



**DEPARTMENT OF  
NATURAL RESOURCES**

**Forest Practices Division**  
1111 Washington St SE  
Olympia, WA 98504

**360-902-1400**  
[WWW.DNR.WA.GOV](http://WWW.DNR.WA.GOV)

July 28, 2023

**TO:** Forest Practices Board

**FROM:** Marc Engel, Senior Policy Planner, Forest Regulation

**SUBJECT:** Marbled Murrelet Rule Making

On August 9, 2023, I will request Board adoption of the proposed Marbled Murrelet rules with an effective date of January 1, 2024. In May, the Board approved the rule changes and directed staff to file a CR-105 with the Office of the Code Reviser for Expedited Rule Making. The comment period for the Expedited Rule Making closed on July 25, 2023 without any written objections from the public.

In summary, the Marble Murrelet rules have been amended as follows:

WAC 222-16-010 General definitions

- Definition for “Marbled Murrelet Nesting Platform” to add clarity to horizontal tree structures and the addition of western hemlock trees 24 inches diameter at breast height and greater are capable of supporting nesting by marbled murrelets.
- Definition for “Occupied Marbled Murrelet Site” to include most recent Pacific Seabird Group (PSG) protocols for terrestrial survey.
- Definition for “Suitable Marbled Murrelet Habitat” to add clarity to the attributes of contiguous forested areas capable of providing nesting opportunities including changing the acres of qualifying platform-bearing trees from seven to five acres in size.

WAC 222-16-080 (h) Marbled murrelet critical habitat

- Clarify WAC 222-16-080(h)(v) for Critical Habitats designated as Class IV-Special, by requiring the no-cut inner zone and managed outer zone; and that landowners shall consult with WDFW on managed buffer prescriptions.
- Add a provision for a small forest landowner exemption in WAC 222-16-080(h)(vi).

WAC 222-10-042 Marbled murrelets.

- Clarifies that forest practices without survey information which may adversely impact rule defined “suitable marbled murrelet habitat” that occurs within or outside a marbled murrelet detection area may have a probable significant adverse impact on the environment; and
- Establishes that the forested area within 300 feet of “suitable marbled murrelet habitat” is assumed to be necessary for buffering potentially occupied habitat as defined in WAC 222-16-080 (1)(h)(v).

- Clarifies that the survey information and the buffering of 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 and be classified Class IV-Special.

WAC 222-12-090 Forest practices board manual.

- Board Manual Section 14 to include the most current Pacific Seabird Group terrestrial survey protocol.
- Board Manual Section 15 to change estimated number of nesting platforms and to provide guidance for certain management actions under Class IV-Special Forest practices added to WAC 222-16-080(h)(v).

Board Manual Development

DNR convened a stakeholder workgroup to develop the Marbled Murrelet guidance for the implementation of the rules in Board Manual Sections 14 and 15. The stakeholder group includes members of the Marbled Murrelet Wildlife Working Group which developed the proposed rules, and WDFW and DNR staff, including Region Forest Practices staff who are familiar with the implementation of the Marbled Murrelet rules.

The stakeholder workgroup amendments to Board Manual Section 14, *Survey protocol for marbled murrelets* have been completed, and the amendments to Board Manual Section 15, *Guidelines for Estimating the Number of Marbled Murrelet Nesting Platforms and for Harvesting Adjacent to Lands Designated as Critical Habitat (State) for Marbled Murrelet* are still being developed.

The stakeholder workgroup has added to Part 3. *Harvest Methodology for Occupied Marbled Murrelet Site Buffers* the Board approved Marbled Murrelet Wildlife Working Group recommended guidance to implement the new rules required timber harvest methodologies within the no-harvest inner zone and a managed outer zone of the 300- foot average buffer zone adjacent to an occupied marbled murrelet site. The stakeholder group review of existing guidance in Board Manual 15, however, has identified the need for additional amendment of:

- The preamble to the manual to add clarity on how the Marbled Murrelet rules are to be applied;
- Part 1. *General Description of Marbled Murrelet Habitat* to make current with the new rule;
- Part 2. *Protocol Platform Assessment Methods* to add clarity to the existing manual alternative field methods to determine whether or not there are enough platforms present in a timber stand to trigger Marbled Murrelet surveys; and
- The figures, tables and graphics to make current with the new rule requirements.

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The stakeholder workgroup will continue to develop Board Manual Section 15 with a target completion date of September 30, 2023. This will afford time for DNR and WDFW to provide training to landowners and agency staff before the January 1, 2024 effective date of the new rules. The final Board Manual Sections 14 and 15 will be presented to the Board for approval at the November 2023 meeting.

I look forward to requesting adoption of the Marbled Murrelet rules and presenting the draft Board Manual Sections 14 and 15 to the Board at your August meeting. If you have any questions please contact Marc Engel at 360 628-1107 or [marc.engel@dnr.wa.gov](mailto:marc.engel@dnr.wa.gov).

**Attachments:**

*Rule Proposal*

*Draft Board Manual Section 14*

*Draft Board Manual Section 15*

ME/

**DRAFT**  
**Rule Proposal for Marbled Murrelet**  
**FOREST PRACTICES BOARD**  
**August 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.

- (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) 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 state-wide, 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.
- (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.

#### **WAC 222-12-090 Forest practices board manual.**

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

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

- (11) The standard methodology for conducting watershed analysis shall specify the quantitative methods, indices of resource conditions, and definitions, for conducting watershed analysis under chapter 222-22 WAC. The methodology shall also include a cultural resource module that shall specify the quantitative and qualitative methods, indices of resource conditions, and guidelines for developing voluntary management strategies for cultural resources. Except for cultural resources, the department, in consultation with Timber/Fish/Wildlife's Cooperative Monitoring, Evaluation and Research Committee (CMER), may make minor modifications to the version of the standard methodology approved by the board. Substantial amendments to the standard methodology requires approval by the board.
- (12) **Guidelines** for forest chemicals.
  - (a) A list of special concerns related to aerial application of pesticides developed under WAC 222-16-070(3).
  - (b) Guidelines for aerial applications of pesticides and other forest chemicals under chapter 222-38 WAC.
- (13) **Guidelines** for determining fish use for the purpose of typing waters under WAC 222-16-031.
- (14) **Survey protocol for marbled murrelets.** The most current Pacific Seabird Group terrestrial 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.
- (15) The department shall, in consultation with the department of fish and wildlife, develop:
  - (a) platform-Platform protocols for use by applicants in estimating the number of platforms, and by the department in reviewing and classifying forest practices under WAC 222-16-050. These protocols shall include:
    - (ai) A sampling method to determine platforms per acre in the field;
    - (bij) A method to predict the number of platforms per acre based on information measurable from typical forest inventories. The method shall be derived from regression models or other accepted statistical methodology, and incorporate the best available data; and
    - (eiii) Other methods determined to be reliable by the department, in consultation with the department of fish and wildlife.
  - (b) Guidance for applications classified by the department under WAC 222-16-080 (1) (h) (v) to be Class IV-Special forest practices for lands designated as critical habitat (state) for marbled murrelet (*Brachyramphus marmoratus*) for the following two forest practices activities:
    - (i) Harvesting within a 150-foot no-cut inner zone buffer of a 300-foot managed buffer zone adjacent to an occupied marbled murrelet site.
    - (ii) Harvesting within a 150-foot outer zone managed buffer of a 300-foot managed buffer zone adjacent to an occupied marbled murrelet site that results in less than a residual stand relative density of less than 35 for Douglas-fir or red alder dominant species group or a residual stand relative density of 50 for Western hemlock dominant species group.
- (16) **Guidelines** for evaluating potentially unstable slopes and landforms.
- (17) **Guidelines** for the small forest landowner forestry riparian easement program.
- (18) **Guidelines** for rivers and habitat open space program.
- (19) **Guidelines** for hardwood conversion.
- (20) **Guidelines** for financial assurances.

