Appendix B: Annual net carbon exchange in live vegetation and soil (sans mortality) under historic climate. Data are presented as mean plus and minus SD, with positive values indicating carbon uptake. Carbon losses and gains due to mortality are not included in vegetation and soil carbon exchange values, respectively, unless otherwise noted.

Land Type	Region	Ownership	Net Carbon Exchange Vegetation	Net Carbon Exchange Soil	Source
			Mg C ha^{-1} y^{-1}		
Water	All	All	NA[1]	0[2]	
Ice	All	All	NA[1]	0[2]	
Barren	All	All	0[2]	0[2]	
Sparse	All	All	0[2]	0[2]	
Desert	All	All	0[2]	0.76 ± 0.07	Hastings et al., 2005, and Wohlfahrt et al., 2008 (soil)
Shrubland	All	All	0.93 ± 0.31[3]	0.28 ± 0.08	Quideau et al., 1998 (vegetation and soil)
Grassland	All	All	0[2]	-2.22 ± 1.29	Based on expert opinion due to lack of available data (vegetation); and Ma et al., 2007, and Ryals and Silver, 2013 (soil)
Savanna	All	All	3.67 ± 0.68[4]	-2.69 ± 0.47[5]	Ma et al., 2007 (vegetation and soil)
Woodland	All	All	3.67 ± 0.68[4]	-2.69 ± 0.47[5]	Ma et al., 2007 (vegetation and soil)
Meadow	All	All	0[2]	0.95 ± 0.25	Drexler et al., 2015 (soil)
Coastal Marsh	All	All	0[2]	1.44 ± 1.23	Callaway et al., 2012, and Chmura et al., 2003 (soil)
Fresh Marsh	All	All	NA[1]	3.37 ± 0.33	Based on expert opinion due to lack of available data (vegetation); and Knox et al., 2015 (soil)
Cultivated	Non-Delta	All	0[2]	0.19 ± 0.26	Based on expert opinion due to lack of available data (vegetation); and Mitchell et al., 2015, Wu et al., 2008, and Kong et al., 2005 (soil)
Cultivated	Delta	All	0[2]	-2.82 ± 2.51	Based on expert opinion due to lack of available data (vegetation); and Hatala et al., 2012, and Knox et al., 2015 (soil)

Appendix B: Annual net carbon exchange in live vegetation and soil (sans mortality) under historic climate. Data are presented as mean plus and minus SD, with positive values indicating carbon uptake. Carbon losses and gains due to mortality are not included in vegetation and soil carbon exchange values, respectively, unless otherwise noted.

Land Type	Region	Ownership	Net Carbon Exchange Vegetation	Net Carbon Exchange Soil	Source
			Mg C ha^{-1} y^{-1}		
Urban	Central Valley	All	0.95 ± 0.006[6]	0[2,7]	McPherson et al., 2017 (vegetation)
	Delta		0.95 ± 0.006[6]	0[2,7]	
	Deserts		0.20 ± 0.01[6]	0[2,7]	
	Eastside		0.70 ± 0.01[6]	0[2,7]	
	Klamath		0.70 ± 0.01[6]	0[2,7]	
	North Coast		1.96 ± 0.07[6]	0[2,7]	
	Sierra Cascades		0.70 ± 0.01[6]	0[2,7]	
Forest	All	Other federal	1.82 ± 0.12[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
Forest	Central Coast	U.S. Bureau of Land Management	0.44 ± 0.26[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
		U.S. Department of Defense	0.44 ± 0.26[8,9]	0.71 ± 0.30[10]	
		Conservation Easement Protected	1.85 ± 0.42[8,9]	0.71 ± 0.30[10]	
		Local Government	2.62 ± 0.82[8,9]	0.71 ± 0.30[10]	
		National Park Service	0.44 ± 0.26[8,9]	0.71 ± 0.30[10]	
		Private	2.03 ± 0.39[8,9]	0.71 ± 0.30[10]	
		State Government	2.62 ± 0.82[8,9]	0.71 ± 0.30[10]	
		USDA Forest Service (non-wilderness)	0.74 ± 0.35[8,9]	0.71 ± 0.30[10]	
Forest	Central Valley	U.S. Bureau of Land Management	0[2]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
Forest	Central Valley	U.S. Department of Defense	0[2]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
		Conservation Easement Protected	1.26 ± 0.80[8,9]	0.71 ± 0.30[10]	
		Local Government	0.79 ± 0.95[8,9]	0.71 ± 0.30[10]	
		Private	1.15 ± 0.74[8,9]	0.71 ± 0.30[10]	
		State Government	0.79 ± 0.95[8,9]	0.71 ± 0.30[10]	

Appendix B: Annual net carbon exchange in live vegetation and soil (sans mortality) under historic climate. Data are presented as mean plus and minus SD, with positive values indicating carbon uptake. Carbon losses and gains due to mortality are not included in vegetation and soil carbon exchange values, respectively, unless otherwise noted.

Land Type	Region	Ownership	Net Carbon Exchange Vegetation	Net Carbon Exchange Soil	Source
			Mg C ha^{-1} y^{-1}		
Forest	Delta	U.S. Bureau of Land Management	0.00 ± 0.00[2]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
		U.S. Department of Defense	0[2]	0.71 ± 0.30[10]	
		Conservation Easement Protected	1.26 ± 0.80[8,9]	0.71 ± 0.30[10]	
		Local Government	0.79 ± 0.95[8,9]	0.71 ± 0.30[10]	
		Private	1.15 ± 0.74[8,9]	0.71 ± 0.30[10]	
		State Government	0.79 ± 0.95[8,9]	0.71 ± 0.30[10]	
Forest	Deserts	U.S. Bureau of Land Management	0.05 ± 0.03[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
		U.S. Department of Defense	0.05 ± 0.03[8,9]	0.71 ± 0.30[10]	
		Conservation Easement Protected	0.32 ± 0.14[8,9]	0.71 ± 0.30[10]	
		Local Government	0.41 ± 0.35[8,9]	0.71 ± 0.30[10]	
		National Park Service	0.05 ± 0.03[8,9]	0.71 ± 0.30[10]	
		Private	0.27 ± 0.11[8,9]	0.71 ± 0.30[10]	
		State Government	0.41 ± 0.35[8,9]	0.71 ± 0.30[10]	
		USDA Forest Service (non-wilderness)	0.65 ± 0.15[8,9]	0.71 ± 0.30[10]	
Forest	Eastside	U.S. Bureau of Land Management	0.20 ± 0.05[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
		U.S. Department of Defense	0.20 ± 0.05[8,9]	0.71 ± 0.30[10]	
		Conservation Easement Protected	0.50 ± 0.21[8,9]	0.71 ± 0.30[10]	
		Local Government	1.32 ± 1.52[8,9]	0.71 ± 0.30[10]	
		National Park Service	0.20 ± 0.05[8,9]	0.71 ± 0.30[10]	
		Private	1.21 ± 0.30[8,9]	0.71 ± 0.30[10]	
Forest	Eastside	State Government	1.32 ± 1.52[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
		USDA Forest Service (non-wilderness)	0.74 ± 0.11[8,9]	0.71 ± 0.30[10]	
Forest	Klamath	U.S. Bureau of Land Management	3.00 ± 0.85[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
		U.S. Department of Defense	3.00 ± 0.85[8,9]	0.71 ± 0.30[10]	

Appendix B: Annual net carbon exchange in live vegetation and soil (sans mortality) under historic climate. Data are presented as mean plus and minus SD, with positive values indicating carbon uptake. Carbon losses and gains due to mortality are not included in vegetation and soil carbon exchange values, respectively, unless otherwise noted.

