



WASHINGTON STATE DEPARTMENT OF
Natural Resources

Peter Goldmark - Commissioner of Public Lands

Marbled Murrelet Long-term Conservation Strategy Analytical Framework



Photo: Nick Hatch, PNWRS

A Report to the Board of Natural Resources
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January 2015

Marbled Murrelet Long-term Conservation Strategy Analytical Framework

- Set of assumptions consistent across alternatives for quantifying take and mitigation
- Objective, repeatable, defensible framework that builds on the actual effects to the marbled murrelet
- Result will be a mathematical framework, but will make assumptions explicit



Identifying Take Types of Take

- Harvest
- Edge Influenced
- Disturbance



Disturbance Take



Disturbance Take Definition

- Effects to murrelets may occur from actions that generate loud noises and activity in close proximity to nesting murrelets, resulting in a potential disruption of murrelet breeding and nesting behaviors



Disturbance Take Activities Listed in HCP

- Forest Land Management Activities
 - Resource Information
 - Land Repositioning
 - Non-timber Resources
 - Transportation System Management
 - Public Use
 - Forest Stand Silvicultural Activities



Disturbance Take Examples Activities That May Cause Disturbance

- Non-timber resources, such as:
 - Sand & gravel sales
 - Electronic site maintenance
 - Recreational site use
 - Road use and maintenance
 - Collecting western greens, Christmas greens and mushrooms

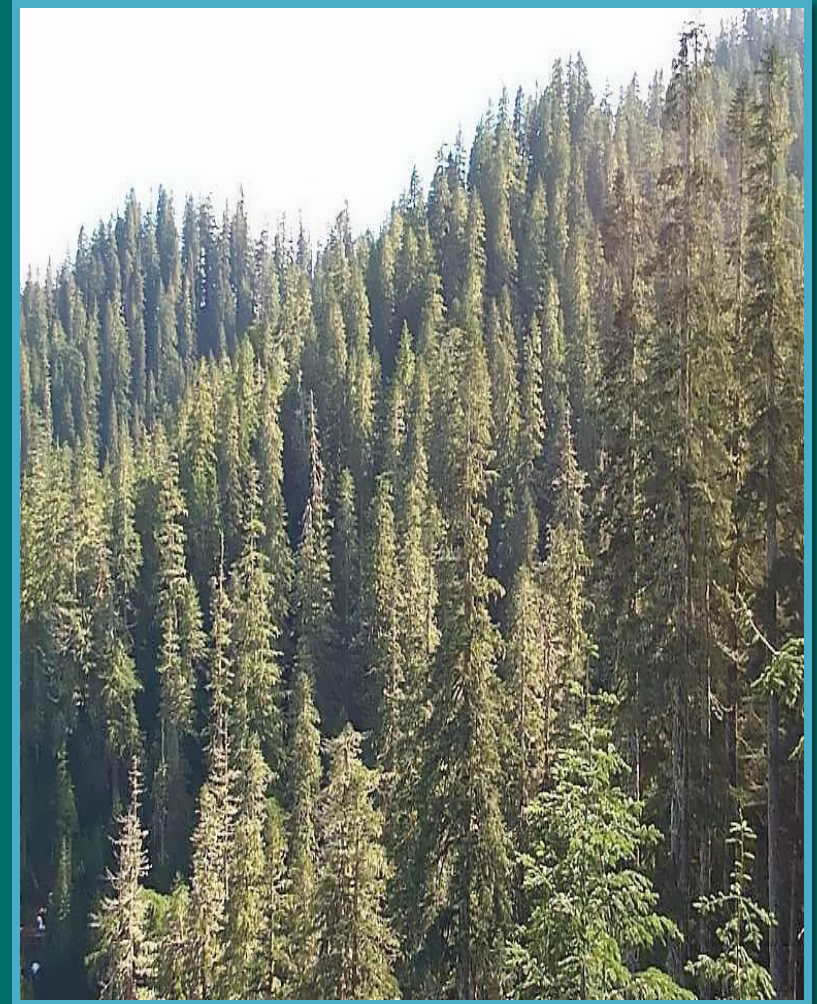


DNR and USFWS identified 36 activities that may cause disturbance to Marbled Murrelets.

Disturbance Take Disturbances

How to measure the
significance of the
disturbance associated
with these activities?