- (21) **Guidelines** for alternate plans.
- (22) **Guidelines** for adaptive management program.
- (23) **Guidelines** for field protocol to locate mapped divisions between stream types and perennial stream identification.
- (24) **Guidelines** for interim modification of bull trout habitat overlay.
- (25) **Guidelines** for bull trout presence survey protocol.
- (26) **Guidelines** for placement strategy for woody debris in streams.

**WAC 222-16-010 \*General definitions.**

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

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

"**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.

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

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

"**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.

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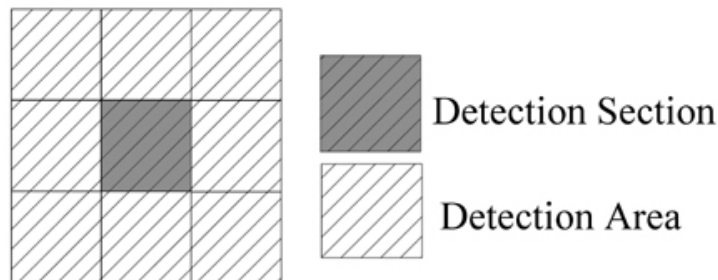
"**Critical habitat (federal)**" means the habitat of any threatened or endangered species designated as critical habitat by the United States Secretary of the Interior or Commerce under Sections 3 (5)(A) and 4 (a)(3) of the Federal Endangered Species Act.

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

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

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"**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.



**"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 diameter-width including associated moss if present, that is 50 feet or more above the ground in western hemlock trees 32-24 inches dbh and greater (~~generally over 90 years of age~~) and in other conifer trees 32 inches dbh and greater and is capable of supporting nesting by marbled murrelets.

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**"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 current Pacific Seabird Group (PSG) terrestrial survey 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-the most current PSG terrestrial survey 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.

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"Public resources" means water, fish, and wildlife and in addition means capital improvements of the state or its political subdivisions.

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"Suitable marbled murrelet habitat" means for the purpose of conducting a protocol survey, a contiguous forested area containing trees capable of providing nesting opportunities: with ~~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~~ conifer tree species;
- (c) Two or more nesting platforms per acre;
- (d) At least ~~7.5~~ 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~~ (minimum convex polygon), of qualifying platform-bearing trees.

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

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

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

- (1) Critical habitats (state) of threatened or endangered species and specific forest practices designated as Class IV-Special are as follows:
  - (a) Gray wolf (*Canis lupus*) - harvesting, road construction, or site preparation within 1 mile of a known active den site, documented by the department of fish and wildlife, between the dates of March 15 and July 30 or 0.25 mile from the den site at other times of the year.
  - (b) Grizzly bear (*Ursus arctos*) - harvesting, road construction, aerial application of pesticides, or site preparation within 1 mile of a known active den site, documented by the department of fish and wildlife, between the dates of October 1 and May 30 or 0.25 mile at other times of the year.
  - (c) Mountain (woodland) caribou (*Rangifera tarandus*) - harvesting, road construction, aerial application of pesticides, or site preparation within 0.25 mile of a known active breeding area, documented by the department of fish and wildlife.

- (d) Oregon silverspot butterfly (*Speyeria zerene hippolyta*) - harvesting, road construction, aerial or ground application of pesticides, or site preparation within 0.25 mile of an individual occurrence, documented by the department of fish and wildlife.
- (e) Sandhill crane (*Grus canadensis*) - harvesting, road construction, aerial application of pesticides, or site preparation within 0.25 mile of a known active nesting area, documented by the department of fish and wildlife.
- (f) Northern spotted owl (*Strix occidentalis caurina*).
  - (i) **Within a SOSEA boundary** (see maps in WAC 222-16-086), except as indicated in (f)(ii) of this subsection, harvesting, road construction, or aerial application of pesticides on suitable spotted owl habitat within a median home range circle that is centered within the SOSEA or on adjacent federal lands.
  - (ii) **Within the Entiat SOSEA**, harvesting, road construction, or aerial application of pesticides within the areas indicated for demographic support (see WAC 222-16-086(2)) on suitable spotted owl habitat located within a median home range circle that is centered within the demographic support area.
  - (iii) **Outside of a SOSEA**, harvesting, road construction, or aerial application of pesticides, between March 1 and August 31 on the seventy acres of highest quality suitable spotted owl habitat surrounding a northern spotted owl site center located outside a SOSEA. The highest quality suitable habitat shall be determined by the department in cooperation with the department of fish and wildlife. Consideration shall be given to habitat quality, proximity to the activity center and contiguity.
  - (iv) **Small parcel northern spotted owl exemption.** Forest practices proposed on the lands owned or controlled by a landowner whose forest land ownership within the SOSEA is less than or equal to 500 acres and where the forest practice is not within 0.7 mile of a northern spotted owl site center shall not be considered to be on lands designated as critical habitat (state) for northern spotted owls.
- (g) Pacific pond turtle (*Actinemys marmorata*) - harvesting, road construction, aerial application of pesticides, or site preparation within 0.25 mile of a known individual occurrence, documented by the department of fish and wildlife.
- (h) Marbled murrelet (*Brachyramphus marmoratus*).
  - (i) Harvesting, other than removal of down trees outside of the critical nesting season, or road construction within an occupied marbled murrelet site.
  - (ii) Harvesting, other than removal of down trees outside of the critical nesting season, or road construction within suitable marbled murrelet habitat within a marbled murrelet detection area.
  - (iii) Harvesting, other than removal of down trees outside of the critical nesting season, or road construction within suitable marbled murrelet habitat containing 7 platforms per acre outside a marbled murrelet detection area.
  - (iv) Harvesting, other than removal of down trees outside of the critical nesting season, or road construction outside a marbled murrelet detection area within a marbled murrelet special landscape and within suitable marbled murrelet habitat with 5 or more platforms per acre.

