— A landowner may request the department of fish and wildlife to survey. The department of fish and wildlife should survey to the maximum extent practicable based on an appropriation to survey marbled murrelet suitable habitat within detection areas where the landowner provides access for surveys to the department of fish and wildlife, and sufficient time is allowed to complete the protocol surveys. The department shall provide a notice to the landowner within 60 days from the date of application of the department of fish and wildlife’s intent to survey. If the department of fish and wildlife cannot conduct marbled murrelet surveys the responsibility for surveys remains with the landowner.

(3) **Outside a marbled murrelet detection area:**

(a) Suitable marbled murrelet habitat with at least a 60% probability of occupancy is assumed to have a high likelihood of marbled murrelet occupancy. It is currently assumed that 7 platforms per acre meets the 60% probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment.

(b) Within a marbled murrelet special landscape suitable marbled murrelet habitat with at least a 50% probability of occupancy is assumed to have a high likelihood of marbled murrelet occupancy. It is currently assumed that five platforms per acre meets the fifty percent probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment.

Attachment 1

1 (4) The adjacent forested area within 300 feet of “suitable marbled murrelet habitat” described in
2 subsections (2) and (3) is assumed to be necessary for buffering potentially occupied habitat
3 as defined in WAC 222-16-080 (1)(h)(v). This additional information on the forested area
4 within 300 feet of “suitable habitat” is necessary for the department to evaluate the
5 environmental impact of the forest practice. Without survey information, forest practices that
6 will adversely impact this buffer may have a probable significant adverse impact on the
7 environment.

8 (5) When determining whether a forest practice will have a probable significant adverse impact
9 on the environment, the department shall, in consultation with the department of fish and
10 wildlife, evaluate the impacts on the state-wide, regional (Southwest Washington, Olympic
11 Peninsula, Hood Canal, North Puget Sound, South Puget Sound and South Cascades) and
12 local (within the marbled murrelet detection area) marbled murrelet populations and
13 associated habitats. The department should consider a variety of information including but not
14 limited to survey data, habitat quality and patch size, the amount of edge in relation to the area
15 of habitat, amount of interior habitat, distance from saltwater, detection rates, the amount and
16 quality of habitat, the likelihood of predation and the recovery goals for the marbled murrelet.

17 (56) The platform assumptions set forth above are based on regional data. Applicants or others
18 may submit information to the department which was gathered in conjunction with a marbled
19 murrelet survey agreement with the department of fish and wildlife, and other reliable
20 information that is more current, or specific to the platform numbers in the marbled murrelet
21 suitable habitat definition. The department shall use such information in making its
22 determinations under this section where the department finds, in consultation with the
23 department of fish and wildlife, that the information is more likely to be valid for a particular
24 WRIA or physiographic province. If the department does not use the information, it shall
25 explain its reasons in writing to the applicant.
26
27

WAC 222-12-090 Forest practices board manual.

28
29 When approved by the board the manual serves as an advisory technical supplement to these forest
30 practices rules. The department, in cooperation with the departments of fish and wildlife, agriculture,
31 ecology, and such other agencies, affected Indian tribes, or interested parties as may have appropriate
32 expertise, is directed to prepare, and submit to the board for approval, revisions to the forest practices
33 board manual. The manual shall include:

- 34 (1) **Method for determination of adequate shade requirements on streams** needed for use
35 with WAC 222-30-040.
- 36 (2) Standards for identifying channel migration zones and bankfull channel features.
- 37 (3) **Guidelines** for forest roads.
- 38 (4) **Guidelines** for clearing slash and debris from Type Np and Ns Waters.
- 39 (5) **Guidelines** for forest practices hydraulic projects.
- 40 (6) **Guidelines** for determining acceptable stocking levels.
- 41 (7) **Guidelines** for riparian management zones.
- 42 (8) **Guidelines** for wetland delineation.
- 43 (9) **Guidelines** for wetland replacement or substitution.
- 44 (10) A list of nonnative wetland plant species.

Attachment 1

- 1 (11) The standard methodology for conducting watershed analysis shall specify the quantitative
2 methods, indices of resource conditions, and definitions, for conducting watershed analysis
3 under chapter 222-22 WAC. The methodology shall also include a cultural resource module
4 that shall specify the quantitative and qualitative methods, indices of resource conditions, and
5 guidelines for developing voluntary management strategies for cultural resources. Except for
6 cultural resources, the department, in consultation with Timber/Fish/Wildlife's Cooperative
7 Monitoring, Evaluation and Research Committee (CMER), may make minor modifications to
8 the version of the standard methodology approved by the board. Substantial amendments to
9 the standard methodology requires approval by the board.
- 10 (12) **Guidelines** for forest chemicals.
- 11 (a) A list of special concerns related to aerial application of pesticides developed under
12 WAC 222-16-070(3).
- 13 (b) Guidelines for aerial applications of pesticides and other forest chemicals under
14 chapter 222-38 WAC.
- 15 (13) **Guidelines** for determining fish use for the purpose of typing waters under WAC 222-16-031.
- 16 (14) **Survey protocol for marbled murrelets.** The most current Pacific Seabird Group terrestrial
17 survey protocol dated January 6, 2003, and formally titled *Methods for Surveying Marbled*
18 *Murrelets in Forests: A Revised Protocol for Land Management and Research*, shall be used
19 when surveying for marbled murrelets in a stand. Surveys are valid if they were conducted in
20 compliance with the board-recognized Pacific Seabird Group survey protocols in effect at the
21 beginning of the season in which the surveys were conducted.
- 22 (15) The department shall, in consultation with the department of fish and wildlife, develop:
- 23 (a) platform-Platform protocols for use by applicants in estimating the number of
24 platforms, and by the department in reviewing and classifying forest practices under
25 WAC 222-16-050. These protocols shall include:
- 26 (ai) A sampling method to determine platforms per acre in the field;
- 27 (bii) A method to predict the number of platforms per acre based on information
28 measurable from typical forest inventories. The method shall be derived from
29 regression models or other accepted statistical methodology, and incorporate
30 the best available data; and
- 31 (eiii) Other methods determined to be reliable by the department, in consultation
32 with the department of fish and wildlife.
- 33 (b) Guidance for applications classified by the department under WAC 222-16-080 (1) (h)
34 (v) to be Class IV-Special forest practices for lands designated as critical habitat
35 (state) for marbled murrelet (*Brachyramphus marmoratus*) for the following two
36 forest practices activities:
- 37 (i) Harvesting within a 150-foot no-cut inner zone buffer of a 300-foot managed
38 buffer zone adjacent to an occupied marbled murrelet site.
- 39 (ii) Harvesting within a 150-foot outer zone managed buffer of a 300-foot managed
40 buffer zone adjacent to an occupied marbled murrelet site that results in less than a
41 residual stand relative density of 35 for Douglas-fir or red alder dominant species
42 group or a residual stand relative density of 50 for Western hemlock dominant
43 species group.
- 44 (16) **Guidelines** for evaluating potentially unstable slopes and landforms.
- 45 (17) **Guidelines** for the small forest landowner forestry riparian easement program.
- 46 (18) **Guidelines** for rivers and habitat open space program.
- 47 (19) **Guidelines** for hardwood conversion.

Attachment 1

- 1 (20) **Guidelines** for financial assurances.
- 2 (21) **Guidelines** for alternate plans.
- 3 (22) **Guidelines** for adaptive management program.
- 4 (23) **Guidelines** for field protocol to locate mapped divisions between stream types and perennial stream identification.
- 5
- 6 (24) **Guidelines** for interim modification of bull trout habitat overlay.
- 7 (25) **Guidelines** for bull trout presence survey protocol.
- 8 (26) **Guidelines** for placement strategy for woody debris in streams.
- 9

10
11 **WAC 222-16-010 *General definitions.**

12 Unless otherwise required by context, as used in these rules:

13 **"Act"** means the Forest Practices Act, chapter 76.09 RCW.

14 **"Affected Indian tribe"** means any federally recognized Indian tribe that requests in writing from the department information on forest practices applications and notification filed on specified areas.

15 **"Alluvial fan"** see "sensitive sites" definition.

16 **"Appeals board"** means the pollution control hearings board established in RCW 43.21B.010.

17 **"Aquatic resources"** means water quality, fish, the Columbia torrent salamander (*Rhyacotriton kezeri*), the Cascade torrent salamander (*Rhyacotriton cascadae*), the Olympic torrent salamander (*Rhyacotriton olympian*), the Dunn's salamander (*Plethodon dunni*), the Van Dyke's salamander (*Plethodon vandyke*), the Tailed frog (*Ascaphus truei*) and their respective habitats.

18 ...

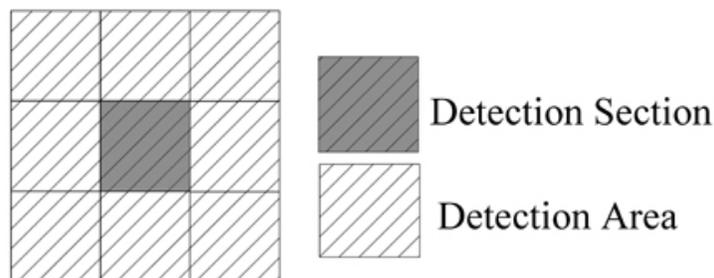
19 **"Critical habitat (federal)"** means the habitat of any threatened or endangered species designated as critical habitat by the United States Secretary of the Interior or Commerce under Sections 3 (5)(A) and 4 (a)(3) of the Federal Endangered Species Act.

20 **"Critical habitat (state)"** means those habitats designated by the board in accordance with WAC 222-16-080.

21 **"Critical nesting season"** means for marbled murrelets - April 1 to August 31.

22 ...

23 **"Marbled murrelet detection area"** means an area of land associated with a visual or audible detection of a marbled murrelet, made by a qualified surveyor which is documented and recorded in the department of fish and wildlife data base. The marbled murrelet detection area shall be comprised of the section of land in which the marbled murrelet detection was made and the eight sections of land immediately adjacent to that section.



36

Attachment 1

1 **"Marbled murrelet nesting platform"** means any horizontal tree structure such as a limb, an area
2 where a limb branches, a surface created by multiple leaders, a deformity, or a debris/moss platform
3 or stick nest equal to or greater than 7 inches in diameter including associated moss if present, that is
4 50 feet or more above the ground in trees 32 inches dbh and greater (generally over 90 years of age)
5 and is capable of supporting nesting by marbled murrelets.

6 ...

7 **"Occupied marbled murrelet site"** means:

- 8 (1) A contiguous area of suitable marbled murrelet habitat where at least one of the following
9 marbled murrelet behaviors or conditions occur:
 - 10 (a) A nest is located; or
 - 11 (b) Downy chicks or eggs or egg shells are found; or
 - 12 (c) Marbled murrelets are detected flying below, through, into or out of the forest canopy;
13 or
 - 14 (d) Birds calling from a stationary location within the area; or
 - 15 (e) Birds circling above a timber stand within one tree height of the top of the canopy; or
- 16 (2) A contiguous forested area, which does not meet the definition of suitable marbled murrelet
17 habitat, in which any of the behaviors or conditions listed above has been documented by the
18 department of fish and wildlife and which is distinguishable from the adjacent forest based on
19 vegetative characteristics important to nesting marbled murrelets.
- 20 (3) For sites defined in (1) and (2) above, the sites will be presumed to be occupied based upon
21 observation of circling described in (1)(e), unless a two-year survey following the 2003
22 Pacific Seabird Group (PSG) protocol has been completed and an additional third-year of
23 survey following a method listed below is completed and none of the behaviors or conditions
24 listed in (1)(a) through (d) of this definition are observed. The landowner may choose one of
25 the following methods for the third-year survey:
 - 26 (a) Conduct a third-year survey with a minimum of nine visits conducted in compliance
27 with 2003 PSG protocol. If one or more marbled murrelets are detected during any of
28 these nine visits, three additional visits conducted in compliance with the protocol of
29 the first nine visits shall be added to the third-year survey. Department of fish and
30 wildlife shall be consulted prior to initiating third-year surveys; or
 - 31 (b) Conduct a third-year survey designed in consultation with the department of fish and
32 wildlife to meet site specific conditions.
- 33 (4) For sites defined in (1) above, the outer perimeter of the occupied site shall be presumed to be
34 the closer, measured from the point where the observed behaviors or conditions listed in (1)
35 above occurred, of the following:
 - 36 (a) 1.5 miles from the point where the observed behaviors or conditions listed in (1) above
37 occurred; or
 - 38 (b) The beginning of any gap greater than 300 feet wide lacking one or more of the
39 vegetative characteristics listed under "suitable marbled murrelet habitat"; or
 - 40 (c) The beginning of any narrow area of "suitable marbled murrelet habitat" less than 300
41 feet in width and more than 300 feet in length.
- 42 (5) For sites defined under (2) above, the outer perimeter of the occupied site shall be presumed
43 to be the closer, measured from the point where the observed behaviors or conditions listed in
44 (1) above occurred, of the following:
 - 45 (a) 1.5 miles from the point where the observed behaviors or conditions listed in (1) above
46 occurred; or

Attachment 1

- 1 (b) The beginning of any gap greater than 300 feet wide lacking one or more of the
- 2 distinguishing vegetative characteristics important to murrelets; or
- 3 (c) The beginning of any narrow area of suitable marbled murrelet habitat, comparable to
- 4 the area where the observed behaviors or conditions listed in (1) above occurred, less
- 5 than 300 feet in width and more than 300 feet in length.
- 6 (6) In determining the existence, location and status of occupied marbled murrelet sites, the
- 7 department shall consult with the department of fish and wildlife and use only those sites
- 8 documented in substantial compliance with guidelines or protocols and quality control
- 9 methods established by and available from the department of fish and wildlife.

10 ...

11 **"Public resources"** means water, fish, and wildlife and in addition means capital improvements of

12 the state or its political subdivisions.

13 ...

14 **"Suitable marbled murrelet habitat"** means for the purpose of conducting a protocol survey, a

15 contiguous forested area containing trees capable of providing nesting opportunities: with

16 ~~With~~ all of the following indicators unless the department, in consultation with the department of fish

17 and wildlife, has determined that the habitat is not likely to be occupied by marbled murrelets:

- 18 (a) Within 50 miles of marine waters;
- 19 (b) At least forty percent of the dominant and codominant trees are ~~Douglas fir, western hemlock,~~
- 20 ~~western red cedar or sitka spruce~~ conifer tree species;
- 21 (c) Two or more nesting platforms per acre;
- 22 (d) At least 7.5 acres in size, ~~including the contiguous forested area within 300 feet of nesting~~
- 23 ~~platforms, with similar forest stand characteristics (age, species composition, forest structure)~~
- 24 ~~to the forested area in which the nesting platforms occur~~ (minimum convex polygon), of
- 25 qualifying platform-bearing trees.

26 **"Suitable spotted owl habitat"** see WAC 222-16-085(1).

27 ...

28 **"Young forest marginal habitat"** see WAC 222-16-085 (1)(b).

30

31 **WAC 222-16-080 Critical habitats (state) of threatened and endangered species.**

- 32 (1) Critical habitats (state) of threatened or endangered species and specific forest practices
- 33 designated as Class IV-Special are as follows:
- 34 (a) Gray wolf (*Canis lupus*) - harvesting, road construction, or site preparation within 1
- 35 mile of a known active den site, documented by the department of fish and wildlife,
- 36 between the dates of March 15 and July 30 or 0.25 mile from the den site at other
- 37 times of the year.
- 38 (b) Grizzly bear (*Ursus arctos*) - harvesting, road construction, aerial application of
- 39 pesticides, or site preparation within 1 mile of a known active den site, documented by
- 40 the department of fish and wildlife, between the dates of October 1 and May 30 or 0.25
- 41 mile at other times of the year.
- 42 (c) Mountain (woodland) caribou (*Rangifera tarandus*) - harvesting, road construction,
- 43 aerial application of pesticides, or site preparation within 0.25 mile of a known active
- 44 breeding area, documented by the department of fish and wildlife.
- 45 (d) Oregon silverspot butterfly (*Speyeria zerene hippolyta*) - harvesting, road construction,
- 46 aerial or ground application of pesticides, or site preparation within 0.25 mile of an
- 47 individual occurrence, documented by the department of fish and wildlife.

Attachment 1

- 1 (e) Sandhill crane (*Grus canadensis*) - harvesting, road construction, aerial application of
2 pesticides, or site preparation within 0.25 mile of a known active nesting area,
3 documented by the department of fish and wildlife.
- 4 (f) Northern spotted owl (*Strix occidentalis caurina*).
- 5 (i) **Within a SOSEA boundary** (see maps in WAC 222-16-086), except as
6 indicated in (f)(ii) of this subsection, harvesting, road construction, or aerial
7 application of pesticides on suitable spotted owl habitat within a median home
8 range circle that is centered within the SOSEA or on adjacent federal lands.
- 9 (ii) **Within the Entiat SOSEA**, harvesting, road construction, or aerial application
10 of pesticides within the areas indicated for demographic support (see WAC
11 222-16-086(2)) on suitable spotted owl habitat located within a median home
12 range circle that is centered within the demographic support area.
- 13 (iii) **Outside of a SOSEA**, harvesting, road construction, or aerial application of
14 pesticides, between March 1 and August 31 on the seventy acres of highest
15 quality suitable spotted owl habitat surrounding a northern spotted owl site
16 center located outside a SOSEA. The highest quality suitable habitat shall be
17 determined by the department in cooperation with the department of fish and
18 wildlife. Consideration shall be given to habitat quality, proximity to the
19 activity center and contiguity.
- 20 (iv) **Small parcel northern spotted owl exemption.** Forest practices proposed on
21 the lands owned or controlled by a landowner whose forest land ownership
22 within the SOSEA is less than or equal to 500 acres and where the forest
23 practice is not within 0.7 mile of a northern spotted owl site center shall not be
24 considered to be on lands designated as critical habitat (state) for northern
25 spotted owls.
- 26 (g) Pacific pond turtle (*Actinemys marmorata*) - harvesting, road construction, aerial
27 application of pesticides, or site preparation within 0.25 mile of a known individual
28 occurrence, documented by the department of fish and wildlife.
- 29 (h) Marbled murrelet (*Brachyramphus marmoratus*).
- 30 (i) Harvesting, other than removal of down trees outside of the critical nesting
31 season, or road construction within an occupied marbled murrelet site.
- 32 (ii) Harvesting, other than removal of down trees outside of the critical nesting
33 season, or road construction within suitable marbled murrelet habitat within a
34 marbled murrelet detection area.
- 35 (iii) Harvesting, other than removal of down trees outside of the critical nesting
36 season, or road construction within suitable marbled murrelet habitat
37 containing 7 platforms per acre outside a marbled murrelet detection area.
- 38 (iv) Harvesting, other than removal of down trees outside of the critical nesting
39 season, or road construction outside a marbled murrelet detection area within a
40 marbled murrelet special landscape and within suitable marbled murrelet
41 habitat with 5 or more platforms per acre.
42

Attachment 1

- 1 (v) Harvesting within a 300 foot managed buffer zone adjacent to an occupied
2 marbled murrelet site that results in ~~less than a residual stand stem density of~~
3 ~~75 trees per acre greater than 6 inches in dbh; provided that 25 of which shall~~
4 ~~be greater than 12 inches dbh including 5 trees greater than 20 inches in dbh;~~
5 ~~where they exist~~ no-cut inner zone of 150 feet and a 150 feet outer zone
6 managed by relative density by major habitat type: ≥ 50 for hemlock – spruce
7 dominant and ≥ 35 for Douglas-fir and red alder dominant. The inner zone of
8 the buffer shall begin at the edge of the outer extent of the platform trees of the
9 occupied habitat. The primary consideration for the design of managed buffer
10 zone widths and leave tree retention patterns shall be to ~~mediate~~ help minimize
11 edge effects. The width of the buffer zone may be reduced in some areas to a
12 minimum of 200 feet and extended to a maximum of 400 feet as long as the
13 average of 300 feet is maintained. WDFW to consult with landowner on
14 managed buffer.
- 15 (vi) Except that the following shall not be critical habitat (state):
- 16 (A) Where a landowner owns less than 500 acres of forest land within 50
17 miles of saltwater and the land does not contain an occupied marbled
18 murrelet site or the 300-foot average buffer of an occupied marbled
19 murrelet site; or
- 20 (B) Where a protocol survey (see WAC 222-12-090(14)) has been
21 conducted and no murrelets were detected. The landowner is then
22 relieved from further survey requirements. However, if an occupied
23 marbled murrelet site is established, this exemption is void.
- 24 (2) The following critical habitats (federal) designated by the United States Secretary of the
25 Interior or Commerce, or specific forest practices within those habitats, have been determined
26 to have the potential for a substantial impact on the environment and therefore are designated
27 as critical habitats (state) of threatened or endangered species.
- 28 (3) For the purpose of identifying forest practices which have the potential for a substantial
29 impact on the environment with regard to threatened or endangered species newly listed by
30 the Washington fish and wildlife commission and/or the United States Secretary of the
31 Interior or Commerce, the department shall after consultation with the department of fish and
32 wildlife, prepare and submit to the board a proposed list of critical habitats (state) of
33 threatened or endangered species. This list shall be submitted to the board within 30 days of
34 the listing of the species. The department shall, at a minimum, consider potential impacts of
35 forest practices on habitats essential to meeting the life requisites for each species listed as
36 threatened or endangered. Those critical habitats (state) adopted by the board shall be added
37 to the list in subsection (1) of this section. See WAC 222-16-050 (1)(b).
- 38 (4) For the purpose of identifying any areas and/or forest practices within critical habitats
39 (federal) designated by the United States Secretary of the Interior or Commerce which have
40 the potential for a substantial impact on the environment, the department shall, after
41 consultation with the department of fish and wildlife, submit to the board a proposed list of
42 any forest practices and/or areas proposed for inclusion in Class IV - Special forest practices.
43 The department shall submit the list to the board within 30 days of the date the United States
44 Secretary of the Interior or Commerce publishes a final rule designating critical habitat
45 (federal) in the Federal Register. Those critical habitats included by the board in Class IV -
46 Special shall be added to the list in subsection (2) of this section. See WAC 222-16-050
47 (1)(b).

Attachment 1

- 1 (5) (a) The critical habitats (state) of threatened and endangered species and specific forest
2 practices designated in subsections (1) and (2) of this section are intended to be
3 interim. These interim designations shall expire for a given species on the earliest of:
4 (i) The effective date of a regulatory system for wildlife protection referred to in
5 (b) of this subsection or of substantive rules on the species.
6 (ii) The delisting of a threatened or endangered species by the Washington fish and
7 wildlife commission and by the United States Secretary of Interior or
8 Commerce.
- 9 (b) The board shall examine current wildlife protection and department authority to
10 protect wildlife and develop and recommend a regulatory system, including baseline
11 rules for wildlife protection. To the extent possible, this system shall:
12 (i) Use the best science and management advice available;
13 (ii) Use a landscape approach to wildlife protection;
14 (iii) Be designed to avoid the potential for substantial impact to the environment;
15 (iv) Protect known populations of threatened and endangered species of wildlife
16 from negative effects of forest practices consistent with RCW 76.09.010; and
17 (v) Consider and be consistent with recovery plans adopted by the department of
18 fish and wildlife pursuant to RCW 77.12.020(6) or habitat conservation plans
19 or 16 U.S.C. 1533(d) rule changes of the Endangered Species Act.
- 20 (6) Regardless of any other provision in this section, forest practices applications shall not be
21 classified as Class IV-Special based on critical habitat (state) (WAC 222-16-080 and 222-16-
22 050 (1)(b)) for a species, if the forest practices are consistent with one or more of the
23 following:
- 24 (a) Documents addressing the needs of the affected species provided such documents have
25 received environmental review with an opportunity for public comment under the
26 National Environmental Policy Act, 42 U.S.C. section 4321 et seq.:
- 27 (i) A habitat conservation plan and incidental take permit; or an incidental take
28 statement covering such species approved by the Secretary of the Interior or
29 Commerce pursuant to 16 U.S.C. § 1536 (b) or 1539 (a); or
30 (ii) An “unlisted species agreement” covering such species approved by the U.S.
31 Fish and Wildlife Service or National Marine Fisheries Service; or
32 (iii) Other conservation agreement entered into with a federal agency pursuant to its
33 statutory authority for fish and wildlife protection that addresses the needs of
34 the affected species; or
35 (iv) A rule adopted by the U.S. Fish and Wildlife Service or the National Marine
36 Fisheries Service for the conservation of an affected species pursuant to 16
37 U.S.C. section 1533(d); or
- 38 (b) Documents addressing the needs of the affected species so long as they have been
39 reviewed under the State Environmental Policy Act;
- 40 (i) A landscape management plan; or
41 (ii) Another cooperative or conservation agreement entered into with a state
42 resource agency pursuant to its statutory authority for fish and wildlife
43 protection;
- 44 (c) A special wildlife management plan (SWMP) developed by the landowner and
45 approved by the department in consultation with the department of fish and wildlife;
- 46 (d) A landowner option plan (LOP) for northern spotted owls developed pursuant to WAC
47 222-16-100(1);

Attachment 1

- 1 (e) A cooperative habitat enhancement agreement (CHEA) developed pursuant to WAC
2 222-16-105; or
- 3 (f) A take avoidance plan issued by the U.S. Fish and Wildlife Service or the National
4 Marine Fisheries Service prior to March 20, 2000.
- 5 (g) Surveys demonstrating the absence of northern spotted owls at a northern spotted owl
6 site center have been reviewed and approved by the department of fish and wildlife
7 and all three of the following criteria have been met:
 - 8 (i) The site has been evaluated by the spotted owl conservation advisory group,
9 and
 - 10 (ii) As part of the spotted owl conservation advisory group's evaluation, the
11 department's representative has consulted with the department of fish and
12 wildlife, and
 - 13 (iii) The spotted owl conservation advisory group has reached consensus that the
14 site need not be maintained while the board completes its evaluation of rules
15 affecting the northern spotted owl. The spotted owl conservation advisory
16 group shall communicate its findings to the department in writing within sixty
17 days of the department of fish and wildlife's approval of surveys demonstrating
18 the absence of northern spotted owls.

19 In those situations where one of the options above has been used, forest practices applications
20 may still be classified as Class IV-Special based upon the presence of one or more of the
21 factors listed in WAC 222-16-050(1), other than critical habitat (state) for the species covered
22 by the existing plan or evaluations.

- 23 (7) The department, in consultation with the department of fish and wildlife, shall review each
24 SOSEA to determine whether the goals for that SOSEA are being met through approved
25 plans, permits, statements, letters, or agreements referred to in subsection (6) of this section.
26 Based on the consultation, the department shall recommend to the board the suspension,
27 deletion, modification or reestablishment of the applicable SOSEA from the rules. The
28 department shall conduct a review for a particular SOSEA upon approval of a landowner
29 option plan, a petition from a landowner in the SOSEA, or under its own initiative.
- 30 (8) The department, in consultation with the department of fish and wildlife, shall report annually
31 to the board on the status of the northern spotted owl to determine whether circumstances
32 exist that substantially interfere with meeting the goals of the SOSEAs.

Attachment 1

Board Manual Guidance for Marbled Murrelet FOREST PRACTICES BOARD May 2023

The accompanying guidance follows for insertion into Board Manual Section 15, per WAC 222-12-090 (15),

Specific forest practices on lands designated as Critical habitat (state) for Marbled Murrelet (*Brachyramphus marmoratus*) have been determined to have potential for a substantial impact on the environment and have been classified by the department to be Class IV-Special Forest Practices. The following two forest practices have been so classified as Class IV-Special Forest Practices under WAC 222-16-080 (1) (h) (v):

1. Harvesting within a 150-foot no-cut inner zone buffer of a 300-foot managed buffer zone adjacent to an Occupied marbled murrelet site.
2. Harvesting within a 150-foot outer zone managed buffer of a 300-foot managed buffer zone adjacent to an Occupied marbled murrelet site that
3. results in less than a residual stand relative density of 35 (Douglas-fir or red alder dominant species group) or a residual stand relative density of 50 (Western hemlock dominant species group).

The total width of the 300-foot managed buffer zone may be reduced in some areas to a minimum of 200 feet and extended to a maximum of 400 feet as long as the average of 300 feet is maintained; however, a 150-foot no-cut inner zone buffer adjacent to the Occupied marbled murrelet habitat will be retained in these reduced or extended buffer zones.

Per WAC 222-16-080 (1) (h) (v), the primary consideration for the design of managed buffer zone widths and leave tree retention patterns is to help minimize edge effects, including effects from prevailing wind patterns.

The following is simplified guidance for 1) field layout of an outer zone managed buffer within a 300-foot managed buffer adjacent to an Occupied marbled murrelet site to produce a residual stand Relative Density of at least 35 (Douglas-fir or red alder dominant species group) or a residual stand Relative Density of at least 50 (Western hemlock dominant species group) following harvest and 2) conducting the harvest within the outer zone managed buffer.

Simplified Guidance for field layout and conducting harvest within a Marbled Murrelet outer zone managed buffer²

2 Tables referenced in this section were omitted for clarity. See WDFW 2023 – MAMU Briefing Report.

If you intend to utilize an outer zone managed buffer (managed buffer zone) adjacent to an Occupied marbled murrelet site, determine (mark in the field) the inner and outer edges of the proposed 150-foot managed buffer zone adjacent to the Occupied marbled murrelet site.

Attachment 1

The tree retention requirements (the target leave tree stocking levels following harvest) are determined by calculating the quadratic mean diameter (QMD) of the stand within the managed buffer zone and by knowing the dominant species group (see “Dominant species group” information box) within your proposed managed buffer zone. The QMD method works well in even-aged stands where the dominant and codominant trees are of uniform diameter.

Use a sample cruise (using fixed-radius or variable plots) to determine the QMD of the trees within your delineated managed buffer zone, as well as the dominant species group (Douglas-fir, western hemlock or red alder) within this buffer.

Measure the dbh (diameter at breast height, i.e., 4.5 feet above the ground) of each sampled tree and note the dominant species group (Douglas-fir, western hemlock or red alder) of each tree that falls within cruise area. Determine for each tree you have measured whether it is a legacy tree (see description in Appendix B) or not a legacy tree. The vast majority of managed buffer zone stands adjacent to Occupied marbled murrelet sites will likely be even-aged but may have some legacy conifer trees, but identifying which trees are legacy trees is critically important to the proper calculation of QMD for the trees within the managed buffer.

Dominant species group: Dominant species group is determined by stem count of trees greater than or equal to 6” dbh. If there are more Douglas-fir stems than other conifer and hardwood tree species stems, choose Douglas-fir as the dominant species. If there are more other conifer stems than Douglas-fir and hardwood species stems, choose western hemlock as the dominant species group. If there are more red alder / hardwood stems than conifer stems, choose red alder as the dominant species group.

As you measure each tree, either a) directly enter the diameter and species group you have measured into the appropriate category (“Legacy” tree category or “Non-Legacy” tree category) in the “QMD Calculator” smartphone application (to be provided) or b) record (on any paper form of your choice) the diameter and species group of each measured tree, again making sure to note whether the tree is a Legacy or Non-Legacy and then input your data into the “QMD Calculator” computer application (to be provided).

The QMD Calculator will provide the calculated QMD for the Non-Legacy trees within your managed buffer zone stand, as well as the estimated number of Legacy trees within your managed buffer zone, based on your sample cruise. It will also provide the “Dominant species group”, Douglas-fir, western hemlock or red alder.

Use the identified “Dominant species group” category to determine which Modified Curtis Relative Density Calculator” table you should use (Douglas-fir / Red alder or Western Hemlock). Using the appropriate species table and the calculated non-Legacy QMD for your managed buffer zone, find the stand QMD in the table and determine the calculated number of conifers “Leave Trees/Acre (Minimum)” to retain after partial harvest.

Attachment 1

Use this calculated minimum number of leave trees per acre to determine the actual trees you must retain within your managed buffer zone. **If there are no legacy conifer trees within your managed buffer zone**, merely use this calculated minimum number of leave trees per acre for your field layout of leave trees within your managed buffer zone, using the appropriate “Average Tree Spacing (Feet)” figure from the table as a guide. **If, however, you have any legacy conifer trees within your managed buffer zone**, all such legacy conifer trees within your managed buffer zone must be identified for leave. Once these legacy conifer trees have been identified for leave, the remaining minimum number of leave trees per acre to leave within the managed buffer zone should be calculated and then those remaining leave trees must be identified for leave during field layout. Strive to maintain pre-harvest levels of species diversity.

Mark leave trees, as appropriate, as specified under the “**Additional Preparation and Harvest Requirements**” section.

Additional Preparation and Harvest Requirements:

1. A representative sample of the proposed managed buffer zone must be laid out on the ground with leave trees marked prior to harvest and before the FPA is submitted to demonstrate how the managed buffer zone harvest will be implemented.
2. Reasonable care shall be taken to avoid damage to the stems and root systems of all residual trees within the managed buffer zone from falling, skidding or yarding. Any residual leave trees damaged must remain on site and do not count toward the residual retention requirements.
3. If Type Np, F or S waters and their associated riparian buffer zones occur within or overlaps an outer zone managed buffer, the most restrictive buffer zone leave tree / buffer zone prescription will be applied within the affected outer zone managed buffer.
4. Within the managed buffer zone, ground-based systems shall not be used on slopes where in the opinion of the department, this method of operation would cause actual or potential material damage to a public resource. When transporting logs in or through the managed buffer zone with ground-based equipment, the number of routes through the zone shall be minimized. Logs shall be transported to minimize damage to leave trees and vegetation in the managed buffer, to the extent practical and consistent with good safety practices.
5. Cable yarding within the managed buffer zone is subject to requirements listed in WAC 222-30-060 Cable Yarding.

