Pacific Madrone Survey Assessment Guide

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CONTENTS

COLLECTING SURVEY DATA ........................................................................................................................... 3
  Getting the app ........................................................................................................................................ 3

LOCATION DATA ........................................................................................................................................... 4
  Geopoint Information ............................................................................................................................... 4
  Paper survey and webform ................................................................................................................... 4
  Mobile application ................................................................................................................................ 4

SITE INFORMATION ....................................................................................................................................... 5
  Slope ......................................................................................................................................................... 5
  Aspect ....................................................................................................................................................... 5
  Stand characteristics ................................................................................................................................. 6
  Site Disturbance ........................................................................................................................................ 6

GENERAL TREE INFORMATION ..................................................................................................................... 6
  Tree height ................................................................................................................................................ 6
  Width ........................................................................................................................................................ 6
  Tree crown assessment ............................................................................................................................ 7
  New foliage ............................................................................................................................................... 8
  Other vegetative observations ................................................................................................................. 8

TREE HEALTH ASSESSMENT .......................................................................................................................... 9
  Overall impression of tree health ............................................................................................................. 9
  Percent dead crown ................................................................................................................................ 10
  Foliar symptoms ..................................................................................................................................... 10
  Foliage disease severity .......................................................................................................................... 12
  Stem and branch symptoms ................................................................................................................... 13
  Stem canker severity ................................................................................................................................ 13
  Insect activity .......................................................................................................................................... 14
  Wildlife activity ........................................................................................................................................ 15

HELPFUL LINKS: ........................................................................................................................................... 17

CONTACTS ................................................................................................................................................... 17
Pacific Madrone Survey Assessment Guide

The Pacific madrone (*Arbutus menziesii Pursh*) tree is the largest member of the family Ericaceae and is native to western North America. Ecologically, it is an important hardwood species in Pacific Northwest forests as it provides food and nesting sites for numerous wildlife. In urban environments, it provides excellent erosion control and slope stabilization. In addition, it is a valued ornamental species due to its crooked beauty, colorful bark, showy flowers, and brightly-colored fruit. Pacific madrone trees are relatively drought tolerant and fast growing, but they do not tolerate extreme temperature changes.

To obtain a broader geographical dataset and understanding of how this species is tolerating a host of diseases that plague it, and to identify healthy tree populations, researchers at WSU are reaching out to citizen scientists to help gather important information on the species. Collecting all this important information would not be possible with you, our volunteer. We sincerely thank you for helping with this project and participating in our mission to conserve this majestic species.

COLLECTING SURVEY DATA

Survey data can be collected in several ways:

1. Download the paper survey, complete, and return to WSU either by scanning/emailing, entering data in the webform on your computer, or snail mail. Return completed surveys to

   Marianne Elliott
   WSU Puyallup
   2606 West Pioneer
   Puyallup, WA, USA
   98371-4998
   email melliott2@wsu.edu

2. Webform – use your smartphone and web browser (must have internet connection).

3. Smartphone app – download and use the smartphone app. Data can be collected offline and uploaded when there is internet access later.

Surveys are located at https://ppo.puyallup.wsu.edu/pmr/survey/

GETTING THE APP

Visit this link for information on the mobile collector application: https://ppo.puyallup.wsu.edu/pmr/madrone-survey-phone-app/

To download the free application, go the app store on your phone and search for **Survey 123** or **Survey 123 for ArcGIS**. Instructions for loading the madrone survey app are on the website at the link above.

Be patient as it may take a while to download. Once it is downloaded you will be prompted to open the survey. If you get an error message try downloading again. We have found the app can be a bit temperamental at times.
LOCATION DATA

GEOPOINT INFORMATION

Pacific madrone ranges from the east coast of Vancouver Island and the immediate mainland of British Columbia (lat. 50° N.) southward to near Palomar Mountain, San Diego County, CA (lat. 33° N.), a north-south distance of about 1880 km (1,170 mi). The species is common along the western slopes of the Coast Ranges in Washington, Oregon, and California, southward to San Luis Obispo County, CA. It is abundant throughout much of the Klamath Mountains of Oregon and California, and from Yuba County, CA, southward through Calaveras County in the Sierra Nevada.