- (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~~ harvest within a no-cut inner buffer of 150 feet; or, harvest within a managed 150 foot outer buffer which will leave a residual stand relative density of less than 35 for Douglas-fir or red alder dominant species group or residual stand relative density of less than 50 for Western hemlock-spruce dominant species group. 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.
- (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 is void.
- (2) The following critical habitats (federal) designated by the United States Secretary of the Interior or Commerce, or specific forest practices within those habitats, have been determined to have the potential for a substantial impact on the environment and therefore are designated as critical habitats (state) of threatened or endangered species.
- (3) For the purpose of identifying forest practices which have the potential for a substantial impact on the environment with regard to threatened or endangered species newly listed by the Washington fish and wildlife commission and/or the United States Secretary of the Interior or Commerce, the department shall after consultation with the department of fish and wildlife, prepare and submit to the board a proposed list of critical habitats (state) of threatened or endangered species. This list shall be submitted to the board within 30 days of the listing of the species. The department shall, at a minimum, consider potential impacts of forest practices on habitats essential to meeting the life requisites for each species listed as threatened or endangered. Those critical habitats (state) adopted by the board shall be added to the list in subsection (1) of this section. See WAC 222-16-050 (1)(b).
- (4) For the purpose of identifying any areas and/or forest practices within critical habitats (federal) designated by the United States Secretary of the Interior or Commerce which have the potential for a substantial impact on the environment, the department shall, after consultation with the department of fish and wildlife, submit to the board a proposed list of any forest practices and/or areas proposed for inclusion in Class IV - Special forest practices. The department shall submit the list to the board within 30 days of the date the United States Secretary of the Interior or Commerce publishes a final rule designating critical habitat (federal) in the Federal Register. Those critical habitats included by the board in Class IV - Special shall be added to the list in subsection (2) of this section. See WAC 222-16-050

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

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

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

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

## Section 14

### Survey Protocol for Marbled Murrelets

WAC 222-12-090 (14) requires that the most current Pacific Seabird Group terrestrial survey protocol ~~in effect on January 6, 2003~~, be used to conduct marbled murrelet surveys. This document, ~~formally titled *Methods for Surveying Marbled Murrelets in Forests: A Revised Protocol for Land Management and Research*~~, as well as a survey guidance document to assist in implementing the protocol, is available through DNR and Washington Department of Fish and Wildlife in Olympia and regional offices. Landowners are encouraged to contact Washington Department of Fish and Wildlife for information regarding on conducting protocol surveys.

## Section 15

### Guidelines for Estimating the Number of Marbled Murrelet Nesting Platforms and for Harvesting Adjacent to Lands Designated as Critical Habitat (State) for Marbled Murrelet

These guidelines accompany WAC 222-12-090(15) to help determine whether a forest stand contains sufficient potential marbled murrelet nesting platforms to require surveys for murrelets. Forest practices activities on landowners owning less than 500 acres within 50 miles of saltwater are exempt from the SEPA policies in WAC 222-10-42 and critical habitat requirements in WAC 222-16-080 (h) unless there is an occupied site or the 300-foot average width buffer from an occupied site within the proposal area. All landowners are required to minimize disturbance during the “daily peak activity period” (1 hour before to 2 hours after official sunrise and 1 hour before to 1 hour after official sunset) within the “critical nesting season” (April 1<sup>st</sup>-August 31<sup>st</sup>) per the definitions in WAC 222-16-010 for the following activities within 0.25 mile of an Occupied marbled murrelet site: Road construction and blasting (222-24030 (11), Felling/bucking (222-16-050(6)), Cable Yarding (222-16-060(8)), Helicopter yarding or other operations (222-30-065(2), Ground-based yarding or heavy equipment operation (222-30-070(11)), and slash disposal or prescribed burning (222-30-100(8)). Consult with the Washington Department of Fish and Wildlife (WDFW) for information on the existence, location and status of occupied murrelet stands.

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#### **PART 1. GENERAL DESCRIPTION OF MARBLED MURRELET HABITAT IN WASHINGTON**

To conduct an efficient field inspection or preliminary assessment of potential marbled murrelet (*Brachyramphus marmoratus*) habitat, it is extremely valuable to be able to recognize the types of forests and forest conditions likely to be used by murrelets. This general description, when combined with reading additional details in the “Identification of Marbled Murrelet Nesting Structures” guide published by Washington Department of Fish and Wildlife (WDFW), formal field training, and familiarity with known occupied sites, will assist in gaining proficiency in stand assessments. When conducting stand assessments in different regions of the state, the platform search image needs to be based on forest types of local occupied stands relative to geographical variation.

In Washington State, marbled murrelets typically nest within 50 miles of the marine shoreline in low-elevation, conifer, multi-layered canopy forests characterized by the presence of large diameter trees greater than 24 inches diameter at breast height (dbh) for western hemlock and 32<sup>2</sup> inches dbh

for all other conifer species. Thirty-two inches diameter conifer species are mature enough to potentially have limbs large enough to be 7 inches or greater. Twenty-four inches diameter western hemlock with dwarf mistletoe infestation may have witches' broom or other abnormal growth that qualifies as platforms. Potentially suitable murrelet nesting habitats are primarily old-growth and mature forests, but they may also include a variety of forest types including younger forests containing individual remnant ~~older-legacy~~ or deformed trees. When evaluating a stand for platform potential, it is important to consider the historical events and influences that may have created irregular structures. Nesting habitat may sometimes develop earlier in younger coastal forests with a high proportion of western hemlock. Douglas-fir dominated forests develop murrelet habitat characteristics at an older age. Forests with residual trees or other suitable stand attributes may be the products of windstorms, fire, local microclimates such as high humidity zones, previous logging operations that did not remove all trees, or high site productivity for regrowth of historic clearcuts. These stands usually exhibit a broad range of interior conditions often including snags, decaying down material, and moss.

Within the broad range of forests described above, the primary individual tree attribute for murrelet nests is the presence of marbled murrelet nesting platforms as described in WAC 222-16-010. Platforms may be the top of a large branch, forked limb, dwarf mistletoe infection, witches broom, deformities, overgrown broken tops, or other structure large enough to provide a useable surface for a nesting adult. Canopy cover directly over nests provides protection from predators and weather.