- Stressors
- Duration
- Response



Disturbance Take Stressor Categories

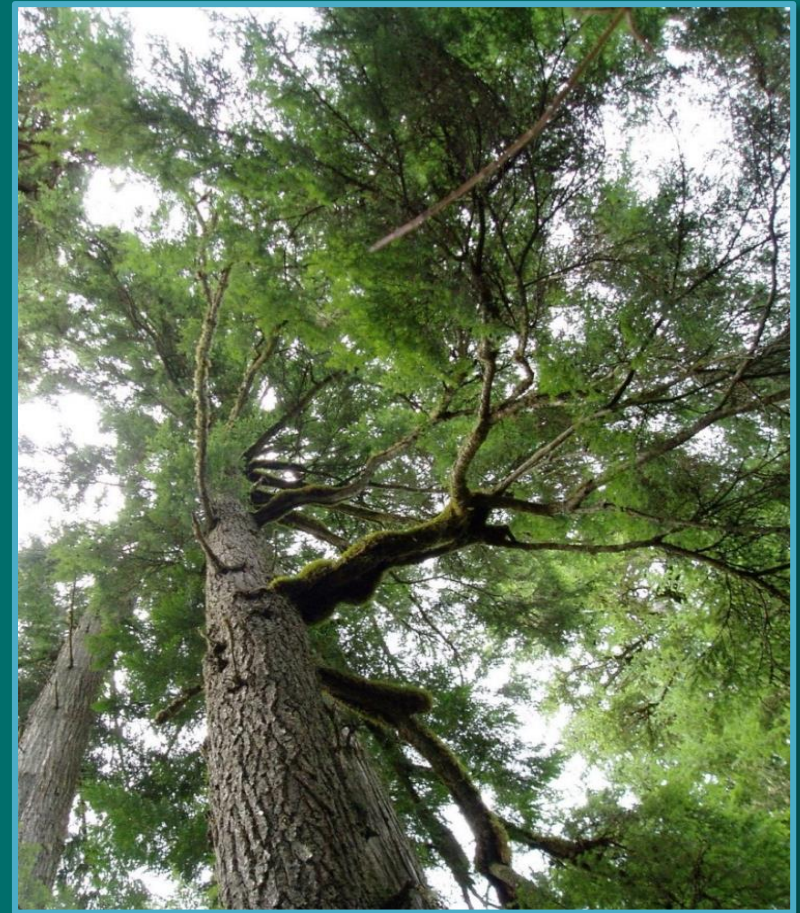
- Ground-based noise
- Visual disturbance
- Predator attraction
- Impulsive noise
- Aircraft noise



Assigned stressor categories to each activity.

Disturbance Take Duration Categories

- <1 day
- <7 days
- >7 days and <1 month
- >1 month



Assigned duration category to each activity.

Disturbance Take

MM Response Categories

- No significant response
- Aborted feedings
- Adults flushing
- Mortality from removal of nest tree
- Mortality from predation
- Hearing damage

Assigned response category to each activity.



Disturbance Take Grouping Activities

Group Assignment	Stressor	Duration	Response
Group 1	Ground-based Noise and Visual Disturbance	< 1 Day	No significant response based on duration
Group 2	Ground-based Noise and Visual Disturbance	< 7 Days	Aborted feedings, Adults flushing
Group 3	Ground-based Noise and Visual Disturbance Predator Attraction	> 1 Month	Mortality from removal of nest tree, increased predation risk, aborted feeding, adults flushing
Group 4	Ground-based Noise and Visual Disturbance	> 7 Days < 1 Month	Aborted feedings, Adults flushing
Group 5	Ground-based Noise and Visual Disturbance	> 7 Days < 1 Month	Hearing damage from blast noise, aborted feedings, adults flushing
Group 6	Aircraft Noise	< 7 Days	Aborted feedings, Adults flushing



Disturbance Take Campground Example

- Stressors
 - Ground-based noise and visual disturbance
- Duration
 - >1 month
- Response
 - Potential mortality from removal of nest tree, increased predation risk, aborted feedings, adults flushing