**Forest Practices Rules
Stakeholder Assessment and
Recommendations for the
Marbled Murrelet**

Forest Practices Rules Stakeholder Assessment and Recommendations for the Marbled Murrelet

Wildlife Work Group

Representing Washington State Association of Counties (WSAC), Washington Forest Protection Association (WFPA), Washington Farm Forestry Association (WFFA), Washington Conservation Caucus- Marbled Murrelet Coalition, Washington Department of Natural Resources (WDNR), Washington Department of Fish and Wildlife (WDFW), and U.S. Fish and Wildlife Service (USFWS):

Gary Bell (WDFW prior to 4/15/2022, DNR after 4/15/2022), Darric Lowery (WDFW since 4/1/2022), Darrin Masters (WDFW since 9/15/2022), Steve Barnowe-Meyer until 6/30/2022 (WFFA), Marc Engel (WDNR), Steve Desimone until 7/31/2022 (WDFW), Vince Harke (USFWS¹), Doug Hooks (WFPA), Court Stanley (WSAC), Kara Whittaker (Marbled Murrelet Coalition prior to 3/1/2022, WDFW after 3/1/2022), Scott Swanson until 2020 (WSAC)

¹The findings and conclusions in this report are those of the author(s) and do not necessarily represent the views of the U.S. Fish and Wildlife Service.

TABLE OF CONTENTS

BACKGROUND.....	3
SECTION I	5
1.0 Introduction	5
1.1 Habitat definitions (effective June 2022).....	5
1.1.1 Suitable Habitat.....	5
1.1.2 Status Classification of Marbled Murrelet Sites and Survey Areas.....	7
1.1.3 Marbled Murrelet Special Landscape	7
1.1.4 Critical Habitat (state) for Marbled Murrelets and Class IV – Special Forest Practices	7
1.2 Platform thresholds for SEPA guidance	8
1.3 Determination of “Suitable marbled murrelet habitat”, survey requirements, and delineation of Occupied sites	9
1.4 Disturbance avoidance	12
1.5 Exemptions to Forest Practices Rules for the Marbled Murrelet	12
1.6 Planning Options.....	13
2.0 Ecology, Distribution and management designation.....	13
2.1 Terrestrial (Forest) Survey Effort	14
2.2 Current Marbled Murrelet Status.....	14
SECTION II	17
3.0 INTRODUCTION.....	17
4.0 OBJECTIVES	18
4.1 Objective 1: Review population status and assess stressors which have led to a continued decline of the Marbled Murrelet population in Washington & the resulting state up-listing (endangered) of Murrelets.	18
4.1.1 Population status.	18
4.1.2 Stressors.....	19
4.1.3 Cumulative and Interactive Effects.....	26
4.2 Objective 2: Review and assess the potential contributions of non-federal lands regulated under the Rules towards Marbled Murrelet habitat conservation.....	27
4.2.1 Estimates of Available Habitat	27
4.2.2 Private Lands Contributions to Conservation	29
4.3 Objective 3. Identify the habitat components presumed necessary for forested areas to be considered Suitable habitat (state) and/or Occupied habitat (evaluate past modeling, statistical probabilities, etc.) using the current best available science.....	30
4.3.1 MaxEnt Habitat Model for Northwest Forest Plan monitoring estimates.....	30
4.3.2 Forest Practices Model	31

4.3.3	Components of Habitat Definitions Table.....	32
4.4	Objectives 4, 5, and 6 Combined	32
4.4.1	Rule Evaluation and Recommended Rule Change Format Overview	32
4.4.2	Recommended Changes for Forest Practices Rules.....	33
4.4.3	WAC 222-12-090 Forest Practices Board Manual. NEW Proposed Guidance	44
4.5	Objective 7. Review the Rule & recommend any changes or add procedures to current Rule, if necessary, when stand conditions change; or suggest a different Rule set all together	50
4.6	Objective 8. Develop a timeline for development of the recommendations that will be provided to the Board	51
4.7	Objective 9. Develop potential adaptive management strategies for Marbled Murrelet conservation.	51
4.8	Objective 10. Evaluate/assess existing suitable habitat on non-federal lands and potential future contributions of other regulatory habitat set asides across the landscape	51
5.0	Conclusion.....	51
6.0	Literature Cited	52

LIST OF TABLES

Table 1. Estimated acres of Moderate and Higher Probability potential Marbled Murrelet nesting habitat for Washington by landowner for the baseline period (1993) and final year of analysis (2017) with net change in Moderate and Higher Probabilities (from Lorenz et al. 2021)..... 21

Table 2. Estimated changes (acres) of Higher Probability (P>0.64-1.0) nesting habitat from 1993 to 2017 by landowner in Washington based on Northwest Forest Plan habitat monitoring (after Lorenz et al. 2021: Table 9)..... 22

Table 3. Northwest Forest Plan model estimates of gross loss (114,269 total acres) of Higher Probability potential nesting habitat from 1993 to 2017 by landowner in Washington (after Lorenz et al. 2021: Table 11). 22

Table 4. Modified Curtis Relative Density Calculator for Douglas-fir / red alder (RD 35)..... 48

Table 5. Modified Curtis Relative Density Calculator for western hemlock (RD 50)..... 49

LIST OF FIGURES

Figure 1. protocol for assessing Suitable marbled murrelet habitat (from Ramsdell and Ritchie 1998). 10

Figure 2. Marbled Murrelet landscape management example (from Ramsdell and Ritchie 1998)... 11

Figure 3. Proportion of Higher Probability (>0.64-1.0) nesting habitat, among all habitat-capable lands, managed by different landowners in 2017 for the NW Forest Plan analysis area in Washington (Lorenz et al. 2021). Used by permission from the authors..... 20

BACKGROUND

The Marbled Murrelet was listed as Threatened in Washington, Oregon and California under the US Endangered Species Act (ESA) in 1992 and state-listed in Washington in 1993.

For Washington landowners to avoid take of murrelets under the ESA, state Forest Practices Rules (Rules) were developed to reduce potential adverse impacts to Murrelets associated with timber management. Building on the Timber – Fish – Wildlife Agreement (1987) model, the Rules reflect negotiated minimum standards produced by Washington Department of Natural Resources (WDNR), Washington Tribes, the forest products industry, environmental groups, and Washington Department of Fish and Wildlife (WDFW). The Washington Forest Practices Board (Board) adopted emergency rules in 1996. Permanent Forest Practices Rules for protection of Marbled Murrelets were adopted on July 10, 1997, effective August 22, 1997. Important elements of the new Rules included protection of known “Occupied marbled murrelet sites” and a requirement to survey forest stands containing “Suitable marbled murrelet habitat” prior to any proposed forest practices.

The objectives of the 1997 Marbled Murrelet Rules are to identify and avoid forest practice activities that are likely to have a significant adverse impact on the species. The Rules require WDNR to “. . . evaluate whether the forest practice(s) would be expected, directly or indirectly, to reduce appreciably the likelihood of the survival or recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species” (WAC 222-10-040(2)). The rules also address specific forest practices listed in WAC 222-16-080 on lands designated as Critical habitat (state) of threatened or endangered species (WAC 222-16-050(b)). Such activities are subject to State Environmental Policy Act (SEPA) review and are classified as “Class-IV Special” forest practices.

In February 2017, the Washington State Fish and Wildlife Commission (WFWC) approved the WDFW recommendation to up-list the Marbled Murrelet from state threatened to state endangered: “seriously threatened with extinction throughout all or a significant portion of its range within the state” (WAC 220-610-110). The Rules require WDNR to consult with WDFW and make a recommendation to the Board as to whether protection is needed under the Critical Habitat (state) rule (WAC 222-16-080(3)) when a species current listing status changes or is newly listed by the WFWC and/or the U.S. Secretary of the Interior or Commerce. With that requirement, WDNR, in consultation with WDFW, recommended that the Board support WDFW’s initiation of a Marbled Murrelet Rule assessment with a diverse group of stakeholders. WDFW convened a Wildlife Working Group (WWG) to evaluate Rule effectiveness in identifying and protecting Murrelet habitat, identify weaknesses in Rule language and on-the-ground implementation, consider potential habitat conservation incentives, and bring recommendations regarding Rule improvements to the Board for consideration. In February 2018, the Board recognized the role of the WWG, and meetings commenced in September 2018. This report is the result of those meetings and evaluation of the current state of information for Marbled Murrelets used to inform the Rule assessment. The Board’s scope of rulemaking is limited to its state-delegated authority and compliance with all applicable state and federal laws. Although states may choose to provide more protection to listed species than the federal government, the Board may only adopt Rules under the Washington state laws that govern its rule-making activity and authority. Acknowledging the sideboards of the Board’s authority will ensure that the Board does not adopt a Rule which exceeds its authority, possibly subjecting the state’s Forest Practices Rules to litigation and invalidation. The state Rules offer landowners opportunities for voluntary participation in species protection efforts such as Landowner Option Plans (LOP) and Cooperative Habitat Enhancement Agreements

(CHEA) (WAC 222-16-100 and 105). Regarding Murrelets, the Rules (222-16-080(6)(c)) also provide an alternative harvest planning option known as a Special Wildlife Management Plan (SWMP), which is intended to protect the ecological requirements of Murrelets and their habitat (Critical habitat-state) while also allowing Forest Practices that would otherwise be prohibited by the Rules. In addition to state Rules related to natural resource conservation, the ESA provides frameworks for listed species protection, pro-active conservation, permitting and mitigation, and other types of regulation. Landowners may seek federal approval for voluntary permits, such as a Safe Harbor Agreement (SHA – USFWS 2021a, USFWS 2021b) or a Habitat Conservation Plan (HCP), under the ESA that provide net conservation benefits and regulatory assurances (e.g., Incidental Take Permit - ITP). These mechanisms provide legal protection for landowners and regulatory certainty in the event of incidental take during a permit period. Neither WDNR nor the Board have the legal authority to require private landowners to recover a listed species, to retain unoccupied habitat after an approved occupancy survey, or to restore potential habitat.

Definitions used for habitat in ESA incidental take permits and HCPs are useful to define potential impacts and appropriate mitigation; in SHAs, those definitions help shape a definition of net conservation benefit to a species' population. This document cites several conservation documents to provide context for Murrelet habitat recommendations. References to "habitat" from these sources must be qualified (i.e., "suitable", "potential", "occupied") to make appropriate comparisons to the Rules. Because federal lands are expected to provide the majority of habitat for the conservation of Marbled Murrelets, much of the existing information regarding amount and distribution of potential habitat is derived from monitoring efforts at the scale of the entire Marbled Murrelet Northwest Forest Plan (NWFP) analysis area (WA, OR, CA; Lorenz et al. 2021). The habitat estimates derived from the NWFP do not equate to the amount of habitat identified under the Rules.

Section I of this report is a briefing to the Forest Practices Board on issues related to the Marbled Murrelet and the associated Forest Practices Rules. Specifically, it provides: 1) background on Forest Practices Rules that apply to Marbled Murrelets, and 2) an early preliminary discussion of areas of concern regarding Rule implementation, and 3) WDFW's role in habitat delineation for survey, survey guidance and quality review. Relative to discussions regarding the Rules, the specific topics to be addressed in Section I of this report include:

1. Overview of Marbled Murrelet habitat definitions in the rule and Marbled Murrelet Critical Habitat (state) designations.
2. Long-standing identification of ambiguous Rule language and problems with aspects of rule interpretation.
3. Reporting of survey data, and how this relates to Rule effectiveness.

Section II of this report provides an in-depth assessment of selected Rules that govern forest practice activities with the intent to support conservation of the Marbled Murrelet on the Washington landscape. The assessment is organized by a series of objectives developed by the WWG. Existing rule language is presented with proposed changes for removal in ~~strikeout text~~ and new insertions in underlined text. The proposed changes are followed by discussion of the issues and concerns about the existing language, the rationale behind the proposed changes, WWG's recommendations, and WDFW's perspective.

SECTION I

CONTEXT AND OVERVIEW OF THE CURRENT FOREST PRACTICES RULES FOR MARBLED MURRELET

Provided by

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

1.0 INTRODUCTION

The Forest Practices Rules establish minimum standards for timber harvest design and protection of both Marbled Murrelet critical (state) and suitable habitats and for WDNR to review and classify “forest practice” (WAC 222-12-010) applications. The Rules adopted for Marbled Murrelet establish thresholds for activities that may have a probable significant/adverse impact to Marbled Murrelet habitat requiring review, evaluation, and modification or otherwise conditioned, as appropriate, under the provisions of the State Environmental Policy Act (SEPA; RCW 43.21C). Language in WAC 222-10-040 provides WDNR the authority to use SEPA policy to evaluate forest practices applications. This section provides context for the Rules reviewed in this report.

1.1 Habitat definitions (effective June 2022)

The habitat definitions in the Marbled Murrelet rules (WAC 222-16-010) reflect a range (although not complete) of habitat conditions and habitat use in Washington. “Suitable marbled murrelet habitat” outlines important Murrelet habitat values of various forest structures, such as tree species, tree size, and the presence and number of nesting platforms (limbs, tree crotches, mistletoe deformities). Habitat can generally be described as mature and older conifer forests with large trees that have large limbs or branch deformities that provide nesting opportunities (i.e., trees that contain potential nesting platforms) for Murrelet reproduction and chick development.

1.1.1 SUITABLE HABITAT

The current definition of “Suitable marbled murrelet habitat” (WAC 222-16-010) contains an element relating to the number of nesting platforms

“Suitable marbled murrelet habitat” is defined as “a contiguous forested area where (a) at least 40% of the dominant and codominant trees are Douglas-fir, Western hemlock, Sitka spruce or Western red cedar; (b) there are 2 or more nesting platforms per acre (see below), and (c) the 7 acres as assessed for survey includes the contiguous forested area within 300 feet of nesting platforms with similar stand characteristics (age, species composition forest structure) added to the forested area in which the nesting platforms occur.”

“Marbled murrelet nesting platform” (WAC 222-16-010) is a separate definition that is an element of suitable habitat, which is any horizontal surface measuring at least 7 inches wide, including associated moss, if present, such as a tree limb, a cluster of limbs, a surface created by multiple leaders, a tree deformity, accumulated debris or moss, or a stick nest, that is at least 50 feet above the ground in trees that are ≥ 32 inches diameter at breast height (dbh).

The determination of “*Suitable marbled murrelet habitat*” is the basis for conducting, at least, a consecutive 2-year survey to protocol standards developed by the Pacific Seabird Group (PSG) (Evans Mack et al. 2003) to determine if Murrelets have exhibited occupied behavior at the site (WAC 222-12-090(14)). Once the survey is completed and submitted to WDFW, the data are processed, and the Survey Area is assigned a temporary detection status based on the detection(s) documented by the surveyor. When a Forest Practices Application (FPA) is filed indicating there is proximity to, or inclusion of, possible “*Suitable marbled murrelet habitat*,” a 2-year survey effort was conducted, or an Occupied site was established, WDFW evaluates the need for additional FPA review and any need for a Survey Quality Review to ensure substantial compliance standards with Forest Practices and the Pacific Seabird Group terrestrial survey protocol for Marbled Murrelets (WAC 222-16-010 “*Occupied marbled murrelet site*” (6); WAC 222-12-090(14)). Survey Quality Review must be done within the typical 30-day FPA review period and the results are communicated to WDNR with survey status. The temporary site status designated in unreviewed survey data may change because of WDFW’s later and more comprehensive review of the survey effort. Before the Survey Quality Review is completed, all site determinations assigned by parties other than WDFW are preliminary. Upon completion of the WDFW Survey Quality Review, the “*Suitable marbled murrelet habitat*” (referred to in PSG protocol as “Survey Area”) is assigned an official site status of either Occupied (WDFW Status 1, 2, or 3), Presence (Status 4), No Detection (Status 5), or Undetermined/Inconclusive (Status U/I) (see section 1.2 Status Classification of Occupied marbled murrelet sites, below).

“*Marbled murrelet detection area*” (WAC 222-16-010) includes the Detection Section plus the adjacent 8 sections. The Marbled Murrelet Detection Section is the legal section in which any Status 1-4 Murrelet detection was recorded by a qualified observer.

“*Occupied marbled murrelet site*” (WAC 222-16-010) means:

- (1) A contiguous forested area where any (at least one) of the occupied behaviors or conditions occur:
 - (a) nest located, or
 - (b) downy chicks or eggshells are found, or
 - (c) Marbled Murrelets are detected flying at or below, though, into or out of the forest canopy, including Murrelets seen landing in or taking off from trees or
 - (d) Murrelets calling from a stationary location within the area, or
 - (e) birds circling above a timber stand within one tree height of the top of the canopy, or;
- (2) a contiguous forested area, which does not meet the definition of “*Suitable marbled murrelet habitat*”, in which any of the conditions or behaviors listed above has been documented and that is distinguishable from the adjacent forest based on vegetative characteristics important to nesting Murrelets.
- (3) For sites defined in (1) and (2) above, sites are presumed to be Occupied based on observations of circling described in (1)(e) unless a 2-year survey using 2003 protocol has been conducted and an additional 3rd year of survey (using methods listed below) is also completed and none of the behaviors listed in (1)(a) through (d) of this definition have been observed.

The landowner may choose the third-year method of either:

- (a) minimum of 9 visits in compliance with 2003 PSG protocol. If at least one Marbled Murrelet is detected in any of the 9 visits, 3 additional protocol visits shall be done. WDFW shall be consulted prior to initiating the third-year surveys; or
- (b) conduct third-year surveys designed in consultation with WDFW to meet specific site conditions.

Subsections (4) and (5) of this definition are explained below in Section 1.3, Step 3; Occupied marbled murrelet site delineation and extent.

(6) In determining the existence, location, and status of Occupied sites, WDNR shall consult with WDFW and use only sites documented in substantial compliance with guidelines or protocols and quality control methods (i.e., Protocol for Washington guidelines and Survey review guidelines; WDFW 2001, 2003) established by and available from WDFW.

1.1.2 STATUS CLASSIFICATION OF MARBLED MURRELET SITES AND SURVEY AREAS.

WDFW has five status classifications of Marbled Murrelet detections recognized by the Rule, including three that relate to a formal designation of “Occupied marbled murrelet site” status. Status 1 through 3 is assigned to sites that are Occupied. Status 4 sites indicate Presence:

- Status 1 – a known nest;
- Status 2 – a downy chick, eggs, or eggshell fragments (whether chicks/shells are on ground or in tree); and,
- Status 3 – the observation of “occupancy behavior” relative to the site. Occupancy behavior includes the observation of Marbled Murrelets as defined in the definition of “*Occupied marbled murrelet site*” above and in WAC 222-16-010.
- Status 4 – are where Murrelet presence was demonstrated but occupancy behavior was not determined. Status 4 includes non-stationary auditory detections and visual detections of Murrelets that are greater than 1 canopy heights in straight flight or circling flight greater than 2 canopy heights, above or adjacent to the site.
- Status 5 – are locations where no Marbled Murrelets were detected during protocol surveys and the survey data was approved by WDFW as being in substantial compliance with Forest Practices delineation and PSG survey protocol.

1.1.3 MARBLED MURRELET SPECIAL LANDSCAPE

The Federal Recovery Plan (USFWS 1997) recognized a landscape area extending from northwestern Oregon through southwestern Washington where the distribution of Murrelets was sparse, and few known Occupied sites were close to areas of federal land (US Department of Interior, USFWS 1992). The lack of federal lands available for species conservation and recovery, and the relative isolation of Occupied sites in southwestern Washington resulted in the establishment of a “*Marbled murrelet special landscape*” in southwest Washington by the Board (WAC 222-16-087). This special landscape is the area south of Highways 8 and 12 and west of Interstate 5. Forest Practice’s Marbled Murrelet nesting platform thresholds for SEPA guidance are different in the “*Marbled murrelet special landscape*” than in the rest of the state: 5 platforms/acre vs. 7 platforms/ac, respectively outside a detection area; see Platform thresholds for SEPA guidance described in section 1.5 below.

1.1.4 Critical Habitat (state) for Marbled Murrelets and Class IV – Special FOREST PRACTICES

WDNR assigns “*Class IV – special*” to Forest Practice Applications that propose the harvesting of trees or construction of roads on lands designated as Critical habitat (state) or areas for Marbled Murrelet (WAC 222-16-080 (h)), other than removal of existing down trees outside the critical nesting season. These include forest practices that could occur within: (i) an Occupied marbled murrelet site; (ii) “*Suitable marbled murrelet habitat*” within a “*Marbled murrelet detection area*” (see definition); (iii) suitable habitat containing 7 or more platforms/acre outside a “*Marbled murrelet detection area*”; and

(iv) suitable habitat having 5 or more platforms/acre outside a Marbled murrelet detection area in the Marbled murrelet special landscape.

An “Occupied marbled murrelet site” is required to have a buffer of live trees around the perimeter as Critical habitat (state). The buffer zone may be as narrow as 200 feet and extended to a maximum of 400 feet if an average of 300 feet is maintained around the delineated habitat (i.e., outer extent of platform trees of the Occupied site). Harvest of trees within the 300-foot (average) managed buffer zone surrounding an Occupied site that would result in less than 75 trees per acre >6 inches dbh (of which 25 must be >12 inches dbh, including 5 trees >20 inches dbh where they exist) would be considered Class IV– special.

Finally, forest practices involving “Suitable marbled murrelet habitat” are Class IV- special, unless protocol surveys were conducted and there was no documentation of occupancy behavior, provided the survey results were reviewed and the site status determination was approved by WDFW. In the absence of this information, proposed harvest activities involving the “Suitable marbled murrelet habitat” represents a potentially significant adverse environmental impact. The present language within this definition of “...including the 300 feet of similar vegetation...” and “trees with similar stand characteristics” passage can be difficult to assess because the trees in the buffer may not contain platforms or may not have those stand characteristics (G. Graves, WDNR, pers. comm. 2002). This can present conflicting harvest and conservation decisions as harvesting in the buffer of an Occupied site and leaving below the minimum leave tree requirements invokes a Class IV-special and is listed in the same subsection as designated Critical habitat (state) for the Marbled Murrelet (WAC 222-16-080 (h)).

There are two cases where the Critical habitat (state) for Murrelet designation is exempt and the proposed forest practice is, therefore, not a Class IV-Special:

1. If a landowner owns less than 500 acres of forest within 50 miles of marine waters and the land does not contain or is not part of an Occupied marbled murrelet site; or,
2. If a PSG protocol-compliant survey is conducted and no Murrelets are detected.

However, exemption 2 is void if an Occupied marbled murrelet site is established (WAC 222-16-080(h)(vi)).

1.2 Platform thresholds for SEPA guidance

Under current SEPA rule (WAC 222-10-042), it is assumed that forests with varying numbers of platforms per acre will have different probabilities of occupancy by Marbled Murrelets. Forest areas (stands) with 7 platforms per acre will likely have a 60% probability of being Occupied, whereas forests with 5 platforms per acre will have a 50% probability, and 2 platforms per acre will have a 30% probability of occupancy (WAC 222-10-042). These probability thresholds were the reached by the Forest Practices Board Marbled Murrelet Technical Committee and adopted as the SEPA platform thresholds for inclusion into the Rule definition of Critical habitat (state) for Murrelets.

Without valid protocol survey information *and* an accurate site status determination through WDFW Survey Quality Review, a forest practice in “Suitable marbled murrelet habitat” has the potential to have a significant adverse environmental impact. A Marbled Murrelet 2-year PSG protocol survey is determined to be officially valid only after the survey quality review process has documented that the survey protocol objectives were conducted in substantial compliance as interpreted by WDFW using WDFW survey review guidelines and a data form checklist (WAC 222-16-010 “Occupied marbled

murrelet site” (6)). Before such a review is completed, all site determinations assigned by parties other than WDFW are preliminary.

1.3 Determination of “Suitable marbled murrelet habitat”, survey requirements, and delineation of Occupied sites

“Suitable marbled murrelet habitat” (WAC 222-16-010) subsection (d). This section outlines the steps and review process for: (1) how to assess the amount of “Suitable marbled murrelet habitat” present within a forested area to determine whether surveys are warranted, and (2) how to delineate Occupied sites (Ramsdell and Ritchie, 1998 unpublished report, Doug Hooks WFPA pers com., and G. Graves WDNR pers com.).

Step 1: Determining the extent and perimeter of “Suitable marbled murrelet habitat”.

- a. *Platform tree core area*: identify qualifying platform trees (≥ 32 dbh with platforms) within 300 feet of each other and delineate a minimum convex polygon (i.e., the outermost edge of this area). Use only this to calculate the density of platforms per acre. Do not use the 300 feet of similar vegetation since there are no qualifying platform trees.
- b. *Similar stand characteristics*: Add the first 300 feet of adjacent forest with similar stand characteristics around the edge of the platform core area above; as interpreted includes 32-inch dbh trees *without* platforms, or trees with platforms < 32 inches dbh¹.

The core area platform density in (a) plus the similar stand characteristics within 300 feet (b) equals the total acres of “Suitable marbled murrelet habitat” (Figure 1). If this entire area is less than 7 acres, regardless of the number of nesting platforms per acre, a protocol survey for Marbled Murrelets is not required.

Step 2: Determining platform density thresholds and need for surveys.

The survey component is required only if the 7-acre or greater area of “Suitable marbled murrelet habitat” condition is met. Landowners proposing a forest practice in “Suitable marbled murrelet habitat” must survey according to the Pacific Seabird Group Inland Survey Protocol (Evans Mack et al. 2003) if the core area platform density averages 7 platforms/acre (outside a Marbled murrelet detection area), 5 platforms/acre (in Marbled murrelet special landscape) or 2 platforms/acre (within a Detection Area), and then add the area with the similar stand characteristics to determine if “Suitable habitat” is 7 acres or greater. Forest Practices in potential “Suitable marbled murrelet habitat” not having at least 7 (outside a Detection Area), 5 (in Marbled murrelet special landscape), or 2 (within a Marbled murrelet detection area) platforms/acre are exempt from further survey requirements for that defined “Suitable marbled murrelet habitat” polygon area.

The Forest Practices Board Manual, Section 15, provides guidance on how to assess the number of platforms in “Suitable marbled murrelet habitat” via field transect cruise methods, or using a Platform Inventory Model Method (PIMM) calculation, as well as a brief description of the types and locations of landscapes in which platforms can occur. The guidance also calls for the landowner to assess the

¹ See definition of “*Suitable marbled murrelet habitat*”; specifically, “...containing trees capable of providing nesting opportunities...” New available information on some nest trees in Washington (Meekins and Hamer 1999; Hamer et al. 1998,1999) indicate this could be interpreted to include trees < 32 inches with nesting platforms.

contiguous suitable habitat within ¼ mile distance of the proposed forest practice area up to a minimum of 125 acres in size (Evans Mack 2003). Contiguous habitat areas that are outside the Detection Area and outside the Occupied site boundary but are within 1.5 miles of where previously observed Occupied site behaviors occurred need to be assessed (Figure 1).

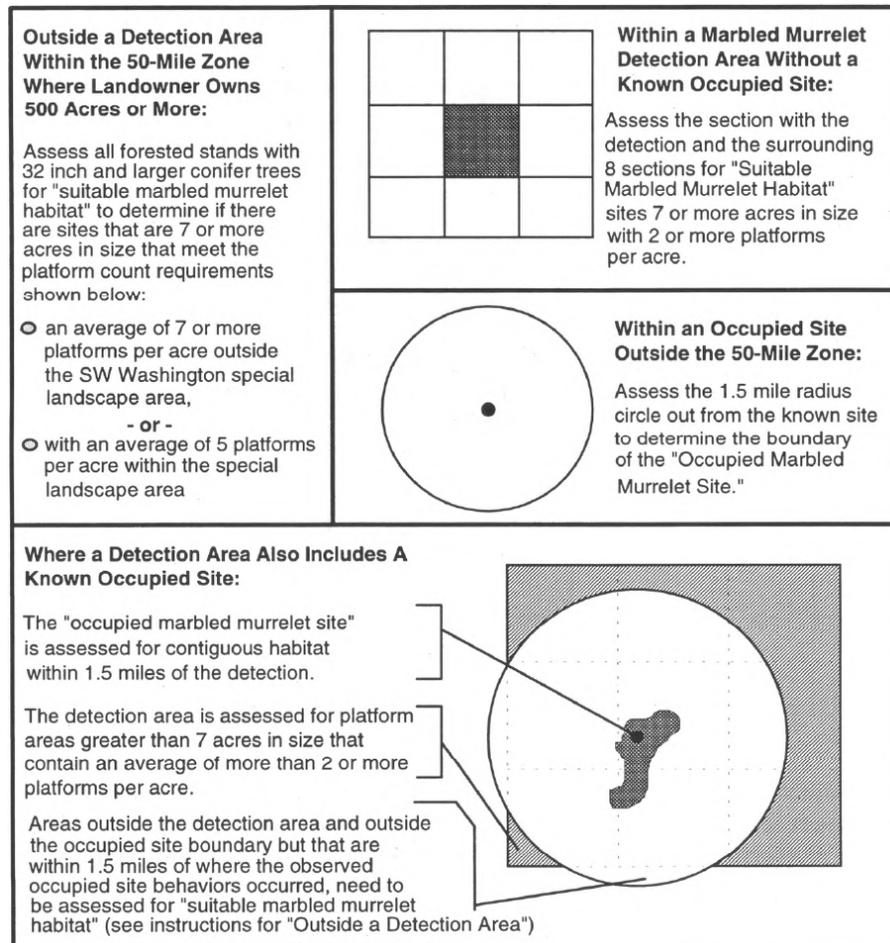


Figure 1. Protocol for assessing Suitable marbled murrelet habitat (from Ramsdell and Ritchie 1998).

All contiguous Suitable marbled murrelet habitat shall (WAC 222-12-090(14)) be surveyed for occupancy using the 2003 protocol (Evans Mack et al. 2003). Surveys reviewed by WDFW that are found to be in substantial compliance with the PSG protocol in effect at the time of survey and that have a final site status of 4 (Presence-only) or 5 (no detections) are considered complete and require no further surveys. Future forest practices in that polygon are not considered Class IV- Special for 5 years from the completion of surveys. After 5 years, the area of the original forest practice proposal would need to be re-assessed and re-surveyed if Critical habitat (state) is still present (Evans Mack et al. 2003).

Step 3: Occupied marbled murrelet site delineation and extent.

“Occupied marbled murrelet site” means (1) a contiguous area [i.e., minimum convex polygon] of “Suitable marbled murrelet habitat” trees where one or more occupied behaviors are or were associated (explained in Section 3.2 “Occupied marbled murrelet site”); (2) a contiguous forested area, which does not meet the definition of “Suitable marbled murrelet habitat” where at least one occupied behavior in (1) is documented, and which is distinguishable from the adjacent forest based on vegetative characteristics important to nesting Marbled Murrelets. Currently, the 300 feet of similar stand characteristics adjacent to the core area platform trees only applies when determining whether the minimum acreage of suitable habitat plus the 300 feet surrounding it trigger the need for surveys (i.e., ≥ 7 ac. sum).

It is helpful to refer to Figure 2 while reviewing the following Rule language for delineation of an “Occupied marbled murrelet site”. Subsections (4) and (5) of this definition give guidance regarding delineation of the outer perimeter of an Occupied Site: “The outer perimeter of the Occupied Site is presumed to be within (a) 1.5 miles from the point where the observed behaviors or conditions listed in (1) and (2) occurred [i.e., within 1.5 miles of the Occupied Site, inside a “Marbled murrelet detection area”]; or (b) the beginning of a gap greater than 300 feet lacking “Suitable marbled murrelet habitat”; or (c) the beginning of any area of “Suitable marbled murrelet habitat” less than 300 feet wide and 300 feet long” (Figure 2). Subsection (6) states that WDNR shall consult with WDFW to determine the existence, location, and status of “Occupied marbled murrelet sites”. WDFW maintains this information in its Wildlife Survey and Data Management (WSDM) system.

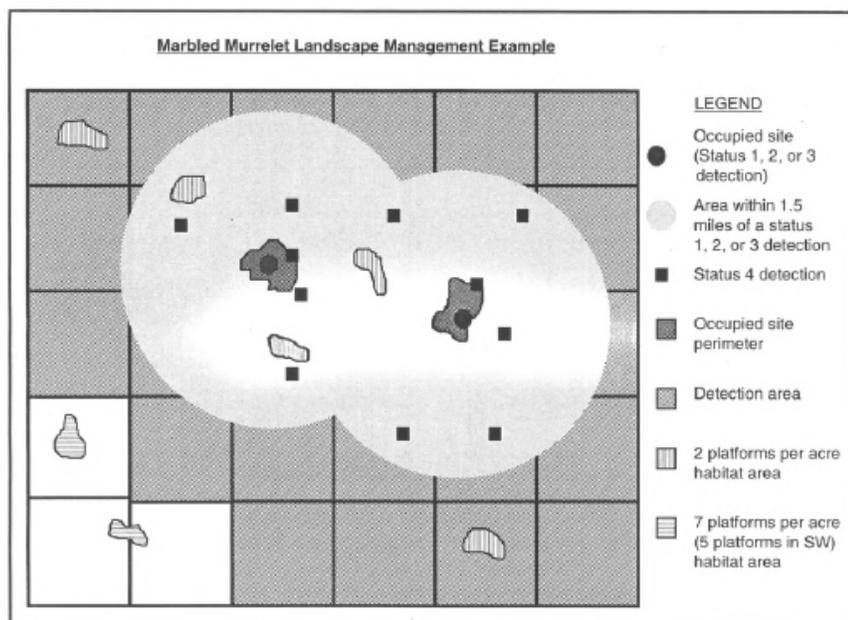


Figure 2. Marbled Murrelet landscape management example (from Ramsdell and Ritchie 1998).