Land Type	Region	Ownership	Net Carbon Exchange Vegetation	Net Carbon Exchange Soil	Source
			Mg C ha^{-1} y^{-1}		
Forest	Klamath	Conservation Easement Protected	2.38 ± 0.30[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
		Local Government	1.36 ± 0.79[8,9]	0.71 ± 0.30[10]	
		National Park Service	3.00 ± 0.85[8,9]	0.71 ± 0.30[10]	
		Private	2.74 ± 0.24[8,9]	0.71 ± 0.30[10]	
		State Government	1.36 ± 0.79[8,9]	0.71 ± 0.30[10]	
		USDA Forest Service (non-wilderness)	2.61 ± 0.17[8,9]	0.71 ± 0.30[10]	
Forest	North Coast	U.S. Bureau of Land Management	5.18 ± 1.88[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
		U.S. Department of Defense	5.18 ± 1.88[8,9]	0.71 ± 0.30[10]	
		Conservation Easement Protected	4.11 ± 0.62[8,9]	0.71 ± 0.30[10]	
		Local Government	5.98 ± 1.53[8,9]	0.71 ± 0.30[10]	
		National Park Service	5.18 ± 1.88[8,9]	0.71 ± 0.30[10]	
		Private	4.91 ± 0.45[8,9]	0.71 ± 0.30[10]	
		State Government	5.98 ± 1.53[8,9]	0.71 ± 0.30[10]	
		USDA Forest Service (non-wilderness)	7.94 ± 5.15[8,9]	0.71 ± 0.30[10]	
Forest	Sierra Cascades	U.S. Bureau of Land Management	1.48 ± 0.18[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
		U.S. Department of Defense	1.48 ± 0.18[8,9]	0.71 ± 0.30[10]	
		Conservation Easement Protected	1.20 ± 0.12[8,9]	0.71 ± 0.30[10]	
		Local Government	2.55 ± 0.82[8,9]	0.71 ± 0.30[10]	
		National Park Service	1.48 ± 0.18[8,9]	0.71 ± 0.30[10]	
		Private	2.09 ± 0.14[8,9]	0.71 ± 0.30[10]	
		State Government	2.55 ± 0.82[8,9]	0.71 ± 0.30[10]	
Forest	Sierra Cascades	USDA Forest Service (non-wilderness)	2.45 ± 0.11[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
Forest	South Coast	U.S. Bureau of Land Management	0.05 ± 0.03[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)

Appendix B: Annual net carbon exchange in live vegetation and soil (sans mortality) under historic climate. Data are presented as mean plus and minus SD, with positive values indicating carbon uptake. Carbon losses and gains due to mortality are not included in vegetation and soil carbon exchange values, respectively, unless otherwise noted.

Land Type	Region	Ownership	Net Carbon Exchange Vegetation	Net Carbon Exchange Soil	Source
			Mg C ha^{-1} y^{-1}		
Forest	South Coast	U.S. Department of Defense	0.05 ± 0.03[8,9]	0.71 ± 0.30[10]	Christensen et al., 2017, and Jenkins et al., 2003 (vegetation); Quideau et al., 1998 (soil)
		Conservation Easement Protected	0.32 ± 0.14[8,9]	0.71 ± 0.30[10]	
		Local Government	0.41 ± 0.35[8,9]	0.71 ± 0.30[10]	
		National Park Service	0.05 ± 0.03[8,9]	0.71 ± 0.30[10]	
		Private	0.27 ± 0.11[8,9]	0.71 ± 0.30[10]	
		State Government	0.41 ± 0.35[8,9]	0.71 ± 0.30[10]	
		USDA Forest Service (non-wilderness)	0.65 ± 0.15[8,9]	0.71 ± 0.30[10]	
Seagrass	Ocean	Other Federal	NA[1]	0.45 ± 0.45	Mcleod et al., 2011 (soil)

[1]Carbon pool is not represented in CALAND.

[2]Due to lack of data, static carbon density is assumed (i.e., net carbon exchange is 0 Mg C ha^{-1} y^{-1}) based on expert opinion.

[3]Only includes aboveground main canopy net carbon exchange; belowground main canopy and understory carbon exchange are additional and are calculated annualyannually as follows:

(a) $\boldsymbol{CO_{2\,root}} = \frac{\boldsymbol{f_{root}}}{\boldsymbol{f_{stem}}} \cdot \boldsymbol{CO_{2\,stem}}$, where $\boldsymbol{CO_{2\,root}}$ is the C accumulation in the root (Mg C ha^{-1} y^{-1}), $\boldsymbol{CO_{2\,stem}}$ is the CO_2 uptake in the stem (bole) (Mg C ha^{-1} y^{-1}), $\boldsymbol{f_{root}}$ is the ratio of root to aboveground main canopy carbon density (fraction), and $\boldsymbol{f_{stem}}$ is the constant fraction (0.66) of stem to aboveground main canopy.

(b) $\boldsymbol{CO_{2\,understory}} = \boldsymbol{f_{understory}} \cdot \boldsymbol{CO_{2\,above\,main}}$, where $\boldsymbol{CO_{2\,understory}}$ is the CO_2 uptake in the understory (Mg C ha^{-1} y^{-1}), $\boldsymbol{f_{understory}}$ is a constant fraction (0.1) of understory to above main canopy, and $\boldsymbol{CO_{2\,above\,main}}$ is the CO_2 uptake in aboveground main canopy (Mg C ha^{-1} y^{-1}).

[4]Based on measured net carbon flux of total main canopy (above and below), and an assumed grassland understory with static carbon density. Net vegetation carbon exchange value (sans mortality) is partitioned into below- and above-ground main canopy based on the existing ratio of root to aboveground biomass carbon.

[5]Based on soil surface CO_2 flux, which excludes carbon inputs from roots. Thus, root carbon inputs to soil are additional and are calculated each year as follows: $\boldsymbol{below2dead\_flux\_vals} = \boldsymbol{D_{root}} \cdot \boldsymbol{f_{mortality}}$, where below2dead_flux_vals is the root-derived carbon inputs to soil (Mg C ha^{-1} y^{-1}), $\boldsymbol{D_{root}}$ is main canopy root carbon density (Mg C ha^{-1}) and $\boldsymbol{f_{mortality}}$ is the annual mortality fraction of live aboveground main canopy (fraction).

[6]Net vegetation carbon exchange (sans mortality) in Urban Area is partitioned to above- and belowground main canopy pools with 72% allocatedbased on initial 2010 ratio of above- to aboveground and 28% is allocated to belowground biomass (McPherson et al., 2017).below-ground main canopy carbon.

[7]If belowground mortality rates increase in Urban Area from the initial 2010 values, the difference in root carbon mortality is added to the net soil carbon exchange.

[8]Total aboveground main canopy net carbon exchange based on scaled up measurements of carbon accumulation in stem (bole) (Christensen et al., 2017) and

component fractions of leaf (0.05), bark (0.12), branch (0.17), and stem (0.66) (Jenkins et al., 2003).

[9]Excludes net carbon exchange in understory and belowground main canopy, which are calculated each year as follows:

(a) $\boldsymbol{CO_{2\,root}} = \boldsymbol{CO_{2\,stem}} \frac{\boldsymbol{f_{root}}}{\boldsymbol{f_{stem}}}$, where $\boldsymbol{CO_{2\,root}}$ is carbon accumulation in the belowground main canopy (Mg C ha^{-1} y^{-1}), $\boldsymbol{CO_{2\,stem}}$ is the CO_2 uptake in the stem (bole) (Mg C ha^{-1} y^{-1}), $\boldsymbol{f_{root}}$ is the ratio of root to aboveground main canopy carbon density (fraction), and $\boldsymbol{f_{stem}}$is the constant fraction (0.66) of stem to aboveground main canopy.