Examples of younger-aged Washington coastal forests which have suitable stand structure for platforms and have documented higher levels of murrelet occupancy include the "21 Blow" typestands that have been affected by ice or windstorms, old second-growth in southwest Washington originating from early 1900's harvest, areas where less efficient logging or high-grading methods were used, and unmanaged regrowth from late 1800's fires or light burns. Small remnant stands of mature habitat in even-aged, managed forest landscapes appear to have a higher likelihood of occupancy when surrounded by pole size or older forests of any age rather than being isolated in clearcuts or young even-aged forests.

The basic example of unsuitable habitat are the even-aged, second growth forests of Douglas-fir in western Washington, which originated in the last 60 years. Some of those forests may indeed have large size classes of fast growing trees on high quality sites, but lack the large branches and irregular crown structures for platforms, cover, and moss potential.

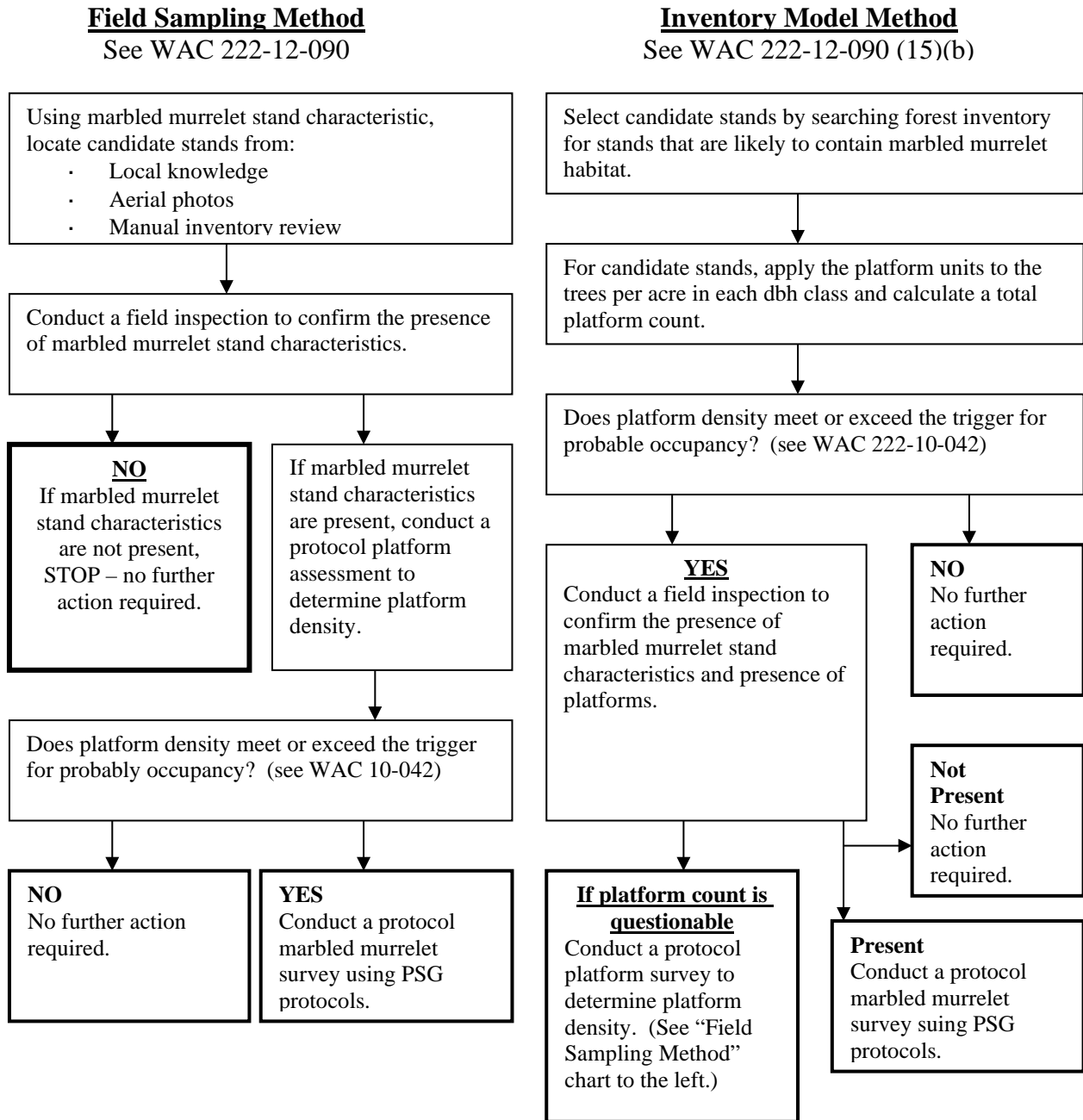
For the purpose of habitat determination on ownerships greater than 500 acres, under Forest Practices rules, forest stands that have all of the following **forest stand characteristics** may have sufficient potential nesting platforms to require murrelet surveys:

1. Within 50 miles of marine waters.
2. Contiguous forested area containing trees capable of providing nesting opportunities (platforms).
3. At least 40% of the dominant and codominant trees are ~~Douglas-fir, western hemlock, western red cedar or sitka spruce~~ conifers.
4. At least 7-5 acres in size (a minimum convex polygon (MCP) encompassing trees with platforms that occur within 300 feet of one another).
5. Presence of large (≥32" inches+ dbh) trees (>24 inches for western hemlock).
6. Generally multi-storied (2-3 layers).
7. Moderate canopy closure.



**PART 2. PROTOCOL PLATFORM ASSESSMENT METHODS**

The process outlined below displays two alternative methods can be used to determine whether or not there are enough platforms present in a stand to trigger murrelet surveys. The Field Sampling Method employs sampling of candidate stands selected using local knowledge, aerial photographs, and inventory data. The Inventory Model Method utilizes the results of a platform model developed to query an inventory system and predict the likelihood of platforms. See Figure 15.1 for a flow chart to aid in method selection.



*Figure 15.1 Protocol assessment methods selection flow chart.*

**2.1 Field Sampling Methods**

Select stands that meet murrelet forest stand characteristics and field review to confirm the findings. In some cases, the field review will be sufficient to decide that the presence of marbled murrelet

habitat, including the minimum density of platforms, is so obvious that further sampling is not needed. If the platform density meets or exceeds the trigger for probable occupancy, conduct a protocol marbled murrelet survey using the most current board-recognized Pacific Seabird Group (PSG) terrestrial survey protocol in effect at the beginning of the season in which surveys are conducted. If the platform density is below the trigger for probable occupancy, bird surveys are not required. Where a field sampling is needed to determine the density of platforms in the stand, follow the methods described below.