Step 4: Managed buffer of an Occupied Site.

Once the delineation of an Occupied Site has been determined by WDFW (in consultation with WDNR), a Managed Buffer 300 feet wide (average) is applied to the outer perimeter of the Occupied Site (WAC 222-16-080 (1)(h)(v)). The primary consideration of the managed buffer is to mitigate edge effects by using leave tree patterns that can help to minimize potential impacts to Marbled Murrelets and occupied habitat.

1.4 Disturbance avoidance

To address concerns that certain types of activities might affect behavior and disrupt breeding, seasonal timing restrictions of specific management activities were developed. Seasonal timing restrictions are in place for proposed activities within 0.25 miles of known “Occupied marbled murrelet sites” during the daily peak activity periods (one hour before to two hours after official sunrise, and one hour before to one hour after official sunset) during the critical nesting season (April 01 – August 31) (WFPB 2002, Evans Mack et al. 2003). The timing restrictions apply to road construction and blasting (WAC 222-24-030(11)); operation of heavy equipment (including tractor and wheeled skidding systems WAC-222-30-070), felling and bucking (WAC-222-30-050); cable yarding (WAC-222-30-060), helicopter yarding/operations (WAC-222-30-065). Slash disposal or prescribed burning is always prohibited within 0.25 mile within the critical nesting season (WAC-222-30-100)(7). These restrictions do not apply if the forest practice is operating in compliance with a reviewed and accepted plan developed for protecting Marbled Murrelets under the National Environmental Policy Act or an approved Special Wildlife Management Plan developed in consultation with WDFW (222-16-080(6)(a)(c)).

1.5 Exemptions to Forest Practices Rules for the Marbled Murrelet

The Rules contain exemptions that apply in two specific circumstances. The first type of exemption is for landowners who have developed an alternative land management plan, such as an HCP or SHA with the USFWS, or a CHEA or SWMP with the WDNR and WDFW (WAC 222-16-080(6)). Landowners with an approved HCP or SHA for Marbled Murrelets must still submit forest practices applications for timber management activities, but if the stated activity is covered by the HCP with an incidental take permit or SHA with an approved Enhancement of Survival Permit for Marbled Murrelets, the application can be approved without further review for potential adverse impacts to Murrelets. However, if it is found that a Marbled Murrelet survey(s) in habitat covered under an approved HCP was not in substantial compliance with the PSG protocol in effect at the time of the surveys, then the proposed forest practice activity would still be subject to complete FPA review for Murrelets.

The SHA is a relatively new tool that was first implemented in 1995 as a way to provide incentive for landowners to implement management actions that conserve habitat with assurances that new regulatory requirements under the ESA will not be imposed on them during the lifespan of the agreement. Whereas the conservation standard for an HCP is to offset impacts with an emphasis on mitigation, the standard for an SHA is net conservation benefit through avoidance of impacts. To date, there are four SHAs approved in the state of Washington that cover Marbled Murrelet and encompass a large portion of the remaining privately held Murrelet habitat in the state. Additional SHA’s are currently under review by USFWS.

A Cooperative Habitat Enhancement Agreement (CHEA) is a negotiated management agreement between the landowner and the WDNR intended to remove incentives for early harvesting of forest lands based on fear of future regulation. They can be developed for currently existing habitat that has been surveyed and determined to be unoccupied and/or for forest lands that are not currently habitat (i.e., lands that would be unregulated by the Marbled Murrelet rules). A CHEA provides safe harbor to a landowner for covered lands in exchange for retaining or growing new Marbled Murrelet habitat for the agreed upon time period. The conservation benefits are the retention of Murrelet habitat that might have been harvested earlier, or the retention of forests long enough for Murrelet habitat to develop and become available for use. CHEA terms and duration are flexible and could include

thinning, partial harvesting through time, a shifting mosaic approach, or simply deferring harvest of a stand for a specified period of time (Example: Everett Municipal Water Supply).

The second type of exemption applies to any landowner owning less than 500 acres of forest land in Washington state within 50 miles of marine waters. These landowners are exempt from the Rules restricting timber harvest of potential Marbled Murrelet habitat unless the proposed forest practice is within or becomes an established Occupied marbled murrelet site; this exemption would then become void because of the presence of Critical habitat (state) within the Occupied Site (WAC 222-16-080 (1)(h)(vi)).

1.6 Planning Options

During the negotiations of the current Rules, stakeholders agreed that an optional process allowing for more effective landscape-level planning for Murrelets, coupled with more efficient forest management, should be included in the Rules. Consequently, the Rules contain two provisions that allow for some flexibility in management of Marbled Murrelet habitat.

WAC 222-10-042(5) provides an opportunity for landowners to submit data and other information specific to platform numbers in the “Suitable marbled murrelet habitat” definition that is more current for a particular region. These data would need to be collected in conjunction with a Marbled Murrelet survey agreement with WDFW. To date, only one landowner has an approved regional Marbled Murrelet habitat model under this “new information” clause.

Another optional planning opportunity is the CHEA. As described in section 1.5 above, this element of the rules was included to encourage creation, enhancement, or retention of Murrelet habitat in areas beyond current or future Occupied Sites. Any disincentive for this type of activity was addressed in the Rule by a guarantee that creation, enhancement, or retention of habitats outside known Occupied Sites would not result in future regulations restricting harvest options, should Marbled Murrelets eventually be detected or occupy the habitat (WAC 222-16-105).

2.0 ECOLOGY, DISTRIBUTION AND MANAGEMENT DESIGNATION

The Marbled Murrelet (*Brachyramphus marmoratus*) is a small seabird that ranges the coast of North America from Alaska to southern California. It is unique among seabirds as it utilizes the marine environment and terrestrial inland forests that are both essential habitats for survival and reproduction. In Washington, Murrelets occupy and forage in near-shore marine waters year-round. During the breeding season (late March to mid-September), birds may fly inland up to 78 miles (125 km) daily to visit their nests in mature and old conifer forests (Hamer and Nelson 1995). Murrelets are cryptic, secretive, and fast-flying (average 57 mph, range 35- 95; Cooper and Blaha 2002) to maximize predator avoidance. Adult visits to their nests are largely inconspicuous; birds enter and leave the nest stand during low light levels and primarily without vocalizations.² In Washington, the maximum distance recorded for observed Marbled Murrelet occupancy behaviors is 52 miles (84 km); the majority being within 40 miles of marine waters (WDFW, Wildlife Resources Data Systems 2004). The USFWS establishes the range in Washington at 55 miles from marine water. Females lay a single egg

² Lack of vocalization by Marbled Murrelets around their nests has prompted concern for potential survey protocol problems due to lack of visibility at a survey station, such as high canopy cover obscuring observer’s view of the sky. See Survey Protocol Problems section for discussion.

per nesting attempt, and both adults participate in incubation; one of the nesting pair forages at sea while its mate incubates for about 24 hours, usually exchanging shifts at dawn. The duration of the breeding period in Washington is believed to be about 124 days (April 26 – mid-September) based on breeding records (Hamer and Nelson 1995). Hatching occurs within 27–28 days, and most adult feeding of chicks occurs at dawn and dusk, with as many as 7 feedings per day observed. Dawn feeding visits occur as late as 65 minutes after sunrise (Nelson and Hamer 1995). Chicks fledge at about 30 days and presumably fly directly to marine waters in their first flight (McShane et al. 2004).

2.1 Terrestrial (Forest) Survey Effort

Forest habitat surveys are used to gain inference on how Murrelets are associated with “Suitable marbled murrelet habitat”, which is synonymous with potential nesting habitat. Individual sites of contiguous “Suitable marbled murrelet habitat” that have been surveyed for Murrelets exist as a linked group of survey stations in the WDFW database. WDFW began formal Marbled Murrelet surveys in forest habitats with potential for nesting in 1990. Audio-visual forest surveys do not provide population estimates, but rather indicate associations of Murrelets with the survey area at a point in time. Surveys rely on ground-based observers at a predetermined station in “Suitable marbled murrelet habitat” to document Marbled Murrelet detections by listening and looking for Marbled Murrelet activity. Visual documentation of Murrelets circling over, flying through or below the forest canopy, or Murrelet vocalizations and other auditory detections (i.e., wing beats and “jet sounds” produced by diving Murrelets) are indications of an association with the habitat (see Section 1.1 Habitat Definitions). After the completion of the required number of surveys, WDFW may review surveys for compliance with Pacific Seabird Group (PSG) protocols (FP Board Manual Section 14). If the surveys are in substantial compliance, a determination of official Site Status (1-5; see Section 1.1.2 Definitions) is made for the contiguous “Suitable marbled murrelet habitat” survey area. By overlaying the mapped audio-visual survey results onto an orthophotograph, remote vegetation analysis and/or field inspection can be used to best determine the extent of forest habitat associated with breeding season Marbled Murrelets.

The PSG survey protocol for Marbled Murrelets (Ralph et al. 1994) was adopted as the official survey method for the 1997 Forest Practices Rules for the Marbled Murrelet. In early 2004, the Rules were updated to include the PSG 2003 inland flight survey protocol, “Methods for Surveying Marbled Murrelets In Forests: A Revised Protocol for Land Management and Research” (Evans Mack et al. 2003). This update included the recommendations from the PSG Marbled Murrelet Technical Committee that cited results of an analysis using Marbled Murrelet detection data from the 3-state area (WA, OR, CA). The analysis showed that an increased number of survey visits to a site were required over the amount used in the previous protocol (Ralph et al. 1994) to reach a 95% probability of correctly classifying Murrelet sites (i.e., detecting Murrelets in a stand if they are present) (Evans Mack et al. 2003).

2.2 Current Marbled Murrelet Status

This section briefly discusses the current status of the Marbled Murrelet in the state. More detailed discussion of the stressors that likely contribute to the status is found in Section II, Objective 1.

The Marbled Murrelet is classified as Federally threatened over its range in Washington, Oregon and California, and State endangered (2017) in Washington. They were also listed as Federally threatened in Canada in 2003. Marbled Murrelets are not considered threatened in Alaska. The evaluation of Marbled Murrelet status is an important consideration because it provides insight on the health of the

state's overall population. Moreover, some information may relate to the status of Marbled Murrelet at smaller spatial scales, such as a Detection Area.

On the Olympic Peninsula, numbers of daily terrestrial visits by Murrelets to watersheds were strongly correlated with the amount of nesting habitat present (Raphael et al. 2002) and research supports the claim that a decline in Murrelet populations as counted at sea is mainly due to loss of nesting habitat (Raphael et al. 2015). It is thought that overall quantity and quality of nesting habitat predicts relative abundance of breeding birds offshore of those areas.

Population and forest habitat. There is an established link between forest habitat condition and the occurrence of Marbled Murrelets in the marine offshore environment during the breeding season (Raphael et al 2015, Falxa and Raphael 2016). Because the cryptic nature of Murrelets makes them difficult to observe in the forest environment, there is agreement that populations are best assessed at sea. Long-term population trends from standardized at-sea breeding season transect counts under the NWFP, begun in 2000 in Washington, Oregon, and California, account for different distributions of Murrelets on the water over time (Northwest Forest Plan Monitoring 2001- 2021; Lorenz et al. 2021, Pearson et al 2021). These repeatable transect surveys are coordinated over the 3-state recovery area and require at least 8 years of data to produce a reliable population and trend estimate.

Loss of Forest Habitat. The loss of Marbled Murrelet habitat has been mainly due to timber harvest in potential nesting habitat (USFWS 1992, 1997; Falxa and Raphael 2016; Lorenz et al. 2021) and remains a most significant threat (McShane et al. 2004, Lorenz et al. 2021).

We know potential nesting habitat loss has occurred across the listed range due to both timber harvest and natural causes (USFWS 2004, Lorenz et al. 2021). In Washington, additional forest habitat loss occurred due to the negotiated nature of the Rules, which do not recognize *all* ecologically defined habitat (Appendix A) that includes actual nest locations in trees with platforms less than 7 inches wide, occur in trees less than 32 inches dbh, and/or may have platforms less than 50 ft. above the ground (Nelson and Hamer, Unpubl. data; Evans Mack et al. 2003, USFWS 2009, WDFW Marbled Murrelet database).

Windthrow in Murrelet habitat can also be a significant factor of stand disturbance at local and watershed scales in western Washington and is not infrequent in occurrence. Impacts to suitable habitat at the stand level can range from severe to moderate to slight and are immediate. Further, cumulative impacts of windthrow on suitable habitat (including Occupied Sites) without adequate protective forest buffers are a continued concern (see *Stressors* in Section II). As forest fragmentation increases from timber harvest, the threat of habitat loss from windthrow likely increases as well. Cumulative edge effects and changes in the amount of interior forest can affect forest microclimate by increasing desiccation and the amount of moss available for nesting platforms (Chen et al. 1993, 1995). Malt and Lank 2007:

“Accounting for landscape-scale fragmentation, disturbances by avian predators were significantly more frequent at hard edges relative to interiors, but less frequent at soft edges. There were no edge effects at natural-edged sites. These results imply that detrimental edge effects adjacent to recent clearcuts may decline with time due to successional processes. Survey data suggest that this pattern was caused by Steller’s jays (Cyanocitta stelleri), who were observed more often at hard edges than soft edges in one region. Where corvids are important predators, we recommend that managers maintain reserves that lessen the amount of hard edge per patch area. Harvest adjacent to reserves should proceed in stages to limit hard edge effects at any given time.”

The bottom line is that the Murrelet population throughout the state has continued to decline since its initial listing under the ESA. While the cause of the decline is multifactorial, one thing is clear, without support for recovery among the many stakeholders whose otherwise lawful activities affect Murrelet fitness, the population in Washington will likely continue to decline.

SECTION II

RECOMMENDATIONS AND PROPOSED RULE CHANGE FOR MARBLED MURRELET FOREST PRACTICES RULES

Provided by
WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

3.0 INTRODUCTION

Given the 2017 state up-listing of Marbled Murrelet to “Endangered” status, WDFW and stakeholders have undertaken a comprehensive review of factors potentially affecting Washington’s Murrelet population. As part of this assessment, WDFW reviewed the Forest Practices Rules (Rules) for Marbled Murrelet to identify components that could potentially be revised to strengthen protections for Murrelet habitat and its associated ecological functions. This assessment has only considered the biological and ecological implications for the species as related to the current Rule. WDFW has not evaluated economic or sociopolitical aspects that might be associated with changes to the existing Rule and looks forward to working collaboratively with stakeholders to develop alternatives that address these other elements beyond the species’ needs. The overarching goal is to maximize opportunities for Marbled Murrelet conservation while also increasing clarity in the Rule language and maintaining sustainable timber industry practices involving Murrelet habitat on non-federal forest lands.

Based on WDNR’s March 3, 2017, recommendation to the Board that WDFW initiate an assessment of the Marbled Murrelet rules to determine whether habitat is being adequately protected and if any amendments are warranted, WDFW is providing initial ideas of potential changes to strengthen the Rule for better protection of Murrelet habitat based on the best available science. WDNR also recommended to the Board that WDFW convene a diverse group of participants to complete the rule assessment based on the topics outlined in WDFW’s 24 February 2017 letter, and to present any subsequent recommendations to the Board:

“The up-listing of the Marbled Murrelet to state endangered status acknowledges a needed assessment of the Board’s 1990’s-era rules based on updated best available science.

A diverse group of participants should collaboratively review current murrelet rules to bring recommendations to the Board.

In the meantime, the department (WDNR) will continue to implement the Board’s current murrelet rules, and WDFW will continue to screen proposed forest practices for potential adverse impacts to murrelets. Given a formal request from WDFW, the department (WDNR) can condition the application to protect the murrelet.”

To fulfill its purpose of evaluating Rule effectiveness in identifying and protecting Murrelet habitat, the WWG developed a set of 10 objectives. Successful completion of each objective included an outline of stressors to the species, identification of ambiguous Rule language, development of needed implementation guidance, addition of new language clarifications, and delivery of recommendations that balance conservation needs and economic viability of the timber industry to the Board for consideration.

4.0 OBJECTIVES

4.1 Objective 1: Review population status and assess stressors which have led to a continued decline of the Marbled Murrelet population in Washington & the resulting state up-listing (endangered) of Murrelets.

4.1.1 POPULATION STATUS.

The most recent population estimate for the entire Northwest Forest Plan area (WA, OR, CA) through the 2020 survey year was 19,700 Murrelets (95 percent confidence interval [CI]: 15,500 to 23,900 birds) (McIver et al. 2022). The long-term Murrelet population derived from marine surveys across the NWFP area for the period from 2001 to 2018 indicate that while slightly positive at 0.5% per year, the trend is not conclusive because the 95% Confidence Intervals for the estimate overlap zero (-0.6 to 1.6 percent) (McIver et al. 2021). The largest and most stable Murrelet subpopulations now occur off the Oregon and northern California coasts, where the population trends are positive, while subpopulations in Washington declined at a rate of approximately -3.9 percent per year for the period from 2001 to 2018 (McIver et al. 2021).

Washington's Marbled Murrelet population has declined dramatically in recent decades: by 57% over the past 20 years alone, at a -3.9% decrease per year (McIver et al. 2021). The estimated population declined from 11,030 birds in 2001 (8,936 + 2,094; Puget Sound/Strait of Juan de Fuca + WA outer coast, respectively) to 4161 birds in 2021 (3,143 + 1,018, WA total: NWFP recovery zones 1 & 2; Pearson et al. 2021; Lance and Pearson 2020). Similar rates of population decline have been observed in southern British Columbia where Murrelet populations are estimated to have declined -8.6 percent/year at east Vancouver Island, and -3.1 percent/year at the south mainland coast for the period from 1996 – 2013 (Bertram et al. 2015). As in Washington, the Murrelet population declines in southern British Columbia are attributed to reductions in forest nesting habitat and changes in marine conditions that have caused reductions in prey fish species (Bertram et al. 2015).

Murrelet populations are declining in Washington because either the annual rate of reproduction does not compensate adequately for annual mortality, immigration or emigration, or the combination of these. Annual survival rates of Murrelets have been estimated at 83 to 92 percent (McShane et al. 2004), meaning about 8 to 17 percent of Murrelets die each year. Murrelets are preyed upon by raptors at sea and inland (e.g., peregrine falcons, bald eagles) and many die during the fall or winter months due to unknown causes (Nelson 1997). Murrelet nesting rates (the proportion of Murrelets that attempt to nest each year), and nesting success are both highly variable. Range-wide, Murrelets are estimated to have an average nesting success rate of about 33 percent (range: 0 to 69 percent) (Raphael et al. 2018). In Washington, a small sample of nesting Murrelets tracked with radio telemetry had very low breeding rates (5 to 20 percent of tagged adults attempted to nest), and nest success ranged from 0 to 50 percent, with an average overall success rate of 20 percent (Lorenz et al. 2017). Nests failed because eggs failed to hatch, eggs were abandoned during incubation, or the chick died at the nest due to accidental death or other causes (Lorenz et al. 2019).

The best indication we have of reproduction and productivity in Murrelets in Washington is derived from at-sea counts of hatch-year juveniles. The ratio of hatch-year juveniles to adults provides an index of reproduction, however it does not provide breeding rates or nest success rates. Marine

surveys for Murrelets in the San Juan Islands from 1995 to 2012 documented a 3.9 percent annual decline in Murrelets over this period, which mirrors the estimated rate of decline for the Washington population (Lorenz and Raphael 2018). Despite the decline in the total number of Murrelets, the annual productivity ratio (number of juvenile Murrelets) in the San Juans averaged 7 percent ($\pm 2\%$) (Lorenz and Raphael 2018, p. 206). This indicates that while the overall Murrelet population of adults has declined, reproduction has been relatively stable, although low.

The combination of these stressors in the forested and marine ecosystems has resulted in sustained low juvenile Murrelet recruitment (too few juveniles to offset adult mortality) combined with low rates of breeding success, the overarching cause of the continued population decline (USFWS 2012). This decline is attributed to a wide range of interacting stressors, which can be grouped into four main categories: ongoing nesting habitat loss; nesting habitat edge effects and forest fragmentation; changing marine conditions affecting prey base; and human disturbance, overfishing and pollution (USFWS 2012).

While both marine and forest ecosystems are vital to Murrelet persistence, multivariate models show that the area and cohesion of potential nesting habitat are stronger predictors of Murrelet abundance and foraging location than marine variables (Raphael et al. 2015, Falxa and Raphael 2016). Because manmade and natural threats are likely to continue at current or increased levels, the Murrelet population decline in Washington is expected to continue (USFWS 2010, 2019).

4.1.2 STRESSORS

Terrestrial nesting habitat loss

The loss of mature and old forests negatively affects reproductive rates by reducing the availability of Murrelet nest sites, thereby reducing the proportion of the population able to reproduce. Displaced adults are inhibited in finding replacement nest sites after habitat loss and may encounter increased competition or are forced to use less than quality habitat for nesting (McShane et al. 2004). An increased density of nests may incur more stand edge use by Murrelets that may increase probability of nest predation by corvids (jays and crows). Also, increased fragmentation of habitat increases stand-level edge and further isolates habitat, which may incur increased predation and susceptibility to natural disturbances that alter quality habitat.

Northwest Forest Plan Habitat Monitoring Assessment

Nesting habitat loss due to timber harvest and natural disturbances (fire, windthrow and forest diseases) and subsequent fragmentation of remaining stands were identified as primary factors leading to population declines and federal listing of the Marbled Murrelet (USFWS 1997). It was estimated then that less than 12-18% of the original unmanaged old-growth forest remained in western Washington (Booth 1991).

Currently, only about 9% of habitat-capable lands in Washington contain “Higher Probability” (i.e., $>0.64- 1.0$) potential nesting habitat for the Marbled Murrelet using the Northwest Forest Plan habitat monitoring methods (Lorenz, et. al. 2021) (Figure 3). To estimate potential nesting habitat abundance and change analysis, Raphael et al. (2016) and Raphael et al. (2018) characterized Marbled Murrelet potential nesting habitat 0.39 to 0.64 probability as “Class 3” and >0.64 to 1.0 probability as “Class 4”. These two tracked categories for the 25-year NW Forest Plan report

correspond to “Moderate Probability” and “Higher Probability” nesting habitat and were renamed respectively (Lorenz et al. 2021).

It is important to note that lower end of Moderate probability in the NWFP model is 0.39 probability and is higher than Forest Practices Rules minimum probability threshold for survey at 0.30 probability, which was estimated at a density of 2 platforms per acre (WDNR 2018). However, the two methods for estimating probability of use are not directly comparable, as the Forest Practices Rules used habitat attributes measured directly by ground-based empirical data (Perez-Comas and Skalski 1996, unpublished report), using specific physical constraints. The NWFP-modeled acres of habitat that use remotely sensed satellite imagery of forest cover, as trained by the presence of Murrelets in forest stands from ground surveys and interpolation techniques (Lorenz et al 2021). Thus, the NWFP acres reported here are not exactly equivalent to the acres of habitat as defined by WDNR (2019) or current Forest Practices Rules (V. Harke, USFWS, pers. comm.). However, the NWFP habitat monitoring model (Lorenz et al. 2021) represents the best science available for predicting Marbled Murrelet potential nesting habitat over large scale landscapes.

The distribution of nesting habitat in Washington is disjunct, with a major gap in the distribution of habitat and Occupied Sites occurring along the southwest Washington coast from roughly Grays Harbor south to the Columbia River. This area is currently identified under the Rules as the “Marbled murrelet special landscape” (WAC 222-16-087). Additionally, historical loss of low-elevation coastal old-growth forest in Washington has greatly reduced available nesting habitat for Murrelets that is in closest proximity to marine waters, increasing the distance Murrelets must fly inland to find suitable nesting sites. Murrelets have been detected further inland in Washington (52 miles inland for an Occupied site) than in other parts of the species’ range (Evans Mack et al. 2003, WDFW Wildlife Survey and Data Management 2022).

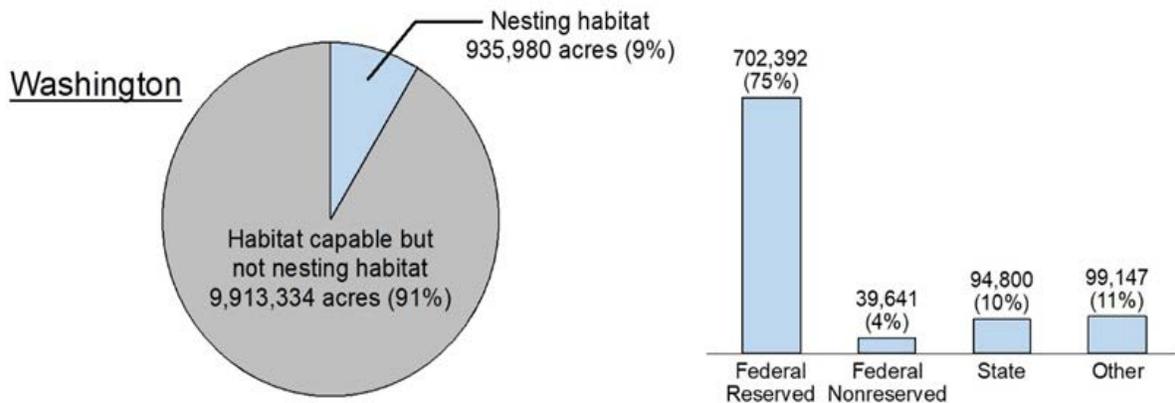


Figure 3. Proportion of Higher Probability (>0.64-1.0) nesting habitat, among all habitat-capable lands, managed by different landowners in 2017 for the NW Forest Plan analysis area in Washington (Lorenz et al. 2021). Used by permission from the authors.

Across its listed range of Washington, Oregon and California, losses of Murrelet nesting habitat and declining population size have been greatest in Washington since implementation of NWFP monitoring (Falxa and Raphael 2016, Raphael et. al 2018, Lorenz et. al. 2021, McIver et. al. 2021).

Table 1 shows NWFP-modeled area of potential nesting habitat for Moderate and Higher Probability by landowner for Washington. State lands include WDNR state trust lands, and those managed by Washington State Parks and Washington Department of Fish and Wildlife. Private industrial and non-industrial lands make up the vast majority of “other landowners”, which also include local municipalities, county, and tribal lands.

Accounting for both potential nesting habitat gains and losses due to human and natural causes, the net change in “Higher Probability” nesting habitat between 1993-2017 on non-federal lands (defined as state and other landowners) far exceeded the net change on federal lands (-58,587 ac [-44.2%] vs. -5,451 ac [-0.7%] respectively; Lorenz et al. 2021) (Table 2).

Table 2 shows the net change of Higher Probability habitat was -13.7% on state lands and -30.5% on other non-federal lands (Lorenz et al. 2021:30;). Table 3 shows gross loss of Higher Probability habitat from all sources for 1993- 2018 to be 114,269 acres. Moreover, of the Higher Probability nesting habitat loss attributed to timber harvest, 95.8% of the loss occurred on non-federal lands (Lorenz et al. 2021; Table 3).

Table 1. Estimated acres of Moderate and Higher Probability potential Marbled Murrelet nesting habitat for Washington by landowner for the baseline period (1993) and final year of analysis (2017) with net change in Moderate and Higher Probabilities (from Lorenz et al. 2021).

Landowner	1993		2017			
	Moderate Probability	Higher Probability	Moderate Probability	Moderate Net Change	Higher Probability	Higher Net Change
Federal	1,117,917	747,484	1,195,405	77,488	742,033	(5,449)
State	290,022	109,907	274,532	-15,490	94,800	(15,107)
Other landowners ^a	563,834	142,627	371,990	-191,844	99,147	(43,481)
Total	1,971,773	1,000,018	1,841,927	-129,846	935,980	(64,037)

^a Private, county, tribal.

The NWFP change-detection modeling used to make these estimates was not always able to accurately distinguish between planned timber harvest and windthrow events; for example, 29% of total losses could not be assigned a definitive disturbance agent. However, total windthrow of Murrelet habitat was estimated to be relatively minimal during the analysis period, compared to planned timber harvest (Lorenz et al. 2021) (Table 3).

The NWFP model for Higher Probability habitat estimated that natural disturbance (i.e., fire, insect damage, and other) together accounted for about 6% (6490 acres) of the total nesting habitat loss on state and other lands in Washington during 1993-2017 period (Landscape Change Monitoring System, Lorenz et al. 2021). Also, during the December 2007 winter storm event, DNR verified about 800 acres of Marbled Murrelet habitat, including Occupied Sites and areas with other status, was affected by windthrow on their managed lands in southwest Washington (WDNR 2008).

Surveyed, unoccupied habitat loss

Marbled Murrelet Survey Quality Reviews for protocol compliance conducted by WDFW were associated with Forest Practices Applications (FPAs) involving “Suitable marbled murrelet habitat” (WAC 222-16-010) on private and county lands. WDFW Status 4 (Presence)

Table 2. Estimated changes (acres) of Higher Probability (P>0.64-1.0) nesting habitat from 1993 to 2017 by landowner in Washington based on Northwest Forest Plan habitat monitoring (after Lorenz et al. 2021: Table 9).

Landowner	1993	2017	Loss	Gain	Net Loss	% Change
Federal	747,484	742,033	30,931	25,482	-5,449	-0.7
State	109,907	94,800	27,041	11,934	-15,107	-13.7
Other landowners ^a	142,627	99,147	56,297	12,816	-43,481	-30.5
Total	1,000,018	935,980	114,269	50,232	-64,037	-6.4

^a Private, county, tribal.

Table 3. Northwest Forest Plan model estimates of gross loss (114,269 total acres) of Higher Probability potential nesting habitat from 1993 to 2017 by landowner in Washington (after Lorenz et al. 2021: Table 11).

Higher Probability Nesting Habitat					
Landowner	Timber harvest	Wildfire	Insect damage	Other ^b	Unattributable Loss ^c
Federal	3,103 (4.2%)	2,923	114	2,788	22,003
State	21,383 (28.8%)	2	137	2	5,518
Private landowners ^a	49,857 (67.1%)	92	415	17	5,916
Total	74,343 (100%)	3,017	666	2,807	33,436

^a Private, county, or municipal, tribal. ^b Includes landslide, flood, some blowdown. ^c Loss not directly accounted for by the previous disturbance categories by Landscape change monitoring system (LCMS, USDA Forest Service).

and 5 (No Detections) were released for harvest or management totaling about 4251.9 acres on private lands between March 2012 to July 2022. This total was composed of 3,657 acres (86%) of surveyed habitat with surveys approved by WDFW that were determined not to be Occupied. Another 594 acres (14%) were shown, by orthophoto, as harvested after protocol surveys were completed and assigned a status rating of 4 or 5 (as interpreted by consultants and periodically, WDFW). However, there were no WDFW Marbled Murrelet Survey Quality Review approvals for these acres documented before the harvests were permitted (S. Desimone, WDFW unpublished data). In contrast, very few new Occupied Sites were located, confirmed, and deferred from harvest during that time. Occupied acres for the same time period (2012-2022) totaled only 500.5 acres. For example, in 2020-2021 (2 survey years) WDFW confirmed only one new Occupied Site out of 12 protocol survey efforts (WDFW, unpublished data). Of those 2-year protocol survey efforts submitted to WDFW for review from 2012 -2019, about 10% of Survey Quality Reviews per year resulted in identification of new Occupied Sites, and from 2016-2021, the rate was about a 9.7% (n=41). The ratio of released to occupied habitat between 2012 and 2022 is 8:1, which is a substantial loss of unoccupied habitat.

The Rules (i.e., “Suitable marbled murrelet habitat”) permit the harvest of potential habitat that does not meet the minimum habitat definition criteria above (for more detail, see Objectives 4-6). The NWFP (federal) definition of nesting habitat is broader than the state Rules, in that the federal definition does not specify a minimum tree diameter (dbh) vs. the Rule minimum of 32 inches dbh. The federal definition also uses a smaller nest platform size (≤ 4 in. vs. ≤ 7 in.) and no minimum patch size for contiguous habitat vs. 7 acres in the Rule. Thus, since permanent rule implementation (1997), there have likely been an unknown amount of potential habitat and undocumented Occupied sites harvested. Perez-Comas and Skalski (1996) showed that 30% of Occupied sites used to calculate platform threshold determinations for surveys were negotiated as the cutoff and represents similar potential stands as lost habitat. The extent to which breeding Murrelet individuals that are displaced by habitat loss may disperse to search for other nesting habitat is unknown, but they do not appear to increase density in the remaining local nesting habitat after logging (Burger 2001, Raphael et al. 2002, Hall et al. 2009, Peery et al. 2010). This observation may explain, in part, why the Murrelet population size continues to decrease in tandem with the continued net loss of potential nesting habitat in Washington. WDFW’s estimates of habitat loss do not include other potential habitat loss due to application of the Rule.