(b) $\boldsymbol{CCO_{2\,understory}} = \boldsymbol{CO_{2\,stem}} \cdot \frac{\boldsymbol{D_{understory}}}{\boldsymbol{D_{stem}}}$, where $\boldsymbol{CO_{2\,understory}}$ is the CO_2 uptake in aboveground understory (Mg C ha^{-1} y^{-1}), $\boldsymbol{CO_{2\,stem}}$ is the CO_2 uptake in the main canopy stem (bole) (Mg C ha^{-1} y^{-1}), $\frac{\boldsymbol{D_{understory}}}{\boldsymbol{D_{stem}}}$ is the ratio of understory to main canopy stem carbon density (fraction), which is constrained to a maximum value of 1.

[10]Based on measured historical changes in soil organic carbon density, which implicitly includes root-derived carbon inputs. However, if mortality rates increase from initial 2010 values, the difference in root carbon mortality is added to the soil.

Appendix C: Annual net mortality fractions of live biomass carbon.

Annual mortality flux from each live biomass pool is computed as follows:

$M_i = f_{mortality,i} \cdot D_i$, where M_i is the mortality flux from live biomass pool *i* (Mg C ha^{-1} y^{-1}), $f_{mortality,i}$ is the mortality fraction of live biomass carbon pool *i* (fraction), and D_i is the carbon density (Mg C ha^{-1}) of live biomass carbon pool *i*.

Land Type	Region	Ownership	Annual Mortality Fractions			Source
			Main canopy		Understory	
			Aboveground	Belowground		
Water	All	All	NA[1]	NA[1]	NA[1]	NA
Ice	All	All	NA[1]	NA[1]	NA[1]	NA
Barren	All	All	0[2]	0[2]	NA[1]	Based on expert opinion due to lack of available data (all).
Sparse	All	All	0[2]	0[2]	NA[1]	
Desert	All	All	0[2]	0[2]	0[2]	
Shrubland	All	All	0.01[3]	0.01[4]	0.01[3]	
Grassland	All	All	0[2]	0[2]	0[2]	
Savanna	All	All	0.01[4]	0.01[5]	0.01[6]	
Woodland	All	All	0.01[4]	0.01[5]	0.01[6]	
Meadow	All	All	0[2]	0[2]	0[2]	
Coastal Marsh	All	All	0[2]	0[2]	0[2]	
Fresh Marsh	All	All	0[2]	0[2]	0[2]	
Cultivated	All	All	0[2]	0[2]	0[2]	
Urban	All	All	0.01[7]	0.01[4]	NA[1]	
Forest	Central Coast	U.S. Bureau of Land Management	0.013[8,9]	0.013[4,9]	0.01[8]	Christensen et al., 2017 (main canopy), and expert opinion for understory mortality due to lack of available data.
Forest	Central Coast	U.S. Department of Defense	0.013[8,9]	0.013[4,9]	0.01[8]	
Forest	Central Coast	Easement	0.0076[8,9]	0.0076[4,9]	0.01[8]	
Forest	Central Coast	Local Government	0.0043[8,9]	0.0043[4,9]	0.01[8]	
Forest	Central Coast	National Park Service	0.0130[8,9]	0.0130[4,9]	0.01[8]	
Forest	Central Coast	Other federal	0.0146[8,9]	0.0146[4,9]	0.01[8]	
Forest	Central Coast	Private	0.0069[8,9]	0.0069[4,9]	0.01[8]	
Forest	Central Coast	State Government	0.0043[8,9]	0.0043[4,9]	0.01[8]	
Forest	Central Coast	USDA Forest Service (non-wilderness)	0.0241[8,9]	0.0241[4,9]	0.01[8]	
Forest	Central Valley	U.S. Bureau of Land Management	0[2]	0[2]	0.01[8]	

Appendix C: Annual net mortality fractions of live biomass carbon.

Annual mortality flux from each live biomass pool is computed as follows:

$M_i = f_{mortality,i} \cdot D_i$, where M_i is the mortality flux from live biomass pool *i* (Mg C ha^{-1} y^{-1}), $f_{mortality,i}$ is the mortality fraction of live biomass carbon pool *i* (fraction), and D_i is the carbon density (Mg C ha^{-1}) of live biomass carbon pool *i*.

Land Type	Region	Ownership	Annual Mortality Fractions			Source
			Main canopy		Understory	
			Aboveground	Belowground		
Forest	Central Valley	U.S. Department of Defense	0[2]	0[2]	0.01[8]	Christensen et al., 2017 (main canopy), and expert opinion for understory mortality due to lack of available data.
Forest	Central Valley	Easement	0.0089[8,9]	0.0089[4,9]	0.01[8]	
Forest	Central Valley	Local Government	0.0001[8,9]	0.0001[4,9]	0.01[8]	
Forest	Central Valley	Other federal	0.0146[8,9]	0.0146[4,9]	0.01[8]	
Forest	Central Valley	Private	0.0080[8,9]	0.0080[4,9]	0.01[8]	
Forest	Central Valley	State Government	0.0001[8,9]	0.0001[4,9]	0.01[8]	
Forest	Delta	U.S. Bureau of Land Management	0[2]	0[2]	0.01[8]	
Forest	Delta	U.S. Department of Defense	0[2]	0[2]	0.01[8]	
Forest	Delta	Easement	0.0089[8,9]	0.0089[4,9]	0.01[8]	
Forest	Delta	Local Government	0.0001[8,9]	0.0001[4,9]	0.01[8]	
Forest	Delta	Other federal	0.0146[8,9]	0.0146[4,9]	0.01[8]	
Forest	Delta	Private	0.0080[8,9]	0.0080[4,9]	0.01[8]	
Forest	Delta	State Government	0.0001[8,9]	0.0001[4,9]	0.01[8]	
Forest	Deserts	U.S. Bureau of Land Management	0.041[8,9]	0.041[4,9]	0.01[8]	
Forest	Deserts	U.S. Department of Defense	0.041[8,9]	0.041[4,9]	0.01[8]	
Forest	Deserts	Easement	0.0105[8,9]	0.0105[4,9]	0.01[8]	
Forest	Deserts	Local Government	0.0267[8,9]	0.0267[4,9]	0.01[8]	
Forest	Deserts	National Park Service	0.041[8,9]	0.041[4,9]	0.01[8]	
Forest	Deserts	Other federal	0.0146[8,9]	0.0146[4,9]	0.01[8]	
Forest	Deserts	Private	0.0097[8,9]	0.0097[4,9]	0.01[8]	
Forest	Deserts	State Government	0.0267[8,9]	0.0267[4,9]	0.01[8]	
Forest	Deserts	USDA Forest Service (non-wilderness)	0.042[8,9]	0.042[4,9]	0.01[8]	
Forest	Eastside	U.S. Bureau of Land Management	0.0013[8,9]	0.0013[4,9]	0.01[8]	
Forest	Eastside	U.S. Department of Defense	0.0013[8,9]	0.0013[4,9]	0.01[8]	
Forest	Eastside	Easement	0.0018[8,9]	0.0018[4,9]	0.01[8]	
Forest	Eastside	Local Government	0.0002[8,9]	0.0002[4,9]	0.01[8]	

Appendix C: Annual net mortality fractions of live biomass carbon.