1. ~~Delineate the stand of contiguous habitat~~ Assess the proposal area and the 300-foot adjacent to it with similar stand characteristics by field examination or use of aerial photos. Stands of similar habitat are considered contiguous unless separated by at least 300 feet of forest lacking platforms in 32" or greater diameter trees one or more of the distinguishing vegetative characteristics important to murrelets. Contiguous habitat includes adjacent areas outside the planned harvest boundaries that have similar stand structural characteristics or platform densities meeting rule requirements (WAC 222-10-042).
2. Use either the sample plot method or 100% cruise method to determine the number of platforms per acre. ~~Consider using the 100% cruise method in stands that are smaller than approximately 25 acres.~~

#### 2.1.1 Sample Plot Method –WAC 222-12-090(15)(a):

1. Locate 8 to 30 plot points on the photo using an appropriate systematic grid from a random starting point. (Depending on the variability of the occurrence of large trees and platforms in individual stands, a greater number of plots, up to 30, may yield greater precision in the sampling results.)
2. Locate plot centers at least 75 feet from the edge of the potential habitat being sampled.
3. The starting location and plot centers should be flagged for future relocation.
4. At each plot record the following within a 75-foot radius area (0.4 acre plot):
  - Plot number
  - For all trees  $\geq 32$ " inches dbh (24 inches for western hemlock)
    - Species
    - dbh
    - Number of platforms by height and type
5. Within each plot, ~~use one clear vantage point~~ record the number of platforms per conifer tree  $\geq 32$  inches dbh ~~to estimate the number of platforms~~ or hemlock tree > 24 inches dbh. Follow the forest practices rule definitions for “marbled murrelet nesting platforms” found in WAC 222-16-010. ~~For additional platform identification information, see the “Identification of Marbled Murrelet Nesting Structures” guide published by the Washington Department of Fish and Wildlife.~~
6. After the stand is delineated via the MCP methodology (see habitat delineation section below), ~~Conduct~~ conduct a single tailed t-test to determine if the platform density is significantly less than 2, 5, or 7 platforms per acre. The example below shows how a t-test is used in conjunction with a marbled murrelet ~~survey~~ platform assessment.

Single tailed t-test formula:  $t = \frac{\bar{x}-p}{s/\sqrt{n}}$

$\bar{x}$  = the average number of platforms/acre

p = minimum number of platforms required in assessment area

s = the standard deviation

n = the number of plots taken in the field

t = the calculated t-test value

Example:  $\bar{x} = 1.25$ ;  $p = 2$ ;  $s = 2.5$ ; and  $n = 8$ ,  $t = \frac{1.25-2}{2.5/\sqrt{8}} t = -0.848$

Once the t-test value is determined compare it to the critical value associated with the number of plots taken in the survey on the table below.

**Table 15.1 Critical Value Table**

Number of Plots	Critical Value	Number of Plots	Critical Value	Number of Plots	Critical Value
8	-1.895	16	-1.753	24	-1.714
9	-1.860	17	-1.746	25	-1.711
10	-1.833	18	-1.740	26	-1.708
11	-1.812	19	-1.734	27	-1.706
12	-1.796	20	-1.729	28	-1.703
13	-1.782	21	-1.725	29	-1.701
14	-1.771	22	-1.721	30	-1.699
15	-1.761	23	-1.717		

If the value of the t-test is greater than the critical value indicated on the Critical Value Table, assume that the unit meets the 2, 5, or 7 platforms per acre requirements, even if the average used in the calculation shows that the unit does not have sufficient platforms. In the example above, the negative t-test value of -0.848 is greater than the listed critical value of -1.895. Therefore, the platform density is not significantly less than 2, and a marbled murrelet protocol survey is required. The more variability in plot results, the more likely that this forest stand may not pass the t-test. In cases where there will be a great deal of variability between plots, it is generally better to increase the number of plots taken. If the t-test value is less than the applicable listed critical value, the delineated stand is not suitable murrelet habitat.

7. Additional plots maybe installed and added to the analysis to improve the sensitivity of the statistical t-test. However, current data suggests that more than 30 plots will not improve the test sensitivity enough to justify the effort.

### 2.1.2 100% Cruise Method—WAC 222-12-090(15)(a):

1. Overlay belt transects onto the air photo or stand map at one-acre spacing (i.e., transect centerlines are 208 ~~ft.~~ feet apart or narrower if canopies obscure visibility) ~~so to ensure~~ that 100% of the delineated stand is sampled. Transects should be uniquely identified and beginning and end points flagged in the field.

2. The observer should:
  - a. Traverse the centerline of each transect and record and map all trees  $\geq 32$  inches dbh (24 inches for western hemlock) with platforms that are within 104 feet of the transect centerline.
  - ~~b. Use one clear vantage point per tree  $\geq 32$  inches dbh to estimate the number of potential platforms present.~~
  - ~~e.b.~~ Follow the guidelines in Forest Practices Rules, definitions section (WAC 222-16-010) and the “Identification of Marbled Murrelet Nesting Structures” guide published by the ~~Washington Department of Fish and Wildlife~~ WDFW to identify platforms.
3. ~~To~~ After the stand is delineated via the MCP methodology (see habitat delineation section below), determine the average number of platforms per acre, by dividing the total ~~the~~ number of observed platforms ~~for all transects and divide~~ by the number of acres in the delineated stand.

Inventory Model Method – WAC 222-12-090(15)(b)

~~Assumption: The landowner has a stand inventory of trees per acre for trees with 32” or larger diameter at breast height (dbh) and wishes to estimate the number of platforms per acre.~~

~~Procedure: Using a typical forest inventory, query for stands that are likely to contain murrelet habitat characteristics. For these stands, apply the Platform Units per Tree from the table below to the number of trees per acre in each dbh class. The accumulated total represents the number of platforms per acre in the stand. If the platform density meets or exceeds the threshold for probable occupancy, conduct a field inspection to confirm the presence of murrelet platform stand characteristics and conduct protocol marbled murrelet survey. If the platform density does not meet the threshold for probable occupancy, a protocol marbled murrelet survey is not required.~~

dbh Classes		Inventory Stand Tree Count per dbh Class (Average/Acre)	Platform Units per Tree	Platform Units per Class (trees/dbh class) (Platform Units/tree)
dbh Classes	Diameter Range			
32"	.32", <33"		0.37	
34"	.33", <35"		0.34	
36"	.35", <37"		0.33	
38"	.37", <39"		0.34	
40"	.39", <41"		0.39	
42"	.41", <43"		0.47	
44"	.43", <45"		0.56	
46"	.45", <47"		0.69	
48"	.47", <49"		0.84	
50"	.49", <51"		1.03	
52"	.51", <53"		1.26	
54"	.53", <55"		1.53	
56"	.55", <57"		1.86	
58"	.57", <59"		2.26	
.60"	.59"		2.75	
(Total of all Platform Units for all dbh Classes) = Platforms/Acre				