Disturbance Take Determine Location of Potential Impact

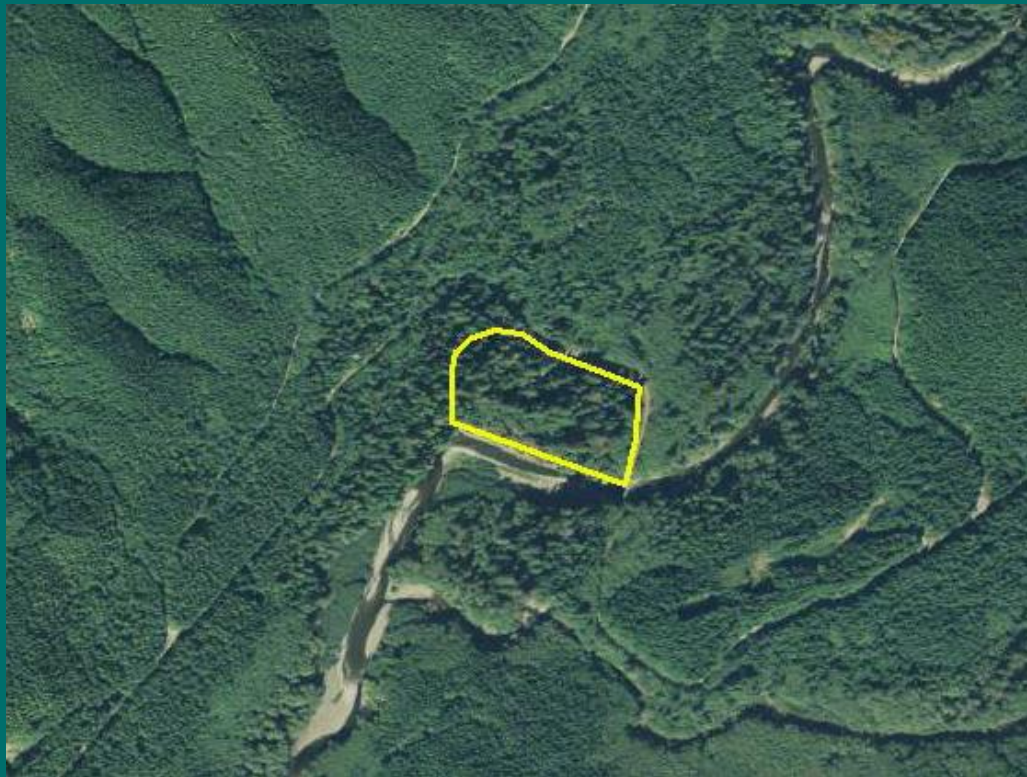
- Where does the activity occur?

Using DNR GIS and other corporate data we identified the locations where each activity occurred.



Disturbance Take Determine Location of Potential Impact Campground Example

- Identifying footprint



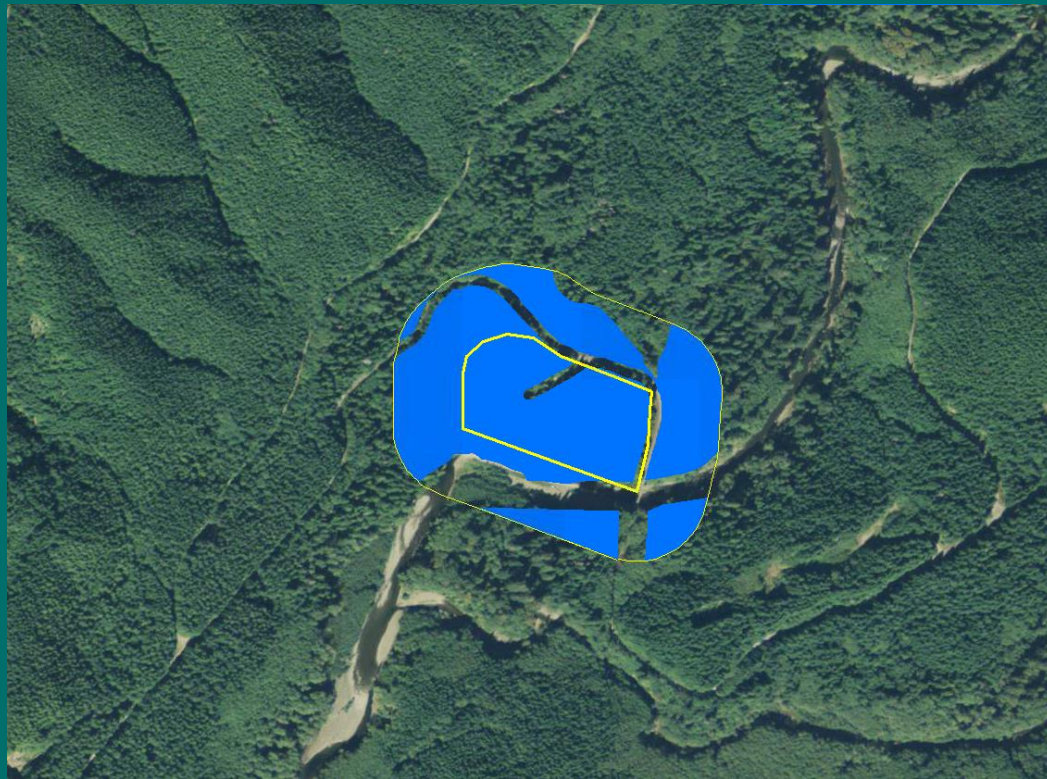
Disturbance Take Buffering Activities Campground Example