Genetic divergence

Certain evidence suggests that large scale timber harvest and fragmentation of nesting habitat over the past century has led to some genetic divergence of Murrelets at the southern end of the geographic range (Santa Cruz population, NWFP recovery zone 5) from those to the north (Peery et al. 2006, Piatt et al. 2007, Peery et al. 2010, USFWS 2019). This is of concern because genetic and demographic isolation can contribute to extinction risk. It is suspected that Washington populations, however, should have relatively less inhibited genetic flow, as they are positioned geographically in the middle of the species’ range. However, consistently depressed population numbers off the southern Washington and northern Oregon coasts coupled with paucity of adjacent nesting habitat in that region could lead to some inhibited genetic flow between Oregon and Washington (USFWS 2009) and possibly hamper breeding dispersal (Divoky and Horton 1995), but there is a lack of evidentiary studies at this time.

Nesting Habitat Fragmentation and Edge Effects

Edge effects within remaining nesting habitat due to forest fragmentation have influenced the Murrelet population. Factors including higher nest predation rates, shifts in microclimatic conditions that alter epiphyte/moss condition, windthrow, human disturbance, and perhaps even changes in genetic flow, may all contribute in various ways towards declining numbers of murrelets in Washington.

Predation Risk

Breeding success of Marbled Murrelets may be driven by the distribution of potential nest predators, which is influenced by the landscape pattern of forest cover. Forest edge effects from timber harvest patterns are largely a direct result of habitat fragmentation. Increasing fragmentation can lead to higher predation levels by corvids (i.e., jays, crows, and ravens) by reducing the size of the habitat patch and increasing the high contrast edge around habitat patches (Divoky and Horton 1995). Predation rates by corvids on Murrelet eggs and chicks were higher

when nests were within 50 meters of hard-edged forest, but the relationship varies with proximity to human activity and structure of the adjacent forest (Raphael et al. 2002b).

Microclimatic Changes & Windthrow

High contrast edges affect interior forest microclimate up to 150 meters inside the forest edge, modifying sunlight, temperature, and humidity, and may reduce moss and epiphyte abundance for development and maintenance of potential nesting platforms (Chen et al. 1995, van Rooyen et al. 2011). For example, appreciable tree mortality decreases substantially beyond 120 meters from edges in western Washington and Oregon old-growth forests (Chen et al. 1992). Habitat degradation is also occurring from chronic wind disturbances and smaller storms (WDNR 2008). Wind damage occurs more frequently along hard forest edges where there is significant contrast between older, interior forest conditions and adjacent recently harvested or younger regeneration stands. In addition, climate change is expected to act synergistically with other stressors (such as ongoing habitat loss and fragmentation and altered disturbance regimes) to affect wildlife populations (Halofsky et al. 2011).

Disturbance

Forest edges can also be subjected to audiovisual impacts from forest practices such as road construction, blasting, aircraft, and timber harvest. Human-caused disturbances have the potential to take Murrelets when they impair nesting behaviors and nest success. The ESA's implementing regulations define two forms of behavior-related take: "harm" is an act that kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering and "harass" is an act which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly impair normal behaviors, including breeding, feeding, or sheltering (50 CFR 17.3). Human disturbances are considered significant when they cause a Murrelet to delay or avoid nest establishment, flush away from an active nest site, or abort a feeding attempt during incubation or brooding of nestlings (USFWS 2012, WDNR 2019 p. H-9). The Rules address a variety of disturbance factors that may have a negative effect on Murrelets, including timing of harvest-related activities and distance of activities from Occupied Sites.

Prey Base & Reproductive Success

Along the Pacific coast, a notable shift has occurred in Murrelet prey base availability and foraging trophic level from forage fish reductions, fluctuating sea temperature, and primary productivity, which have all been associated with lower Murrelet reproductive success.

There has been a long-term decline in forage fish populations in the range of the Marbled Murrelet (Becker and Beissinger 2006, Norris et al. 2007, Gutowsky et al. 2009). The effects of decreased or changed prey availability during the last century, thought largely to be from depletion of forage fish, may have driven Marbled Murrelets to increasingly rely on less nutritious food sources (e.g., smaller fish, krill) and subsequently a decline in reproductive output (Becker and Beissinger 2006, Norris et al. 2007, Gutowsky et al. 2009).

Studies of Murrelet diets in the Puget Sound–Georgia Basin region indicate that Pacific sand lance now comprise the majority of the Murrelet diet (Gutowsky et al. 2009). Historically, energy-rich fishes such as herring and northern anchovy comprised most of the Murrelet diet (Becker and Beissinger 2006, Gutowsky et al. 2009). This is significant because sand lance have the lowest

energetic value of the fishes that Murrelets commonly feed on. For example, a single northern anchovy has nearly six times the energetic value of a sand lance of the same size (Gutowsky et al. 2009), so a Murrelet would have to eat six sand lance to get the equivalent energy of a single anchovy.

Murrelets in Washington have the largest recorded marine home ranges documented for the species, with some individuals flying over 62 miles one way from nest sites to preferred marine foraging areas (Lorenz et al. 2017). Even Murrelets that nested relatively close to marine waters (within 6 miles) sometimes travelled great distances (up to 82 miles one-way) over marine waters to reach preferred marine foraging areas (Lorenz et al. 2017). These findings suggest that availability of forage fish is likely an important factor influencing Murrelet breeding and nesting success in Washington. The Marbled Murrelet Recovery Implementation Team (USFWS 2012) concluded: “There is a potential disconnect between quality marine and terrestrial habitats. The best foraging habitat may not be near the best nesting habitat, due to nesting habitat losses. Longer commuting times between nesting and foraging habitats can increase both energetic costs of reproduction and exposure to predators.”

Timing and abundance of prey are often dependent on ocean temperature and upwelling events, and these factors are closely linked with trends in oceanic cycles and climate change (Cury et al. 2011). Forage fish production on the outer coast of Washington is particularly influenced by both sea surface temperature and summer upwelling events. These events are influenced by both short- and long-term climatic events (e.g., El Niño and Pacific Decadal Oscillation) and local offshore winds. Lower sea surface temperatures and strong upwelling events have strong positive influences on fish populations. In contrast, the southern Salish Sea (Puget Sound and Strait of Juan de Fuca) is a non-upwelling system whereby foraging conditions are influenced more by tidal activity and freshwater inputs. The complex interaction between these two marine ecosystems – coastal ocean and inland Salish Sea – and their influence on predators and their prey are not yet well understood.

Marine habitat in terms of forage quality and location for Marbled Murrelets in Washington has not been studied in much detail. Studies on commercial catches of important forage fish species in Washington (e.g., herring, anchovy, Eulachon) have not shown direct links to Marbled Murrelet population decline or reproductive failure, but these relationships have not been explicitly tested. Moreover, it is widely understood that there has been a reduction in abundance of these preferred high-calorie forage species due to overharvesting and dynamics of marine productivity (i.e., plankton abundance) cycles, having an effect on seabirds in general (Becker and Beissinger 2006, Norris et al. 2007, Gutowsky et al. 2009, USFWS 2012). In aggregate, Pacific herring stocks in Puget Sound were generally listed as “moderately healthy” in 2012, with exception of the Cherry Point stock, which has declined 62% since 1986 and is now regarded as “critical”. Other Puget Sound herring stocks in aggregate have seen a 26% decline from 1986-2010 (Stick et al. 2014).

Timely data are lacking for herring and other forage fish stocks for the Washington outer coast. An analysis of 40 years of trawl-sampling in Puget Sound indicated significant decreases in herring and surf-smelt in south and central Puget Sound. Raphael et al (2015) suggested that the human footprint was likely a significant factor affecting Murrelets.

Seasonal harmful algal blooms in Washington marine waters vary in frequency and occurrence and are influenced by sea surface warming. In Washington, they can have negative consequences for marine birds, including matting of feathers causing hypothermia and death in Common Murres,

loons and grebes, but this has not documented for Marbled Murrelets in Washington. Saxitoxin produced by dinoflagellate blooms in Alaska have been shown to be a cause of juvenile mortality in Kittlitz's Murrelet fed contaminated sand lance but was not documented in Marbled Murrelets in WA (Lorenz et al 2019).

Marine Disturbances & Pollution

Human disturbance and pollution on marine waters include fisheries bycatch, derelict fishing gear, commercial vessel traffic, catastrophic and chronic small-scale oil and chemical pollution, shoreline alteration, and military exercises.

In the U.S. portion of the Salish sea (NWFP Recovery Zone 1), Raphael et al. (2015) found a slightly greater influence of human-related threats (i.e., commercial vessel traffic, pollution, fishing, shoreline alteration, climate influences) on distribution and abundance of Murrelets over time, than other marine factors such as primary productivity (surrogate for forage fish) and sea temperature factors. Research indicates the annual variation in Murrelet numbers was more strongly correlated with the amount and configuration of adjacent nesting habitat than with trends in marine factors such as productivity and sea surface temperature (Raphael et al. 2015, Lorenz et al. 2016). Specifically, Murrelet density and distribution at sea was strongly correlated with the number of larger blocks of unfragmented areas of older forest (i.e., greater "habitat cohesion").

Disturbance in the marine environment is most prevalent within Puget Sound, where there is a high level of urbanization, shoreline development, and recreational, commercial, and military vessel traffic. Boat traffic in important foraging areas can displace Murrelets and disrupt feeding during critical chick-rearing periods. The USFWS determined that the Navy's Northwest Training and Testing program "may affect and is likely to adversely affect" the Murrelet by exposing Murrelets to aircraft noise and underwater sound impacts in marine foraging areas in Puget Sound (USFWS 2016).

Other sources of human-caused mortality of Murrelets include oil spills and net fisheries. Several studies have documented Murrelets becoming entangled in gillnets in Washington and British Columbia (USFWS 2019). While efforts to reduce fisheries bycatch remain in place, the USFWS estimates that about five Murrelets per year may be killed in Washington fisheries (USFWS 2019). While there have been no recent major oil spills with documented mortalities of Murrelets in Washington, the risk of oil spills remains and may be increasing as a result of new and expanded oil transportation facilities being developed in Washington and British Columbia (USFWS 2019). Impacts can result from direct mortality through oiling, and through changes in prey base, marine habitat, and vessel traffic disturbance.

4.1.3 CUMULATIVE AND INTERACTIVE EFFECTS

The cumulative and interactive effects of the above stressors and other factors combined are a major mechanism contributing to the continued population decline of the Marbled Murrelet (USFWS 2012, 2019). These effects occur at the scales of individuals, populations, and the species and include (but are not limited to):

1. Legacy effects of past declines on current population dynamics and resiliency
2. Spatial disconnect between quality marine and terrestrial habitats, increasing the energetic costs of commuting and the risk of depredation

3. Chronic stress responses and energetic costs from repeated or sustained audiovisual disturbances in terrestrial and marine habitats
4. Increased vulnerability to predators and disease and decreased reproductive success due to energy deficits
5. More severe impacts of pollutants, toxins, pathogens, or disease due to chronic stress

To the extent these and other cumulative and interactive effects limit the recruitment of new adults into the population, the Murrelet's population decline will continue. In its periodic status review of the species, WDFW concluded that "without solutions that can effectively address these concerns [stressors] in the short-term, *it is likely the Marbled Murrelet could become functionally extirpated in Washington within the next several decades*" (Desimone 2016, emphasis added).

4.2 Objective 2: Review and assess the potential contributions of non-federal lands regulated under the Rules towards Marbled Murrelet habitat conservation.

4.2.1 ESTIMATES OF AVAILABLE HABITAT

Several Murrelet nesting habitat models have been developed in Washington for monitoring and/or permitting purposes. The "MaxEnt" Marbled Murrelet potential nesting habitat models developed for the NWFP indicate approximately 1.84 million acres of Moderate Probability potential nesting habitat and 935,980 acres of Higher Probability (~2.78 million total) exists within 55 miles from marine waters in Washington (Lorenz et al. 2021), and the majority of Murrelet habitat in Washington occurs on federal lands (Falxa and Raphael 2016, Raphael et al. 2018; Table 1; see Objective 3 for further details).

Habitat on non-federal lands also plays a key role in the persistence of the species. Roughly 371,990 acres of Moderate Probability and 99,147 of Higher Probability habitat occurred on "Other landowners" (mostly private; includes county and tribal) in 2017 (Lorenz et al. 2021), about 17% of the state total (Table 1).

In WDNR's Habitat Conservation Plan Long-Term Conservation Strategy (WDNR 2019), over the next five decades the area of existing habitat on DNR-managed lands expected to be harvested is ~38,000 acres, with an expected net habitat increase of ~65,000 acres as forest deferrals mature, for a total of 273,000 acres of habitat on DNR-managed lands by the year 2067 (this includes riparian zones and 0.25 Probability of and higher, WDNR 2019).

Under the Washington Rules, Murrelet habitat on private lands is identified in the field on a site-by-site basis based on Rule-defined habitat criteria (FP Board Manual 15). When these criteria are met, it triggers a protocol Murrelet survey for occupancy or non-occupancy (see Objective 4). Murrelet habitat on private lands is projected to continue to decline except within Occupied Sites, riparian corridors, potentially unstable slope buffers, and other deferrals (Raphael et al. 2018). For instance, from January 2012-December 2019, the management or harvest of about 500 acres per

year on average (total 3,962 acres)³ of “Suitable marbled murrelet habitat” was permitted on private lands where surveys conducted in compliance with Pacific Seabird Group survey protocols demonstrated the habitat was not occupied by Murrelets (S. Desimone, WDFW unpublished data). In some cases, lower quality habitat may develop within riparian zones and unstable slopes over long periods of time, generally 70-120 years, for naturally regenerated stands (WDNR 2019). However, these areas are not expected to develop significant amounts of habitat secure for successful nesting where they are too narrow (i.e., less than 200 meters wide) due to forest edge effects from predators and microclimate changes (Desimone 2016).

The Marbled Murrelet federal recovery plan (USFWS 1997) emphasizes the interaction between landownerships:

“Maintenance of marbled murrelet populations on private lands is critical in arresting the decline of the species in the next 50—100 years. This is especially true where additional nesting habitat is not expected to be available on nearby Federal lands. While the Endangered Species Act Section 9 prohibition against unauthorized incidental take provides some protection for the marbled murrelet, this may not be sufficient to protect and enhance habitat on non-federal lands in the long term. This is because a continuing decline in populations would be expected to eventually result in unoccupied habitat [by negative survey outcomes] where the prohibition against take may not apply. This unoccupied, but suitable, habitat might then be harvested, continuing the erosion of habitat that is needed to recover the species.”

The NWFP monitoring team (Falxa and Raphael 2016) also emphasized the crucial role of non-federal habitat (e.g., public State and municipal; private) in maintaining the current amount of Murrelet habitat across the listed range:

“Accomplishing this goal will require significant contributions from non-federal lands. Over time, as potential nesting habitat on federal reserved lands increases in quality, less reliance on non-federal lands may be warranted. Thus, currently, there are limits on the extent to which the NWFP can protect remaining suitable habitat and prevent its ongoing loss.”

Non-federal forests also provide important advantages to Murrelets relative to federal habitat. For example, most non-federal lands are lower elevation and closer to marine habitat, providing shorter over-land commutes, less energy expenditure, and a lower risk of predation from diurnal predators. Maintaining habitat in low-elevation areas near productive marine habitat supports higher Murrelet occupancy and abundance (Meyer et al. 2002). Nonfederal forests are also widely distributed geographically (a population biological goal; Raphael et al. 2008) and are generally of a higher site class, where large trees grow more quickly than in higher elevation, federal forests.

Temporally, existing habitat on non-federal lands is needed to serve as a bridge to support the Murrelet population while it is most vulnerable to extirpation over the next 30-50 years (Raphael et

³ Total acres harvested or available to harvest on private lands, as a result of the FP Rule habitat definition for survey component, and Forest Practices Application information. These acres do not include those dismissed by Rule that are presently unknown: density of platforms less than the Platform Inventory Model Method threshold, or less than the specific Detection Area threshold of 2 platforms/acre. Also, the total amount of Murrelet habitat acres harvested or managed on private lands from 1997 through 2011 resulting from WDFW official approved survey reviews have not been calculated.

al. 2008). Although relatively little Murrelet habitat has been lost on federal lands since the implementation of the NWFP, federal scientists “anticipated a challenge in maintaining Murrelet populations for 50 to 200 years, until new nesting habitat develops. Considering observed population trends, our findings underscore the importance of the short-term goal to maintain existing nesting habitat” (Falxa and Raphael 2016, Peery, and Jones 2019). Even under continued implementation of a robust NWFP, “it is uncertain whether [Murrelet] populations will persist to benefit from potential future increases in habitat suitability. *This underscores the need to arrest the loss of suitable habitat on all lands, especially on non-federal lands and in the relatively near term (3-5 decades)*” (Falxa and Raphael 2016, emphasis added). Population stabilization is expected once nesting habitat sufficiently recovers from previous losses and fecundity increases, but further habitat loss on non-federal lands could cause Murrelet populations to fall before then (Falxa and Raphael 2016).

The best available science is clear that maximizing Murrelet habitat across all landownerships would maximize the probability that Washington’s Murrelet populations will persist. Non-federal lands have the potential to make significant contributions towards Murrelet conservation by helping to stabilize the area of habitat across the landscape during this crucial period in time.

4.2.2 PRIVATE LANDS CONTRIBUTIONS TO CONSERVATION

As reflected in the current Rules for Critical habitats (state) of threatened and endangered species, Marbled Murrelet (WAC 222-16-080(1)(h)), private lands contribute a number of habitat elements essential to the Murrelet’s ability to reproduce. The most important contributions to Murrelet conservation on *all* landownerships are the “Occupied Sites” where potential nesting behaviors have been observed, and the forested buffers around these areas (USFWS 1997). Likewise, any high probability potential nest areas that have not been surveyed are important (where appropriate, federal lands are assumed to be occupied because of their structure and age). Occupied Sites contain stand structures Murrelets need to nest, such as nest platforms with vertical and horizontal cover, and Murrelets show high site fidelity to the same Occupied Sites between years (USFWS 2012). Forested buffers adjacent to Occupied areas are also Critical habitat (state) and important for minimizing forest edge effects that negatively impact Murrelet nest success (USFWS 1997, 2012). Hence, deferring Occupied Sites and their buffers from forest practices represents the *minimum* conservation contribution necessary for take avoidance on non-federal lands. Under Section 9 of the ESA, “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any threatened or endangered species. Restrictions on forest practices within buffers of Occupied Sites are also important to avoid harm from potential edge effects and disturbance.

Critical habitat (state) also includes “Suitable marbled murrelet habitat” (WAC 222-16-010) that provides the forest structures Murrelets need for nesting but has not yet been surveyed to determine occupancy. This habitat is important to recognize because it could be occupied by nesting Murrelets now or in the future and must be surveyed for occupancy prior to FPA approval. Approval of an FPA is contingent upon the official survey review, conducted by WDFW, for determining if compliance with the Marbled Murrelet survey protocol standards have been met (WAC 222-16-010 “Occupied marbled murrelet site” (6)).

4.3 Objective 3. Identify the habitat components presumed necessary for forested areas to be considered Suitable habitat (state) and/or Occupied habitat (evaluate past modeling, statistical probabilities, etc.) using the current best available science.

In the most general sense, Marbled Murrelet potential nesting habitat consists of those trees within a forested context having the biophysical characteristics Murrelets need for nesting. The first Murrelet nest was not discovered until 1974 (Binford et al. 1975), and since then, roughly 121 (n= 41 WA; 80 in OR) Murrelet nests have been located in Washington and Oregon as of 2019 (Hamer and Nelson, unpublished data). The current Marbled Murrelet terrestrial survey protocol (Evans Mack et al. 2003) best describes the observed characteristics of Murrelet nest sites:

“Marbled Murrelet nests have been found primarily in mature and old-growth habitat and, in a few cases in Oregon, in younger (60-80 years) forests that have trees with dwarf mistletoe or other deformations or structures that provide a nest platform (Nelson 1997, Nelson and Wilson 2001). Douglas-fir, coast redwood, western hemlock, western red cedar, yellow cedar, mountain hemlock, and Sitka spruce predominate nest stands found to date (Hamer and Nelson 1995a but see Bradley and Cooke 2001 for a tree nest in a large deciduous red alder and nests on cliffs; S.K. Nelson (pers. comm.) found a tree nest in large moss-laden bigleaf maple). Therefore, potential habitat that should be surveyed for murrelets is defined as (1) mature (with or without an old-growth component) and old-growth coniferous forests; and (2) younger coniferous forests that have platforms. A platform is a relatively flat surface at least 10 cm (4 in) in diameter [sic] and 10 m (33 ft) high in the live crown of a coniferous tree. Platforms can be created by a wide bare branch, moss or lichen covering a branch, mistletoe, witches’ brooms, other deformities, or structures such as squirrel nests. It is important to note that murrelets have occupied small patches of habitat within larger areas of unsuitable habitat (Nelson and Wilson 2001). Some Occupied sites also have included large, residual trees in low densities, sometimes less than one tree per acre (Grenier and Nelson 1995, Ralph et al. 1995). The presence of platforms appears to be the most important stand characteristic for predicting murrelet presence in an area (Hamer et al. 1994). Platform presence is more important than tree size, which alone is not a good indicator of platform abundance (Hamer 1995; S. K. Nelson, pers. comm.). Therefore, any forested area with a residual tree component, small patches of residual trees, or one or more platforms should be considered potential murrelet nesting habitat. Continuous potential habitat is that which contains no gaps in suitable forest cover wider than 100 m (328 ft).” From Evans-Mack et al. 2003 pp. 2 and 3.

4.3.1 MAXENT HABITAT MODEL FOR NORTHWEST FOREST PLAN MONITORING ESTIMATES

The empirical observations summarized above form the foundation of Murrelet nesting habitat suitability models that apply across the species’ listed range (WA, OR, and CA). The Northwest Forest Plan MaxEnt model for habitat estimation provides estimates of the amount, spatial distribution, and trends of potential nesting habitat with the goal of evaluating whether the NWFP has been effective for maintaining and restoring Marbled Murrelet nesting habitat on federal lands as well as detecting habitat trends on non-federal lands (Lorenz et al 2021, Raphael et al. 2018; Table 1). The NWFP monitoring efforts include a series of detailed habitat models that have been refined over time (Raphael et al. 2006, Raphael et al. 2011, Raphael et al. 2016, Raphael et al. 2018,

Lorenz et al 2021,). MaxEnt is now one of the most widely used and useful methods currently available for species distribution modeling (Merow and Silander 2014, Ahmed et al. 2015).

MaxEnt model inputs included a suite of remotely sensed, hypothesized habitat variables, and model training included nest site and Occupied stand data (N=368 sites). Many of the model covariates were based on range-wide 'gradient nearest neighbor' (GNN) attribute maps of forest composition and structure developed for large scale analysis and monitoring (Ohmann and Gregory 2002). The covariates that made the greatest contributions to the Washington model were the old-growth structure index, the average effective precipitation from fog drip and low clouds, and the platforms per acre (derived from GNN trees per hectare by species and dbh variables; Raphael et al. 2016).

The model estimated the relative probability of occurrence at locations where Murrelets nest (presence sites) relative to unobserved locations, assigning a higher probability of occurrence to locations with environmental conditions more similar to presence sites (Baldwin 2009, Raphael et al. 2018, Lorenz et al. 2021). These predicted to expected (P/E) ratios were then used to define two classes of higher suitability habitat:

1. Moderate Probability (Formerly Class 3): the relative likelihood of Murrelet presence exceeds that expected by chance, given the set of environmental conditions (covariate values) at that location.
2. Higher Probability (Formerly Class 4): environmental conditions are equal to or exceed those of the average nest/Occupied location.

These two classes are combined for estimating the area of Murrelet habitat across large spatial scales (Table 1).

As with any modeling exercise, various sources of uncertainty exist in model input and assumptions and in interpretation of model output. Unfortunately, the model can't necessarily predict habitat at the stand level due to its relatively coarse resolution (30 m² pixels). As a result, the model missed some known Occupied sites (false negatives) and overestimated suitable habitat in other areas (false positives). The most appropriate use of MaxEnt model output is across scales much larger than stands or patches, such as landscapes, counties, large watersheds, states, or ecoregions (Raphael et al. 2016).

4.3.2 FOREST PRACTICES MODEL

The Forest Practices definition of Murrelet potential nesting habitat is defined as "Suitable marbled murrelet habitat" (WAC 222-16-010) and can be considered a subset of the federal USFWS definition, and of the WDNR definition (Appendix A – Habitat Definitions).

Habitat platform thresholds are used as recommended triggers for survey requirement of "Suitable marbled murrelet habitat" and were modeled and categorized by empirically derived data used to calculate nesting platform density thresholds. As stated in Section I, these are considered the Marbled Murrelet "probability of use" thresholds and platform density thresholds, which were the consensus reached by the Board's Marbled Murrelet Committee in the Timber, Fish and Wildlife working group arena, and were adopted as the negotiated SEPA thresholds for inclusion into the Rule definition of Critical habitat (state) for Murrelets.

Forest Practices Board Manual Section 15 provides guidance on how to assess the number of platforms in “Suitable marbled murrelet habitat”, as well as a brief description of the types and locations of landscapes that platforms can occur. Individual areas of “Suitable marbled murrelet habitat” identified for survey are derived from 1) field-based transect method for recording platform counts to calculate density assessments. This method utilizes eight to 30 0.4 acre plots along systematic transects to determine platform density. All trees ≥ 32 inches dbh are evaluated for the number and type of platforms to determine if the entire area meets platform per acre requirements (2, 5, or 7). 2) landowner forest inventory data, known as the Platform Inventory Model Method (Board Manual Section 15). Rather than conducting transect surveys, this method relies on landowner stand inventories to estimate the number of platforms per acre. Trees 32 inches dbh or greater are organized into size classes. A regression-derived index (platform units per tree) is applied to the average trees per acre in each class, which yields an estimate of the number of platforms per acre.

4.3.3 COMPONENTS OF HABITAT DEFINITIONS TABLE

The full range of Marbled Murrelet habitat components were considered and evaluated by the WWG. They are listed in Appendix A. The table in Appendix A provides a comparison of definitions of Marbled Murrelet habitat between federal, WA state, and the Pacific Seabird Group. From the habitat component assemblage in the appendix, the WWG evaluated and produced the Nest Tree summary report data (Desimone, Barnowe-Meyer unpublished reports) which covers tree dbh, tree height, and platform height in a tree.

4.4 Objectives 4, 5, and 6 Combined

In the process of evaluating and proposing Rule language changes, the WWG realized that as these three objectives are closely related, our thought process took us through these significant steps outlined below for each, which is the synthesis of Objectives 4, 5, and 6. Throughout this section, recommended deletions are shown as struck, and proposed language is underlined. Existing Rule language is italicized and presented as found in the WAC.

Objective 4. Review the forest practices definition of “Suitable marbled murrelet habitat” and Critical habitat (state) or potential Critical habitat). Refine the definition(s) as needed based on best available information synthesized in Objective 3.

Objective 5. Based on recommended habitat definition, characterize the processes/steps necessary to address its protection under the proposed Rule changes.

Objective 6. Evaluate the recommended process and provide rationale after recommended rule changes and identify when/where/how the Forest Practice Rules would be applied in relation to “Suitable marbled murrelet habitat” and Critical Habitat (state).

4.4.1 RULE EVALUATION AND RECOMMENDED RULE CHANGE FORMAT OVERVIEW

Under each of the following affected WAC listings, current Rule language is shown in italics, with proposed insertions in underline text and proposed deletions in strikeout text. For each Rule, the following elements are identified and a recommendation for the Board is identified:

1. Issue or a concern for evaluation. We briefly describe the components and what analyses were conducted;
2. Rationale for the proposed change;
3. Conclusions reached;
4. Recommendation to the Board. Either consensus-based recommendation – unanimous agreement by WWG, or not unanimous consensus – reasons why, and WWG and/or WDFW’s recommendation to the Board.

4.4.2 RECOMMENDED CHANGES FOR FOREST PRACTICES RULES

SEPA Guidance WAC 222-10-042 Marbled Murrelet

Issue and Concerns for Evaluation

Since 1997, current Rules have allowed management or loss of habitat having a 30-60% probability of occupancy (WAC 222-10-042(2) and (3); WAC 222-16-080(1)(h) Critical habitat) with no requirement to survey for Marbled Murrelet occupancy prior to harvest. WDFW identified this issue and presented it to the WWG for evaluation (WDFW 2022).

The first consideration for the WWG was to determine if the platform density thresholds of 7, 5, or 2 platforms/acre are adequate or insufficient for triggering protocol surveys; is a significant amount of habitat potentially being lost, or should the thresholds be adjusted to minimize habitat loss?

Occupancy is only determined through protocol survey information done in substantial compliance with the most current Pacific Seabird Group Inland Survey Protocol Methods for Marbled Murrelets (Evans Mack et al. 2003).

WDFW suggested to the WWG that the ideal proposal would be to consider a more conservative Critical Habitat definition used to identify stands for survey (WAC 222-10-042, Marbled Murrelets) to minimize future potential habitat loss: identify all stands for survey having 2 or more platforms per acre, regardless of “Special landscape” or if inside or outside a “Detection area” (WAC 222-16-010, General Definitions), which eliminates the minimums of 7 and 5 platforms per acre requirement currently needed to trigger surveys outside of Detection areas. A second alternative proposed was to eliminate the 7 platforms/acre requirement and retain the 5 platforms/acre for areas outside of Detection areas.

Proposed Rule Language (Objective 4)

Marbled murrelets.

The following policies shall apply to forest practice subject to SEPA where the forest practices may cause adverse impacts to marbled murrelets.

(1) Within an Occupied marbled murrelet site, forest practices that will adversely impact this habitat will likely have a probable significant adverse impact on the environment except where the department determines, in consultation with the department of fish and wildlife, that the applicant’s proposal will actually have no significant adverse impact.

(2) Within marbled murrelet detection area:

~~(a) Suitable marbled murrelet habitat with at least a 50% probability of occupancy is assumed to have a high likelihood of marbled murrelet occupancy. It is currently assumed that 5 platforms per acre meets the 50% probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment.~~

~~(b) Suitable marbled murrelet habitat with at least a 30% but less than 50% probability of occupancy has a sufficiently high likelihood of marbled murrelet occupancy to warrant a survey. It is currently assumed that 2 platforms per acre meets the 30% probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment. This additional information is necessary for the department to evaluate the environmental impact of the forest practice. It is currently assumed that 2 platforms per acre meets the 30% probability of occupancy.~~

A landowner may request the department of fish and wildlife to survey. The department of fish and wildlife should survey to the maximum extent practicable based on an appropriation to survey marbled murrelet suitable habitat within detection areas where the landowner provides access for surveys to the department of fish and wildlife, and sufficient time is allowed to complete the protocol surveys. The department shall provide a notice to the landowner within 60 days from the date of application of the department of fish and wildlife's intent to survey. If the department of fish and wildlife cannot conduct marbled murrelet surveys the responsibility for surveys remains with the landowner.

(3) Outside a marbled murrelet detection area:

(a) Suitable marbled murrelet habitat with at least a 60% probability of occupancy is assumed to have a high likelihood of marbled murrelet occupancy. It is currently assumed that 7 platforms per acre meets the 60% probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment.

(b) Within a marbled murrelet special landscape, suitable marbled murrelet habitat with at least a 50% probability of occupancy is assumed to have a high likelihood of marbled murrelet occupancy. It is currently assumed that 5 platforms per acre meets the 50% probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment.

(4) The adjacent forested area within 300 feet of "suitable marbled murrelet habitat" described in subsections (2) and (3) is assumed to be necessary for buffering potentially occupied habitat as defined in WAC 222-16-080 (1)(h)(v). This additional information on the forested area within 300 feet of "suitable habitat" is necessary for the department to evaluate the environmental impact of the forest practice. Without survey information, forest practices that will adversely impact this buffer may have a probable significant adverse impact on the environment.

~~(5)~~ (4) *When determining whether a forest practice will have a probable significant adverse impact on the environment, the department shall, in consultation with the department of fish and wildlife, evaluate the impacts on the statewide, regional (Southwest Washington, Olympic Peninsula, Hood Canal, North Puget Sound, South Puget Sound and South Cascades) and local (within the marbled murrelet detection area) marbled murrelet populations and associated habitats. The department should consider a variety of information including but not limited to survey data, habitat quality and patch size, the amount of edge in relation to the area of habitat, amount of interior habitat, distance from saltwater, detection rates, the amount and quality of habitat, the likelihood of predation and the recovery goals for the marbled murrelet.*

~~(6)~~ (5) *The platform assumptions set forth above are based on regional data. Applicants or others may submit information to the department which was gathered in conjunction with a marbled murrelet survey agreement with the department of fish and wildlife, and other reliable information that is more current, or specific to the platform numbers in the marbled murrelet suitable habitat definition. The department shall use such information in making its determinations under this section where the department finds, in consultation with the department of fish and wildlife, that the information is more likely to be valid for a particular WRIA or physiographic province. If the department does not use the information, it shall explain its reasons in writing to the applicant.*

WDFW Rationale (WDFW 2022)

The Marbled Murrelet was up listed to state endangered in 2017 (Desimone 2016). Overall, terrestrial habitat loss has been a major factor in Murrelet declines throughout its listed range. It is estimated that nesting habitat on non-federal lands in WA has declined by 30.5% for the period 1993-2017 (Lorenz et al. 2021). For the data used in developing the 1997 Murrelet Rules, as much as 30% of known Occupied stands used in that model had a lower end platform density of <2 platforms per acre (Forest Practices Marbled Murrelet Technical Committee notes: J. Pierce, WDFW unpublished data, with reference to Perez-Comas and Skalksi 1996), and these areas were subsequently negotiated by stakeholders as exempt from the Rules as to requiring surveys.