Example:-

If a stand inventory shows 5 trees per acre (tpa) in the 32” dbh class, 4 tpa in the 38” class, and 3 tpa in the 42” class, and 1 tpa in the 48” class, the estimated platforms per acre would be calculated as shown below:

$$(5 * 0.37) + (4 * 0.34) + (3 * 0.47) + (1 * 0.84) = 5.46 \text{ platforms per acre}$$

*Note: This inventory model was developed using a sample of habitat stands in southwest Washington on private commercial timber lands. Although the model correctly identified most of the known occupied sites in a test sample, some occupied sites were missed by the model. Therefore, some caution is warranted when applying this model. A workgroup of interested stakeholders is currently developing a species specific inventory model method using a larger data set that should be ready for use during the 1999 survey season. This method will be proposed as a replacement to this section of the manual once complete.*

**Delineation of Suitable marbled murrelet habitat**

1. Map all trees  $\geq 32$  inches dbh (24 inches dbh for western hemlock) that contain platforms in a stand. This includes the area outside of a proposed harvest unit when the forest structure is contiguous. Count all platforms.
2. Identify platform trees that occur within 300-feet of each other.
3. Draw a minimum convex polygon (MCP) around the perimeter of the tree cluster (Figure 15.2).
4. The area of the MCP is used to calculate platforms per acre. If the MCP of platforms trees is less than 5 acres, then the stand is not suitable murrelet habitat, and no further work is needed. If the stand is greater than 5 acres, divide the number of platforms observed within the MCP by its area.
5. The required number of platforms per acre for the subject area is either 2, 5, or 7 depending on the site’s proximity to a known Marbled murrelet detection area (WAC 222-16-010) or within the Marbled murrelet special landscape WAC 222-16-087 (Figure 15.3). Forest practice activities in stands meeting these platform density thresholds are suitable habitat, subject to SEPA, and require a protocol survey.
6. If suitable murrelet habitat is determined, then the first 300-feet of adjacent timber with similar stand characteristics is added to the MCP. This is not necessarily a continuous buffer around the MCP. The addition only includes areas of similar stand age and structure (Figure 15.2). This additional acreage is assumed to be necessary for buffering a potentially occupied stand and subject to SEPA policies per WAC 222-12-042 without survey information.

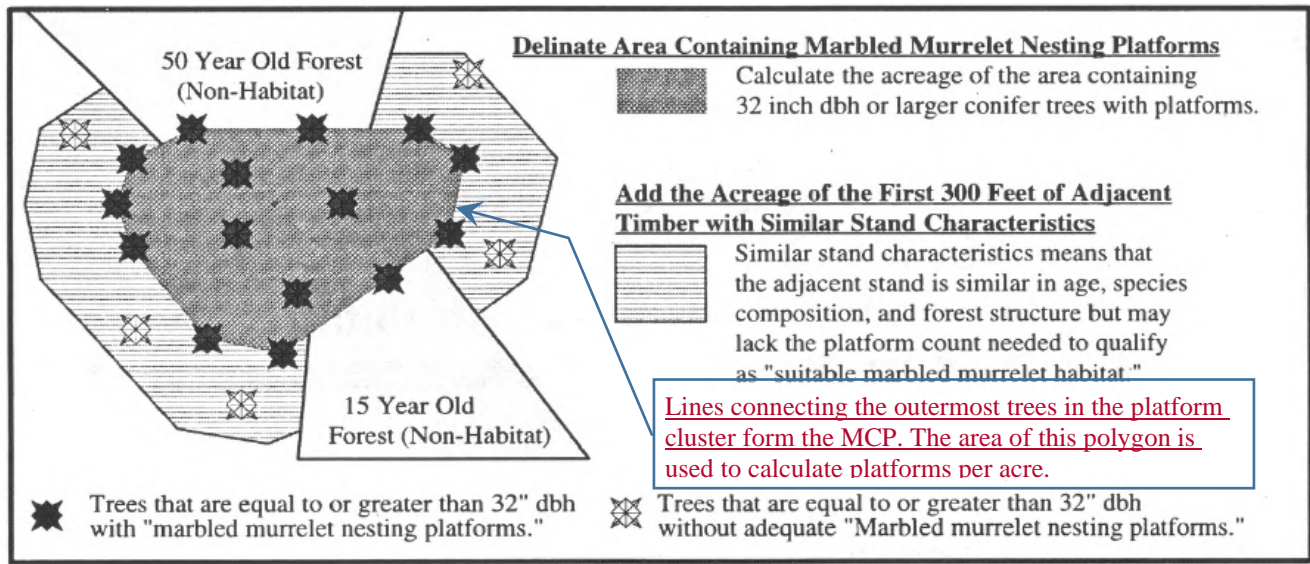


Figure 15.2. Determining the outer perimeter of Suitable marbled murrelet habitat. From Ramsdell and Ritchie 1998.

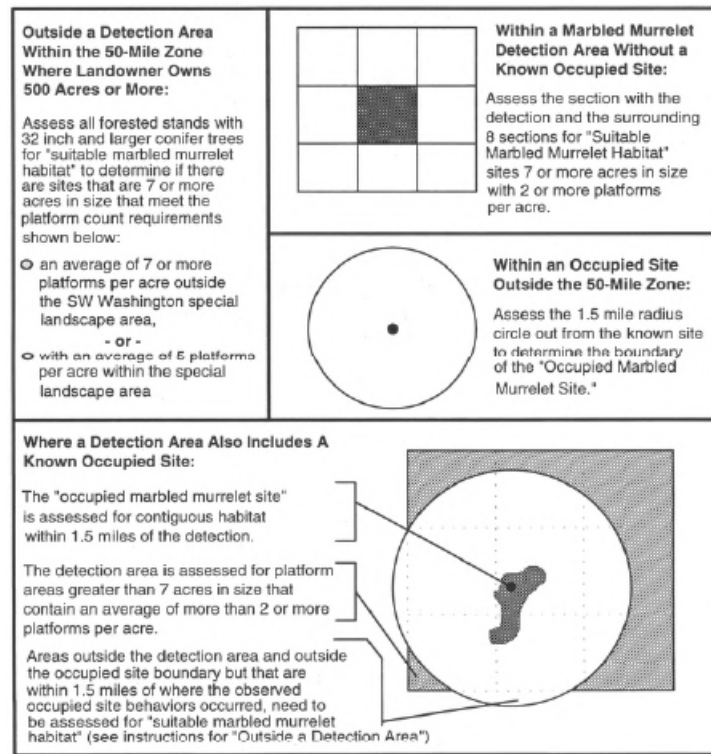


Figure 15.3. Target areas for conducting nesting platform assessments. From Ramsdell and Ritchie