Annual mortality flux from each live biomass pool is computed as follows:

$M_i = f_{mortality,i} \cdot D_i$, where M_i is the mortality flux from live biomass pool *i* (Mg C ha^{-1} y^{-1}), $f_{mortality,i}$ is the mortality fraction of live biomass carbon pool *i* (fraction), and D_i is the carbon density (Mg C ha^{-1}) of live biomass carbon pool *i*.

Land Type	Region	Ownership	Annual Mortality Fractions			Source
			Main canopy			
			Aboveground	Belowground	Understory	
Forest	Eastside	National Park Service	0.0013[8,9]	0.0013[4,9]	0.01[8]	Christensen et al., 2017 (main canopy), and expert opinion for understory mortality due to lack of available data.
Forest	Eastside	Other federal	0.0146[8,9]	0.0146[4,9]	0.01[8]	
Forest	Eastside	Private	0.0106[8,9]	0.0106[4,9]	0.01[8]	
Forest	Eastside	State Government	0.0002[8,9]	0.0002[4,9]	0.01[8]	
Forest	Eastside	USDA Forest Service (non-wilderness)	0.0053[8,9]	0.0053[4,9]	0.01[8]	
Forest	Klamath	U.S. Bureau of Land Management	0.0083[8,9]	0.0083[4,9]	0.01[8]	
Forest	Klamath	U.S. Department of Defense	0.0083[8,9]	0.0083[4,9]	0.01[8]	
Forest	Klamath	Easement	0.0059[8,9]	0.0059[4,9]	0.01[8]	
Forest	Klamath	Local Government	0.0161[8,9]	0.0161[4,9]	0.01[8]	
Forest	Klamath	National Park Service	0.0083[8,9]	0.0083[4,9]	0.01[8]	
Forest	Klamath	Other federal	0.0146[8,9]	0.0146[4,9]	0.01[8]	
Forest	Klamath	Private	0.007[8,9]	0.007[4,9]	0.01[8]	
Forest	Klamath	State Government	0.0161[8,9]	0.0161[4,9]	0.01[8]	
Forest	Klamath	USDA Forest Service (non-wilderness)	0.011[8,9]	0.011[4,9]	0.01[8]	
Forest	North Coast	U.S. Bureau of Land Management	0.0031[8,9]	0.0031[4,9]	0.01[8]	
Forest	North Coast	U.S. Department of Defense	0.0031[8,9]	0.0031[4,9]	0.01[8]	
Forest	North Coast	Easement	0.0033[8,9]	0.0033[4,9]	0.01[8]	
Forest	North Coast	Local Government	0.0072[8,9]	0.0072[4,9]	0.01[8]	
Forest	North Coast	National Park Service	0.0031[8,9]	0.0031[4,9]	0.01[8]	
Forest	North Coast	Other federal	0.0146[8,9]	0.0146[4,9]	0.01[8]	
Forest	North Coast	Private	0.0035[8,9]	0.0035[4,9]	0.01[8]	
Forest	North Coast	State Government	0.0072[8,9]	0.0072[4,9]	0.01[8]	
Forest	North Coast	USDA Forest Service (non-wilderness)	0.0069[8,9]	0.0069[4,9]	0.01[8]	
Forest	Sierra Cascades	U.S. Bureau of Land Management	0.0081[8,9]	0.0081[4,9]	0.01[8]	
Forest	Sierra Cascades	U.S. Department of Defense	0.0081[8,9]	0.0081[4,9]	0.01[8]	

Appendix C: Annual net mortality fractions of live biomass carbon.

Annual mortality flux from each live biomass pool is computed as follows:

$M_i = f_{mortality,i} \cdot D_i$, where M_i is the mortality flux from live biomass pool *i* (Mg C ha^{-1} y^{-1}), $f_{mortality,i}$ is the mortality fraction of live biomass carbon pool *i* (fraction), and D_i is the carbon density (Mg C ha^{-1}) of live biomass carbon pool *i*.

Land Type	Region	Ownership	Annual Mortality Fractions			Source
			Main canopy			
			Aboveground	Belowground	Understory	
Forest	Sierra Cascades	Easement	0.0063[8,9]	0.0063[4,9]	0.01[8]	Christensen et al., 2017 (main canopy), and expert opinion for understory mortality due to lack of available data.
Forest	Sierra Cascades	Local Government	0.0038[8,9]	0.0038[4,9]	0.01[8]	
Forest	Sierra Cascades	National Park Service	0.0081[8,9]	0.0081[4,9]	0.01[8]	
Forest	Sierra Cascades	Other federal	0.0146[8,9]	0.0146[4,9]	0.01[8]	
Forest	Sierra Cascades	Private	0.0069[8,9]	0.0069[4,9]	0.01[8]	
Forest	Sierra Cascades	State Government	0.0038[8,9]	0.0038[4,9]	0.01[8]	
Forest	Sierra Cascades	USDA Forest Service (non-wilderness)	0.0117[8,9]	0.0117[4,9]	0.01[8]	
Forest	South Coast	U.S. Bureau of Land Management	0.041[8,9]	0.041[4,9]	0.01[8]	
Forest	South Coast	U.S. Department of Defense	0.041[8,9]	0.041[4,9]	0.01[8]	
Forest	South Coast	Easement	0.0105[8,9]	0.0105[4,9]	0.01[8]	
Forest	South Coast	Local Government	0.0267[8,9]	0.0267[4,9]	0.01[8]	
Forest	South Coast	National Park Service	0.041[8,9]	0.041[4,9]	0.01[8]	
Forest	South Coast	Other federal	0.0146[8,9]	0.0146[4,9]	0.01[8]	
Forest	South Coast	Private	0.0097[8,9]	0.0097[4,9]	0.01[8]	
Forest	South Coast	State Government	0.0267[8,9]	0.0267[4,9]	0.01[8]	
Forest	South Coast	USDA Forest Service (non-wilderness)	0.042[8,9]	0.042[4,9]	0.01[8]	
Seagrass	Ocean	Other Federal	NA[1]	NA[1]	NA[1]	NA

[1]Carbon pool is not represented in CALAND.

[2]Due to lack of available mortality data and modeled static C density, mortality fraction is set to 0 (i.e., net carbon exchange is 0 Mg C ha^{-1} y^{-1}).

[3]Dead C flux (Mg C ha^{-1} y^{-1}) is transferred to dead C pools in proportion to the existing proportions of standing dead, down dead, and litter carbon densities unless there are non-existing dead pools, in which case the missing proportions are replaced with default values for standing dead (0.11), down dead (0.23), and/or litter (0.66).

[4]Dead belowground main canopy C flux (Mg C ha^{-1} y^{-1}) is only transferred to the soil C pool if there is an increase in the initial 2010 dead belowground main canopy (Mg C ha^{-1} y^{-1}).

[5]Dead belowground main canopy C flux (Mg C ha^{-1} y^{-1}) in Savanna and Woodland is transferred to the soil C pool because in these land types soil C exchange represents an annual net ecosystem carbon exchange which does not explicitly include a net change in soil C density.

[6]Due to the data available for Savanna and Woodland, which are based on a grass understory, the understory mortality reflects the same understory mortality fraction as in Grassland (i.e., 0).

[7]Dead aboveground main canopy C flux (Mg C ha^{-1} y^{-1}) in Urban Area is transferred to harvest pathways, which is prescribed in the input file (i.e., durable wood products and/or bioenergy).

