

Section 15

Guidelines for Estimating the Number of Marbled Murrelet Nesting Platforms

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.

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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 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, 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 32”dbh. 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 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.

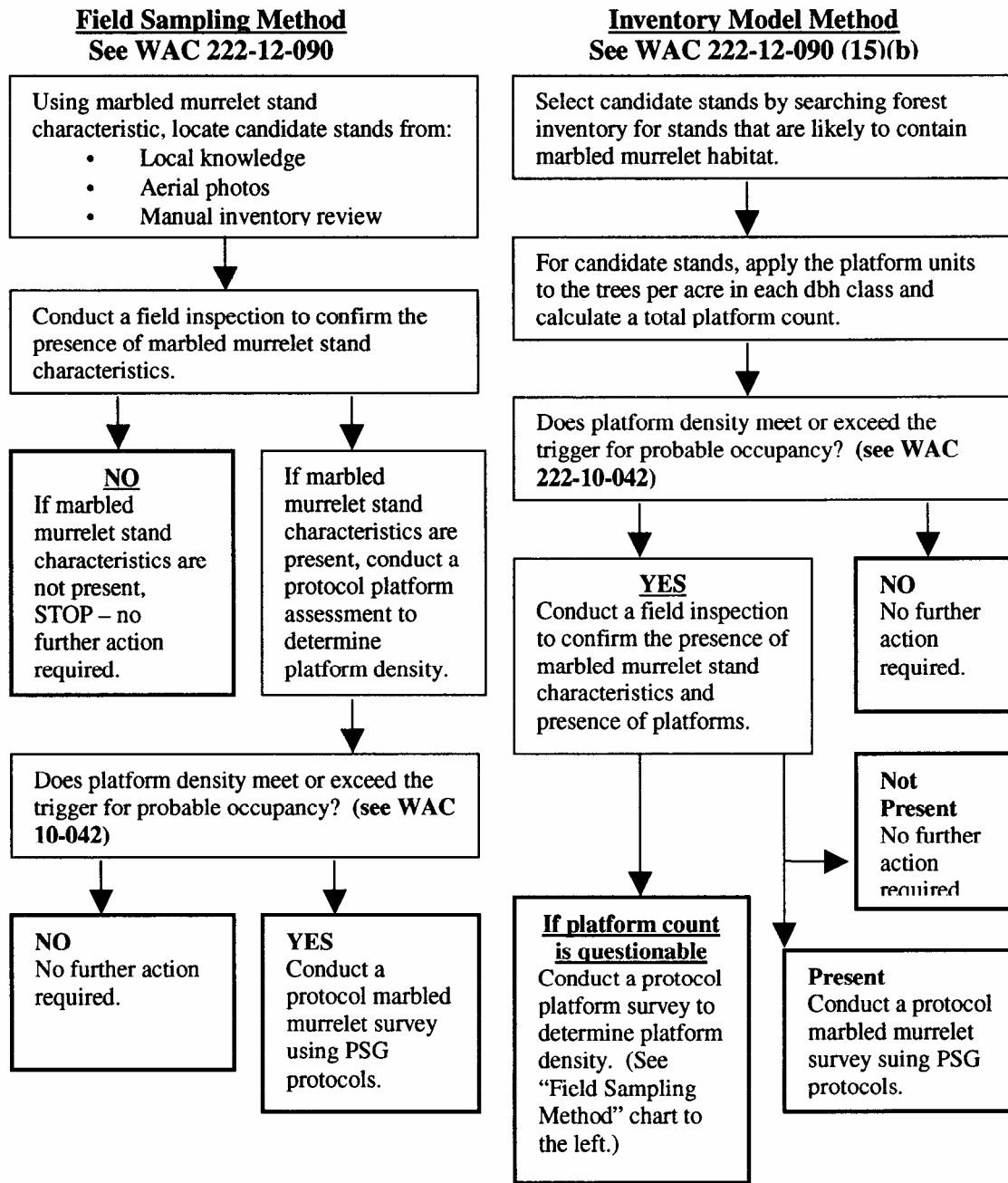
Within the broad range of forests described above, the primary individual tree attribute for murrelet nests is the presence of marbled murrelet nesting platforms as described in WAC 222-16-010. Platforms may be the top of a large branch, forked limb, dwarf mistletoe infection, witches broom, deformities, 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” type, 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 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
3. At least 40% of the dominant and codominant trees are Douglas-fir, western hemlock, western red cedar or sitka spruce
4. At least 7 acres in size
5. Presence of large (32”+ dbh) trees
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 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.

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 board-recognized Pacific Seabird Group (PSG) 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 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. Contiguous habitat includes adjacent areas outside the planned harvest boundaries that have similar stand structural characteristics or platform densities.
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.

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 (.4 acre plot):
 - Plot number
 - For all trees ≥ 32 " dbh
 - Species
 - dbh
 - Number of platforms by height and type
5. Within each plot, use one clear vantage point per tree ≥ 32 ? dbh to estimate the number of platforms. 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. 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.

Singled 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 $n = 8$. $\frac{1.25 - 2}{2.5 \sqrt{8}} \quad t = -0.848$

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.

- 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.

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. apart) so 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 all trees > 32 inches dbh that are within 104 feet of the transect centerline.
 - b. Use one clear vantage point per tree > 32 inches dbh to estimate the number of potential platforms present.
 - c. 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 to identify platforms.
3. To determine the average number of platforms per acre, 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.