**PART 3. HARVEST METHODOLOGY FOR OCCUPIED MARBLED MURRELET SITE BUFFERS**

Part 3.1 Additional Preparation and Harvest Requirements:

Once occupancy has been confirmed (or assumed), a 300- foot average buffer zone adjacent to the MCP delineated occupied marbled murrelet site is necessary for minimizing harvest edge effects

WAC 222-16-080 (1)(h)(v)). This is the same area identified in step 6 under delineation of suitable murrelet habitat above. The 300-foot average managed buffer contains a no-harvest inner zone and a managed outer zone. Specific forest practices on lands adjacent to designated Marbled Murrelet Critical habitat (state) 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. Figure 15.4 for determining the outer perimeter of occupied marbled murrelet habitat.

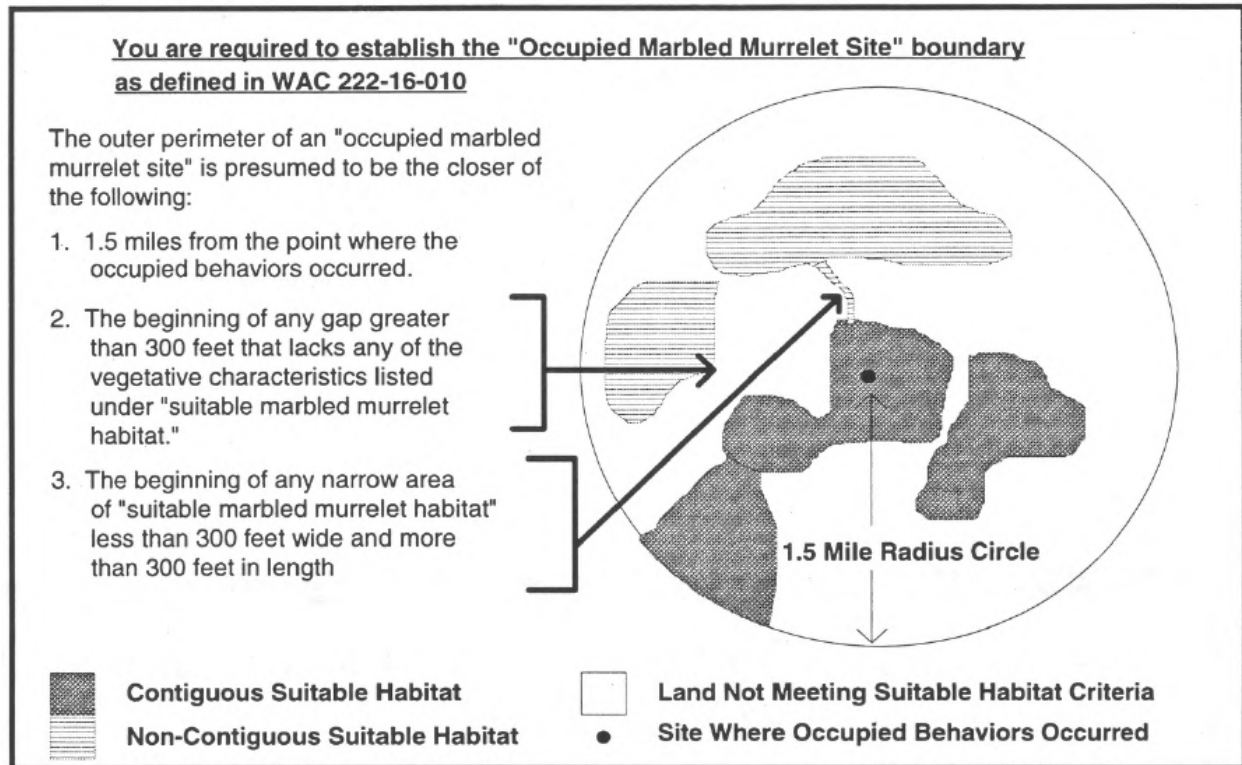


Figure 15.4 Determining the outer perimeter of Occupied marbled murrelet habitat. From Ramsdell and Ritchie 1998.

The following two forest practices have been so classified as Class IV-Special Forest Practices under WAC 222-16-080 (1) (h) (v) (see Figure 15.6 for classing flow chart):

1. Harvesting within the 150-foot no-cut inner zone buffer of a 300-foot managed buffer zone adjacent to an occupied marbled murrelet site.
2. Harvesting within the 150-foot outer zone managed buffer of a 300-foot managed buffer zone adjacent to an occupied marbled murrelet site that 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 must be applied in these reduced or extended buffer zones. The landowner is required to consult with WDFW on managed buffer prescriptions.

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.