- Buffer Footprint
 - Measure 100 meters from edge of activity footprint
 - Sum the area of p-stage habitat within the activity footprint and the 100 meter buffer



Disturbance Take Buffering Activities Campground Example

- Acres of p-stage habitat within footprint and 100m buffer = 27 acres



Disturbance Take

Determining Footprint of Impact for All Campgrounds in Range of MM

Step 1. Identify land within footprint and buffer

1,336 acres

Step 2. Identify p-stage habitat within footprint and buffer

305 acres

Step 3. Apply a weighted average p-stage

See next slide



Disturbance Take Calculating Weighted Average P-stage DNR Lands in Range of MM

- Acres of Habitat Adjusted by P-stage

Average P-stage habitat across DNR lands:

$$\frac{\text{Sum of weighted p-stage acres}}{\text{Total acres of DNR land with p-stage value}}$$



Disturbance Take Calculating Weighted Average P-stage Example Acres

Average P-stage habitat
across DNR lands:

Sum of weighted p-stage acres

Total acres of DNR land with
p-stage value

$$\frac{653 \text{ acres}}{1900 \text{ acres}} = 0.34$$

**Average P-stage in this
example is 0.34.**

P-stage	Raw Acres	Weighted Acres (P-stage * Raw Acres)
0.25	1100	275
0.36	500	180
0.47	100	47
0.62	100	62
0.89	100	89
Total	1900	653

Disturbance Take Determining Footprint of Impact Applying Weighted Average P-stage to All Campgrounds in Range of MM

Statewide acres of campgrounds footprints and buffers in p-stage habitat	x	Average of p-stage habitat across DNR lands	=	Statewide acres of campgrounds footprints and buffers in weighted p-stage habitat
305 acres	x	.34	=	104 acres



Disturbance Take Determining Footprint of Impact All Campgrounds in Range of MM

Step 1. Identify land within footprint and buffer

1,336 acres

Step 2. Identify p-stage habitat within footprint and buffer

305 acres

Step 3. Weighted average p-stage

$305 \times .34 = 104 \text{ acres}$

Step 4. Average proportion of DNR lands in ALTFC

See next slide

Disturbance Take

Determining Footprint of Impact

All Campgrounds in Range of MM

Adjust to Areas of Long-term Forest Cover

Statewide acres of campgrounds footprints and buffers in weighted p-stage habitat	x	Percent of DNR land in areas of long-term forest cover (ALTFC)	=	Statewide acres of campgrounds footprints and buffers, weighted p-stage habitat in ALTFC
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104 acres	x	.51	=	53 acres
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Disturbance Take

Determining Footprint of Impact for All Campgrounds in Range of MM

Summary of Steps

Step 1. Identify land within footprint and buffer

1,336 acres

Step 2. Identify p-stage habitat within footprint and buffer

305 acres

Step 3. Weighted average p-stage

$305 \times .34 = 104$ acres

Step 4. Average proportion of DNR lands in ALTFC

$104 \times .51 = 53$ acres

Disturbance Take Adjusting for Time All Campgrounds in Range of MM

- Why adjust for time?
- Same acre can be impacted multiple times over the life of the HCP
- An activity that causes take when it occurs in the nesting season, may not cause take if it occurs outside the nesting season.