[8]Dead aboveground main canopy C (Mg C ha^{-1} y^{-1}) in Forest is transferred to dead pools according to the following:

Standing dead: $\boldsymbol{dC_{standing\ dead} = 0.66 \cdot M_{above}}$, where $\boldsymbol{dC_{standing\ dead}}$ is the annual accumulation of carbon in the standing dead pool (Mg C ha^{-1} y^{-1}), 0.66 is the constant fraction of main canopy stem (bole) relative to total aboveground main canopy (fraction), $\boldsymbol{M_{above}}$ is the total dead carbon lost from aboveground main canopy (Mg C ha^{-1} y^{-1});

Down dead: $\boldsymbol{dC_{down\ dead} = \frac{D_{down}}{D_{down}+D_{litter}} \cdot 0.44 \cdot M_{above}}$, where $\boldsymbol{dC_{down\ dead}}$ is the annual accumulation of carbon in the down dead pool (Mg C ha^{-1} y^{-1}), $\frac{\boldsymbol{D_{down}}}{\boldsymbol{D_{down}+D_{litter}}}$is the fraction of down dead carbon density relative to down dead and litter, 0.44 is the constant fraction of main canopy leaf, bark, and branch relative to total aboveground main canopy (fraction), $\boldsymbol{M_{above}}$ is the total dead carbon lost from aboveground main canopy (Mg C ha^{-1} y^{-1});

Litter: $\boldsymbol{dC_{litter} = \frac{D_{litter}}{D_{down}+D_{litter}} \cdot 0.44 \cdot M_{above}}$, where dC_{litter} is the annual accumulation of carbon in the litter pool (Mg C ha^{-1} y^{-1}), $\frac{\boldsymbol{D_{litter}}}{\boldsymbol{D_{down}+D_{litter}}}$ is the fraction of litter carbon density relative to down dead and litter, 0.44 is the constant fraction of main canopy leaf, bark, and branch relative to total aboveground main canopy (fraction), $\boldsymbol{M_{above}}$ is the total dead carbon lost from aboveground main canopy (Mg C ha^{-1} y^{-1}).

[9]Doubled mortality from 2015 to 2024 to represent ongoing die-off of trees due to insects and drought.

Appendix D: Grassland, Savanna, Woodland, and Cultivated land management enhancement factors for soil C exchange. The baseline soil C exchange rates (Appendix B) are multiplied by the following factors to calculate the new annual values under management. Benefits are applied for each year of management in the areas managed by the specific practice.

Parameter	Region	Landtype	Ownership	Agricultural Management Soil C Enhancement Factors (fraction)			Source
				Soil Conservation	Rangeland Compost		
					Low frequency	Medium Frequency	
Net soil carbon exchange	All	Grassland, Savanna, Woodland	All	NA	0.94[1]	0.77[2]	Ryals et al., 2015
	Non-Delta	Cultivated	All	3.11 (range: 0.79 to 5.42)[3,4]	NA	NA	Mitchell et al., 2015; Wu et al., 2008; Kong et al., 2005; Wu et al., 2008
	Delta	Cultivated	All	0.86 (range: 1.77 to -0.05)[3,5,6]	NA	NA	Hatala et al., 2012, and Knox et al., 2015; Mitchell et al., 2015; Wu et al., 2008; Kong et al., 2005; Wu et al., 2008

[1]Reduces baseline soil carbon emissions by a factor of 0.06.

[2]Reduces baseline soil carbon emissions by a factor of 0.23.

[3]Uncertainty range is calculated as follows:

$Range = \frac{Mean_{managed} \pm SD_{managed}}{Mean_{baseline}}$, where *Range* is the uncertainty range; $Mean_{managed}$ and $Mean_{baseline}$ are the mean annual soil C fluxes (Mg C ha^{-1} y^{-1}) under soil conservation management and no management (baseline), respectively; and $SD_{managed}$ is the standard deviation soil C flux (Mg C ha^{-1} y^{-1}) under soil conservation management.

[4]Uncertainty in the managed soil conservation flux ranges from a *reduction* of baseline soil carbon accumulation by a factor of 0.21 to an *increase* in baseline soil carbon accumulation by a factor of 4.42.

[5]Uncertainty in the managed soil conservation flux ranges from an *increase* in baseline soil carbon emissions by a factor of 0.77 to a *reduction* in baseline soil carbon emissions by a factor of 1.05.

[6]Mean soil C flux under soil conservation is based on the absolute average benefit of soil conservation in non-Delta regions (0.40 ± 0.2 Mg C ha^{-1} y^{-1}) due to lack of data, while the uncertainty range is based on the propagated errors of the non-Delta benefit and Delta baseline soil C flux (-2.82±2.51 Mg C ha^{-1} y^{-1}).

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
Central Coast							
Net vegetation C exchange (sans mortality)	U.S. Bureau of Land Management	1	7.01	7.01	7.01	7.01	Christensen et al., 2017
	U.S. Department of Defense	1	7.01	7.01	7.01	7.01	
	Conservation Easement Protected	1	1.65	1.65	1.65	1.65	
	Local Government	1	1.16	1.16	1.16	1.16	
	National Park Service	1	7.01	7.01	7.01	7.01	
	Other Federal	1	2.08	2.08	2.08	2.08	
	Private	1	1.5	1.5	1.5	1.5	
	State Government	1	1.16	1.16	1.16	1.16	
	USDA Forest Service (non-wilderness)	1	4.11	4.11	4.11	4.11	
Net soil C exchange (sans mortality)	All	1	1	1	1	1	Due to lack of data no effect is assumed.
Mortality fraction	U.S. Bureau of Land Management	1	0.32	0.32	0.32	0.32	Christensen et al., 2017
	U.S. Department of Defense	1	0.32	0.32	0.32	0.32	
	Conservation Easement Protected	1	0.55	0.55	0.55	0.55	
	Local Government	1	0.96	0.96	0.96	0.96	
	National Park Service	1	0.32	0.32	0.32	0.32	
	Other Federal	1	0.6	0.6	0.6	0.6	
	Private	1	0.96	0.96	0.96	0.96	

[1] Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
Central Coast (Cont.)							
Mortality fraction	State Government	1	0.17	0.17	0.17	0.17	Christensen et al., 2017
	USDA Forest Service (non-wilderness)	0.32	0.84	0.76	0.84	0.84	
High severity wildfire fraction	All	0.87	1.1	1.3	1.1	1.1	Lyderson et al., 2017
Medium severity wildfire fraction	All	1.94	1.19	0.94	1.19	1.19	
Low severity wildfire fraction	All	1	7.01	7.01	7.01	7.01	
Central Valley							
Net vegetation C exchange (sans mortality)	U.S. Bureau of Land Management	1	1	1	1	1	Christensen et al., 2017
	U.S. Department of Defense	1	1	1	1	1	
	Conservation Easement Protected	1	1	1	1	1	
	Local Government	1	1.59	1.59	1.59	1.59	
	Other Federal	1	2.08	2.08	2.08	2.08	
	Private	1	1.1	1.1	1.1	1.1	
	State Government	1	1.59	1.59	1.59	1.59	
Net soil C exchange (sans mortality)	All	1	1	1	1	1	Due to lack of data no effect is assumed.
Mortality fraction	U.S. Bureau of Land Management	1	1	1	1	1	Christensen et al., 2017
	U.S. Department of Defense	1	1	1	1	1	

[1]Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
Central Valley (Cont.)[3]							
Mortality fraction	Conservation Easement Protected	1	0.9	0.9	0.9	0.9	Christensen et al., 2017
	Local Government	1	69.99	69.99	69.99	69.99	
	Other Federal	1	0.43	0.43	0.43	0.43	
	Private	1	1	1	1	1	
	State Government	1	69.99	69.99	69.99	69.99	
High severity wildfire fraction	All	0.32	0.84	0.76	0.84	0.84	Lyderson et al., 2017
Medium severity wildfire fraction	All	0.87	1.1	1.3	1.1	1.1	
Low severity wildfire fraction	All	1.94	1.19	0.94	1.19	1.19	
Delta							
Net vegetation C exchange (sans mortality)	U.S. Bureau of Land Management	1	1	1	1	1	Christensen et al., 2017
	U.S. Department of Defense	1	1	1	1	1	
	Conservation Easement Protected	1	1	1	1	1	
	Local Government	1	1.59	1.59	1.59	1.59	
	Other Federal	1	2.08	2.08	2.08	2.08	
	Private	1	1.1	1.1	1.1	1.1	
	State Government	1	1.59	1.59	1.59	1.59	
Delta (Cont.)							

