

## National Whitebark Pine Restoration

All GIS layers are raster with 1 km pixel resolution. Spatial extent is for US only unless otherwise specified

Name	Format	Source	Contact	Description	Units
<b>RANGEWIDE</b>					
<b>Potential</b>	Geotiff	Keane et al. (2012)	Bob Keane, USFS	Modeled layer to identify all areas that have the potential to support WBP	Presence (1) of WBP
<b>Dominant</b>	Geotiff	Keane et al. (2012)	Bob Keane, USFS	Modeled layer to identify all areas that are currently dominated by WBP	Presence (1) of WBP
<b>Existing</b>	Geotiff	<a href="http://whitebarkfound.org/resources/help-update-range-maps">http://whitebarkfound.org/resources/help-update-range-maps</a>	Cyndi Smith, Adam Collingwood, Parks Canada, Waterton Lakes National Park, Alberta	Updated map of existing WBP distribution, includes Canada	Presence (1) of WBP
<b>Refugia</b>	Geotiff	Mahalovich et al. 2017	Mary F. Mahalovich USFS	Model predictions for WBP genetic refugia in year 2020 for 2 representative concentration pathways (RCP 4.5 and 8.5), including grids for lower and upper bounds to account for uncertainty. No refugia predicted for lower bound RCP8.5 scenario; hence, no grid layer included.	Presence (1) of WBP
<b>Viability</b>	Geotiff	<a href="http://charcoal.cnre.vt.edu/climate/species/speciesDist/Whitebark-pine/">http://charcoal.cnre.vt.edu/climate/species/speciesDist/Whitebark-pine/</a>	Nicholas Crookston, USFS	Model predictions for viability of WBP for current conditions and future conditions under 3 global climate models (CGCM3, GFDLLCM21, HADCM3), 4 emission scenarios (A1B, A2, B1, B2), and years 2030, 2060, 2090; includes Canada. Note, layer for HADCM3, B2, year 2090 not available.	Species Viability Scores, 0-1

Name	Format	Source	Contact	Description	Units
<b>Loss to Mountain Pine Beetle &amp; Rust</b>	Geotiff	<a href="https://www.fs.fed.us/foresthealth/applied-sciences/mapping-reporting/gis-spatial-analysis/national-risk-maps.shtml">https://www.fs.fed.us/foresthealth/applied-sciences/mapping-reporting/gis-spatial-analysis/national-risk-maps.shtml</a>	Frank Sapio, USFS	Percentage of WBP basal area lost to Mountain Pine Beetle & Blister Rust	Percent, 0-100
<b>Loss to Mountain Pine Beetle &amp; Rust by HUC6 watershed</b>	Geotiff	<a href="https://www.fs.fed.us/foresthealth/applied-sciences/mapping-reporting/gis-spatial-analysis/national-risk-maps.shtml">https://www.fs.fed.us/foresthealth/applied-sciences/mapping-reporting/gis-spatial-analysis/national-risk-maps.shtml</a>	Frank Sapio, USFS	Percentage of WBP basal area lost to Mountain Pine Beetle & Blister Rust summarized to HUC6 watershed	Proportion, 0-1
<b>Total basal area of all tree spp.</b>	Geotiff	<a href="https://www.fs.fed.us/foresthealth/applied-sciences/mapping-reporting/gis-spatial-analysis/national-risk-maps.shtml">https://www.fs.fed.us/foresthealth/applied-sciences/mapping-reporting/gis-spatial-analysis/national-risk-maps.shtml</a>	Frank Sapio, USFS	Total basal area across all tree species	Square feet per acre, 0 – 1,243
<b>Tree presence</b>	Geotiff	<a href="https://www.fs.fed.us/foresthealth/applied-sciences/mapping-reporting/gis-spatial-analysis/national-risk-maps.shtml">https://www.fs.fed.us/foresthealth/applied-sciences/mapping-reporting/gis-spatial-analysis/national-risk-maps.shtml</a>	Frank Sapio, USFS	Tree presence or absence (also known as 'Treed areas')	Presence (1) or absence (0)
<b>Mountain Pine Beetle aerial detection surveys</b>		Not yet available			

Name	Format	Source	Contact	Description	Units
<b>SUB-RANGE MAPS</b>					
<b>Region 6</b>	Geotiff	O:\NFS\R06\Program\Botany\Whitebark Pine\GIS	Andrew Bower, USFS	WBP distribution in USFS Region 6	Presence (1) of WBP
<b>GYA Probability</b>	Geotiff	<a href="https://www.sciencebase.gov/catalog/item/5845a4a6e4b04fc80e52346a">https://www.sciencebase.gov/catalog/item/5845a4a6e4b04fc80e52346a</a>	Andrew Chang, Montana State University	Probability of suitable WBP habitat in Greater Yellowstone Area (GYA) for recent year (2010) and future conditions based on 1 global climate model (ENS_AVG), 2 representative concentration pathways (RCP 4.5 and 8.5), and years 2040,2070, 2099	Probability of suitable WBP habitat, 0-1
<b>Flathead National Forest</b>		Not yet available			
<b>Salish/Kootenai tribes</b>		Not yet available			
<b>OTHER ANCILLARY RANGEWIDE LAYERS</b>					
<b>LANDFIRE Biophysical Settings</b>	ArcGIS grid	<a href="https://www.landfire.gov/version_comparison.php?mosaic=Y">https://www.landfire.gov/version_comparison.php?mosaic=Y</a>	Rollins, Matthew, USFS	Vegetation dominant prior to Euro-American settlement based on biophysical environment & historical disturbance regime (version 2014)	LANDFIRE Vegetation classification system
<b>LANDFIRE Existing vegetation type</b>	ArcGIS grid	<a href="https://www.landfire.gov/version_comparison.php?mosaic=Y">https://www.landfire.gov/version_comparison.php?mosaic=Y</a>	Rollins, Matthew, USFS	Existing vegetation type (version 2014)	LANDFIRE Vegetation classification system
<b>LANDFIRE Canopy</b>	ArcGIS grid	<a href="https://www.landfire.gov/version_comparison.php?mosaic=Y">https://www.landfire.gov/version_comparison.php?mosaic=Y</a>	Rollins, Matthew, USFS	Forest canopy bulk density (version 2014)	Density of available canopy fuel in a