Disturbance Take Adjusting for Time

- Nesting Season

Marbled Murrelet Nesting Season and Analytical Framework for Section 7 Consultation in Washington (USFWS 2012)

April 1st – September 23th, 176 days

- Activity Occurrence:

5/7 days or 7/7 days

Assigned percentage of the nesting season during which the activity occurs.

Disturbance Take Adjusting for Time All Campgrounds in Range of MM

Statewide acres of campgrounds footprints and buffers, weighted p-stage habitat in ALTC x Number of days activity overlaps with nesting season x Activity occurrence = Impact of habitat disturbed during the nesting season

$$53 \text{ acres} \quad \times \quad \frac{176}{176} \quad \times \quad \frac{7}{7} \quad = \quad 53 \text{ acres}$$



Disturbance Take Adjusting for Time All Campgrounds in Range of MM

Step 1. Overlap with Nesting
Season

$$53 \times \frac{176}{176} \times \frac{7}{7} = 53 \text{ acres}$$

Step 2. Years Remaining in HCP

See next slides



Disturbance Take Adjusting for Time All Campgrounds in Range of MM

Statewide acres
of campgrounds
footprints and
buffers
disturbed during
the nesting
season

x

Years
Remaining in
HCP

=

Statewide time-
adjusted acres of
p-stage habitat
disturbed during
the nesting
season

53 acres

x

53

=

2,809 time-
adjusted acres

Disturbance Take

All Campgrounds in Range of MM

Summary of Steps to Determine Impact

Determine Footprint

Step 1. Identify land within footprint and buffer

1,336 acres

Step 2. Identify p-stage habitat within footprint and buffer

305 acres

Step 3. Weighted average p-stage

104 acres

Step 4. Average proportion of land in long-term forest cover

53 acres

Adjust for Time

Step 1. Overlap with Nesting Season

53 acres

Step 2. Years Remaining in HCP

2,809 "time-adjusted acres"

Disturbance Take Timber Harvest Example

- Stressors
 - Ground-based noise and visual disturbance
- Duration
 - > 7 days <1 month
- Response
 - Aborted feedings, Adults flushing



Disturbance Take Footprint of Activities and Buffer Timber Harvest Example

- Acres of p-stage habitat within footprint and 100m buffer = 20 acres



Disturbance Take Determining Footprint of Impact Applying Weighted Average P-stage to Timber Harvesting in Range of MM

Statewide acres of timber harvesting × Average of p-stage habitat across DNR lands = Statewide acres of timber harvesting in weighted p-stage habitat

2,410 acres × .34 = 819 acres



Disturbance Take Determining Footprint of Impact Timber Harvesting in Range of MM Adjust to Areas of Long-term Forest Cover

Statewide acres of timber harvesting weighted p-stage habitat x Percent of DNR land in areas of long-term forest cover = Statewide acres of timber harvesting in weighted p-stage habitat in ALTFC

819 acres x .51 = 418 acres

Disturbance Take Adjusting for Time Timber Harvesting Statewide in Range of MM

Statewide acres of timber harvesting weighted p-stage habitat in ALTFC × Number of days activity overlaps with nesting season × Activity occurrence = Impact of habitat disturbed during the nesting season

$$418 \text{ acres} \times \frac{176}{176} \times \frac{6}{7} = 358 \text{ acres}$$



Disturbance Take Adjusting for Time Timber Harvesting in Range of MM

Acres of weighted p-stage habitat in ALTFC	x	Years Remaining in HCP	=	Statewide time- adjusted acres of p-stage habitat disturbed during the nesting season
358 acres	x	53	=	18,989 time- adjusted acres



Disturbance Take Timber Harvesting in Range of MM Summary of Steps to Determine Impact

Determine Footprint

Step 1. Identify land within footprint and buffer

26,955 acres

Step 2. Identify p-stage habitat within footprint and buffer

2,410 acres

Step 3. Weighted average p-stage

819 acres

Step 4. Average proportion of DNR land in ALTFC

418 acres

Adjust for Time

Step 1. Overlap with Nesting Season

358 acres

Step 2. Years Remaining in HCP

18,989 time-adjusted acres

Marbled Murrelet Long-term Conservation Strategy

Next Steps

- Biological Implications
- Baseline Acres
- Alternatives





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