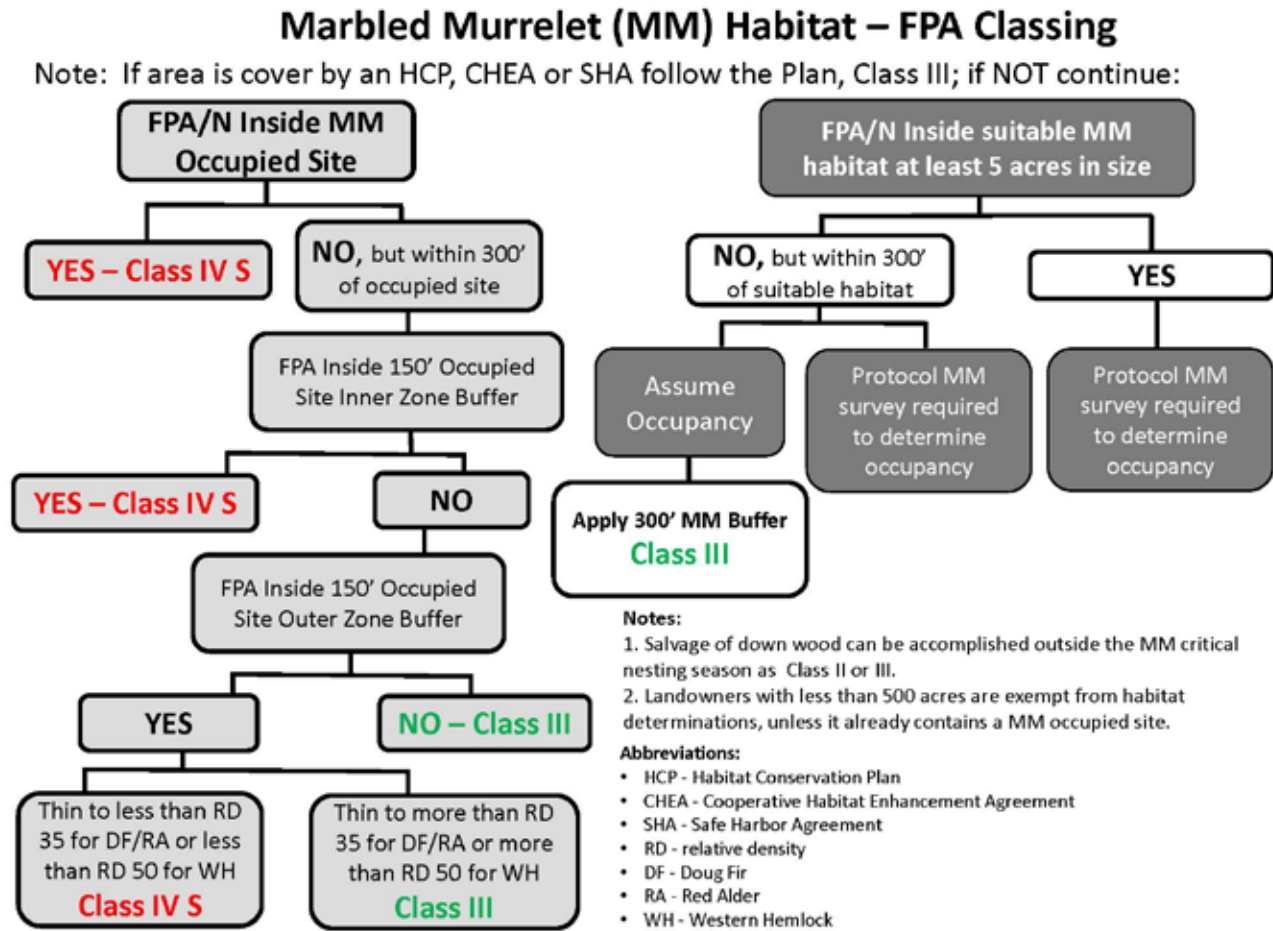


Figure 15.5 Classing flow chart (T. Allison, Olympic Region)

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

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.

If you intend to utilize the outer zone of the managed 300-foot buffer adjacent to an occupied marbled murrelet site, determine both the inner and outer edges of the proposed 150-foot managed buffer zones. Mark these two locations in the field.

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 below) 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, red alder, or other conifers) 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 A) 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) 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).

**“Dominant species group”:** Dominant species group is determined by majority stem count of trees greater than or equal to 6” dbh. There are three choices for dominant species group Douglas fir, red alder, and western hemlock. If Douglas fir is the majority species choose Douglas Fir as the dominant species group. If western hemlock or other conifer is the majority species, choose western hemlock as the dominant species group. If red alder or other hardwood is the majority species, choose red alder as the dominant species group.

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 (Tables 15.2 or 15.3) 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 (Leave Trees/Acre (Minimum)) 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 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.

Table 15.2 Modified Curtis Relative Density (RD) Calculator for Douglas-fir / red alder (RD 35)

<u>QMD</u> <u>Quadratic Mean Diameter</u> <u>(Inches)</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 15.3 Modified Curtis Relative Density Calculator for western hemlock (RD 50)

<u>QMD</u> <u>Quadratic Mean Diameter</u> <u>(Inches)</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>

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. Leave trees with considerable damage will not count towards the residual retention requirements. If damage is likely during falling and yarding, leave additional trees within the buffer zone to ensure the adequate number of retention trees are met post-harvest.
3. 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.
4. Cable yarding within the managed buffer zone is subject to requirements listed in WAC 222-30-060 Cable Yarding.

## APPENDIX A – CROWN CLASSIFICATION DESCRIPTIONS

A tree crown classification system is useful in discussing stand development. Figure 15.6 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.

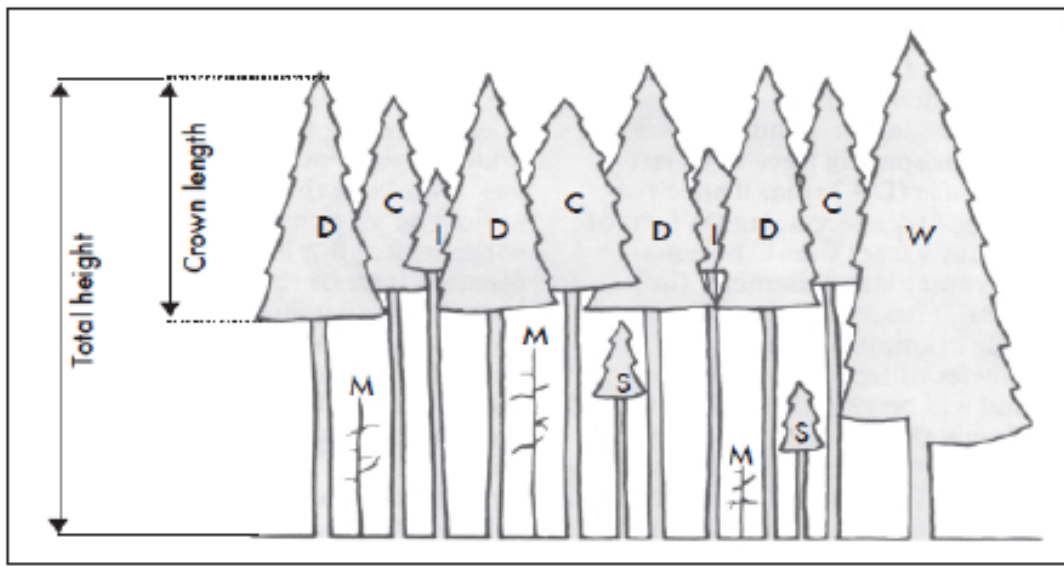


Figure 15.6 Crown type classifications of trees in even-age stands. D = Dominant, C = Codominant, I = Intermediate, S = Suppressed, M = Mortality and W = Wolf or Legacy Trees. The “crown ratio” is the proportion of total tree height that is occupied by live crown. In this illustration, the dominants have a 50 percent crown ratio; the residual tree has an 80 percent crown ratio. (Adapted from: W.H. Emmingham and N.E. Elwood 1983 “Thinning: An Important Timber Management Tool”, Oregon State University, PNW 184)