Collecting geopoint information is critical for creating an updated range map for madrone. This can be done in several ways.

PAPER SURVEY AND WEBFORM

Use a personal gps device and record the latitude and longitude on the form. If you have a smartphone, these come with a gps app. If you know your location but don't have gps available, you can look it up on Google Earth (https://www.google.com/earth/) on a computer. Or write the location information to the best of your ability and we will figure it out.

MOBILE APPLICATION

To enter a geopoint on the mobile application, tap on the map and it will automatically show you where you are with a pin icon. If you press on the compass button on the right-hand side of the map it will show you where you are as you move. If you are near the tree press the check mark on the lower right side of the screen and it will record the location of the tree. Be sure to have your location services activated on your device. This is typically found under settings and privacy or personal settings.

See the following links for more information:

Apple Devices: https://support.apple.com/en-ca/HT203033

Android Devices: https://support.google.com/nexus/answer/3467281?hl=en

If your device is offline you can still collect data, however, you will not be able to use the geopoint locator. As long as your Locational Services is activated on your device and you take a picture we will still be able to determine the location of the tree. If you submit your report while offline the survey will store it. Once you are able to get online again you will be able to send your report.
SITE INFORMATION

SLOPE
Pacific madrone grows on a variety of terrain from nearly level flats and gently sloping hillsides to steep mountainsides. It is found in canyons near creeks and rivers. In general, madrone grows on all aspects but is found most often on those facing south and west.

Based on the above slope diagram, please record slope as follows:

- Horizontal (0%-2%)
- Very flat (2% - 5%)
- Gently Sloping (5%-10%)
- Moderate (10%-30%)
- Steep (<30%)

ASPECT
Aspect is the compass direction that a slope faces. This is important, for example, south-facing slopes tend to be dryer than north-facing slopes. You can measure this with a compass by standing next to the tree and facing in the downslope direction. Read the bearing (degrees) on the compass and record in the space provided. Or choose one of the options provided on the survey form.

If the site is flat, there is no need to record the aspect.
STAND CHARACTERISTICS
Please describe the stand type is where the tree is found. For example, is it in a densely forested area of pure madrone trees or is in in a mixed forest stand with other trees such as conifer trees. Is in an open field alone or are there other trees nearby?

SITE DISTURBANCE
Pacific madrone seedlings usually become established in disturbed areas, such as along road cuts, on bare mineral soil at the base of uprooted trees, in semi-open forests, or after natural events such as forest fires or landslides. Young Pacific madrone seedlings need partial shade for establishment, especially in the southern portion of their range. As trees age, the need for light increases and older trees require top light for survival. Pacific madrone root systems do not tolerate root disturbance or soil compaction, which often accompany episodes of site development.

Fire is a major damaging agent to madrone. Seedlings, sprouts, and trees all die back to the root crown after fire, but are rarely killed. If a mature tree has multiple stems, this is often due to re-sprouts after a fire or other disturbance. Competing conifers are typically damaged badly or killed, allowing the fast-growing madrone sprouts to establish dominance.

Record the type of site disturbance, if any, that you see.

GENERAL TREE INFORMATION

TREE HEIGHT
Pacific madrones attain heights of 80 to 125 feet (24 – 38 m). The largest trees may be as much as 400 years old; ages of 200 to 250 years have been counted.

Height:
1. < 10' (3m) (<1 story building)
2. 10' to 30' (3-9m) (1-3 story building)
3. 30' to 75' (9-23m) (3-7 story building)
4. > 75' (>23m) (>7 story building)

WIDTH
The growth and quality of Pacific madrone stands may be greatly improved through management. Diameter growth of madrone is responsive to increased growing space within or between sprout clumps. Pacific madrones attain diameters of 24 to 48 in (61 – 122 cm).