In addition to the 30% of Occupied stands with <2 platforms/ac, direct habitat loss attributed to the Rules also involved areas with special circumstance survey thresholds. Since the permanent Rule was enacted in 1997, WDFW has observed numerous Forest Practices Applications where “Suitable marbled murrelet habitat” with ≥ 2 platforms/acre to <5 platforms/ac (assumed 0.30 – 0.50 probability of occupancy) were exempt from survey requirements, as calculated by the Platform Inventory Model Method (PIMM) devised after Duke et al. (1998; FP Board Manual 15). For the years 1997 to 2022, this translates to an unknown amount of potential nesting habitat loss having ≥ 2 to <5 platforms/ac in the Southwest Washington “Marbled murrelet special landscape” (WAC 222-16-087). For example, of 85 FPAs using PIMM to estimate platform density and submitted to WDNR between 2007-2019, WDFW estimated about 889 acres of habitat (10% random sample extrapolation: average 10.5 acres per FPA, using applicant’s FPA data) were dismissed from survey and subsequently harvested (S. Desimone, WDFW, unpublished data). The time period was constrained by WDNR’s ability to retrieve electronic files from their FPARS database. Likewise, WDFW observed examples of similar stands dismissed from surveys where ≥ 2 to <7 platforms/ac (0.60 probability of occupancy) thresholds in non-detection areas occurred (FPA data unavailable to estimate acreage).

The impacts to Marbled Murrelet nesting habitat since Rule inception in 1997:

- In non-detection sections outside of the “Southwest Washington Special landscape” there has been and continues to be direct loss of habitat in areas with otherwise suitable habitat >2 platforms/acre to <7 platforms/acre due to surveys not being required, and thus, no opportunity to identify new Occupied habitat.
- Inside the “Special landscape” in non-detection sections, there is also no survey requirement for otherwise suitable habitat within the platform density range from >2 to <5 platforms/ac. As such, there is an additional likelihood of direct habitat loss since no surveys are required.

Several members of the WWG were interested in further exploring the probability of habitat loss as related to predicting occupancy by Murrelets through survey results. It was determined that to review and analyze the statistics that drive current assumptions in the Rule would be outside of the ability of the group at this time.

WWG Recommendation

After reviewing WDFW’s assessment of change in available Marbled Murrelet nesting habitat and probability of occupancy since 1997, the group agreed that further assessment of the probability of occupancy as scaled by the original Rules is research beyond the scope of this Rule assessment.

The WWG recommends to the Board that focused funding and statistical analysis would help inform possible revisions to the platform threshold alternatives and any subsequent Rule changes. Further, no language changes are recommended until further platform threshold analysis can be done.

WAC 222-16-010 General Definitions

Suitable marbled murrelet habitat

Issue/Concern for Evaluation

Subsection (a): The USFWS identifies the breeding range inland to as much as 55 miles in WA. There is one documented “Occupied marbled murrelet site” at 52 miles from marine waters in Washington. An evaluation by WWG for this subsection identified some possible stands using orthophotography out to 55 miles and a basic GIS exercise indicated that the risk to harvest of habitat in the 50-55 mile zone (~800 acres on private lands) was “low” but not zero risk (pers. Com. V. Harke, Forest and Fish HCP). The WWG recommendation for subsection (a) is no change.

Subsection (b): The WWG determined (WDFW 2022) that it was unnecessary to limit species of habitat trees to Sitka spruce, western hemlock, western red cedar, and Douglas fir. Some higher elevation “Occupied marbled murrelet sites” on private landholdings in Washington contain trees with yellow cedar, silver fir, and mountain hemlock which have potential 7-inch wide nesting platforms (WDFW, unpublished data). WWG recommendation for subsection (b) is to remove reference to specific conifer species and replace with “conifers” as proposed.

Subsection (c): Minimum Platform density. Is there enough data to support a change from ≥ 2 platforms/acre to another value? The WWG concluded that there are not enough data to support a Rule change; nothing to compare it to in other states. WDNR did do some Occupied site evaluation

in the past (Raphael et al. 2008) and did have several Occupied stands with less than 2 platforms/acre). WWG recommendation for subsection (c) is no change; keep platform density minimum for survey threshold at ≥ 2 platforms/acre (future evaluation & adaptive management as needed).

Subsection (d): “Suitable marbled murrelet habitat” qualifying polygon area. There are two issues to consider under this subsection:

Issue 1 – Current ambiguous language makes identification of Critical Habitat for surveys historically problematic. Suggest revising language or adding a diagram (e.g., Ramsdell and Ritchie 1998) for clarity and direction.

Issue 2 – Should the Rule stay at seven (7) acres in size, including the contiguous forested area within 300 feet of nesting platforms, with similar forest stand characteristics (age, species composition, forest structure) to the forested area in which the nesting platforms occur, with clarification edits in Issue 1 (Option 1); OR should the WWG recommend adopting new language to simplify 5 acres (Option 2) as the threshold for a minimum convex polygon of qualifying platform trees?

The language (subsection (d) Issue 2) “similar forest stand characteristics” was first identified as problematic by WDFW in 1997 (R. Frederickson letter to J. Mankowski December 1998) and was being misinterpreted by multiple parties. The current wording is ambiguous and has led to many discussions regarding what specifically constitutes “similar forest stand characteristics” without specific metrics; it is subjective and can be interpreted differently by various parties depending on harvest management goals (G. Bell, S. Desimone, pers. obs.). WDFW historical context (Marbled Murrelet Talking Points for November 2011 Forest Practices Board Meeting, 03 Oct2011, S. Desimone) notes:

Rule-defined habitat delineation and specific illustration to show how the “300 feet of similar vegetation characteristics” are incorporated into the area for survey were illustrated in “The Rule Review” guide prepared jointly by DNR and WDFW (Feb. 23, 1998) after discussion with industry (WFPA). At the time, it was determined that 32-inch trees without platforms located within 300 feet of platform bearing 32-inch trees are to be incorporated into the delineated habitat area. [Ecologically speaking, it should also include any platform bearing trees within 300 feet that are <32-inch dbh.] Recommended fix to the Rule (as per R. Fredrickson, Wildlife Program, March 24, 1998, memo to J. Mankowski, Habitat Program).

Additionally, forested buffers around Occupied sites, which are designated state Critical habitat, don’t qualify as Critical habitat (state) until the stand is surveyed and found Occupied. This is a possible degradation to potential Occupied site Critical habitat (state) without survey information. (The current FPA Murrelet addendum form may have tried to fix this, but it is imperfect, and relies on correct answers by the applicant that the FPA does not have platform trees or >32-inch trees within 300 feet of the proposal.)

Proposed Rule language changes for “Suitable marbled murrelet habitat”

for the purpose of conducting a protocol survey, means a contiguous forested area containing trees capable of providing nesting opportunities:

With all of the following indicators unless the department, in consultation with the department of fish and wildlife, has determined that the habitat is not likely to be occupied by marbled murrelets:

(a) Within 50 miles of marine waters;

(b) At least forty percent of the dominant and codominant trees are ~~Douglas fir, western hemlock, western red cedar or sitka spruce~~ conifers;

(c) Two or more nesting platforms per acre;

(d) ~~At least 7 acres in size, including the contiguous forested area within 300 feet of nesting platforms, with similar forest stand characteristics (age, species composition, forest structure) to the forested area in which the nesting platforms occur.~~ 5 acres in size (minimum convex polygon) of qualifying platform-bearing trees.

WDFW Rationale (WDFW 2022)

WDNR and WDFW deliberations post-1997 believe the original intent for including and retaining the 300 feet of forest outside the “Suitable marbled murrelet habitat” platform trees was to provide a temporary holding place for the buffer around the identified (but un-surveyed) habitat. The goal is to protect the integrity of the potential nesting habitat in the interim until protocol-compliant surveys that meet quality review for the habitat are completed. Then, if Occupied, the temporary buffer would become the permanent buffer for the Occupied Site critical habitat; if not Occupied, then the temporary buffer and survey area would be available for forest management.

WWG Recommendation

The WWG deliberated many times concerning how to interpret the original language. The recommendation for subsection (b) is to remove the reference to a list of specific conifer species and replace it with “conifers”. The recommendation for subsection (d) is to strike the ambiguous language and replace it with “At least 5 acres in size (minimum convex polygon) of qualifying platform-bearing trees.”

Marbled Murrelet nesting platform

Issues/ Concern for Evaluation

Issue 1 – Ambiguous language confusing branch diameter with platform on top of branch – Clarify what constitutes a qualifying platform with descriptive corrections.

Issue 2 – Minimum qualifying platform width – Federal and PSG definitions of nesting platform width is 4 in. minimum. We evaluated the WA nest data for minimum branch height for actual nesting platforms used and frequency of occurrence to 95% of data to determine if there are enough data to support a change from current 7-inch wide platform to any narrower width.

Issue 3 – Evaluate data for platform height above ground – Is there enough data to support a change from current rule 50 feet above ground level (AGL) to 33 feet AGL (10 meters; federal and PSG definition), or other value?

Issue 4 – Western hemlock minimum dbh – Western hemlock is well known to produce potential nesting platforms and structure in size class that is less than 32 inches dbh (WDFW 2020).

Issue 5 – Accompanying Board Manual 15 Concern – Platform Inventory Model Method identified by WDFW Rule Concerns Statement (2020). Related but separate to definition language above. In Board Manual 15, under Platform Inventory Model Method (PIMM) for habitat assessment, the calculation for determining platform thresholds for SEPA guidance on Critical habitat(state) for survey (WAC 222-10-042) is based on data and analysis produced by Weyerhaeuser for southwest WA (Duke et al. 1998) and is used as a substitute method for field transect of platform count to determine if “Suitable marbled murrelet habitat” is present. The PIMM method has not been refined or verified/vetted since adoption as was originally intended by the Board (Board Manual 15, WDNR 2020).

Proposed Rule language for “*Marbled murrelet nesting platform*”

means any horizontal tree structure such as a limb, an area where a limb branches, a horizontal surface created by multiple leaders, a deformity created by mistletoe infection or branch break or a debris/moss platform or stick nest equal to or greater than 7 inches in width diameter including associated moss if present, that is 50 feet or more above the ground in western hemlock trees 24 inches dbh and greater and in other conifer trees 32 inches dbh and greater ~~(generally over 90 years of age)~~ and is capable of supporting nesting by marbled murrelets.

WDFW Rationale (WDFW 2022)

Issue 1 – Platforms should be based on moss (or other) substrate’s flat top and horizontal width, not the branch diameter beneath the platform.

Issue 2 – Of the available data assessing platform width selection by Murrelets, there is some ambiguity of the empirical data “nest branch diameter” category (as measured under the nest) collected being confused with the actual horizontal surface platform width (i.e., potential nest location) that is on top of a branch and separate from the limb diameter.

We reviewed data collected from 49 Marbled Murrelet nest sites in Washington. Of these, 84 percent of nests were located on tree limbs that were 7 inches or larger in diameter, with an average nest branch diameter of 11.7 inches. The smallest nest branch measured in WA was 4.2 inches in diameter, and a total of 3 nests in WA were located on nest limbs that measured between 4 to 5 inches in diameter. However, all of the nests located on smaller nest limbs were located in old-growth stands.

Issue 3 – Based on nest data collected, actual nest locations below 50 feet AGL represent less than 5% of data in WA and OR combined; to date none have been recorded in WA below 50 feet. No other value was suggested.

Issue 4 – Rationale for this issue is based on Nelson and Hamer 1995; Hamer and Nelson 1995; Oregon nest database (Hamer, Nelson unpublished data OSU database); (WDFW 2020); Pers. obs., Bell and Desimone).

Issue 5 – Some field checks as to the accuracy of the platform calculations by the model have been made by WDFW Staff periodically, but data was not compiled. A recent analysis and presentation to the Wildlife Working Group (I. Keren, WDFW biometrician 2021) showed there were some errors in methods and statistical modeling of the categorical variables in Duke et al. (1998). and Discussions by the WWG of the Duke model as basis for determining dbh thresholds for trees having platforms would warrant further investigation, and the scope of a complete analysis would involve retrieving the original dataset from Weyerhaeuser in order to re-run the analysis using better suited analysis techniques. Inquiries were made to obtain the original dataset by the WWG members, but efforts to retrieve the original data were unsuccessful or unanswered. Focuses on 32 “diameter limit How to incorporate smaller hemlock >24-inch with platforms?”

WWG Recommendation

Issue 1 – Accept all proposed language changes.

Issue 2 – Since most of the nest limbs measured in WA are greater than 7 inches in diameter, WWG does not recommend a Rule change at this time. The WWG does acknowledge our findings that the range of nesting platform widths used by the species occurs as less than 7 inches, and with ongoing data collection and analysis for the species, the Board may bring into question what the appropriate platform width is, and WDFW may choose to revisit this topic in future Rule language proceedings.

Issue 3 – No change; keep current Rule language for 50 feet and greater above ground level. As new data accumulate, future evaluation for the FP definition and or adaptive management should be done.

Issue 4 – The WWG determined that there are data to support recommended change to account for unique characteristics of western hemlock and its potential to contain 7 in. platforms at tree diameters less than 32 inches dbh (e.g., mistletoe); therefore, adopt the proposed rule language to add 24 inches and greater dbh for Western Hemlock species and retain 32 inches and greater dbh for all other conifer species.

Issue 5 – When/if 24 inch dbh in. Western hemlock is incorporated into FP Rule, PIMM will also need have to incorporate the new hemlock diameter. Or do not use PIMM until improved and/or inclusive to changes in the recommended proposed “Suitable marbled murrelet habitat”.

Occupied marbled murrelet site

Issues/ Concern for Evaluation

Specific reference to the 2003 PSG survey protocol for determination of Occupied sites restricts the application of new science that improves the methodology over time. By specifically citing the 2003 protocol in Rule, any changes or method updates that yield stronger results cannot be implemented.

The Pacific Seabird Group (PSG) 2022 revision team stakeholders accepted circling to two canopy heights as occupancy behavior. Conducting a third year survey may unnecessarily allow harvest in what would otherwise be considered an Occupied site.

Proposed rule language for "Occupied marbled murrelet site"

Occupied marbled murrelet site means:

(1) A contiguous area of suitable marbled murrelet habitat where at least one of the following marbled murrelet behaviors or conditions occur:

(a) A nest is located; or

(b) Downy chicks or eggs or egg shells are found; or

(c) Marbled murrelets are detected flying below, through, into or out of the forest canopy; or

(d) Birds calling from a stationary location within the area; or

(e) Birds circling above a timber stand within one tree height of the top of the canopy;

or

(2) A contiguous forested area, which does not meet the definition of suitable marbled murrelet habitat, in which any of the behaviors or conditions listed above has been documented by the department of fish and wildlife and which is distinguishable from the adjacent forest based on vegetative characteristics important to nesting marbled murrelets.

(3) For sites defined in (1) and (2) above, the sites will be presumed to be Occupied based upon observation of circling described in (1)(e), unless a two-year survey following the ~~2003~~ most recent Pacific Seabird Group (PSG) protocol has been completed. and an additional third-year of survey following a method listed below is completed and none of the behaviors or conditions listed in (1)(a) through (d) of this definition are observed. The landowner may choose one of the following methods for the third-year survey:

(a) Conduct a third-year survey with a minimum of nine visits conducted in compliance with 2003 PSG protocol. If one or more marbled murrelets are detected during any of these nine visits, three additional visits conducted in compliance with the protocol of the first nine visits shall be added to the third-year survey. Department of fish and wildlife shall be consulted prior to initiating third-year surveys; or

(b) Conduct a third-year survey designed in consultation with the department of fish and wildlife to meet site specific conditions.

(4) For sites defined in (1) above, the outer perimeter of the Occupied site shall be presumed to be the closer, measured from the point where the observed behaviors or conditions listed in (1) above occurred, of the following:

(a) 1.5 miles from the point where the observed behaviors or conditions listed in (1) above occurred; or

(b) The beginning of any gap greater than 300 feet wide lacking one or more of the vegetative characteristics listed under "suitable marbled murrelet habitat"; or

(c) The beginning of any narrow area of "suitable marbled murrelet habitat" less than 300 feet in width and more than 300 feet in length.

(5) For sites defined under (2) above, the outer perimeter of the Occupied site shall be presumed to be the closer, measured from the point where the observed behaviors or conditions listed in (1) above occurred, of the following:

(a) 1.5 miles from the point where the observed behaviors or conditions listed in (1) above occurred; or

(b) The beginning of any gap greater than 300 feet wide lacking one or more of the distinguishing vegetative characteristics important to murrelets; or

(c) The beginning of any narrow area of suitable marbled murrelet habitat, comparable to the area where the observed behaviors or conditions listed in (1) above occurred, less than 300 feet in width and more than 300 feet in length.

(6) In determining the existence, location and status of Occupied marbled murrelet sites, the department shall consult with the department of fish and wildlife and use only those sites documented in substantial compliance with guidelines or protocols and quality control methods established by and available from the department of fish and wildlife (WDNR 2018: WAC 222-16-010).

WDFW Rationale

Incorporating language that references the “most recent” PSG survey protocol would ensure that the most current best available science is being used for surveys.

WWG Recommendation

Adopt WWG-proposed language as written above until the new protocol is approved. The new protocol will likely remove the requirement for third year surveys. Therefore, it is also recommended that the Board consider striking all Rule language that references third year surveys. However, the WWG recommends waiting until the final PSG protocol is approved.

WAC 222-16-080 Critical habitats (state) of threatened and endangered species. [Effective 3/24/21] proposed rule change (re: Occupied site buffer)

Issue/Concern for evaluation

WAC 222-16-080(h)(v) – Activities in the buffer to Critical Habitat. Identified by WDFW (2020) as a major concern for persistence and longevity of forested Occupied habitat (nesting areas). The current managed Occupied site buffer prescription has been observed over the years as likely being inadequate to minimize edge effects to nesting murrelets.

Proposed language

(1) Critical habitats (state) of threatened or endangered species and specific forest practices designated as Class IV-Special are as follows:

*(h) Marbled murrelet (*Brachyramphus marmoratus*).*

(v) Harvesting within a 300 foot managed buffer zone adjacent to an Occupied marbled murrelet site that results in ~~less than a residual stand stem density of 75 trees per acre greater than 6 inches in dbh; provided that 25 of which shall be greater than 12 inches dbh including 5 trees greater than 20 inches in dbh, where they exist a~~ no-cut inner zone of 150 feet and a 150 foot outer zone managed by Relative Density by major habitat type: ≥ 50 tree per acre for hemlock – spruce dominant and ≥ 35 trees per acre for Douglas-fir and red alder dominant. The inner zone of the buffer shall begin at the edge of the outer extent of the platform trees of the occupied habitat. The primary consideration for the design of managed buffer zone widths and leave tree retention patterns shall be to ~~mediate help minimize~~ help minimize edge effects. ~~The width of the buffer zone may be reduced in some areas to a minimum of 200 feet and extended to a maximum of 400 feet as long as the average of 300 feet is maintained.~~ Landowner shall consult with WDFW on managed buffer prescriptions.

WDFW Rationale (WDFW 2022)

Goals are to maintain a more complete forested canopy closure adjacent to nesting areas to discourage corvids (jays, crows, raven), which are major predators of murrelet eggs and chicks (WDNR 2019, others), and to improve resiliency from wind disturbance. The rule language of 300 feet average (200 minimum-400 feet maximum) width for the buffer of Occupied habitat would remain but change the management prescription: 1) Establish a constant 150-foot unmanaged inner zone adjacent to the Occupied site and 2) allow management in the 150-foot outer zone, using the proposed Relative Density standards set forth in this document (new proposed Board Manual Guidance). Remove prescription for trees per acre by dbh class and replace with a Relative Density prescription for establishing residual tree/stem density in only the managed outer 150-foot zone of the Occupied marbled murrelet site buffer. Maintain a minimum constant 150 no-cut zone in areas reduced to 200 feet buffer or expanded to 400 feet, while averaging 300 feet total buffer average for the Occupied habitat.

WWG recommendation

Adopt WWG-proposed language as written above for WAC 222-16-080(h)(v) in ~~strikeout~~ and underline.

WAC 222-16-080 (1) (h)(vi)- Proposed clarification to rule language (Re: small forest landowner (SFLO) exemption clarification) (Objective 6)

(vi) Except that the following shall not be critical habitat (state):

(A) Where a landowner owns less than 500 acres of forest land within 50 miles of saltwater and the land does not contain an occupied marbled murrelet site or the 300-foot average buffer of an Occupied marbled murrelet site; or

(B) Where a protocol survey (see WAC 222-12-090(14)) has been conducted and no murrelets were detected. The landowner is then relieved from further survey requirements. However, if an occupied marbled murrelet site is established, this exemption (vi) is void.

Issues/ Concern for evaluation

Regarding management activity in an established "Occupied marbled murrelet site" 300-foot average managed buffer (Critical habitat-state) as it pertains to the small landowner, defined in the Marbled Murrelet Rule as owning <500 acres within 50 miles of marine waters in WA. There is a need for clarification to ensure consistent interpretation and application of the buffer Rules concerning small forest landowners (as defined for in the murrelet rules) to avoid misinterpretation and adverse impacts to Critical habitat (state).

WDFW Rationale (WDFW 2022)

The original intention of subsection (vi) is to protect the small forest landowners from the cost of surveying for Marbled Murrelets. If there is no Occupied site established, whole or in part, the landowner is exempt from survey requirements. The overarching intention of the Forest Practice Rules for Murrelet is to keep Occupied sites intact where they are known and documented. Over the long-term, the Occupied site buffer is integral to keeping these nesting sites intact; hence they are considered Critical habitat (state) at the time the Occupied site is established through WDFW Status 1, 2, or 3 occupancy detections. Hence, if an Occupied site is present, Critical habitat (state)

would be recognized and observed. WDFW proposes the above edits to existing Rule language observing buffer retention when an Occupied site (Critical habitat - state) or the Occupied site buffer (Critical habitat - state) is present on or directly adjacent to the small landowner's property. As Critical habitat is encountered, the disturbance avoidance measures would also apply.

Simply stated, if both conditions are true in part (vi)(A), then the SFLO is exempt from observing Critical habitat (state) rules. Reading the language logically, if any part of (A) is false (i.e., owns >500 ac or the land does contain an Occupied site, and therefore the Occupied Critical habitat (state) buffer would mean that there is Critical habitat present. The second part (vi)(B) states this clearly "...However if an Occupied site is established, this exemption is void" (i.e., the whole of (vi)).

It follows that when an "Occupied marbled murrelet site" is established, a 300 ft buffer would also be established around the Occupied site (Critical habitat); these cannot be separated, as they are both identified as Critical habitat (state). Otherwise, if allowing harvesting to less than the managed buffer prescription, the state (WDNR) would be allowing the degradation of the Occupied site that the state, by Rule, protected. This does not make logical, regulatory, or ecological sense.

Unfortunately, in recent years this has sometimes been misinterpreted from its original intent, so the WWG is addressing this for clarification to WAC 222-16-080 (1)(h)(vi).

The WDFW Wildlife Program interpretation is that an SFLO would need to follow the Critical habitat Rules (222-16-080 (1)(h) Marbled Murrelet) for the managed buffer of an established Occupied site and the Occupied site itself. Harvesting in the buffer of an Occupied site and leaving below the minimum leave tree requirements does invoke a Class IV-Special, as outlined above, as it is listed in the same subsection for designated Critical habitat (state) for the Marbled Murrelet (WAC 222-16-080 (h)).

WWG recommendation

Adopt proposed language as suggested (non-substantive change). The proposed WAC language edits would alleviate future misinterpretation.

4.4.3 WAC 222-12-090 FOREST PRACTICES BOARD MANUAL. NEW PROPOSED GUIDANCE

Board manual, WAC 222-12-090 (14)

Issue/ Concern for Evaluation

As statistical modelling has improved and has incorporated survey data from past years, it has been demonstrated that the number of seasonal visits required in the 2003 survey protocol does not achieve the desired 95% probability of correct occupancy/non-occupancy classifications as originally intended (MacKenzie 2016); the error calculated for the estimate can be as much as 15-20%. A confirmation of MacKenzie (2016) findings was conducted by Springford and Jones (2019) and they concurred with MacKenzie's original findings. WDFW (2022) proposes to revise the above (14) Rule language to state as suggested above.

Proposed Rule language

(14) Survey protocol for marbled murrelets. The most current Pacific Seabird Group terrestrial survey protocol ~~*The Pacific Seabird Group survey protocol dated January 6, 2003, and formally titled Methods for Surveying Marbled Murrelets in Forests: A Revised Protocol for Land Management and Research*~~, shall be used when surveying for marbled murrelets in a stand. Surveys are valid if they were conducted in compliance with the board-recognized Pacific Seabird Group survey protocols in effect at the beginning of the season in which the surveys were conducted.

WDFW Rationale (WDFW 2022)

Language such as this will ensure use of the most current and scientifically appropriate survey methods identified by the Pacific Seabird Group (PSG) protocol in terms of spatial coverage and survey intensity with the goal of achieving 95% probability of correct classification of the site after survey review by WDFW (i.e., WDFW Status 1-5), while also avoiding the need to revise Rule language each time the protocol may be updated. The pending revision of the Pacific Seabird Group Inland Survey Protocol for Marbled Murrelets is more likely to achieve a 95% confidence level of correct Murrelet detection(s) during surveys by incorporating improved data-informed statistical sampling methods (MacKenzie 2016; Marbled Murrelet Tech. Comm., PSG, unpublished data; S. Desimone, pers. com.).

WDFW Agency Recommendation

Separate from this WWG Rule assessment, WDFW recommends bringing the Revised PSG Inland Survey Protocol for Marbled Murrelet to the Board for consideration and adoption as soon as possible upon its availability. This multi-stakeholder revision process reflects the best available statistical science for correct classification of survey outcomes for Murrelet. As this will be a substantive change, all appropriate Board required analyses and economic reports will likely need to be done.

WWG Recommendation

The WWG agreed to wait until the PSG protocol revisions are finalized in order to inform any recommendations regarding surveys. The PSG Inland Survey Protocol (ISP) Revision 2022 team consists of representatives from NCASI, Weyerhaeuser, Manulife (formerly, Hancock), Individual Survey consultants, USFS, USFWS, California Fish and Wildlife, Oregon Dept. of Forestry, Oregon Department of Fish and Wildlife and WDFW. The proposed protocol revisions are currently under peer review and expected to be ready for implementation in 2023.

Board Manual, WAC 222-12-090 (15)

The accompanying guidance follows for insertion as a new Part into the Forest Practices Board Manual Section 15 (and amendment to WAC 222-12-090(15)) and as proposed language for WAC 222-16-080(1)(h)(v):

Specific forest practices on lands designated as Critical habitat (state) for Marbled Murrelet (*Brachyramphus marmoratus*) have been determined to have potential for a substantial impact on the environment and have been classified by the department to be Class IV-Special forest practices.

The following two forest practices activities have been so classified as Class IV-Special forest practices under WAC 222-16-080 (1) (h) (v):

1. harvesting within a 150-foot no-cut inner zone buffer of a 300-foot managed buffer zone adjacent to an Occupied marbled murrelet site.
2. harvesting within a 150-foot outer zone managed buffer of a 300-foot managed buffer zone adjacent to an Occupied marbled murrelet site that
3. results in less than a residual stand relative density of 35 (Douglas-fir or red alder dominant species group) or a residual stand relative density of 50 (Western hemlock dominant species group).

The total width of the 300-foot managed buffer zone may be reduced in some areas to a minimum of 200 feet and extended to a maximum of 400 feet as long as the average of 300 feet is maintained; however, a 150-foot no-cut inner zone buffer adjacent to the Occupied marbled murrelet habitat will be retained in these reduced or extended buffer zones.

Per WAC 222-16-080 (1) (h) (v), the primary consideration for the design of managed buffer zone widths and leave tree retention patterns is to help minimize edge effects, including effects from prevailing wind patterns.

The following is simplified guidance for 1) field layout of an outer zone managed buffer within a 300-foot managed buffer adjacent to an Occupied marbled murrelet site to produce a residual stand Relative Density of at least 35 (Douglas-fir or red alder dominant species group) or a residual stand Relative Density of at least 50 (Western hemlock dominant species group) following harvest and 2) conducting the harvest within the outer zone managed buffer.

Simplified Guidance for field layout and conducting harvest within a Marbled Murrelet outer zone managed buffer:

If you intend to utilize an outer zone managed buffer (managed buffer zone) adjacent to an Occupied marbled murrelet site, determine (mark in the field) the inner and outer edges of the proposed 150-foot managed buffer zone adjacent to the Occupied marbled murrelet site.

The tree retention requirements (the target leave tree stocking levels following harvest) are determined by calculating the quadratic mean diameter (QMD) of the stand within the managed buffer zone and by knowing the dominant species group (see “Dominant species group” information box) within your proposed managed buffer zone. The QMD method works well in even-aged stands where the dominant and codominant trees are of uniform diameter.

Dominant species group: Dominant species group is determined by stem count of trees greater than or equal to 6” dbh. If there are more Douglas-fir stems than other conifer and hardwood tree species stems, choose Douglas-fir as the dominant species. If there are more other conifer stems than Douglas-fir and hardwood species stems, choose western hemlock as the dominant species group. If there are more red alder / hardwood stems than conifer stems, choose red alder as the dominant species group.

Use a sample cruise (using fixed-radius or variable plots) to determine the QMD of the trees within your delineated managed buffer zone, as well as the dominant species group (Douglas-fir, western hemlock, or red alder) within this buffer.

Measure the dbh (diameter at breast height, i.e., 4.5 feet above the ground) of each sampled tree and note the dominant species group (Douglas-fir, western hemlock, or red alder) of each tree that falls within cruise area. Determine for each tree you have measured whether it is a legacy tree (see description in Appendix B) or not a legacy tree. The vast majority of managed buffer zone stands adjacent to Occupied marbled murrelet sites will likely be even-aged but may have some legacy conifer trees, but identifying which trees are legacy trees is critically important to the proper calculation of QMD for the trees within the managed buffer.

As you measure each tree, either a) directly enter the diameter and species group you have measured into the appropriate category (“Legacy” tree category or “Non-Legacy” tree category) in the “QMD Calculator” smartphone application (to be provided) or b) record (on any paper form of your choice) the diameter and species group of each measured tree, again making sure to note whether the tree is a Legacy or Non-Legacy and then input your data into the “QMD Calculator” computer application (to be provided).

The QMD Calculator will provide the calculated QMD for the Non-Legacy trees within your managed buffer zone stand, as well as the estimated number of Legacy trees within your managed buffer zone, based on your sample cruise. It will also provide the “Dominant species group”, Douglas-fir, western hemlock, or red alder.

Use the identified “Dominant species group” category to determine which Modified Curtis Relative Density Calculator” table you should use (Douglas-fir / Red alder or Western Hemlock). Using the appropriate species table and the calculated Non-Legacy QMD for your managed buffer zone, find the stand QMD in the table (Tables 4 and 5) and determine the calculated number of conifer “Leave Trees/Acre (Minimum)” to retain after partial harvest.

Use this calculated minimum number of leave trees per acre to determine the actual trees you must retain within your managed buffer zone. **If there are no legacy conifer trees within your managed buffer zone,** merely use this calculated minimum number of leave trees per acre for your field layout of leave trees within your managed buffer zone, using the appropriate “Average Tree Spacing (Feet)” figure from the table as a guide. **If, however, you have any legacy conifer trees within your managed buffer zone,** all such legacy conifer trees within your managed buffer zone must be identified for leave. Once these legacy conifer trees have been identified for leave, the remaining minimum number of leave trees per acre to leave within the managed buffer zone should be calculated and then those remaining leave trees must be identified for leave during field layout. Strive to maintain pre-harvest levels of species diversity.

Mark leave trees, as appropriate, as specified under the “**Additional Preparation and Harvest Requirements**” section.

Additional Preparation and Harvest Requirements:

1. A representative sample of the proposed managed buffer zone must be laid out on the ground with leave trees marked prior to harvest and before the FPA is submitted to demonstrate how the managed buffer zone harvest will be implemented.

2. Reasonable care shall be taken to avoid damage to the stems and root systems of all residual trees within the managed buffer zone from falling, skidding, or yarding. Any residual leave trees damaged must remain on site and do not count toward the residual retention requirements.
3. If Type Np, F or S waters and their associated riparian buffer zones occur within or overlaps an outer zone managed buffer, the most restrictive buffer zone leave tree / buffer zone prescription will be applied within the affected outer zone managed buffer.
4. Within the managed buffer zone, ground-based systems shall not be used on slopes where in the opinion of the department, this method of operation would cause actual or potential material damage to a public resource. When transporting logs in or through the managed buffer zone with ground-based equipment, the number of routes through the zone shall be minimized. Logs shall be transported so as to minimize damage to leave trees and vegetation in the managed buffer, to the extent practical and consistent with good safety practices.
5. Cable yarding within the managed buffer zone are subject to requirements listed in WAC 222-30-060 Cable Yarding.