[1]Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
Net soil C exchange (sans mortality)	All	1	1	1	1	1	Due to lack of data no effect is assumed.
Mortality fraction	U.S. Bureau of Land Management	1	1	1	1	1	Christensen et al., 2017
	U.S. Department of Defense	1	1	1	1	1	
	Conservation Easement Protected	1	0.9	0.9	0.9	0.9	
	Local Government	1	69.99	69.99	69.99	69.99	
	Other Federal	1	1	1	1	1	
	Private	1	69.99	69.99	69.99	69.99	
	State Government	1	69.99	69.99	69.99	69.99	
High severity wildfire fraction	All	0.32	0.84	0.76	0.84	0.84	Lyderson et al., 2017
Medium severity wildfire fraction	All	0.87	1.1	1.3	1.1	1.1	
Low severity wildfire fraction	All	1.94	1.19	0.94	1.19	1.19	
Deserts							
Net vegetation C exchange (sans mortality)	U.S. Bureau of Land Management	1	6.42	6.42	6.42	6.42	Christensen et al., 2017
	U.S. Department of Defense	1	6.42	6.42	6.42	6.42	
	Conservation Easement Protected	1	1	1	1	1	
	Local Government	1	0.77	0.77	0.77	0.77	
	National Park Service	1	6.42	6.42	6.42	6.42	

[1] Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
Deserts (Cont.)							
Net vegetation C exchange (sans mortality)	Other Federal	1	2.08	2.08	2.08	2.08	Christensen et al., 2017
	Private	1	1.2	1.2	1.2	1.2	
	State Government	1	0.77	0.77	0.77	0.77	
	USDA Forest Service (non-wilderness)	1	0.49	0.49	0.49	0.49	
Net soil C exchange (sans mortality)	All	1	1	1	1	1	Due to lack of data no effect is assumed.
Mortality fraction	U.S. Bureau of Land Management	1	0.26	0.26	0.26	0.26	Christensen et al., 2017
	U.S. Department of Defense	1	0.26	0.26	0.26	0.26	
	Conservation Easement Protected	1	1	1	1	1	
	Local Government	1	0.39	0.39	0.39	0.39	
	National Park Service	1	0.26	0.26	0.26	0.26	
	Other Federal	1	0.43	0.43	0.43	0.43	
	Private	1	1.08	1.08	1.08	1.08	
	State Government	1	0.39	0.39	0.39	0.39	
	USDA Forest Service (non-wilderness)	1	0.25	0.25	0.25	0.25	
High severity wildfire fraction	All	0.32	0.84	0.76	0.84	0.84	Lyderson et al., 2017

[1]Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
Deserts (Cont.)							
Medium severity wildfire fraction	All	0.87	1.1	1.3	1.1	1.1	Lyderson et al., 2017
Low severity wildfire fraction	All	1.94	1.19	0.94	1.19	1.19	
Eastside							
Net vegetation C exchange (sans mortality)	U.S. Bureau of Land Management	1	9.79	9.79	9.79	9.79	Christensen et al., 2017
	U.S. Department of Defense	1	9.79	9.79	9.79	9.79	
	Conservation Easement Protected	1	3.93	3.93	3.93	3.93	
	Local Government	1	1.5	1.5	1.5	1.5	
	National Park Service	1	9.79	9.79	9.79	9.79	
	Other Federal	1	2.08	2.08	2.08	2.08	
	Private	1	1.63	1.63	1.63	1.63	
	State Government	1	1.5	1.5	1.5	1.5	
	USDA Forest Service (non-wilderness)	1	2.65	2.65	2.65	2.65	
Net soil C exchange (sans mortality)	All	1	1	1	1	1	Due to lack of data no effect is assumed.
Mortality fraction	U.S. Bureau of Land Management	1	13.84	13.84	13.84	13.84	Christensen et al., 2017
	U.S. Department of Defense	1	13.84	13.84	13.84	13.84	
	Conservation Easement Protected	1	9.52	9.52	9.52	9.52	
	Local Government	1	84.96	84.96	84.96	84.96	

[1]Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
Eastside (Cont.)							
	National Park Service	1	13.84	13.84	13.84	13.84	
	Other Federal	1	0.43	0.43	0.43	0.43	
	Private	1	1.64	1.64	1.64	1.64	
	State Government	1	84.96	84.96	84.96	84.96	
	USDA Forest Service (non-wilderness)	1	3.31	3.31	3.31	3.31	
High severity wildfire fraction	All	0.32	0.84	0.76	0.84	0.84	Lyderson et al., 2017
Medium severity wildfire fraction	All	0.87	1.1	1.3	1.1	1.1	
Low severity wildfire fraction	All	1.94	1.19	0.94	1.19	1.19	
Klamath							
Net vegetation C exchange (sans mortality)	U.S. Bureau of Land Management	1	1.1	1.1	1.1	1.1	Christensen et al., 2017
	U.S. Department of Defense	1	1.1	1.1	1.1	1.1	
	Conservation Easement Protected	1	1.39	1.39	1.39	1.39	
	Local Government	1	2.42	2.42	2.42	2.42	
	National Park Service	1	1.1	1.1	1.1	1.1	
	Other Federal	1	2.08	2.08	2.08	2.08	
	Private	1	1.21	1.21	1.21	1.21	
	State Government	1	2.42	2.42	2.42	2.42	

[1]Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

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Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
Klamath (Cont.)							
Net vegetation C exchange (sans mortality)	USDA Forest Service (non-wilderness)	1	1.27	1.27	1.27	1.27	Christensen et al., 2017
Net soil C exchange (sans mortality)	All	1	1	1	1	1	Due to lack of data no effect is assumed.
Mortality fraction	U.S. Bureau of Land Management	1	1.03	1.03	1.03	1.03	Christensen et al., 2017
	U.S. Department of Defense	1	1.03	1.03	1.03	1.03	
	Conservation Easement Protected	1	1.45	1.45	1.45	1.45	
	Local Government	1	0.53	0.53	0.53	0.53	
	National Park Service	1	1.03	1.03	1.03	1.03	
	Other Federal	1	0.43	0.43	0.43	0.43	
	Private	1	1.23	1.23	1.23	1.23	
	State Government	1	0.53	0.53	0.53	0.53	
	USDA Forest Service (non-wilderness)	1	0.78	0.78	0.78	0.78	
High severity wildfire fraction	All	0.32	0.84	0.76	0.84	0.84	Lyderson et al., 2017
Medium severity wildfire fraction	All	0.87	1.1	1.3	1.1	1.1	
Low severity wildfire fraction	All	1.94	1.19	0.94	1.19	1.19	