Scientists use a standard method to measure the size of trees, diameter-at-breast height (DBH), to ensure consistency over time, across plots and between data collectors. DBH means the diameter of each tree is measured at “breast height”, defined as 1.35m (4.5 ft) up from the highest point of ground at the tree’s base. DBH measurements can be used to estimate the volume, biomass, and carbon storage of trees. Scientists sometimes use special measuring tapes referred to as DBH tapes. Since many
people do not have one of these tapes, we are asking that you estimate the width of the tree without using a tape. If the tree has more than one trunk, and the divide happens to be 4.5 feet from the base of the tree, try to measure just under the area where the tree divides.

If there is more than one trunk estimate an average width of all trunks larger than 5" (12 cm) in diameter, and indicate on the survey form how many trunks there are.

<table>
<thead>
<tr>
<th></th>
<th>small</th>
<th></th>
<th>medium</th>
<th></th>
<th>large</th>
<th></th>
<th>extra</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt;12” (30 cm)</td>
<td>less than a ruler wide</td>
<td>2</td>
<td>12” to 24” (30-60 cm)</td>
<td>1 to 2 rulers wide</td>
<td>3</td>
<td>24” to 36” (60-90 cm)</td>
<td>2 rulers to 1 yard stick wide</td>
</tr>
</tbody>
</table>

TREE CROWN ASSESSMENT
Pacific madrone are broadleaf evergreen trees that have single or multiple trunks with rounded, spreading crowns. When natural or human-caused stresses impact a forest, the first signs of deterioration are often observed in the tree crowns. Large, densely foliated crowns are typically associated with vigorous growth rates, while trees with small, flattened, or sparsely foliated crowns may be in a state of decline, growing little or not at all.

Crown Class
Estimate the height at which the branches begin to grow on the tree trunk
Estimate from the base of the tree.

|   | < 10' (3m) | <1 story building | 2 | 10' to 30' (3-9m) | 1-3 story building | 3 | 30' to 75' (9-23m) | 3-7 story building | 4 | > 75' (23m) | >7 story building |

The following images provide some examples of crown classes on madrone trees:
NEW FOLIAGE

| 0 – No new foliage | 1 – Bud swell | 2 – New, immature foliage |

OTHER VEGETATIVE OBSERVATIONS
Pacific madrone is easy to recognize by its leathery, oval-shaped leaves. The older leaves are shed in the summer. Also in summer, the cinnamon-colored bark peels off to reveal smooth, light green, younger bark that turns golden with age. Older madrones retain a scaly, reddish brown bark. White, urn-shaped flowers, in large drooping clusters, make an appearance in spring, followed by orange-red berries with a bumpy or granular surface in autumn.

1 Flowers  
2 Berries  
3 Newly emerging shoots around base of tree  
4 Other – describe or photograph

| 1 - Flowers present | 2 - Berries present | 3 - Newly emerging shoots around base of tree |
TREE HEALTH ASSESSMENT

The overall health of Pacific madrone has been declining since the last half of the 20th century. Pacific madrone trees are host to a variety of diseases such as: many leaf spots, one leaf rust, a spot anthracnose, a tar spot, at least four cankers, and several root diseases. Increase in foliar pathogens has been attributed to the higher frequency of warmer, wetter spring weather.

OVERALL IMPRESSION OF TREE HEALTH

<p>| | |</p>
<table>
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</thead>
<tbody>
<tr>
<td>H</td>
<td>Healthy</td>
</tr>
<tr>
<td>U</td>
<td>Unhealthy</td>
</tr>
</tbody>
</table>

H - Healthy

U - Unhealthy
PERCENT DEAD CROWN

What percentage of the tree crown looks unhealthy or appears damaged?

1  < 10%
2  10% - 20%
3  20% - 50%
4  50% - 75%
5  > 75%

Some examples of crown damage classes:

FOLIAR SYMPTOMS

Foliage disease is common in the late spring in areas where there is high humidity or periods of extended moisture. Look for it on the lower portion of the canopy where air circulation is poor.