Table 4. Modified Curtis Relative Density Calculator for Douglas-fir / red alder (RD 35)

<u>QMD</u> <u>Quadratic Mean Diameter</u>	<u>Leave Trees/Acre</u> <u>(Minimum)</u>	<u>Average Tree Spacing</u> <u>(Feet)</u>
<u>30</u>	<u>39</u>	<u>38</u>
<u>29</u>	<u>41</u>	<u>37</u>
<u>28</u>	<u>43</u>	<u>36</u>
<u>27</u>	<u>46</u>	<u>35</u>
<u>26</u>	<u>48</u>	<u>34</u>
<u>25</u>	<u>51</u>	<u>33</u>
<u>24</u>	<u>55</u>	<u>32</u>
<u>23</u>	<u>58</u>	<u>31</u>
<u>22</u>	<u>62</u>	<u>30</u>
<u>21</u>	<u>67</u>	<u>29</u>
<u>20</u>	<u>72</u>	<u>28</u>
<u>19</u>	<u>77</u>	<u>27</u>
<u>18</u>	<u>84</u>	<u>26</u>
<u>17</u>	<u>92</u>	<u>25</u>

<u>16</u>	<u>100</u>	<u>24</u>
<u>15</u>	<u>110</u>	<u>22</u>
<u>14</u>	<u>123</u>	<u>21</u>
<u>13</u>	<u>137</u>	<u>20</u>
<u>12</u>	<u>154</u>	<u>19</u>
<u>11</u>	<u>176</u>	<u>18</u>
<u>10</u>	<u>203</u>	<u>17</u>
<u>9</u>	<u>238</u>	<u>15</u>
<u>8</u>	<u>284</u>	<u>14</u>

Table 5. Modified Curtis Relative Density Calculator for western hemlock (RD 50)

<u>QMD</u> <u>Quadratic Mean Diameter</u>	<u>Leave Trees/Acre</u> <u>(Minimum)</u>	<u>Average Tree Spacing</u> <u>(Feet)</u>
<u>30</u>	<u>56</u>	<u>32</u>
<u>29</u>	<u>59</u>	<u>31</u>
<u>28</u>	<u>62</u>	<u>30</u>
<u>27</u>	<u>65</u>	<u>29</u>
<u>26</u>	<u>69</u>	<u>28</u>
<u>25</u>	<u>73</u>	<u>28</u>
<u>24</u>	<u>78</u>	<u>27</u>
<u>23</u>	<u>83</u>	<u>26</u>
<u>22</u>	<u>89</u>	<u>25</u>
<u>21</u>	<u>95</u>	<u>24</u>
<u>20</u>	<u>102</u>	<u>23</u>
<u>19</u>	<u>111</u>	<u>22</u>
<u>18</u>	<u>120</u>	<u>22</u>

<u>17</u>	<u>131</u>	<u>21</u>
<u>16</u>	<u>143</u>	<u>20</u>
<u>15</u>	<u>158</u>	<u>19</u>
<u>14</u>	<u>175</u>	<u>18</u>
<u>13</u>	<u>196</u>	<u>17</u>
<u>12</u>	<u>221</u>	<u>16</u>
<u>11</u>	<u>251</u>	<u>15</u>
<u>10</u>	<u>290</u>	<u>14</u>
<u>9</u>	<u>340</u>	<u>13</u>
<u>8</u>	<u>405</u>	<u>12</u>

Incorporate changes/updates to the Pacific Seabird Group (PSG) Murrelet Survey Protocol and correct/refine all references to PSG in the rule to ensure they refer to the latest/current protocol, etc.

Regarding disturbance avoidance: Consider adding list of what constitutes “harvesting” activities: e.g., road construction, heavy equipment and helicopter operation, blasting, felling & bucking, cable or helicopter yarding, timber processing at landings, slash disposal & prescribed burning, etc. Alternative would be to define “harvesting” in WAC 222-16-010.

Regarding industrial landowners and the application of a 300 ft buffer to adjacent DNR (or USFS, or National Park Service) lands with Occupied habitat (typically occurs along a section line): Does the actual edge of habitat get delineated using DNR’s HCP definition of habitat (e.g., no dbh minimum, just trees with 7” platforms), or using the Rule criteria of 32 inch plus trees with platforms.

WWG Recommendation

The WWG discussed the issues but did not reach a conclusion for the recommended Board Manual Sections 14 and 15 amendments above.

4.5 Objective 7. Review the Rule & recommend any changes or add procedures to current Rule, if necessary, when stand conditions change; or suggest a different Rule set all together

Due to time constraints, this objective could not be thoroughly addressed. However, the WWG did discuss one alternative; assemble an Interdisciplinary Team (ID) on a case by case basis. The group was in general agreement that an ID team including USFWS, WDNR, the Small Forest Landowner,

and WDFW could adequately determine if a change has occurred due to natural events; e.g., stand replacing fire or wind throw. If substantial change is documented, then the site can be reclassified.

4.6 Objective 8. Develop a timeline for development of the recommendations that will be provided to the Board

Timeline was developed in early 2022, and prior to 2022, the WWG maintained an open-ended timeline to effectively evaluate Rule components. The submittal of Rule change recommendations was set for 2023 but delayed until May 2023.

4.7 Objective 9. Develop potential adaptive management strategies for Marbled Murrelet conservation.

There was no in-depth discussion by the WWG during the assessment process. It was determined that more expertise, data, and time would be needed to address this objective. While developing adaptive management strategies or identifying other conservation measures and regulatory incentives (e.g., carbon and ecosystem services markets, transfer of development rights, conservation easements, pilot biodiversity projects, etc.) to maintain and/or improve habitat is important, this objective was tabled so that the WWG could focus on objectives one through eight.

4.8 Objective 10. Evaluate/assess existing suitable habitat on non-federal lands and potential future contributions of other regulatory habitat set asides across the landscape. (GIS based approach)

A full assessment of existing suitable habitat on non-federal lands and an evaluation of the effectiveness of landowner agreements is beyond the scope of the WWG. However, a thorough examination of the status and trends of existing habitat and the efficacy of the approved protective instruments for the Marbled Murrelet would shed valuable light on whether the Rules as implemented are, in fact, contributing to the recovery of this species.

5.0 CONCLUSION

The body of work in this document represents six years of collaborative effort by the WWG to assess the Rules for effectiveness and develop substantive recommendations for changes that benefit both the species and the stakeholders involved with conserving murrelet habitat in Washington. The group successfully evaluated and met objectives 1 through 6 as outlined in the memo provided to the Board (dated July 22, 2022). While objectives 7, 9, and 10 were discussed it was determined that, although relevant and in need of consideration, they were beyond the expertise or scope of the task mandated by the Board. Based on the information provided in this report, the overarching conclusion from this effort is that murrelet habitat has declined in the state since the Rules went into effect and changes must be implemented if we hope to stabilize or reverse this trend. Through hard work and cooperation, the diverse membership of the WWG came to consensus on the WWG recommendations described in this document. This document is intended to be a companion document to the proposed Rule change recommendations document also submitted to the Board. It provides the concise WWG recommendations and the justification behind the recommendations.

6.0 LITERATURE CITED

- Ahmed, S.E., G. McInerny, K. O'Hara, R. Harper, L. Salido, S. Emmott, and L.N. Joppa. 2015. Scientists and software—surveying the species distribution modelling community. *Diversity and Distributions*. 21(3):258–267.
- Baldwin, R.A. 2009. Use of maximum entropy modeling in wildlife research. *Entropy*. 11: 854–866.
- Becker, B.H., and S.R. Beissinger. 2006. Centennial decline in the trophic level of an endangered seabird after fisheries decline. *Conservation Biology* 20(2):470-479.
- Bertram, D.F., M.C. Drever, M.K. McAllister, B.K. Schroeder, D.J. Lindsay, D. Faust. 2015 Estimation of coast-wide population trends of marbled murrelets in Canada using a Bayesian Hierarchical Model. *PLoS ONE* 10(8): e0134891.
- Binford, L.C., B.G. Elliott, and S.W. Singer. 1975. Discovery of a nest and the downy young of the Marbled Murrelet. *Wilson Bull.* 87:303- 319
- Bradley, R.W., and F. Cooke. 2001. Cliff and deciduous tree nests of Marbled Murrelets in southwestern British Columbia. *Northwestern Naturalist* 82:52-57.
- Brotz, L., W.W.L. Cheung, K. Kleisner, E. Pakhomov, D. Pauly. 2012. Increasing jellyfish populations: trends in Large Marine Ecosystems. *Hydrobiologia* 690:3–20. DOI 10.1007/s10750-012-1039-7
- Burger, A.E. 2002. Conservation and assessment of Marbled Murrelets in British Columbia, a review of the biology, populations, habitat associations and conservation. Technical Report Series no. 387. Canadian Wildlife Service, Pacific and Yukon Region, British Columbia.
- Chen J., J.F. Franklin, and T.A. Spies. 1995. Growing season microclimatic gradients from clearcut edges into old-growth Douglas-fir forests. *Ecological Applications* 5(1):74-86.
- Cury, P.M., I.L. Boyd, S. Bonhommeau, T. Anker-Nilssen, R.J.M. Crawford, et al. 2011. Global seabird response to forage fish depletion – one-third for the birds. *Science* 334:1703-1706.
- Desimone Steven M., Eric B. Cummins, Joseph B. Buchanan, Janet Anthony, William Ritchie, Julie Stofel. 2009. (minor edits made in 2022). Draft: A briefing report to the Washington State Forest Practices Board regarding Marbled Murrelet and forest practices rules. Unpublished Draft, Washington Dept. of Fish and Wildlife, Olympia, WA.
- Desimone, S.M. 2016. Periodic status review for the Marbled Murrelet in Washington. Washington Department of Fish and Wildlife, Olympia, Washington.
- Divoky, G.J. and M. Horton. 1995. Breeding and natal dispersal, nest habitat loss and implications for Marbled Murrelet populations. Pages 83-87 in C. J. Ralph, G. L. Hunt, M. G. Raphael, and J. F. Piatt, editors. *Ecology and conservation of the Marbled Murrelet*. General Technical Report PSW-GTR-152, USDA Forest Service, Pacific Southwest Research Station, Albany, California.
- Falxa, G.A., and M.G. Raphael, tech. coords. 2016. Northwest Forest Plan—the first 20 years (1994–2013): status and trend of marbled murrelet populations and nesting habitat. *Gen. Tech.*

- Rep. PNW-GTR-933. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 132 p.
- Emmingham W.H. and N.E. Elwood. 1983. *Thinning: An Important Timber Management Tool*, Oregon State University, PNW 184, Corvallis, OR
- Evans Mack, D., W.P. Ritchie, S.K. Nelson, E. Kuo-Harrison, P. Harrison, and T.E. Hamer. 2003. Methods for surveying marbled murrelets in forests: a revised protocol for land management and research. Pacific Seabird Group unpublished document available at <http://www.pacificseabirdgroup.org>, Seattle, Washington, January 6, 2003. 81 pp.
- ESA Section 9 take prohibition: 16 U.S.C. § 1538(a)(1)(B); see *Aransas Project v. Shaw*, 775 F.3d 641, 657 (5th Cir. 2014) (citations omitted).
- Falxa, G.A., and M.G. Raphael. 2016. Northwest Forest Plan - The First Twenty Years (1994-2013): Status and trend of marbled murrelet populations and nesting habitat. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Gen. Tech. Rep. PNW-GTR-933, Portland, OR. 132 pp.
- Greene C., L. Kuehne, C. Rice, K. Fresh, and D. Pentilla. 2015. Forty years of change in forage fish and jellyfish abundance across greater Puget Sound, Washington (USA): anthropogenic and climate associations. *Marine Ecology Progress Series* 525:153-170.
- Grenier, J.J., and S.K. Nelson. 1995. Marbled Murrelet habitat associations in Oregon. Pp. 191-201 in Ralph, C.J., G.L. Hunt, Jr., M.G. Raphael, and J.F. Piatt, tech. eds. *Ecology and conservation of the Marbled Murrelet*. USDA Forest Service General Technical Report PSW-GTR-152, Albany, CA.
- Gutowsky, S., M.H. Janssen, P. Arcese, T.K. Kyser, D. Ethier, M.B. Wunder, D.F. Bertram, L.M. Tranquilla, C. Loughheed, and D.R. Norris. 2009. Concurrent declines in nesting diet quality and reproductive success of a threatened seabird over 150 years. *Bioscience* 9:247-254.
- Hall, L.A., P.J. Palsboll, S.R. Beissinger, J.T. Harvey, M. Be'rube, M.G. Raphael, S.K. Nelson, R.T. Golightly, L. McFarlane-Tranquilla, S.H. Newman, M.Z. Peery. 2009. Characterizing dispersal patterns in a threatened seabird with limited genetic structure. *Molecular Ecology* 18:5074-5085.
- Hamer, Nelson and Verschuyt. (unpubl. data.). Marbled murrelet nest data for WA and OR, 2020.
- Hamer, T.E. 1995. Inland habitat associations of Marbled Murrelets in western Washington. Pp. 163-175 in Ralph, C.J., G.L. Hunt, Jr., M.G. Raphael, and J.F. Piatt, tech. eds. *Ecology and conservation of the Marbled Murrelet*. USDA Forest Service General Technical Report PSW-GTR-152, Albany, CA.
- Hamer, T.E., and S.K. Nelson. 1995. Characteristics of Marbled Murrelet nest trees and nesting stands. Pp. 69-82 in Ralph, C.J., G.L. Hunt, Jr., M.G. Raphael, and J.F. Piatt, tech. eds. *Ecology and conservation of the Marbled Murrelet*. USDA Forest Service General Technical Report PSW-GTR-152, Albany, CA.
- Hamer, T.E., W.P. Ritchie, E.B. Cummins, and C.W. Turley. 1994. Forest habitat relationships of marbled murrelets in western Washington. Unpublished report, Wildlife Management Division, Nongame Program, Washington Department of Wildlife, Olympia, Washington. 51 pp.

- Harper, K. A., S. E. MacDonald, P. J. Burton, J. Q. Chen, K. D. Brosnokske, S. C. Saunders, E. S. Euskirchen, D. Roberts, M. S. Jaiteh, and P. A. Esseen. 2005. Edge influence on forest structure and composition in fragmented landscapes. *Conservation Biology* 19:768-782.
- Lorenz, T.J., M.G. Raphael and T. D. Bloxton. 2016. Marine habitat selection by Marbled Murrelets (*Brachyramphus marmoratus*) during the breeding season. *PLoS ONE* 11(9): 0162670. doi:10.1371/journal.pone.0162670
- Lorenz, T.J., M.G. Raphael, T.D. Bloxton, and P.G. Cunningham. 2017. Low breeding propensity and wide-ranging movements by marbled murrelets in Washington. *Journal of Wildlife Management* 81(2):306-321.
- Lorenz, T.J. and M.G. Raphael. 2018. Declining marbled murrelet density, but not productivity, in the San Juan Islands, Washington, USA. *The Condor: Ornithological Applications* 120:201-222.
- Lorenz, T.J., M.G. Raphael, T.D. Bloxton. 2019. Nesting behavior of Marbled Murrelets *Brachyramphus marmoratus* in Washington and British Columbia. *Marine Ornithology* 47: 157–166.
- Lorenz, T.J., M.G. Raphael, R.D. Young, D. Lynch, S.K. Nelson, W.R. McIver. 2021. Status and trend of nesting habitat for the marbled murrelet under the Northwest Forest Plan, 1993 to 2017. Gen. Tech. Rep. PNW-GTR—998. Portland, OR: U.S.D.A. Forest Service, Pacific Northwest Research Station. 64 p.
- MacKenzie, D.I. 2016. Probability of Marbled Murrelet Occurrence Reanalysis. Proteus Wildlife Research Consultants. Prepared for The Pacific Seabird Group, Marbled Murrelet Technical Committee, available from the Pacific Seabird Group.org.
- McIver, W., J. Baldwin, M.M. Lance, S.F. Pearson, C. Strong, N. Johnson, D. Lynch, M.G. Raphael, R. Young, T. Lorenz and K. Nelson. 2019. Marbled murrelet effectiveness monitoring, Northwest Forest Plan: 2018 summary report. 22 p.
- McIver, W., J. Baldwin, M.M. Lance, S.F. Pearson, C. Strong, D. Lynch, M.G. Raphael, R. Young, T. Lorenz and N. Johnson. 2020. Marbled murrelet effectiveness monitoring, Northwest Forest Plan: 2019 summary report. 23 p.
- McIver, W., S.F. Pearson, C. Strong, M.M. Lance, J. Baldwin, D. Lynch, M.G. Raphael, R.D. Young, N. Johnson. 2021. Status and trend of marbled murrelet populations in the Northwest Forest Plan area, 2000 to 2018. Gen. Tech. Rep. PNW-GTR—996. Portland, OR: U.S.D.A. Forest Service, Pacific Northwest Research Station. 37 p.
- McIver, W.R.; Baldwin, J.; Lance, M.M.; Pearson, S.F.; Strong, C.; Raphael, M.G.; Duarte, A; Fitzgerald, K. 2022. Marbled murrelet effectiveness monitoring, Northwest Forest Plan: At-sea Monitoring - 2021 summary report. 25 p.
- McShane, C., T. Hamer, H. Carter, G. Swartzman, V. Friesen, D. Ainley, R. Tressler, S. K. Nelson, A. Burger, L. Spear, T. Mohagen, R. Martin, L. Henkel, K. Prindle, C. Strong, and J. Keany. 2004. Evaluation report for the USFWS 5-year status review of the marbled murrelet in Washington, Oregon, and California. EDAW, Inc., Seattle, Washington.

- Merow, C.; Silander, J.A. 2014. A comparison of Maxlike and Maxent for modelling species distributions. *Methods in Ecology and Evolution*. 5:215–225.
- Meyer, C.B., S.L. Miller, and C.J. Ralph. 2002. Multi-scale landscape and seascape patterns associated with marbled murrelet nesting areas on the U.S. west coast. *Landscape Ecology*. 17:95-115.
- Norris, D.R., P. Arcese, D. Preikshot, D.F. Bertram, and T.K. Kyser. 2007. Diet reconstruction and historic population dynamics in a threatened seabird. *Journal of Applied Ecology* 44(4):875-884.
- Nelson, S.K. 1997. The Birds of North America, No. 276 - Marbled Murrelet (*Brachyramphus marmoratus*). Pages 1-32 In A. Poole, and F. Gill, eds. *The birds of North America: Life histories for the 21st century*, The Academy of Natural Sciences & The American Ornithologists' Union, Philadelphia, PA; Washington, D.C.
- Nelson, S.K. and T.E. Hamer. 1995. Nesting biology and behavior of the Marbled Murrelet. Pp. 57-67 in C. J. Ralph, G. L. Hunt, M. G. Raphael, and J. F. Piatt, editors. *Ecology and conservation of the marbled murrelet*. General Technical Report PSW-GTR-152, USDA Forest Service, Pacific Southwest Research Station, Albany, California.
- Nelson, S.K. and A.K. Wilson. 2001. Marbled Murrelet habitat characteristics of state lands in western Oregon. Unpublished final report, OR Coop. Fish and Wildlife Research Unit, Oregon State Univ., Department of Fisheries and Wildlife, Corvallis, OR. 108 pp.
- Ohmann, J.L., and M.J. Gregory. 2002. Predictive mapping of forest composition and structure with direct gradient analysis and nearest-neighbor imputation in coastal Oregon, U.S.A. *Canadian Journal of Forest Research*. 32:725–741.
- Pacific Seabird Group. 2022. DRAFT Inland Survey Protocol for Marbled Murrelet.
- Pearson, S.F., I. Keren, M.M. Lance, M.G. Raphael. 2022. Non-breeding changes in at-sea distribution and abundance of the threatened marbled murrelet (*Brachyramphus marmoratus*) in a portion of its range exhibiting long-term breeding season declines. *PLoS ONE* 17(4): e0267165
- Peery, M.Z., B.H. Becker, S.R. Beissinger. 2006a. Combining demographic and count-based approaches to identify source-sink dynamics of a threatened seabird. *Ecological Applications* 16(4):1516-1528.
- Peery, M.Z., L.A. Hall, A. Sellas, S.R. Beissinger, C. Moritz, M. Be'rube, M.G. Raphael, S.K. Nelson, T.T. Golightly, L. McFarlane-Tranquilla, S. Newman, P.J. Palsboll. 2010. Genetic analysis of historic and modern Marbled Murrelets suggest decoupling of migration and gene flow after habitat fragmentation. *Proc. Biol. Sci.* 277:697–706.
- Peery, M.Z., and G.M. Jones. 2019. Using Population Viability Analyses to Assess the Potential Effects of Washington DNR Forest Management Alternatives on Marbled Murrelets. Univ. Wisconsin, Madison. 74 p. In: Attachment C-2 of Appendix Q, Final State Trust Lands Habitat Conservation Plan Amendment, Washington Department of Natural Resources, U.S. Fish, and Wildlife Service (USFWS), September 2019. Marbled Murrelet Long-term Conservation Strategy Final Environmental Impact Statement. Olympia, WA.

- Perez-Comas, J.A. and J.R. Skalski. 1996. Identification of marbled murrelet forest sites through tree and nesting platform counts. Developed for J. Pierce, Wash. Dept. Fish and Wildl. Unpubl. rep., University of Washington, Seattle.
- Piatt, J.F., K.J. Kuletz, A.E. Burger, S.A. Hatch, V.L. Friesen, T.P. Birt, M.L. Arimitsu, G.S. Drew, A.M.A. Harding, and K.S. Bixler. 2007. Status review of the marbled murrelet (*Brachyramphus marmoratus*) in Alaska and British Columbia. U.S. Geological Survey Open-File Report 2006-1387.
- Ramsdell, R., and W. Ritchie. 1998. Marbled Murrelet Rule Review. WDNR, WDFW, and WFPA illustrated guide to marbled murrelet rules (FIGURES) January 02, 1998.
- Ralph, C.J., G.L. Hunt, Jr., M.G. Raphael, and J.F. Piatt, tech. eds. 1995. Ecology and conservation of the Marbled Murrelet. USDA Forest Service General Technical Report PSW-GTR-152, Albany, CA.
- Raphael, M.G. 2006. Conservation of the Marbled Murrelet under the Northwest Forest Plan. *Conservation Biology* 20(2):297-305.
- Raphael, M.G., A. Shirk, G.A. Falxa, and S.F. Pearson. 2015. Habitat associations of marbled murrelets during the nesting season in nearshore waters along the Washington to California coast. *Journal of Marine Systems* 146:17-25.
- Raphael, M.G., B.M. Galleher, M.H. Huff, S.L. Miller, S.K. Nelson, and R.D. Young. 2006. Spatially explicit estimates of potential nesting habitat for the marbled murrelet. In: Huff, M., tech. coord. Northwest Forest Plan—the first 10 years (1994–2003): status and trend of populations and nesting habitat for the marbled murrelet. Gen. Tech. Rep. PNW-GTR-650. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 97–146. Chapter 5.
- Raphael, M.G., D.E. Mack, J.M. Marzluff, and J.M. Luginbuhl. 2002. Effects of forest fragmentation on populations of the marbled murrelet. *Studies in Avian Biology* 25:221-235.
- Raphael, M.G., S.K. Nelson, P. Swedeen, M. Ostwald, K. Flotlin, S. Desimone, S. Horton, P. Harrison, D. Prenzlów Escene, and W. Jaross. 2008. Recommendations and Supporting Analysis of Conservation Opportunities for the Marbled Murrelet Long-Term Conservation Strategy. Washington State Department of Natural Resources, Olympia, WA. 337 pp.
- Raphael, M.G., G.A. Falxa, D. Lynch, S.K. Nelson, S.F. Pearson, A.J. Shirk, and R.D. Young. 2016. Status and trend of nesting habitat for the Marbled Murrelet under the Northwest Forest Plan. Chapter 2, in Falxa, G.A. and M.G. Raphael (tech. eds.), 2016: Northwest Forest Plan—the first 20 years (1994–2013): status and trend of marbled murrelet populations and nesting habitat. Gen. Tech. Rep. PNW-GTR-933. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 132 p.
- Raphael, M.G., G.A. Falxa, and A.E. Burger. 2018. Chapter 5 Marbled Murrelet *In: Synthesis of Science to Inform Land Management Within the Northwest Forest Plan Area*. Gen. Tech. Rep. PNW-GTR-966. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 1020 p. 3 vol.

- Raphael, M. G., G.A. Falxa, K.M. Dugger, B.M. Galleher, D. Lynch, S.L. Miller, S.K. Nelson, and R.D. Young. 2011. Northwest Forest Plan—the first 15 years (1994–2008): status and trend of nesting habitat for the Marbled Murrelet. USDA Forest Service General Technical Report PNW-GTR-848.
- Springford, A. and J. Jones. 2019. Evaluation of set of survey protocols for marbled murrelets. Report prepared by Weyerhaeuser Corp. biometricians for the Pacific Seabird Group, MMTC, Inland Survey Protocol Revision Team statistical subcommittee. Unpubl. rep., 24 p. [Includes reference and review of MacKenzie (2016)]
- Stick, K.C., A. Lindquist, and D. Lowry. 2014. 2012 Washington State herring stock status report. Washington Department of Fish and Wildlife, Fish Program. Fish Program Technical Report No. FPA14-09. Olympia, WA.
- USFWS (U.S. Fish and Wildlife Service). 1997. Recovery plan for the threatened Marbled Murrelet (*Brachyramphus marmoratus*) in Washington, Oregon, and California. Portland, OR: U.S. Fish and Wildlife Service, Region 1. 202 pp.
- USFWS. 2006. Biological opinion for the issuance of an incidental take permit (PRT-TE121202-0) to the State of Washington for the implementation of the Washington Forest Practices Habitat Conservation Plan. 1-3-06-FWF-0301. U.S. Fish and Wildlife Service, Western Washington Fish and Wildlife Office, Lacey, WA, May 16, 2006, 1152 pp.
- USFWS. 2009. Marbled Murrelet (*Brachyramphus marmoratus*) 5-Year review. U.S. Fish and Wildlife Service. Washington Fish and Wildlife Office Lacey, WA. June 12, 2009.
- USFWS. 2010. Endangered and threatened wildlife and plants; 12-month finding on a petition to remove the marbled murrelet from the list of endangered and threatened wildlife. Federal Register / Vol. 75, No. 13 / Thursday, January 21, 2010.
- USFWS. 2012. Report on Marbled Murrelet Recovery Implementation Team Meeting and Stakeholder Workshop. On file with U.S. Fish and Wildlife Service Western Washington Office, 510 Desmond Dr. SE, Suite 102, Lacey, WA 98503.
- USFWS. 2019. Marbled Murrelet (*Brachyramphus marmoratus*) 5-Year Status Review. Washington Fish and Wildlife Office, Lacey, Washington.
- van Rooyen J.C, J.M. Malt, D.B. Lank. 2011. Relating microclimate to epiphyte availability: edge effects on nesting habitat availability for the Marbled Murrelet. Northwest Science 85(4):549-561.
- WDFW 2022. Rule concerns: Washington Forest Practices Rules for Marbled Murrelet. Wildlife and Habitat Programs (Desimone and Bell), WDFW unpublished, Olympia, WA.
- WDFW 2021. Wildlife Surveys and Data Management (WSDM). Marbled murrelet detection and survey data, unpublished. Olympia WA.
- WDNR 2018. Washington forest practices rules. Washington Forest Practices Board and Department of Natural Resources, Olympia, Washington.

WDNR 2019. Final Environmental Impact Statement (FEIS) for a Long-term Conservation Strategy
for the Marbled Murrelet. Olympia, WA.

APPENDIX A – CRITERIA FOR HABITAT SURVEY

Forest Practices Criteria for Habitat and Survey Area Occupancy

The current Forest Practices Rules identify criteria and attributes that represent “suitable marbled murrelet habitat” (WAC 222-16-010). Suitable marbled murrelet habitat means a contiguous forested area containing trees capable of providing nesting opportunities, with all of the following indicators:

- (a) Within 50 miles of marine waters;
- (b) At least forty percent of the dominant and codominant trees are Douglas-fir, western hemlock, western red cedar or Sitka spruce, or other conifer;
- (c) Two (2) or more nesting platforms per acre;
- (d) At least 7 acres in size, including the contiguous forested area within 300 feet of nesting platforms, with similar forest stand characteristics (age, species composition, forest structure) to the forested area in which the nesting platforms occur.

The Rules further define physical forest components that are associated with murrelet nesting platforms. "Marbled murrelet nesting platform" means any horizontal tree structure such as a limb, an area where a limb branches, a surface created by multiple leaders, a deformity, or a debris/moss platform or stick nest equal to or greater than 7 inches wide including associated moss if present, that is 50 feet or more above the ground in western hemlock trees 24 inches and greater and in all other conifer), – trees 32 inches dbh and greater and is capable of supporting nesting by marbled murrelets (WAC 222-16-010).

The rule also identifies criteria to designate forest stands as Occupied sites.

Habitat models developed for the Northwest Forest Plan indicate approximately 1.3 million acres of potential inland habitat in Washington. Most habitat occurs on federal lands managed under the Northwest Forest Plan while approximately 14 percent (187,000 acres) of the potential habitat occurs on DNR-managed land. Cumulative habitat losses since 1993 have been greatest in Washington, with a 13.3 percent decline over the Northwest Forest Plan’s monitoring period, most of which occurred on non-federal lands due to timber harvest (Raphael and others 2016). Currently, only about 12 percent of habitat-capable lands in Washington contain potential inland habitat for the Marbled Murrelet.