Name	Format	Source	Contact	Description	Units
<b>bulk density</b>					stand, 1-45 (kg m-3 * 100)
<b>LANDFIRE Fuel loading model</b>	ArcGIS grid	<a href="https://www.landfire.gov/version_comparison.php?mosaic=Y">https://www.landfire.gov/version_comparison.php?mosaic=Y</a>	Rollins, Matthew, USFS	Wildland surface fuel classification with representative loading for each fuel component (version 2014)	LANDFIRE fuel classification system
<b>VMAP Existing dominant vegetation – Region 1</b>	ArcGIS grid	Barber 2012	Jed Gregory, USFS	Mid-level existing vegetation classification for USFS Region 1	Region 1 mid-level vegetation classification
<b>Elevation</b>	Geotiff	<a href="https://earthexplorer.usgs.gov/">https://earthexplorer.usgs.gov/</a>	USGS	Digital elevation model, includes Canada	meters
<b>Hydrologic Unit Code (HUC) 4,6,8</b>	ArcGIS grid	<a href="ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Hydrography/WBD/National/GDB/">ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Hydrography/WBD/National/GDB/</a>	USGS	Watershed Boundary Datasets defining areal extent of water drainages, at Subregion (HUC4), Basin (HUC6), and Subbasin (HUC8) levels, includes Canada.	Hydrologic Unit Codes, with associated watershed names
<b>US fire perimeters</b>	Geotiff	<a href="https://www.mtbs.gov/direct-download">https://www.mtbs.gov/direct-download</a>	Jeffrey Eidenshink, USGS	Year of last fire, 1984-2015	Year
<b>US fire severity</b>	Geotiff	<a href="https://www.mtbs.gov/direct-download">https://www.mtbs.gov/direct-download</a>	Jeffrey Eidenshink, USGS	Severity class of most recent fire, 1985-2015	Burn severity classification, 1-6
<b>Canadian fire perimeters</b>	Geotiff	<a href="http://cwfis.cfs.nrcan.gc.ca/ha/nfdb">http://cwfis.cfs.nrcan.gc.ca/ha/nfdb</a>	Canadian National Fire database	Year of last fire, 1917-2016, for Alberta & British Columbia provinces	Year
<b>Forest Inventory Analysis WBP plots</b>	Geotiff	<a href="https://apps.fs.usda.gov/fia/datamart/CSV/datamart_csv.html">https://apps.fs.usda.gov/fia/datamart/CSV/datamart_csv.html</a>	Greg Reams, USFS	Number of WBP trees (live and dead, 5 inches DBH and greater) inventoried in each FIA forest inventory plot	Number of WBP trees / 168 m <sup>2</sup>
<b>Land ownership</b>	ArcGIS grid	US: <a href="https://gapanalysis.usgs">https://gapanalysis.usgs</a> .	US: Lisa Johnson,	Managing agencies of public lands at the state/province and federal levels, including	Public land agency ownership

Name	Format	Source	Contact	Description	Units
		gov/padus/data/download/; Canada: <a href="https://www.protectedplanet.net/">https://www.protectedplanet.net/</a>	USGS; Canada: Brian MacSharry, UNEP World Conservation Monitoring Centre	Canada. US lands additionally classified as non-wilderness, wilderness, and wilderness study areas.	
<b>Roads</b>	Geotiff	US: <a href="https://nationalmap.gov/transport.html">https://nationalmap.gov/transport.html</a> ; Canada: <a href="http://open.canada.ca/data/en/dataset/8e089409-8b6e-40a9-a837-51fcb2736b2c">http://open.canada.ca/data/en/dataset/8e089409-8b6e-40a9-a837-51fcb2736b2c</a>	US: USGS, National Geospatial Technical Operations Center; Canada: Government of Canada; Statistics Canada;	Roads of any size, includes Canada.	Presence (1) or absence (0)
<b>Trails</b>		Not yet available			
<b>US Western states</b>	ArcGIS grid	<a href="https://www.arcgis.com/home/item.html?id=870029dd3baa4c14a5131cd7090a03ea">https://www.arcgis.com/home/item.html?id=870029dd3baa4c14a5131cd7090a03ea</a>	FracTrackerAlliance	11 western US states	State name
<b>Canadian provinces</b>	ArcGIS grid	<a href="http://open.canada.ca">http://open.canada.ca</a>	Government of Canada; Statistics Canada;	Alberta and British Columbia provinces	Province name
<b>Ecoregion</b>	ArcGIS grid	<a href="https://www.epa.gov/ecko-research/ecoregions-north-america">https://www.epa.gov/ecko-research/ecoregions-north-america</a>	US EPA	LEVEL III EPA Ecoregions	Ecoregion name

Name	Format	Source	Contact	Description	Units