The following are some symptoms that may be observed on Pacific madrone foliage:

0  None
1  Wilting leaves
2  Defoliation
3  Leaf spots (Necrotic reddish/brown spots)
4  Rust (Orange spots/bumps on underside of leaf)
5  Leaf blight (Whole leaf appears dry and dead, brown in color)
6  Botryosphaeria blight (Leaves that appear grey/black or "burnt")
7  Shoot Tip Dieback
8  Other – describe or photograph
<table>
<thead>
<tr>
<th>0 – No symptoms</th>
<th>1 - Wilting Leaves</th>
<th>2 - Defoliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - Leaf spots (Necrotic reddish/brown spots)</td>
<td>4 - Rust (Orange spots/bumps on underside of leaf)</td>
<td>5 - Leaf blight (Whole leaf appears dry and dead, brown in color)</td>
</tr>
</tbody>
</table>
FOLIAGE DISEASE SEVERITY

If leaf blight is present, how bad is it?

1. <25% of foliage
2. 25-50%
3. 51-75%
4. >75%

<table>
<thead>
<tr>
<th>6</th>
<th>Botryosphaeria blight (Leaves that appear grey/black or &quot;burnt&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Shoot tip dieback</td>
</tr>
</tbody>
</table>
STEM AND BRANCH SYMPTOMS

Stem and branch cankers can restrict water supply from the roots to the rest of the tree. Wood decay does not cause water stress, but it does make the tree structurally weak.

- **0** None
- **1** Dark, smooth, discolored lesions
- **2** Raised bumpy cankers
- **3** Wood decay
- **4** Other (describe or photograph)

The following images are representative of stem and branch diseases:

<table>
<thead>
<tr>
<th>1 - Dark, smooth, discolored lesions</th>
<th>2 - Raised bumpy cankers</th>
<th>3 - Wood decay</th>
</tr>
</thead>
</table>

STEM CANKER SEVERITY

- **1** 0-5 cankers
- **2** 5-10 cankers
- **3** > 10 cankers or large cankers/lesions covering most of the stem
INSECT ACTIVITY
Insects such as defoliators, wood borers, and bark beetles are common but cause only minor damage.

Please record all that you observe:

1. Wood borers
2. Termites
3. Leaf miner (white "trails" in leaf tissue)
4. Shield bearer (holes punched out of leaf)
5. Webbing in branches
6. Chewing on leaves
7. Other (describe or photograph)

1 - Wood borer
3 - Leaf miner (white "trails" in leaf tissue)
WILDLIFE ACTIVITY

Damage caused by animals is relatively minor on Pacific madrone. Pacific madrone berries are an important food for many birds and mammals. The berries are a particularly significant component in the diet of doves and pigeons during the fall. Live trees with rotten heartwood provide excellent habitat for cavity-nesting birds. Deer eat the berries and browse on young shoots.

1. Bird activity including feeding and nesting
2. Burrowing varmint holes
3. Foliage browse
4. Chewing on bark
5. Other (describe or photograph)
<p>| | |</p>
<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bird activity such as feeding on berries or nesting</td>
</tr>
<tr>
<td>2</td>
<td>Evidence of burrowing varmints</td>
</tr>
<tr>
<td>3</td>
<td>Signs of foliage browse</td>
</tr>
<tr>
<td>4</td>
<td>Signs of bark chewing</td>
</tr>
</tbody>
</table>
HELPFUL LINKS:


http://nativeplantspnw.com/pacific-madrone-arbutus-menziesii/

https://www.nwf.org/pdf/Lesson%2013/LESSON%2013_What%20Is%20DBH.pdf

http://owic.oregonstate.edu/pacific-madrone-arbutus-menziesii

CONTACTS

Marianne Elliott, 253-445-4596

For more information, please visit our website:

https://ppo.puyallup.wsu.edu/pmr/