Marbled Murrelet habitat criteria													
	What is it?	range of spp (distance from marine water)	max detection dist (mi) Status 1	min. platform size**	min. platform height	min. platform density	inter-platform tree distance	tree spp. Used	minimum diameter defining platform tree	min. patch size (acres)	What is contiguous?	data sources	summary
Pacific Seabird Group (2003) <i>currently in revision</i>	potential habitat definition	not stated		4" (10 cm) (platform width)	10 m (33 ft)	1	PSG considering currently	live coniferous trees	none	none	no gaps wider than 100m (328 ft)-may be revised larger	empirical nest data (Nelson and Hamer 1995)	"...any forested area with a residual tree component, small patches of residual trees, or one or more platforms should be considered potential murrelet nesting habitat."
FP Rules (1997) definition	trigger to survey "suitable marbled murrelet habitat" - definition	50 mi.		7" (17.8 cm) (platform defn., WAC 222-16-010)	50 ft (15.2 m)	2, 5, or 7 per ac *	<300 ft	dominant, codominant conifers only (40% DF, WH, RC, or SS)	32" dbh	7	habitat <300 ft wide for longer than 300 ft is a break in contiguous	1993 SAG?	"...a contiguous forested area containing trees capable of providing nesting opportunities: With all of the following indicators unless the department, in consultation with the department of fish and wildlife, has determined that the habitat is not likely to be occupied by marbled murrelets: (a-d)
USFWS (2012)	potential habitat "trigger for consultation Section 7 ESA" & critical habitat- definition	55 mi. (88.5 km)		4" (10 cm) (platform width)	≥ 10 m (33 ft)	1	N/A	coniferous trees	none	5	N/A	empirical nest data (Nelson and Hamer 1995 plus updated)	"...coniferous trees within 55 mi (88.5 km) of marine waters that support at least one 4-inch (10.2-cm) diameter platform located at least 33 ft (10 meters) above the ground, with horizontal and vertical cover."
DNR 1997 HCP Interim strategy (pp IV.40-42)	potential habitat definition for inventory surveys	50 miles		7"	50'	2/ac	300' or wider break: area that does not meet criteria	coniferous trees	none	5	not well defined	not specified	"suitable habitat block" is a contiguous forested area: (a) at least 5 acres in size with (b) an average of at least 2 platforms/ac and (c) within 50 miles of marine waters. "Break" defined as an area that does not meet the 3 criteria.
DNR 2019 LTCS	P-stage Modeled Habitat	55 miles											
Oregon Dept Forestry	using PSG (2003) protocol above												
WA-nest data (Nelson et al., 2019 draft in press)	nest metrics-empirical data	na	WA: 44 (52)	4" (10 cm) min;	65 ft (20.1 m) nest plat	n/a	na	conifers; wh,ss,wrc,df	n/a	n/a	na	collected field data	Not complete set of measurements for all known nests (2014 and before). See separate analysis excel file by Desimone: "20190731 mamu ORWA nest data..." (Nelson et al. 4-2019 draft in press)
OR-nest data (Nelson et al., 2019 draft in press)	nest metrics-empirical data	n/a	OR: 33 (47)	4" (10 cm) min.	32.5 ft (9.9m) nest platform	n/a	na	above conifers; 1 bigleaf maple nest	n/a	n/a	n/a	collected field data	Not complete set of measurements for all known nests (2014 and before). See separate analysis excel file by Desimone: "20190731 mamu ORWA nest data..." (Nelson et al. 4-2019 draft in press)

* In the SWWA Special Landscape: ≥ 5 plats per acre needed to require survey, unless there is a certified detection within the surrounding 9-sector all above; plus yellow cedar, Mt hemlock, amabilis fir

** Width or branch diameter?

APPENDIX B – CROWN CLASSIFICATION DESCRIPTIONS

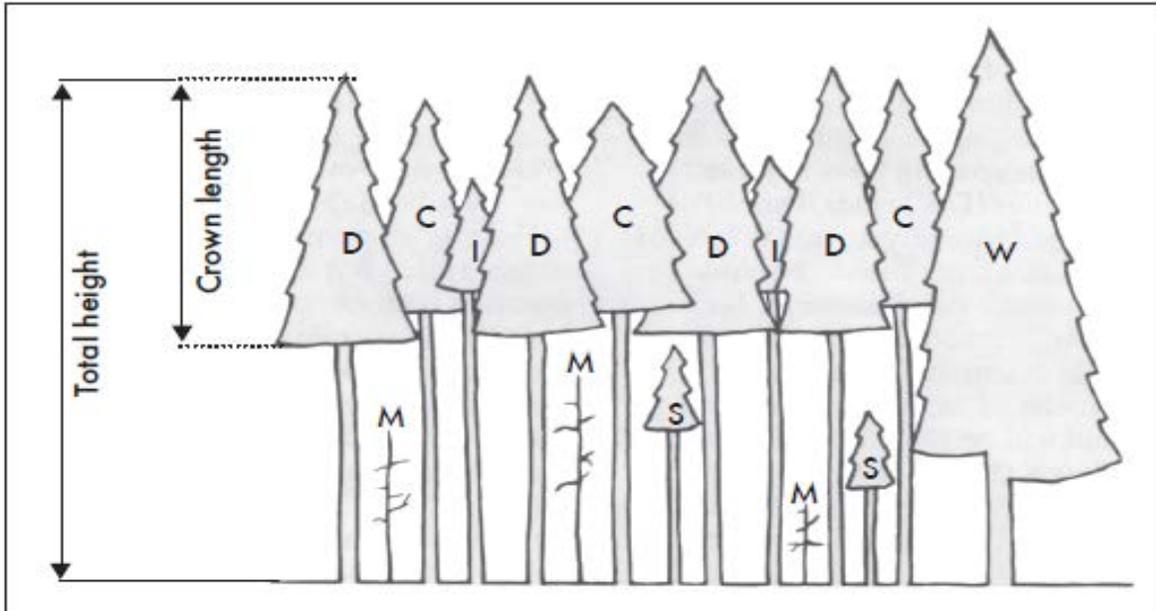


Figure 1. Crown type classifications of trees in even-age stands. D = Dominant, C = Codominant, I = Intermediate, S = Suppressed, M = Mortality and W = Wolf or Legacy Trees. The “crown ratio” is the proportion of total tree height that is occupied by live crown. In this illustration, the dominants have a 50 percent crown ratio; the residual tree has an 80 percent crown ratio

A tree crown classification system is useful in discussing stand development. Figure 1 illustrates a commonly used system, which has the following six classes:

1. Dominant. Trees with the crown extending above the general level of the crown canopy receive full sunlight from above and some from the sides. The sides of the crowns are well developed but (possibly) somewhat crowded. Live crown ratios generally greater than 50%.
2. Codominant. Trees with crowns forming the general level of the crown cover receive full light from above but little from the sides. The tree crowns are medium size and more crowded on the sides than are dominant crowns. Live crown ratios generally greater than 40%.
3. Intermediate. These trees usually are shorter than those in the two preceding classes. They have small, crowded sides. The crowns extend into the canopy formed by dominant and codominant trees; they receive a little direct light from above but none from the sides. Live crown ratios generally below 40%.
4. Suppressed (overtopped). The crowns on these trees are below the level of the crown canopy. They receive no direct light from above or from the sides. Live crown ratios generally less than 33%.
5. Legacy or wolf trees. These trees developed and grew in the open or trees not harvested during previous harvest(s). Their diameters are generally significantly larger than the

diameters of the rest of the stand. They often have full crowns on all sides, with branches well above or below the general canopy level of the rest of the stand. The crowns are uncrowded on two or more sides and receive full light from above and well down on two or more sides. Live crown ratios often exceed 75%.

6. Mortality. These are dead trees within the stand. Suppressed trees usually die, and trees of any crown class may die from disease or insect attack.

(Adapted from: W.H. Emmingham and N.E. Elwood_1983 "Thinning: An Important Timber Management Tool", Oregon State University, PNW 184)

Executive Summary

Forest Practices Rules Stakeholder Assessment and Recommendations for the Marbled Murrelet Report to the Forest Practices Board Washington Dept Fish and Wildlife

The Marbled Murrelet was listed as a federally Threatened Species in Washington, Oregon, and California under the US Endangered Species Act (ESA) in 1992. For forest landowners to avoid illegal take of habitat under the ESA, National Environmental Policy Act (NEPA) and State EPA, there was a need to develop state Forest Practices Rules (Rules) to substantially reduce the potential for adverse impacts to murrelets. The current Rules were the product of five years of negotiations within the Timber and Fish and Wildlife arena involving Washington Department of Fish and Wildlife (WDFW), the forest products industry, environmental groups, Native American Tribes, and Washington Department of Natural Resources (WDNR), and so reflect negotiated minimum standards. The Washington Forest Practices Board (Board) adopted permanent Rules for protection of Marbled Murrelets on July 10, 1997, which became effective August 22, 1997. Important elements of the new Rules included protection of known Occupied Marbled Murrelet sites, and a requirement to survey forest stands containing potential Marbled Murrelet habitat prior to any proposed forest practices.

The report constitutes the second attempt at the Board's assessment process for the Marbled Murrelet Rules, as per their request in 2004. Due to Board time constraints in September 2004, they requested that this assessment and related materials be put on hold until further notice. In February 2017, the Washington State Fish and Wildlife Commission (WFWC) approved the WDFW's recommendation to up-list the Marbled Murrelet from state threatened to state endangered, defined as "seriously threatened with extinction throughout all or a significant portion of its range within the state" (WAC 232-12-297). The up-listing prompted this assessment of the Rules for Marbled Murrelet to determine whether non-federal habitat is being adequately protected and if any Rule amendments, changes, or clarifications are warranted. The Rules require that when a species is newly listed by the WFWC and/or the U.S. Secretary of the Interior or Commerce, that the WDNR consult with WDFW and make a recommendation to the Board as to whether protection is needed under the Critical habitat (State) Rule (WAC 222-16-080(3)). The main objective of the Rules promulgated in 1997 for Marbled Murrelet are to identify and therefore, avoid forest practice activities that are likely to have a significant adverse impact on the species. The Rules require WDNR to "... evaluate whether the forest practice(s) would be expected, directly or indirectly, to reduce appreciably the likelihood of the survival or recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (WAC 222-10-040(2)). The Rules also address specific forest practices listed on lands designated as Critical habitat (state) of the Marbled Murrelet (WAC 222-16-080(1)(h)). Such activities are subject to State Environmental Policy Act (SEPA) review and are classified as "Class-IV Special" forest practices.

Marbled Murrelet ecology

The Marbled Murrelet (*Brachyramphus marmoratus*) is a small seabird that ranges the coast of North America from Alaska to southern California. It is unique among seabirds as it utilizes the marine environment and terrestrial inland forests that are both essential habitats for survival and reproduction. In Washington, Murrelets occupy and forage in near-shore marine waters year-round. During the breeding season (late March to mid-September), birds may fly inland up to 55 miles daily to visit their nests in the branches of mature and old conifer forests (USFWS 2009). Murrelets are cryptic, secretive, and fast flying (average 57 mph, Cooper and Blaha 2002) to maximize predator avoidance. Adult visits to their nests are largely inconspicuous; birds enter and leave the nest stand during low light levels and primarily without vocalizations.

In Washington, the maximum distance recorded for observed Marbled Murrelet Occupancy behaviors is 52 miles (84 km); the majority being within 40 miles of marine waters (WDFW, Wildlife Survey Data Management 2021). Females lay a single egg per nesting attempt, and both adults participate in incubation; one of the nesting pair forages at sea while its mate incubates for about 24 hours, usually exchanging shifts at dawn. The duration of the breeding period in Washington is believed to be about 124 days (April 26 – mid-September) based on 13 breeding records (Hamer and Nelson 1995). Hatching occurs within 27–28 days, and most adult feeding of chicks occur at dawn and dusk, with as many as 7 feedings per day observed. Dawn feeding visits occur as late as 65 minutes after sunrise (Nelson and Hamer 1995). Chicks fledge at about 30 days and presumably fly directly to marine waters in their first flight.

Wildlife Work Group Process

Given the 2017 up-listing, WDNR, in consultation with WDFW, recommended that the Board support WDFW's initiation of an assessment of Marbled Murrelet Rules involving a diverse group of stakeholders. In February 2018, WDFW convened a Marbled Murrelet Wildlife Working Group (WWG) to evaluate Rule effectiveness in identifying and protecting Murrelet habitat, identify weaknesses and ambiguity in Rule language and field implementation, consider potential habitat conservation incentives, and bring consensus recommendations regarding Rules improvements to the Board for consideration. The Board recognized the role of the WWG, and meetings commenced in September 2018. The WWG stakeholder group consisted of representatives from WDFW, Washington State Association of Counties, Washington Forest Protection Association, Washington Farm Forestry Association, Washington Environmental Council/The Marbled Murrelet Coalition, WDNR, and U.S. Fish and Wildlife Service. Tribes were invited but did not participate.

The overall purpose of the WWG was to identify language within the existing Rules that is ambiguous and subject to inconsistent interpretation or ineffective at protecting Murrelet habitat. Using the work group process, the stakeholders could develop a set of recommendations for Rule revisions that would improve conservation outcomes for Murrelets within the forested environment, while also maintaining economic viability of the timber industry. These consensus-based recommendations can then be presented to the Board for their consideration and any subsequent action(s) for Rule changes. The WWG may also be used by the participants as a way of coordinating additional collaborative strategies relating to wildlife conservation.

After formulating a Charter to guide the WWG, a list of 10 objectives was developed to address problems with the Rules that were identified by the group. Problems include ambiguous language that makes identification of Critical habitat difficult, vague language regarding management activities within an Occupied site buffer, confirming the definition of Suitable habitat, and incorporate pending revisions to the Pacific Seabird Group's (PSG) survey protocol used in the Board manual.

Objectives, Conclusions, and Recommendations

Objective 1: Review population status and assess stressors which have led to a continued decline of the Marbled Murrelet population in Washington & the resulting state up-listing (endangered) of Murrelets.

Conclusions: The cumulative and interactive effects of stressors and other factors combined are a major mechanism contributing to the continued population decline of the Marbled Murrelet (USFWS 2012, 2019). These effects occur at the scales of individuals, populations, and the species and include, but are not limited to:

1. Legacy effects of past declines on current population dynamics and resiliency.
2. Spatial disconnect between quality marine and terrestrial habitats, increasing the energetic costs of commuting and the risk of depredation.
3. Chronic stress responses and energetic costs from repeated or sustained audiovisual disturbances in terrestrial and marine habitats.
4. Increased vulnerability to predators and disease and decreased reproductive success due to energy deficits.
5. More severe impacts of pollutants, toxins, pathogens, or disease due to chronic stress.

To the extent these and other cumulative and interactive effects limit the recruitment of new adults into the population, the Murrelet's population decline will continue. In its periodic status review of the species, WDFW concluded that "without solutions that can effectively address these concerns [stressors] in the short-term, *it is likely the Marbled Murrelet could become functionally extirpated in Washington within the next several decades*" (Desimone 2016, emphasis added).

Objective 2: Review and assess the potential contributions of non-federal lands regulated under the Rules towards Marbled Murrelet habitat conservation.

Conclusions: Private lands contribute several habitat elements essential to the Murrelet's ability to reproduce. The most important contributions to Murrelet conservation on *all* landownerships are the "Occupied sites" and their associated forested buffers where potential nesting behaviors have been observed (USFWS 1997). Likewise, any high probability potential nest areas that have not been surveyed are also important. Occupied sites contain stand structures Murrelets need to nest, such as nest platforms with vertical and horizontal cover, and Murrelets show high site fidelity to the same Occupied sites between years (USFWS 2012). Forested buffers adjacent to Occupied sites are also Critical habitat (state) and important for minimizing forest edge effects that negatively impact Murrelet nest success (USFWS 1997, 2012). Hence, deferring Occupied sites and their buffers from forest practices represents the *minimum* conservation contribution necessary for take avoidance on non-federal lands.

Objective 3: Identify the habitat components presumed necessary for forested areas to be considered Suitable habitat (state) and/or Occupied habitat (evaluate past modeling, statistical probabilities, etc.) using the current best available science.

Conclusions: Marbled Murrelet potential nesting habitat consists of those trees within a forested context having the biophysical characteristics Murrelets need for nesting. The first Murrelet nest was not discovered until 1974 (Binford et al. 1975), and since then, roughly 121 Murrelet nests have been located in Washington and Oregon (n= 41 WA; 80 in OR) as of 2019 (Hamer and Nelson, unpublished data). Based on this information and the science produced since 1974, the necessary components needed to identify Suitable marbled murrelet habitat includes both younger (but mature) forests and old-growth habitats that have trees with dwarf mistletoe or other deformations or structures that provide nest platforms. Stands of various ages composed of Douglas-fir, coast redwood, western hemlock, western red cedar, yellow cedar, mountain hemlock, and Sitka spruce have all been documented to be used by Murrelets for nesting (Hamer and Nelson 1995). Therefore, Suitable habitat should include not only old growth forests but also younger coniferous forests that have platforms. Further, it has been shown that platform presence and density is more important than tree size, which alone is not a good indicator of platform abundance

(Hamer 1995). Therefore, small forest patches (young or old) that have platforms have potential to be used by Murrelets for nesting. These areas are not protected by Rule because they lack 32 in. diameter trees. The conclusions outlined in this paragraph were synthesized from Evans-Mack et al. 2003 pp. 2 and 3.

Objectives 4, 5, and 6.

These objectives are closely related and together comprise the bulk of the work for the development of the Rule recommendations by the WWG. Rule language and implementation concerns identified by WDFW were brought to the WWG for evaluation and assessment. Technical information was provided and shared by all group members and recommendations were made by consensus. Deliberations around the recommendations are recorded in the report and recommendations documents.

Objective 4: Review the forest practices definition of “Suitable marbled murrelet habitat” and Critical habitat (state) or potential Critical habitat). Refine the definition(s) as needed based on best available information synthesized in Objective 3.

Objective 5: Based on recommended habitat definition, characterize the processes/steps necessary to address its protection under the proposed Rule changes.

Objective 6: Evaluate the recommended process and provide rationale after recommended Rule changes and identify when/where/how the Forest Practice Rules would be applied in relation to “Suitable marbled murrelet habitat” and Critical Habitat (state).

Upon completion of the WWG process, The WWG provides recommendations under each of the following affected WAC listings:

WAC 222-10-042 Marbled Murrelet. SEPA

WDFW suggested to the WWG that it consider a more conservative Critical habitat definition used to identify stands for survey (WAC 222-10-042, Marbled Murrelets) to minimize future potential habitat loss: identify all stands for survey having 2 or more platforms per acre, regardless of “Special landscape” or if inside or outside a “Detection area” (WAC 222-16-010, General Definitions), which eliminates the minimums of 7 and 5 platforms per acre requirement currently needed to trigger surveys outside of Detection areas. A second alternative proposed was to eliminate the 7 platforms/acre requirement and retain the 5 platforms/acre for areas outside of Detection areas. The WWG considered the proposal above by WDFW and could not come to group consensus. The group agreed that further assessment of the probability of occupancy as scaled by the original Rules is research beyond the scope of this Rule assessment.

Recommendation: The WWG recommends to the Board that focused funding and statistical analysis would help inform possible revisions to the platform threshold alternatives and any subsequent Rule changes. Further, no language changes are recommended until further platform threshold analysis can be done.

WAC 222-12-090 (14) – Survey protocol for Marbled Murrelets

As statistical modelling has improved and has incorporated survey data from past years, it has been demonstrated that the number of seasonal visits required in the 2003 survey protocol does not

achieve the desired 95% probability of correct occupancy/non-occupancy classifications as originally intended (MacKenzie 2016).

Recommendation: Separate from this WWG Rule assessment, the Board should consider adopting the revised PSG Inland Survey Protocol for Marbled Murrelet as soon as possible upon its availability. This multi-stakeholder revision process reflects the best available statistical science for correct classification of survey outcomes for Murrelet. As this will be a substantive change, all appropriate Board required analyses and economic reports will likely need to be done.

WAC 222-16-010 General Definitions – Suitable marbled murrelet habitat

This definition is comprised of four subsections (a-d) that describe the required indicators for a forested area to be considered Suitable habitat. While all subsections were evaluated, consensus recommendations for change were agreed upon for (b) and (d). Subsection (b) specifies that only Douglas-fir, western hemlock, western red cedar or Sitka spruce species be present in a stand. Since the Rules were implemented, WDFW has observed that yellow cedar, silver fir, and mountain hemlock have potential to develop nesting platforms.

Significant discussion and analysis were given to subsection (d), which stipulates that habitat must be “At least 7 acres in size, including the contiguous forested area within 300 feet of nesting platforms, with similar forest stand characteristics (age, species composition, forest structure) to the forested area in which the nesting platforms occur.” This wording is ambiguous and has led to many discussions regarding what specifically constitutes “similar forest stand characteristics”. Without specific metrics, it is subjective and can be interpreted differently by various parties depending on harvest management goals.

Recommendation: The WWG recommendation for subsection (b) is to remove the reference to a list of specific conifer species and replace it with “conifers”. The consensus recommendation for subsection (d) is to strike the ambiguous language and replace it with “At least 5 acres in size (minimum convex polygon) of qualifying platform-bearing trees.”

WAC 222-16-010 General Definitions – Marbled Murrelet nesting platform

Ambiguous language in this definition confuses branch diameter with a platform on top of a branch. Language is proposed, based on consensus, that clarifies what constitutes a qualifying platform with descriptive corrections.

Western hemlock is well known to produce potential nesting platforms and structure in size class that is less than 32 inches DBH (WDFW 2020). The WWG determined that there are data to support and recommend revised language to the definition that accounts for the unique characteristics of western hemlock and its potential to develop 7 in. platforms at tree diameters less than 32 in. DBH; therefore, the WWG proposes Rule language to add 24 inches and greater DBH for western hemlock species and retain 32 inches and greater DBH for all other conifer species.

In Board Manual 15, under Platform Inventory Model Method (PIMM) for habitat assessment, the calculation for determining platform thresholds for SEPA guidance on Critical habitat(state) for survey (WAC 222-10-042) is based on data and analysis produced by Weyerhaeuser for southwest WA (Duke et al. 1998) and is used as a substitute method for field transect of platform count to determine if “Suitable marbled murrelet habitat” is present. The PIMM method has not been refined or verified/vetted since adoption as was originally intended by the Board (Board Manual 15, WDNR 2020).

Recommendation: The WWG determined that there are data to support recommended change to account for unique characteristics of western hemlock and its potential to contain 7 in. platforms at tree diameters less than 32 inches dbh (e.g., mistletoe); therefore, adopt the proposed rule language to add 24 inches and greater dbh for Western Hemlock species and retain 32 inches and greater dbh for all other conifer species. When 24 in. diameter hemlock is incorporated into Rule, PIMM will have to incorporate the new hemlock diameter. Or do not use PIMM until improved and/or inclusive to changes in the recommended proposed “Suitable marbled murrelet habitat”.

WAC 222-16-010 General Definitions – Occupied marbled murrelet site

The PSG’s 2003 Marbled Murrelet survey protocol is currently being revised and is expected to be published sometime in 2023. This definition cites only the 2003 version of the protocol, which will be obsolete in 2023.

Recommendation: Remove the reference to “2003” and replace it with “most recent” PSG protocol. In addition, the new protocol will remove the requirement for third year surveys. Therefore, it is also recommended that the Board consider striking all Rule language that references third year surveys. However, the WWG recommends waiting until the final PSG protocol is approved. The change would represent new science and more precise estimation for 95% probability of correct classification of sites compared to 2003 protocol.

WAC 222-16-080(h)(v) – Activities in buffer to Critical Habitat

The current managed Occupied site buffer prescription outlined in this subsection is likely inadequate to protect murrelet nests from hard edge effects created by clear cuts, which is its expressed purpose WDFW (2022). This is a major concern for the persistence and longevity of forested Occupied habitat (nesting areas). The goal of the buffer prescription is to create a soft edge of forested canopy adjacent to nesting areas to discourage nest predation by jays, crows, and ravens and to improve resiliency to wind disturbance. The rule language of 300 feet average (200 minimum-400 feet maximum) width for the buffer of Occupied habitat would remain but entail changes to the management prescription: 1) Establish a constant 150-foot unmanaged inner zone adjacent to the Occupied site and 2) allow management in the 150-foot outer zone, using the proposed Relative Density standards proposed for incorporation into the Board manual.

Recommendation: Adopt the proposed language strikeout and insertions as described in this report. Further, consensus was reached to insert new guidance for harvesting within a Managed Buffer Zone adjacent to Occupied marbled murrelet sites into the Board manual (WAC 222-12-090) as proposed in the report.

WAC 222-16-080 (1) (h)(vi) – Proposed clarification to rule language (Re: small forest landowner (SFLO) exemption clarification) (Objective 6):

Management activities by SFLO’s within an established Occupied marbled murrelet site’s 300 ft. buffer (which is Critical habitat) has been interpreted inconsistently by different WDNR regions. Some Forest Practice permits have been conditioned to manage the buffer per Rule; others have been conditioned with no required management (i.e., the buffer can be completely cut if the Occupied site, as delineated under Rule, does not occur on the SFL’s property but is adjacent to it). The inconsistent interpretation occurs because the Rule only states that the “. . . the land does not contain an occupied marbled murrelet site.” The definition of an Occupied site does not include the 300 ft. buffer. However, the definition of Critical habitat does include the buffer. Therefore, if

Critical habitat occurs on SFL land, this exemption should be void even though the boundary of the Occupied site does not.

Recommendation: Adopt the language “or the 300- foot average buffer of an Occupied marbled murrelet site” into the Rule. This would alleviate any future misinterpretation.

WAC 222-30-065 – Helicopter Yarding

This should be reworded to “Helicopter yarding and operations” to include aerial spray or other helicopter activities near Occupied sites.

Recommendation: Adopt word addition of “and operations”.

Objective 7: Review the Rule & recommend any changes or add procedures to current Rule, if necessary, when stand conditions change; or suggest a different Rule set all together.

Conclusions: Due to time constraints, this objective could not be thoroughly addressed. However, the WWG did discuss one alternative; assemble an Interdisciplinary Team (ID) on a case by case basis. The group was in general agreement that an ID team including USFWS, WDNR, Small Forest Landowner, and WDFW could adequately determine if a change has occurred due to natural events (e.g., stand replacing fire or wind throw). If substantial change is documented, then the site can be reclassified.

Objective 8: Develop a timeline for development of the recommendations that will be provided to the Board.

Conclusions: Timeline was developed in early 2022 and prior to 2022 the WWG maintained an open-ended timeline to effectively evaluate components. The submittal of the Rule change recommendations was set for May 2023.

Objective 9: Develop potential adaptive management strategies for Marbled Murrelet conservation.

Conclusions: There was no meaningful discussion by the WWG during the assessment process. It was determined that more expertise, data, and time was needed to address this objective. Developing adaptive management strategies or identify other conservation measures and regulatory incentives (e.g., carbon and ecosystem services markets, transfer of development rights, conservation easements, pilot biodiversity projects, etc.) to maintain and/or improve habitat is important. This objective was tabled so that the WWG could focus on objectives one through eight.

Objective 10: Evaluate/assess existing suitable habitat on non-federal lands and potential future contributions of other regulatory habitat set asides across the landscape. (GIS based approach)

Conclusions: A full assessment of existing suitable habitat on non-federal lands and an evaluation of the effectiveness of landowner agreements is beyond the scope of the WWG. However, a thorough examination of the status and trends of existing habitat and the efficacy of the approved protective instruments for the Marbled Murrelet would shed valuable light on whether the Rules as implemented are, in fact, contributing to the recovery of this species.

Conclusion

Based on the information provided in the report, the overarching conclusion from this effort is that Murrelet habitat has declined in the state since the Rules went into effect and changes must be

implemented if we hope to stabilize or reverse this trend. Through hard work and cooperation, the diverse membership of the WWG came to consensus on the WWG recommendations described in this document. The detailed WWG assessment report is intended to be a companion document to the proposed Marbled Murrelet Rule change document also submitted to the Board. It provides the necessary background and reasoning behind the change recommendations and can be consulted as needed.

Washington Forest Practices Rules for Marbled Murrelet Issues and Recommendations

Washington Department of Fish and Wildlife

Introduction

In 2017, the Washington Fish and Wildlife Commission changed Marbled Murrelet status to “Endangered”. On March 3, 2017, the Washington Department of Natural Resources (WDNR) recommended to the Forest Practice Board (Board) that the Washington Department of Fish and Wildlife (WDFW):

1. Assess the Marbled Murrelet Forest Practices Rules (Rules) for adequate habitat protection using best available science,
2. Convene a diverse group to complete the Rule assessment based on the February 24, 2017, uplisting of the species, and
3. Make recommendations to the Board from those reviews.

Until WDFW provides recommendations and the Board acts, DNR will continue to implement the Board’s current Murrelet Rules and WDFW will continue to screen proposed forest practices for potential adverse impacts to Murrelets. Given a formal request from WDFW, DNR can condition the application with Murrelet protections.

The Board convened a Washington Forest Practices Murrelet Wildlife Working Group (WWG) in February 2018. WDFW then crafted “Problem Statements” and “Ideal Outcomes” that were deliberated on by the WWG as part of the overall Rules assessment. The problem statements led to the development of objectives (WDFW 2023) to guide the WWG through the process. The objectives focused on the current state of Murrelets and their habitats to assess the Rules’ efficacy. The first three objectives in that report developed background material that informed the suggested revisions addressed under objectives 4-6. The outcomes for the problem statements addressed herein are informed through the work performed by the WWG to complete objectives 4-6 in the report (WDFW 2023). The report can be consulted for additional background information as Board members consider the suggested revisions in this document.

Actual outcomes of the process are represented here as “Suggested Revisions”, which are based on the collective work of the WWG. Throughout this process, the WWG reviewed the current Rules to identify and propose changes for the Board to consider. This assessment considered only the biological and ecological as well as tree and stand data associated with Occupied sites information for the species and did not evaluate economic or sociopolitical factors that may be associated with any proposed changes to the existing Rule. This document outlines recommendations derived from that effort, which will maximize opportunities for Marbled Murrelet conservation and status improvement, improve clarity in the Rule language, and maintain sustainable timber industry practices related to Murrelet habitat on non-federal forest lands.

Original Rule language is presented in *italics*. Underline indicates added text and strike-through indicates deleted text. A statement on the rationale behind the suggestions is provided. Recommendations are consensus-based unless otherwise noted.

Problem Statement 1. Current ambiguous language makes identification of Critical Habitat (state)¹ for surveys problematic.

Ideal Outcome: To determine the need for a protocol survey, the revised language must provide clear, specific descriptions of criteria used to identify Critical Habitat (state).

Suggested Revisions to WAC 222-16-010 – General definitions.

“SUITABLE MARBLED MURRELET HABITAT”

for the purpose of conducting a protocol survey, means a contiguous forested area containing trees capable of providing nesting opportunities:

With all the following indicators unless the department, in consultation with the department of fish and wildlife, has determined that the habitat is not likely to be occupied by Marbled Murrelets:

(a) Within 50 miles of marine waters;

(b) At least forty percent of the dominant and codominant trees are ~~Douglas fir, western hemlock, western red cedar or sitka spruce~~ conifers;

(c) Two or more nesting platforms per acre;

(d) At least ~~7 acres in size, including the contiguous forested area within 300 feet of nesting platforms, with similar forest stand characteristics (age, species composition, forest structure) to the forested area in which the nesting platforms occur.~~ 5 acres in size (minimum convex polygon) of qualifying platform-bearing trees.

Rationale for Suggested Revisions to Suitable Marbled Murrelet Habitat

(b) CONSENSUS reached – adopted by working group as written here; Occupied sites have been identified in stands in Washington containing other conifer species (e.g., mountain hemlock, silver fir) besides what is listed in the current Rule.

(d) CONSENSUS reached – a negotiated consensus agreement was struck to adopt the suggested language: Delineate the polygon of 5 acres (or greater) of qualifying platform trees as the “Suitable marbled murrelet habitat”.

“MARBLED MURRELET NESTING PLATFORM”

means any horizontal tree structure such as a limb, an area where a limb branches, a horizontal surface created by multiple leaders, a deformity created by mistletoe infection or branch break or a debris/moss platform or stick nest equal to or greater than 7 inches in width diameter including associated moss if present, that is 50 feet or more above the ground in western hemlock trees 24 inches dbh and greater and in other conifer trees 32 inches dbh and greater (generally over 90 years of age) and is capable of supporting nesting by marbled murrelets.

¹ Critical habitat in this document refers to Washington state critical habitat designated by the Board in accordance with WAC 222-16-080 (1)(h) <https://app.leg.wa.gov/wac/default.aspx?cite=222-16-080>

Rationale for Suggested Revisions to Marbled Murrelet Nesting Platform

CONSENSUS reached – The WWG determined that there are data to support recommended change to account for unique characteristics of western hemlock and its potential to contain 7-inch platforms at tree diameters less than 32 inches dbh (e.g., mistletoe); therefore, adopt the proposed rule language to add 24 inches and greater dbh for Western Hemlock species and retain 32 inches and greater dbh for all other conifer species.

“OCCUPIED MARBLED MURRELET SITE”

Occupied marbled murrelet site means:

(1) A contiguous area of suitable marbled murrelet habitat where at least one of the following marbled murrelet behaviors or conditions occur:

(a) A nest is located; or

(b) Downy chicks or eggs or egg shells are found; or

(c) Marbled murrelets are detected flying below, through, into or out of the forest canopy;

or

(d) Birds calling from a stationary location within the area; or

(e) Birds circling above a timber stand within one tree height of the top of the canopy; or

(2) A contiguous forested area, which does not meet the definition of suitable marbled murrelet habitat, in which any of the behaviors or conditions listed above has been documented by the department of fish and wildlife and which is distinguishable from the adjacent forest based on vegetative characteristics important to nesting marbled murrelets.

(3) For sites defined in (1) and (2) above, the sites will be presumed to be Occupied based upon observation of circling described in (1)(e), unless a two-year survey following the 2003 most recent Pacific Seabird Group (PSG) protocol has been completed. and an additional third year of survey following a method listed below is completed and none of the behaviors or conditions listed in (1)(a) through (d) of this definition are observed. The landowner may choose one of the following methods for the third-year survey:

(a) Conduct a third-year survey with a minimum of nine visits conducted in compliance with 2003 PSG protocol. If one or more marbled murrelets are detected during any of these nine visits, three additional visits conducted in compliance with the protocol of the first nine visits shall be added to the third-year survey. Department of fish and wildlife shall be consulted prior to initiating third-year surveys; or

(b) Conduct a third-year survey designed in consultation with the department of fish and wildlife to meet site specific conditions.

(4) For sites defined in (1) above, the outer perimeter of the Occupied site shall be presumed to be the closer, measured from the point where the observed behaviors or conditions listed in (1) above occurred, of the following:

(a) 1.5 miles from the point where the observed behaviors or conditions listed in (1) above occurred; or

(b) The beginning of any gap greater than 300 feet wide lacking one or more of the vegetative characteristics listed under "suitable marbled murrelet habitat"; or

(c) The beginning of any narrow area of "suitable marbled murrelet habitat" less than 300 feet in width and more than 300 feet in length.

(5) For sites defined under (2) above, the outer perimeter of the Occupied site shall be presumed to be the closer, measured from the point where the observed behaviors or conditions listed in (1) above occurred, of the following:

(a) 1.5 miles from the point where the observed behaviors or conditions listed in (1) above occurred; or

(b) The beginning of any gap greater than 300 feet wide lacking one or more of the distinguishing vegetative characteristics important to murrelets; or

(c) The beginning of any narrow area of suitable marbled murrelet habitat, comparable to the area where the observed behaviors or conditions listed in (1) above occurred, less than 300 feet in width and more than 300 feet in length.

(6) In determining the existence, location and status of Occupied marbled murrelet sites, the department shall consult with the department of fish and wildlife and use only those sites documented in substantial compliance with guidelines or protocols and quality control methods established by and available from the department of fish and wildlife (WDNR 2018: WAC 222-16-010).

Rationale for Suggested Revisions to Marbled Murrelet Nesting Platform

CONSENSUS reached – Incorporating language that references the “most recent” PSG survey protocol would ensure that the most current best available science is being used for surveys.

Problem Statement #2. Activities in buffer of Critical Habitat [WAC 222-16-080(h)(v)] – Existing language in WAC lacks details to apply the Rule concerning management within the Occupied site buffer to protect the integrity of Occupied habitat. Additionally, the word “mediate” is incorrectly used.

Ideal Outcome: Revising the Occupied buffer prescriptions to non-managed buffers, protecting Occupied sites from deleterious edge effects such as increased predator (Corvid) access to interior nesting habitat and alteration of nesting stand microclimate. Preferably, the Occupied site buffer would be defined as a 300-foot unmanaged buffer around entire edge/perimeter of Occupied habitat. Also, replace “mediate” with “help minimize”.