[1]Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
North Coast							
Net vegetation C exchange (sans mortality)	U.S. Bureau of Land Management	1	1.08	1.08	1.08	1.08	Christensen et al., 2017
	U.S. Department of Defense	1	1.08	1.08	1.08	1.08	
	Conservation Easement Protected	1	1.36	1.36	1.36	1.36	
	Local Government	1	0.93	0.93	0.93	0.93	
	National Park Service	1	1.08	1.08	1.08	1.08	
	Other Federal	1	2.08	2.08	2.08	2.08	
	Private	1	1.14	1.14	1.14	1.14	
	State Government	1	0.93	0.93	0.93	0.93	
	USDA Forest Service (non-wilderness)	1	0.7	0.7	0.7	0.7	
Net soil C exchange (sans mortality)	All	1	1	1	1	1	Due to lack of data no effect is assumed.
Mortality fraction	U.S. Bureau of Land Management	1	1.19	1.19	1.19	1.19	Christensen et al., 2017
	U.S. Department of Defense	1	1.19	1.19	1.19	1.19	
	Conservation Easement Protected	1.1	1.1	1.1	1.1	1	
	Local Government	0.5	0.5	0.5	0.5	1	
	National Park Service	1.19	1.19	1.19	1.19	1	
	Other Federal	0.43	0.43	0.43	0.43	1	
	Private	1.04	1.04	1.04	1.04	1	
	State Government	0.5	0.5	0.5	0.5	1	

[1]Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
North Coast (Cont.)							
Mortality fraction	USDA Forest Service (non-wilderness)	0.53	0.53	0.53	0.53	1	Christensen et al., 2017
High severity wildfire fraction	All	0.84	0.76	0.84	0.84	0.32	Lyderson et al., 2017
Medium severity wildfire fraction	All	1.1	1.3	1.1	1.1	0.87	
Low severity wildfire fraction	All	1.19	0.94	1.19	1.19	1.94	
Sierra Cascades							
Net vegetation C exchange (sans mortality)	U.S. Bureau of Land Management	1	2.25	2.25	2.25	2.25	Christensen et al., 2017
	U.S. Department of Defense	1	2.25	2.25	2.25	2.25	
	Conservation Easement Protected	1	2.79	2.79	2.79	2.79	
	Local Government	1	1.32	1.32	1.32	1.32	
	National Park Service	1	2.25	2.25	2.25	2.25	
	Other Federal	1	2.08	2.08	2.08	2.08	
	Private	1	1.6	1.6	1.6	1.6	
	State Government	1	1.32	1.32	1.32	1.32	
	USDA Forest Service (non-wilderness)	1	1.37	1.37	1.37	1.37	
Net soil C exchange (sans mortality)	All	1	1	1	1	1	Due to lack of data no effect is assumed.

[1] Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
Sierra Cascades (Cont.)							
Mortality fraction	U.S. Bureau of Land Management	1	0.93	0.93	0.93	0.93	Christensen et al., 2017
	U.S. Department of Defense	1	0.93	0.93	0.93	0.93	
	Conservation Easement Protected	1	1.2	1.2	1.2	1.2	
	Local Government	1	1.97	1.97	1.97	1.97	
	National Park Service	1	0.93	0.93	0.93	0.93	
	Other Federal	1	0.43	0.43	0.43	0.43	
	Private	1	1.09	1.09	1.09	1.09	
	State Government	1	1.97	1.97	1.97	1.97	
	USDA Forest Service (non-wilderness)	1	0.64	0.64	0.64	0.64	
High severity wildfire fraction	All	0.32	0.84	0.76	0.84	0.84	Lyderson et al., 2017
Medium severity wildfire fraction	All	0.87	1.10	1.3	1.10	1.10	
Low severity wildfire fraction	All	1.94	1.19	0.94	1.19	1.19	
South Coast							
Net vegetation C exchange (sans mortality)	U.S. Bureau of Land Management	1	6.42	6.42	6.42	6.42	Christensen et al., 2017

[1]Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
South Coast (Cont.)							
Net vegetation C exchange (sans mortality)	U.S. Department of Defense	1	6.42	6.42	6.42	6.42	Christensen et al., 2017
	Conservation Easement Protected	1	1	1	1	1	
	Local Government	1	0.77	0.77	0.77	0.77	
	National Park Service	1	6.42	6.42	6.42	6.42	
	Other Federal	1	2.08	2.08	2.08	2.08	
	Private	1	1.2	1.2	1.2	1.2	
	State Government	1	0.77	0.77	0.77	0.77	
	USDA Forest Service (non-wilderness)	1	0.49	0.49	0.49	0.49	
Net soil C exchange (sans mortality)	All	1	1	1	1	1	Due to lack of data no effect is assumed.
Mortality fraction	U.S. Bureau of Land Management	1	0.26	0.26	0.26	0.26	Christensen et al., 2017
	U.S. Department of Defense	1	0.26	0.26	0.26	0.26	
	Conservation Easement Protected	1	1	1	1	1	
	Local Government	1	0.39	0.39	0.39	0.39	
	National Park Service	1	0.26	0.26	0.26	0.26	
	Other Federal	1	0.43	0.43	0.43	0.43	
	Private	1	1.08	1.08	1.08	1.08	
	State Government	1	0.39	0.39	0.39	0.39	
	USDA Forest Service (non-wilderness)	1	0.25	0.25	0.25	0.25	

[1]Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix E: Forest management enhancement/reduction factors for vegetation and soil C exchange (sans mortality), mortality fractions, and wildfire severity. The baseline C exchange rates (Appendix B), baseline mortality fractions (Appendix C), and baseline wildfire severity fractions are multiplied by the following factors to calculate the new annual values. Benefits are applied for 20 years for each year of management in the areas managed by the specific practice. Parameter factors equal to 1 indicate the management practice has no effect (assumed due to lack of data), while >1 and <1 indicate an enhancement and reduction, respectively.

Parameter	Ownership	Forest Management[1] Enhancement/Reduction Factors (fraction)					Source
		Fuel reduction practices			Harvest practices		
		Prescribed Burn	Thinning	Understory treatment	Clear cut	Partial cut	
South Coast (Cont.)							
High severity wildfire fraction	All	0.32	0.84	0.76	0.84	0.84	Lyderson et al., 2017
Medium severity wildfire fraction	All	1.94	1.19	0.94	1.19	1.19	
Low severity wildfire fraction	All	0.87	1.1	1.3	1.1	1.1	

[1]Not all management practices presented; afforestation and reforestation are assigned a value of 1 for all parameters (no effect), and high and medium level extra slash utilization paired with any of the fuel reduction or harvest activities are identical to the practice without extra slash utilization.

Appendix F1: Forest biomass carbon transfer fractions due to harvest. The carbon transfers are fractions of the pool specified by the parameter and occur in the areas managed by the specific practice in the same year management occurs. These values apply across Forests in all regions and ownerships.