SUGGESTED REVISION TO WAC 222-16-080(h)(v)

Related to Critical Habitats designated as Class IV-Special, (h) Marbled Murrelet, (v) Harvesting within a 300 foot managed buffer zone adjacent to an Occupied marbled murrelet site.

*(h) Marbled murrelet (*Brachyramphus marmoratus*)*

(v) Harvesting within a 300 foot managed buffer zone adjacent to an Occupied marbled murrelet site that results in less than a residual stand stem density of 75 trees per acre greater than 6 inches in dbh; provided that 25 of which shall be greater than 12 inches dbh including 5 trees greater than 20 inches in dbh, where they exist a no-cut inner zone of 150 feet and a 150 foot outer zone managed by Relative Density by major habitat type: ≥ 50 tree per acre for hemlock – spruce dominant and ≥ 35 trees per acre for Douglas-fir and red alder dominant. The inner zone of the buffer shall begin at the edge of the outer extent of the platform trees of the occupied habitat. The primary consideration for the design of managed buffer zone widths and leave tree retention patterns shall be to ~~mediate~~ help minimize edge effects. The width of the buffer zone may be reduced in some areas to a minimum of 200 feet and extended to a maximum of 400 feet as long as the average of 300 feet is maintained. Landowner shall consult with WDFW on managed buffer prescriptions.

Rationale for Suggested Revisions WAC 222-16-080(h)(v)

The WWG proposed and evaluated several options to revise the Occupied site buffer to provide greater protection from corvid predators and to minimize wind and microclimate effects, providing insulated interior forest conditions (i.e., without edge effects) (e.g., WDNR 2019). Efficacy of the current managed buffer harvest option within 300 feet of an Occupied sites is not

supported by scientific studies of forest “hard” edge effects. These studies show that hard edge contributes to microclimate alteration including increased temperature and reduced humidity of the interior of the stand, changed growing conditions for vegetation and increased windthrow (Chen et al. 1990, 1992, 1993, 1995), and potential nesting substrate epiphytes (e.g., moss) degradation or desiccation (van Rooyen et al. 2011, Harper et al. 2005, McShane et al. 2004). Platform and epiphyte abundance adjacent to regenerating forest (a “hard edge,” approximately 0 – 20 years old) was reduced by 75% in comparison with interior forest, and epiphytic platform abundance at “soft edges” (young forest stands approximately 21 to 40 years old) was reduced by 40% (van Rooyen et al. 2011). Open-canopied edge or hard edges can also increase discovery of Murrelet nests by predators such as corvids (Malt and Lank 2007, 2009). Edge effects resulting from harvest may increase Marbled Murrelet nest predation in habitat located close to edges. Rapid growing vegetation and increased accessibility of fruiting vegetation (e.g., berries) in open canopy or newly harvested areas provide a wider range of food sources and more opportunities for foraging to predator populations, particularly Steller’s jays, a known predator of Marbled Murrelets (McShane et al. 2004).

Considering this, the WWG investigated several concepts and arrived at recommendations to address spatial distribution of leave trees to minimize edge effects. The group discussed alternatives for residual 75 trees per acre (TPA) to better understand this recommendation in the current Rule and explored other “feathering” designs for residual buffer trees. The group discussed whether a higher residual TPA for the Occupied buffer could be defined (what number, what distribution, and over the entire 300 ft.) and discussed a “no-cut” inner zone option and whether that would change TPA to the outer zone. Depending on its final configuration in an FPA proposal, the 75 TPA required within the current 300-foot buffer could be construed as a *hard edge* (“dispersed” TPA prescription) or a *soft edge* (trees bunched against Occupied habitat TPA prescription). If dispersed over the 300-foot depth of the Occupied buffer, its potential open canopy and sparse stem density would not offer protection from wind and microclimate effects and potential predator access to murrelet Occupied sites:

“Hard edge effects extend through towards the interior of the occupied stand and occur when the actively managed forest is comprised of young stands (0-20 years old) that are expected to be generally less than 40 feet high. Higher risk of nest predation, and increased microclimate and windthrow effects are all associated with hard edges... Soft edges are characterized by managed forest stands that are expected to be generally 20-40 years old and 40-80 feet high adjacent to the occupied stand. At this stage, the interior forest of the occupied stand is less affected by predation risk, and microclimate and windthrow effects still factor into edge impacts, but to a lesser degree. Trees in the previously managed forest that are beyond 40 years of age and 80 feet in height are assumed to have minimal edge effects to the interior” (WDNR 2019; based on van Rooyen et al. 2011; Malt and Lank 2008, 2009).

CONSENSUS was reached by the WWG on the following elements and edits:

- Delete residual 75 TPA across the existing diameter classes (applied across the entire edge/perimeter);
- Prescribe 150 feet no-cut “inner zone” and 150 feet “outer-zone” managed buffer;
- Adopt Relative Density concept for the outer 150 feet of Occupied buffer area, specifically ≥ 35 TPA for Douglas-fir/red alder dominant and ≥ 50 TPA for western hemlock dominant; and,
- Clarify that inner zone of the buffer shall begin at the edge of the outer extent of the platform trees making up the Occupied habitat.
- Landowner will consult with WDFW about outer zone management.

Additionally, CONSENSUS was reached to remove “mediate” and replace with “help minimize” (or other wording more appropriate to the context. The definition of mediate is “intervene between people in a dispute in order to bring about an agreement or reconciliation” and is inappropriately used in the current rule.

Problem Statement #3: Since 1997, current Rule has allowed management or loss of habitat having a 30-60% probability (WAC 222-10-042(2) & (3)) of occupancy (WAC 222-16-080(1)(h) Critical habitat) with no requirement to survey for Marbled Murrelet prior to harvest.

Ideal outcome: Identify all stands for survey having two or more platforms per acre, regardless of landscape or detection area (WAC 222-16-080(1)(h) Critical habitat). Eliminate the 7 and 5 platforms per acre requirement currently needed for implementation of survey outside detection areas.

The WWG was unable to adequately address this problem statement due to the complex nature and time constraints of this problem. No language is proposed by the WWG at this time. However, the loss of habitat allowed by this Rule needs further investigation, discussion, and analysis of impacts. Further, the statistical probability of occupancy is a research need and is beyond the scope of the WWG. Focused work and funding on statistical analysis to better predict occupancy would help inform a change here. See the recommendations for future considerations section below for further discussion.

Problem Statement #4: Trees with potential nesting platforms which are less than 32 inch dbh are not Rule-defined as “Suitable habitat” trees. However, trees less than 32 inch dbh that have platforms have oftentimes been observed within the same stand/forest of similar age and can provide potential nesting opportunities.

Ideal Outcome: Eliminate a minimum dbh requirement.

POTENTIAL ALTERNATIVES:

- 1) Eliminate 32-inch dbh tree size requirement for platform trees.
- 2) Reduce the dbh requirement to some smaller dbh more appropriate to account for platform presence.

SUGGESTED REVISIONS WAC 222-16-010 GENERAL DEFINITIONS “MARBLED MURRELET NESTING PLATFORM”

means any horizontal tree structure such as a limb, an area where a limb branches, a horizontal surface created by multiple leaders, a deformity created by mistletoe infection or branch break or a debris/moss platform or stick nest equal to or greater than 7 inches in width diameter including associated moss if present, that is 50 feet or more above the ground in western hemlock trees 24 inches dbh and greater and in other conifer trees 32 inches dbh and greater (generally over 90 years of age) and is capable of supporting nesting by marbled murrelets.

Rationale for Suggested Revisions

On many occasions, we have observed trees with <32-inch dbh that have platforms. These trees are excluded from the Suitable habitat definition in current Rule. This has occurred at the stand level as well (e.g., western hemlock stands with mistletoe). Data from habitat studies within nesting areas demonstrate this issue (Hamer and Nelson 1995; Raphael et. al. 2008; Nelson et

al., unpubl. data: WA and OR Marbled Murrelet nests). This particular restrictive dbh requirement is a primary driver inhibiting recruitment of new habitat because existing second growth stands get cut before trees reach 32-inch dbh. Other factors here may be timber market driven; average stand rotation age (40 yrs.), less need for large dbh trees, less infrastructure to process large dbh trees, etc.; and ultimately, a lack of incentive to grow large trees.

CONSENSUS was reached because the WWG determined that there are data to support a recommended change to account for unique characteristics of western hemlock and its potential to contain 7 inch platforms at tree diameters less than 32 inch dbh; therefore, adopt the proposed rule language to add 24 inches and greater dbh for Western Hemlock species and retain 32 inches and greater dbh for all other conifer species.

Problem Statement #5. Pending Revisions to Survey Protocol [Forest Practices Board Manual WAC 222-12-090 (14)].

Ideal Outcome: The Board supports the most current Pacific Seabird Group survey protocol in effect at the beginning of the season in which the stand surveys were conducted.

The WWG discussed this option to revise WAC, however, the new protocols have not been finalized as of the date of this report. See the Recommendations for future consideration section below for discussion about changes to Board Manual 14.

WWG recommendations for future consideration and Rule making beyond what is proposed herein:

WAC 222-10-042 MARBLED MURRELET SEPA GUIDANCE – PROPOSED RULE LANGUAGE:

Marbled murrelets.

The following policies shall apply to forest practice subject to SEPA where the forest practices may cause adverse impacts to marbled murrelets.

(1) Within an Occupied marbled murrelet site, forest practices that will adversely impact this habitat will likely have a probable significant adverse impact on the environment except where the department determines, in consultation with the department of fish and wildlife, that the applicant's proposal will actually have no significant adverse impact.

(2) Within marbled murrelet detection area:

(a) Suitable marbled murrelet habitat with at least a 50% probability of occupancy is assumed to have a high likelihood of marbled murrelet occupancy. It is currently assumed that 5 platforms per acre meets the 50% probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment.

(b) Suitable marbled murrelet habitat with at least a 30% ~~but less than 50%~~ probability of occupancy has a sufficiently high likelihood of marbled murrelet occupancy to warrant a survey. It is currently assumed that 2 platforms per acre meets the 30% probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment. This additional information is necessary for the department to evaluate the environmental

~~impact of the forest practice. It is currently assumed that 2 platforms per acre meets the 30% probability of occupancy.~~

A landowner may request the department of fish and wildlife to survey. The department of fish and wildlife should survey to the maximum extent practicable based on an appropriation to survey marbled murrelet suitable habitat within detection areas where the landowner provides access for surveys to the department of fish and wildlife, and sufficient time is allowed to complete the protocol surveys. The department shall provide a notice to the landowner within 60 days from the date of application of the department of fish and wildlife's intent to survey. If the department of fish and wildlife cannot conduct marbled murrelet surveys the responsibility for surveys remains with the landowner.

(3) Outside a marbled murrelet detection area:

(a) Suitable marbled murrelet habitat with at least a 60% probability of occupancy is assumed to have a high likelihood of marbled murrelet occupancy. It is currently assumed that 7 platforms per acre meets the 60% probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment.

(b) Within a marbled murrelet special landscape, suitable marbled murrelet habitat with at least a 50% probability of occupancy is assumed to have a high likelihood of marbled murrelet occupancy. It is currently assumed that 5 platforms per acre meets the 50% probability of occupancy. Without survey information, forest practices that will adversely impact this habitat may have a probable significant adverse impact on the environment.

(4) The adjacent forested area within 300 feet of "suitable marbled murrelet habitat" described in subsections (2) and (3) is assumed to be necessary for buffering potentially occupied habitat as defined in WAC 222-16-080 (1)(h)(v). This additional information on the forested area within 300 feet of "suitable habitat" is necessary for the department to evaluate the environmental impact of the forest practice. Without survey information, forest practices that will adversely impact this buffer may have a probable significant adverse impact on the environment.

(5) ~~(4)~~ When determining whether a forest practice will have a probable significant adverse impact on the environment, the department shall, in consultation with the department of fish and wildlife, evaluate the impacts on the statewide, regional (Southwest Washington, Olympic Peninsula, Hood Canal, North Puget Sound, South Puget Sound and South Cascades) and local (within the marbled murrelet detection area) marbled murrelet populations and associated habitats. The department should consider a variety of information including but not limited to survey data, habitat quality and patch size, the amount of edge in relation to the area of habitat, amount of interior habitat, distance from saltwater, detection rates, the amount and quality of habitat, the likelihood of predation and the recovery goals for the marbled murrelet.

(6) ~~(5)~~ The platform assumptions set forth above are based on regional data. Applicants or others may submit information to the department which was gathered in conjunction with a marbled murrelet survey agreement with the department of fish and wildlife, and other reliable information that is more current, or specific to the platform numbers in the marbled murrelet suitable habitat definition. The department shall use such information in making its determinations under this section where the department finds, in consultation with the department of fish and wildlife, that the information is more

likely to be valid for a particular WRIA or physiographic province. If the department does not use the information, it shall explain its reasons in writing to the applicant.

Potential Alternatives: Consider more conservative Critical Habitat definition used to identify stands for survey [WAC 222-16-010 Definitions: “Suitable marbled murrelet habitat”]. One alternative may be to eliminate 7 platforms/acre but keep 5 platforms/acre.

Rationale for Suggested Revisions

Overall, habitat loss has been a major factor in Murrelet declines throughout the listed range and it is estimated that nesting habitat on non-federal lands in WA has declined by 30% since 1993 (Falxa and Raphael 2016, Lorenz et al. 2021). In addition, the data generated for development of the 1997 Murrelet Rules, showed *as much as 30% of known Occupied stands had a lower end platform density of <2 platforms per acre* (Perez-Comas and Skalksi 1996) and these areas were subsequently negotiated as exempt from the Rules that would otherwise require surveys.

In addition to this 30%, direct habitat loss can be attributed to the Rules involving the probability of thresholds established to require Murrelet surveys. Since the 1997 permanent Rule was enacted, WDFW has observed numerous Forest Practices Applications where Suitable marbled murrelet habitat with ≥ 2 platforms/acre to < 5 platforms/ac (assumed 0.30 – 0.50 probability of occupancy) has been exempt from survey requirement, as calculated by the platform inventory model method (PIMM) as devised after Duke et al. (1998; Board Manual 15). This translates to many unknown acres of potential nesting habitat loss between ≥ 2 to < 5 platforms/ac in the SW WA Special Landscape (S. Desimone, unpubl. PIMM data example: years 2012-2020), and many more unknown acres at the < 7 platforms/ac (0.60 probability of occupancy) threshold in non-detection areas.

WAC 222-16-080 (1) (H)(VI)- PROPOSED CLARIFICATION TO RULE LANGUAGE (RE: SMALL FOREST LANDOWNER (SFLO) EXEMPTION CLARIFICATION)

(vi) Except that the following shall not be critical habitat (state):

(A) Where a landowner owns less than 500 acres of forest land within 50 miles of saltwater and the land does not contain an occupied marbled murrelet site or the 300- foot average buffer of an Occupied marbled murrelet site; or

(B) Where a protocol survey (see WAC 222-12-090(14)) has been conducted and no murrelets were detected. The landowner is then relieved from further survey requirements. However, if an occupied marbled murrelet site is established, this exemption (vi) is void.

Ideal Outcome: Revise Rule language to include the 300 foot buffer in addition to “Occupied marbled murrelet site” to avoid misinterpretation and to protect Critical habitat as defined in WAC (222-16-080 (1)(h).

Rationale for Suggested Revisions

The original intention of subsection (vi) is to protect the small landowner from the cost of surveying for Marbled Murrelets. If there is no Occupied site established, whole or in part, the landowner is exempt from survey requirements. The overarching intention of the Forest Practice Rules for murrelet is to keep Occupied sites intact where they are known and documented. Over the long-term, the Occupied site buffer is integral to keeping these nesting sites intact; hence they are considered Critical habitat (state) at the time the Occupied site is established through WDFW Status 1, 2, or 3 occupancy detections. Hence, if an Occupied site is present Critical habitat (state) would be observed. WDFW proposes the clarification edits above for observing buffer retention when an Occupied site (Critical habitat - state) or the Occupied site buffer (Critical habitat - state) is present on or directly adjacent to

the small landowner's property. As Critical habitat is encountered, the existing disturbance avoidance measures in Rule would also apply.

Simply stated, if both conditions are true in part (vi)(A), then the SFL is exempt from observing Critical habitat (state) rules. Reading the language logically, if any part of (A) is false (i.e., owns >500 ac or the land does contain an Occupied site, and therefore the Occupied Critical habitat (state) buffer would mean that there is Critical habitat present. The second part (vi)(B) states this clearly "...However if an Occupied site is established, this exemption is void" (i.e., the whole of (vi)). Notice in (B) that the type of "landowner" is not stipulated, and so would mean all landowners.

It follows that when an "Occupied marbled murrelet site" is established, it would automatically condition the Occupied site to have the 300 ft buffer around the Occupied site as Critical habitat; these cannot be separated, as they are both Critical habitat (state). An existing Occupied site (Critical habitat) means that the managed 300-ft Occupied site buffer is also Critical habitat (state), because it is immediately established at the same time "Occupancy" is documented. Otherwise, if allowing harvesting to less than the managed buffer prescription, the state (WDNR) would be allowing the degradation of the Occupied site that the state, by Rule, protected. This does not make logical, regulatory, or ecological sense.

The interpretation is that a small forest landowner would need to follow the Critical habitat Rules (222-16-080 (1)(h) Marbled Murrelet) for the managed buffer of an established Occupied site and the Occupied site itself. Harvesting in the buffer of an Occupied site and leaving below the minimum leave tree requirements does invoke a Class IV-Special, as outlined above, as it is listed in the same subsection for designated Critical habitat (state) for the Marbled Murrelet (WAC 222-16-080 (h)).

SUGGESTED REVISION WAC 222-12-090 (14) – SURVEY PROTOCOL FOR MARBLED MURRELETS.

(14) Survey protocol for marbled murrelets. The most current Pacific Seabird Group terrestrial survey protocol *The Pacific Seabird Group survey protocol dated January 6, 2003, and formally titled Methods for Surveying Marbled Murrelets in Forests: A Revised Protocol for Land Management and Research*, shall be used when surveying for marbled murrelets in a stand. Surveys are valid if they were conducted in compliance with the board-recognized Pacific Seabird Group survey protocols in effect at the beginning of the season in which the surveys were conducted.

Rationale for Suggested Revision WAC 222-12-090 (14) – Survey protocol for marbled murrelets

The Pacific Seabird Group survey protocols are a consistent expectation for surveyors and a consistent validation method for reviewers. As protocols may change – although not often – with state of the practice, technology, and knowledge of Marbled Murrelet habitat use and behavior, WDFW proposes to eliminate date references to protocol in WAC and generalize reference to current PSG protocols. Additionally, the 2003 protocol (currently used) has not achieved 95% probability of correct occupancy/non-occupancy classifications as originally intended (MacKenzie 2016; Weyerhaeuser Biometricians' Review (Aaron Springford, Jay Jones 2019) of MacKenzie (2016). Eliminating the date reference in WAC assures surveyor and reviewer use of the best available science in current PSG protocol in terms of spatial coverage, survey intensity, and interpretation for site classification through survey review. The current revision (in process) of Pacific Seabird Group Inland Survey Protocol for Marbled Murrelets is expected to reflect 95% confidence level of detection by data-informed statistical sampling methods (MacKenzie 2016; Marbled Murrelet Tech. Comm., PSG, unpublished data; S. Desimone, pers. com.).

NEW PROPOSED GUIDANCE: WAC 222-12-090 FOREST PRACTICES BOARD MANUAL SECTION 15.

Revised Draft Guidance for Harvesting within a Managed Buffer Zone adjacent to Occupied marbled murrelet sites (WAC 222-16-080)(1)(h)(v) (July 2022)

The accompanying guidance follows for insertion into the Board manual and as proposed language for WAC 222-16-080(1)(h)(v):

Specific forest practices on lands designated as Critical habitat (state) for Marbled Murrelet (*Brachyramphus marmoratus*) have been determined to have potential for a substantial impact on the environment and have been classified by the department to be Class IV-Special Forest Practices.

The following two forest practices have been so classified as Class IV-Special Forest Practices under WAC 222-16-080 (1) (h) (v):

1. Harvesting within a 150-foot no-cut inner zone buffer of a 300-foot managed buffer zone adjacent to an Occupied marbled murrelet site.
2. Harvesting within a 150-foot outer zone managed buffer of a 300-foot managed buffer zone adjacent to an Occupied marbled murrelet site that
3. results in less than a residual stand relative density of 35 (Douglas-fir or red alder dominant species group) or a residual stand relative density of 50 (Western hemlock dominant species group).

The total width of the 300-foot managed buffer zone may be reduced in some areas to a minimum of 200 feet and extended to a maximum of 400 feet as long as the average of 300 feet is maintained; however, a 150-foot no-cut inner zone buffer adjacent to the Occupied marbled murrelet habitat will be retained in these reduced or extended buffer zones.

Per WAC 222-16-080 (1) (h) (v), the primary consideration for the design of managed buffer zone widths and leave tree retention patterns is to help minimize edge effects, including effects from prevailing wind patterns.

The following is simplified guidance for 1) field layout of an outer zone managed buffer within a 300-foot managed buffer adjacent to an Occupied marbled murrelet site to produce a residual stand Relative Density of at least 35 (Douglas-fir or red alder dominant species group) or a residual stand Relative Density of at least 50 (Western hemlock dominant species group) following harvest and 2) conducting the harvest within the outer zone managed buffer.

Simplified Guidance for field layout and conducting harvest within a Marbled Murrelet outer zone managed buffer²

If you intend to utilize an outer zone managed buffer (managed buffer zone) adjacent to an Occupied marbled murrelet site, determine (mark in the field) the inner and outer edges of the proposed 150-foot managed buffer zone adjacent to the Occupied marbled murrelet site.

The tree retention requirements (the target leave tree stocking levels following harvest) are determined by calculating the quadratic mean diameter (QMD) of the stand within the managed buffer zone and by knowing the dominant species group (see "Dominant species group" information box) within your proposed managed buffer zone. The QMD method works well in even-aged stands where the dominant and codominant trees are of uniform diameter.

² Tables referenced in this section were omitted for clarity. See WDFW 2023 – MAMU Briefing Report.

Use a sample cruise (using fixed-radius or variable plots) to determine the QMD of the trees within your delineated managed buffer zone, as well as the dominant species group (Douglas-fir, western hemlock or red alder) within this buffer.

Dominant species group: Dominant species group is determined by stem count of trees greater than or equal to 6" dbh. If there are more Douglas-fir stems than other conifer and hardwood tree species stems, choose Douglas-fir as the dominant species. If there are more other conifer stems than Douglas-fir and hardwood species stems, choose western hemlock as the dominant species group. If there are more red alder / hardwood stems than conifer stems, choose red alder as the dominant species group.

Measure the dbh (diameter at breast height, i.e., 4.5 feet above the ground) of each sampled tree and note the dominant species group (Douglas-fir, western hemlock or red alder) of each tree that falls within cruise area. Determine for each tree you have measured whether it is a legacy tree (see description in Appendix B) or not a legacy tree. The vast majority of managed buffer zone stands adjacent to Occupied marbled murrelet sites will likely be even-aged but may have some legacy conifer trees, but identifying which trees are legacy trees is critically important to the proper calculation of QMD for the trees within the managed buffer.

As you measure each tree, either a) directly enter the diameter and species group you have measured into the appropriate category ("Legacy" tree category or "Non-Legacy" tree category) in the "QMD Calculator" smartphone application (to be provided) or b) record (on any paper form of your choice) the diameter and species group of each measured tree, again making sure to note whether the tree is a Legacy or Non-Legacy and then input your data into the "QMD Calculator" computer application (to be provided).

The QMD Calculator will provide the calculated QMD for the Non-Legacy trees within your managed buffer zone stand, as well as the estimated number of Legacy trees within your managed buffer zone, based on your sample cruise. It will also provide the "Dominant species group", Douglas-fir, western hemlock or red alder.

Use the identified "Dominant species group" category to determine which Modified Curtis Relative Density Calculator" table you should use (Douglas-fir / Red alder or Western Hemlock). Using the appropriate species table and the calculated non-Legacy QMD for your managed buffer zone, find the stand QMD in the table and determine the calculated number of conifers "Leave Trees/Acre (Minimum)" to retain after partial harvest.

Use this calculated minimum number of leave trees per acre to determine the actual trees you must retain within your managed buffer zone. **If there are no legacy conifer trees within your managed buffer zone, merely use this calculated minimum number of leave trees per acre for your field layout of leave trees within your managed buffer zone, using the appropriate "Average Tree Spacing (Feet)" figure from the table as a guide. If, however, you have any legacy conifer trees within your managed buffer zone, all such legacy conifer trees within your managed buffer zone must be identified for leave. Once these legacy conifer trees have been identified for leave, the remaining minimum number of leave trees per acre to leave within the managed buffer zone should be calculated and then those remaining leave trees must be identified for leave during field layout. Strive to maintain pre-harvest levels of species diversity.**

Mark leave trees, as appropriate, as specified under the "**Additional Preparation and Harvest Requirements**" section.

Additional Preparation and Harvest Requirements:

1. A representative sample of the proposed managed buffer zone must be laid out on the ground with leave trees marked prior to harvest and before the FPA is submitted to demonstrate how the managed buffer zone harvest will be implemented.
2. Reasonable care shall be taken to avoid damage to the stems and root systems of all residual trees within the managed buffer zone from falling, skidding or yarding. Any residual leave trees damaged must remain on site and do not count toward the residual retention requirements.
3. If Type Np, F or S waters and their associated riparian buffer zones occur within or overlaps an outer zone managed buffer, the most restrictive buffer zone leave tree / buffer zone prescription will be applied within the affected outer zone managed buffer.
4. Within the managed buffer zone, ground-based systems shall not be used on slopes where in the opinion of the department, this method of operation would cause actual or potential material damage to a public resource. When transporting logs in or through the managed buffer zone with ground-based equipment, the number of routes through the zone shall be minimized. Logs shall be transported to minimize damage to leave trees and vegetation in the managed buffer, to the extent practical and consistent with good safety practices.
5. Cable yarding within the managed buffer zone is subject to requirements listed in WAC 222-30-060 Cable Yarding.

OTHER RULE CLARIFICATIONS

The following is a list of Rules that would benefit from language clarification. The recommendations were not specifically targeted in the WWG but came up in conversation throughout the process.

1. WAC 222-30-065 “Helicopter Yarding” should be reworded to “Helicopter Operations” to address/include aerial spray or other helicopter activities near Occupied sites.
2. Regarding disturbance avoidance, the Board might consider adding a list of what constitutes “harvesting” activities: e.g., road construction, heavy equipment and helicopter operation, blasting, felling and bucking, cable or helicopter operations, timber processing at landings, slash disposal & prescribed burning, etc. The alternative would be to define “harvesting” in WAC 222-16-010.
3. Regarding industrial landowners and the application of a 300 foot buffer to adjacent DNR (or USFS, or National Park Service) lands with Occupied habitat (typically occurs along a section line):
 - a. Does the actual edge of habitat get delineated using DNR’s HCP definition of habitat (i.e., no dbh minimum, just trees with 7 inch platforms), or using the Rule criteria of 32 inch plus trees w/ platforms.

CONSIDERATIONS FOR A FUTURE WORKING GROUP COLLABORATION

1. Special Wildlife Management Plans (SWMP) – Need to revise/clarify the Rule for SEPA to address finding that SEPA is required for processing a SWMP (as per Marc Engel).
2. Board Manual Section 14 – New survey protocol nearing completion in 2023. Incorporate changes/updates to the PSG Murrelet Survey Protocol and correct/refine all references to PSG in the rule to ensure they refer to the latest/current protocol, etc.
3. Board Manual Section 15 – Review and address any necessary changes as related to other suggested Rule changes; adequacy of guidance for different methods; identify work or need for model analyzing Platform Inventory Model Method (PIMM); assessment needed.

CONCLUSION

Based on the information synthesized by the WWG stakeholder assessment process, the overarching conclusion from this effort is that Murrelet habitat on non-federal lands has declined in the state since the Rules went into effect. Further, the WWG acknowledges that Rule changes must be implemented if we hope to stabilize or reverse this trend. Through hard work and cooperation, the diverse membership of the WWG came to consensus on the WWG recommendations described in this document. The detailed assessment report is intended to be a companion document to the recommended Marbled Murrelet Rule changes proposed herein. It provides the necessary background and rationale behind the recommended changes.

References/Citations

- Duke, S., B. Anderson, and C. Philips. 1998. The platform unit method for estimating the density of Marbled Murrelet nesting platforms in a forest stand. Research Report. Weyerhaeuser Corp. Technical report Project No. 055-1330.
- Chen, J., J. F. Franklin and T. A. Spies. 1990. Microclimate Pattern and Basic Biological Responses at the Clearcut Edges of Old-Growth Douglas-fir Stands. *Northwest Environmental Journal* 6:424-425.
- Chen, J., J. F. Franklin, and T. A. Spies. 1992. Vegetation responses to edge environments in old-growth Douglas-fir forests. *Ecological Applications* 2:387-396.
- Chen J., J.F. Franklin, and T.A. Spies. 1993. Contrasting microclimates among clearcut, edge and interior old-growth Douglas-fir forest. *Agriculture and Forest Meteorology*, 63: 219-237.
- Chen J., J.F. Franklin, and T.A. Spies. 1995. Growing season microclimatic gradients from clearcut edges into old-growth Douglas-fir forests. *Ecological Applications* 5(1):74-86.
- Falxa, G.A. and M.G. Raphael, technical coords. 2016. Northwest Forest Plan—the first 20 years (1994-2013): status and trend of marbled murrelet populations and nesting habitat. Gen. Tech. Rep. PNW-GTR-933. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 132 p.
- Harper, K. A., S. E. MacDonald, P. J. Burton, J. Q. Chen, K. D. Brosofske, S. C. Saunders, E. S. Euskirchen, D. Roberts, M. S. Jaiteh, and P. A. Esseen. 2005. Edge influence on forest structure and composition in fragmented landscapes. *Conservation Biology* 19:768-782.
- Springford, A. and J. Jones [Weyerhaeuser Corp. biometricians] 2019. Evaluation of a set of survey protocols for marbled murrelets. Report prepared for the Pacific Seabird Group, MMTTC, Inland Survey Protocol Revision Team statistical subcommittee. Unpubl., 24 p. [Includes reference and review of MacKenzie (2016)]
- Malt J.M. and D.B. Lank. 2007. Temporal dynamics of edge effects on nest predation risk for the marbled murrelet. *Biological Conservation* 140:160-173.
- Malt J.M. and D.B. Lank. 2009. Marbled Murrelet nest predation risk in managed forest landscapes: dynamic fragmentation effects at multiple scales. *Ecological Applications* 15(5): 1274-1287.
- MacKenzie, D.I. 2016. Probability of MAMU Occurrence Reanalysis. Proteus Wildlife Research Consultants. Prepared for The Pacific Seabird Group, Marbled Murrelet Technical Committee, available from the Pacific Seabird Group.org.
- McShane, C., T. Hamer, H. Carter, G. Swartzman, V. Friesen, D. Ainley, R. Tressler, S. K. Nelson, A. Burger, L. Spear, T. Mohagen, R. Martin, L. Henkel, K. Prindle, C. Strong, and J. Keany. 2004. Evaluation report for the USFWS 5-year status review of the marbled murrelet in Washington, Oregon, and California. EDAW, Inc., Seattle, Washington.
- Nelson, S.K. and T.E. Hamer. 1995. Nesting biology and behavior of the Marbled Murrelet. Pp. 57-67 in C. J. Ralph, G. L. Hunt, M. G. Raphael, and J. F. Piatt, editors. *Ecology and conservation of the marbled murrelet*. General Technical Report PSW-GTR-152, USDA Forest Service, Pacific Southwest Research Station, Albany, California.
- Hamer T, SK Nelson and J Verschuyf. (unpubl. data.). Marbled murrelet nest data for WA and OR.

- Perez-Comas, J.A. and J.R. Skalski. 1996. Identification of marbled murrelet forest sites through tree and nesting platform counts. Unpubl. rep. [developed for J Pierce, WDFW], University of Washington, Seattle.
- Ramsdell, R., and W. Ritchie. 1998. Marbled Murrelet Rule Review. WDNR, WDFW, and WFPA illustrated guide to marbled murrelet rules (FIGURES) January 02, 1998.
- Raphael, M.G., S.K. Nelson, P. Swedeen, M. Ostwald, K. Flotlin, S.M. Desimone, S. Horton, P. Harrison, D. Prenzlou Escene, W. Jaross. 2008. Recommendations and supporting analysis of conservation opportunities for the Marbled Murrelet long-term conservation strategy. Washington State Department of Natural Resources, Olympia, WA.
- van Rooyen J.C., J.M. Malt, D.B. Lank. 2011. Relating microclimate to epiphyte availability: edge effects on nesting habitat availability for the Marbled Murrelet. Northwest Science 85(4):549-561.
- WDFW 2023. Forest Practices Rules Stakeholder Assessment and Recommendations for the Marbled Murrelet. Report to the state Forest Practices Board. May 2023.
- WDNR (Washington Department of Natural Resources). 2019. Long-term conservation strategy for the Marbled Murrelet. Final Environmental Impact Statement: Appendix G: LTFC Focus Paper: Areas of Long-term Forest Cover, and Appendix H: Potential Impacts and Mitigation. DNR Forest Resources Division, Olympia.
https://www.dnr.wa.gov/publications/amp_sepa_nonpro_mmltcs_app_g.pdf?vkme (accessed October 2022).