Parameter	Harvest						Source
	Partial cut			Clear cut			
	Extra Slash Utilization			Extra Slash Utilization			
	None	Medium	High	None	Medium	High	
Aboveground Main Canopy & Standing Dead[1] to Harvest	0.2	0.2	0.2	0.66	0.66	0.66	Stewart and Nakamura, 2012; Saah et al., 2016; and Battles et al., 2014 (Harvest); Gonzalez et al., 2015 (Conversion)
Harvest to Wood	0.2	0.2	0.2	0.63	0.63	0.63	Stewart and Nakamura, 2012 (Harvest)
Harvest to Energy	0.75	0.75	0.75	0.32	0.32	0.32	
Harvest to Sawmill Decay	0.01	0.01	0.01	0.01	0.01	0.01	
Harvest to Slash	0.04	0.04	0.04	0.04	0.04	0.04	
Understory to Slash	0.7	0.7	0.7	0.9	0.9	0.9	Based on expert opinion due to lack of available data (Harvest)
Down Dead to Slash	0.42	0.42	0.42	0.62	0.62	0.62	Dore et al., 2016 (Harvest)
Litter to Slash	0.42	0.42	0.42	0.62	0.62	0.62	Stewart and Nakamura, 2012 (Harvest)
Slash to Energy	0	0.125	0.25	0	0.125	0.25	"None" extra slash utilization based on expert opinion (Harvest and Conversion). Medium and high extra slash utilization are aspirational, exploratory values and not based on feasibility (Harvest).
Slash to Wood	0	0.125	0.25	0	0.125	0.25	
Slash to Burning	0.25	0	0	0.25	0	0	
Slash to Decay	0.75	0.75	0.5	0.75	0.75	0.5	
Aboveground Main Canopy to Standing Dead	0	0	0	0	0	0	Based on expert opinion due to lack of available data (Harvest)
Understory to Down Dead	0.3	0.3	0.3	0.1	0.1	0.1	Based on expert opinion due to lack of available data (Harvest)
Soil Decay to Atmosphere	0.13	0.13	0.13	0.2	0.2	0.2	Birdsey et al., 2002 (Harvest); Davidson et al., 1993 (Conversion)
Belowground Main Canopy Decay to Atmosphere	0.03[4]	0.03[4]	0.03[4]	0.13[4]	0.13[4]	0.13[4]	Birdsey et al., 2002 (Harvest); Based on personal communication with Bruce Gwynne (Conversion)
Belowground Main Canopy Decay to Soil	0.17[4,5]	0.17[4,5]	0.17[4,5]	0.53[4,5]	0.53[4,5]	0.53[4,5]	

[1]Standing dead assumed to have same fraction harvested as aboveground main canopy

[2]Based on assumption that all landscape vegetation is removed when forest is converted to Urban Area or Cultivated Land, and that the harvested aboveground main canopy and standing dead biomass is utilized for wood and bioenergy in the same proportions as clear cut.

[3]Assumed that all removed vegetation that is not utilized as wood products or bioenergy is immediately lost to decay.

[4]Total loss of belowground main canopy (to atmosphere and to soil) is based on the transfer fractions for aboveground main canopy, while the partitioning to atmosphere and soil is based on Birdsey et al., 2002.

[5]The loss to soil is subtracted from roots but not added to soil, as it is assumed to be implicit in the baseline net soil C flux.

Appendix F2: Forest biomass carbon transfer fractions due to fuel reduction activities. The carbon transfers are fractions of the pool specified by the parameter and occur in the areas managed by the specific practice in the same year management occurs. These values apply across Forests in all regions and ownerships.

Parameter	Fuel Reduction Practices									Source
	Prescribed Burn			Thinning			Understory Treatment			
	Extra Slash Utilization			Extra Slash Utilization			Extra Slash Utilization			
	None	Medium	High	None	Medium	High	None	Medium	High	
Aboveground Main Canopy & Standing Dead to Harvest	0	0	0	0.2	0.2	0.2	0	0	0	Prescribed burn and understory treatment do not involve harvest. Thinning is assigned same values as partial cut (Appendix F1).
Harvest to Wood	0	0	0	0.2	0.2	0.2	0	0	0	
Harvest to Energy	0	0	0	0.75	0.75	0.75	0	0	0	
Harvest to Sawmill Decay	0	0	0	0.01	0.01	0.01	0	0	0	
Harvest to Slash	0	0	0	0.04	0.04	0.04	0	0	0	
Understory to Slash	0.55	0.55	0.55	0.7	0.7	0.7	0.5	0.5	0.5	Pearson et al., 2009 (prescribed burn); Thinning is assigned same values as partial cut (Appendix F1); Understory treatment based on expert opinion.
Down Dead to Slash	0.53	0.53	0.53	0.42	0.42	0.42	0	0	0	Wiechmann et al., 2015; (prescribed burn) Thinning is assigned same values as partial cut (Appendix F1); Understory based on expert opinion.
Litter to Slash	0.6	0.6	0.6	0.42	0.42	0.42	0	0	0	
Slash to Energy	0	0.125	0.25	0	0.125	0.25	0	0.125	0.25	"None" extra slash utilization based on expert opinion. Medium and high extra slash utilization are aspirational, exploratory values and not based on feasibility.
Slash to Wood	0	0.125	0.25	0	0.125	0.25	0	0.125	0.25	
Slash to Burning	1	0.75	0.5	0.25	0	0	0.25	0	0	
Slash to Decay	0	0	0	0.75	0.75	0.5	0.75	0.75	0.5	
Aboveground Main Canopy to Standing Dead	0.03	0.03	0.03	0	0	0	0	0	0	Prescribed burn is based on Wiechmann et al., 2015; Thinning is assigned same values as partial cut (Appendix F1); Understory treatment based on expert opinion.

Appendix F2: Forest biomass carbon transfer fractions due to fuel reduction activities. The carbon transfers are fractions of the pool specified by the parameter and occur in the areas managed by the specific practice in the same year management occurs. These values apply across Forests in all regions and ownerships.

Parameter	Fuel Reduction Practices									Source
	Prescribed Burn			Thinning			Understory Treatment			
	Extra Slash Utilization			Extra Slash Utilization			Extra Slash Utilization			
	None	Medium	High	None	Medium	High	None	Medium	High	
Understory to Down Dead	0.45	0.45	0.45	0.3	0.3	0.3	0.5	0.5	0.5	Prescribed burn is based on medium intensity fire from Pearson et al., 2009; Thinning is assigned same values as partial cut (Appendix F1); Understory treatment based on expert opinion.
Soil Decay to Atmosphere	0	0	0	0.13	0.13	0.13	0	0	0	Thinning is assigned same values as partial cut (Appendix F1); Prescribed burn and understory treatment based on expert opinion.
Belowground Main Canopy Decay to Atmosphere	0	0	0	0.03	0.03	0.03	0	0	0	Thinning is assigned same values as partial cut (Appendix F1); Prescribed burn and understory treatment based on expert opinion.
Belowground Main Canopy Decay to Soil	0	0	0	0.17	0.17	0.17	0	0	0	

Appendix F3: Forest biomass carbon transfer fractions due to conversion to Cultivated Land or Urban Area. These are the fractions of carbon moved from one pool to another, to wood products, or to the atmosphere via decay, burning, or bioenergy. The transfers occur in the areas converted during the same year of conversion. These values apply across all regions and ownerships.

Parameter	Dead removal from conversion	Source
Aboveground Main Canopy & Standing Dead to Harvest	1	Stewart and Nakamura, 2012; Saah et al., 2016, and Battles et al., 2014 (aboveground main canopy). Standing dead assumed to be the same fraction as above main canopy.
Harvest to Wood	0.2	Stewart and Nakamura, 2012
Harvest to Energy	0.75	
Harvest to Sawmill Decay	0.01	
Harvest to Slash	0.04	
Understory to Slash	0.7	Based on expert opinion.
Down Dead to Slash	0.42	Dore et al., 2016
Litter to Slash	0.42	Stewart and Nakamura, 2012
Slash to Energy	0	"None" extra slash utilization based on expert opinion. Medium and high extra slash utilization is aspirational, exploratory values and not based on feasibility.
Slash to Wood	0	
Slash to Burning	0.25	
Slash to Decay	0.75	
Aboveground Main Canopy to Standing Dead	0	Based on expert opinion.
Understory to Down Dead	0.3	Based on expert opinion.
Soil Decay to Atmosphere	0.13	Birdsey et al., 2002
Belowground Main Canopy Decay to Atmosphere	0.03	Total belowground loss based on transfer fractions for aboveground main canopy, while the partitioning to atmosphere and soil is based on Birdsey et al., 2002. The loss to soil is not added to soil, as it is assumed to be implicit in the baseline net soil C flux.