APPENDIX 3

Shading Coefficients

The shading coefficient formula is derived from McPherson et al. (2018). The shading coefficient (y) is based species-specific coefficients (Table 11) and d.b.h., based on the formula:

$$y = 0.0617 * \ln(x) + 0.615 + \text{species-specific shading coefficient}$$

Where: x = d.b.h in cm.

Table 11.—Species-specific shading coefficients

Species	Coefficient	Species	Coefficient
<i>Acacia farnesiana</i>	0.006476	<i>Cocos nucifera</i>	-0.212762
<i>Acacia melanoxylon</i>	0.033203	<i>Conocarpus erectus</i>	-0.064823
<i>Acacia salicina</i>	0.036297	<i>Cordia subcordata</i>	-0.034285
<i>Acer macrophyllum</i>	0.007330	<i>Cornus florida</i>	-0.041082
<i>Acer negundo</i>	0.013600	<i>Crataegus</i> spp.	0.005855
<i>Acer palmatum</i>	0.019860	<i>Crataegus x lavalleyi</i>	-0.044633
<i>Acer platanoides</i>	0.038195	<i>Cupaniopsis anacardioides</i>	-0.032094
<i>Acer rubrum</i>	0.009591	<i>Delonix regia</i>	-0.108310
<i>Acer saccharinum</i>	0.017403	<i>Elaeagnus angustifolia</i>	-0.000679
<i>Acer saccharum</i>	0.024004	<i>Elaeodendron orientale</i>	-0.021490
<i>Bauhinia blakeana</i>	-0.148861	<i>Eriobotrya japonica</i>	-0.031987
<i>Betula nigra</i>	0.018711	<i>Eucalyptus ficifolia</i>	0.008154
<i>Betula pendula</i>	0.001379	<i>Eucalyptus globulus</i>	-0.013452
<i>Brachychiton populneus</i>	0.001286	<i>Eucalyptus microtheca</i>	-0.005495
<i>Callistemon citrinus</i>	-0.000129	<i>Eucalyptus sideroxylon</i>	0.004389
<i>Calocedrus decurrens</i>	0.030777	<i>Fagus sylvatica</i>	0.007078
<i>Calophyllum inophyllum</i>	-0.066124	<i>Ficus benjamina</i>	-0.005748
<i>Carpinus betulus</i>	0.064152	<i>Ficus thonningii</i>	0.019105
<i>Carya illinoensis</i>	-0.015547	<i>Filicium decipiens</i>	0.036698
<i>Cassia x nealiae</i>	-0.052799	<i>Fraxinus americana</i>	0.040826
<i>Casuarina equisetifolia</i>	-0.187445	<i>Fraxinus angustifolia</i>	0.055648
<i>Catalpa speciosa</i>	0.008864	<i>Fraxinus excelsior</i>	0.039979
<i>Cedrus deodara</i>	-0.021595	<i>Fraxinus holotricha</i>	0.021817
<i>Celtis laevigata</i>	-0.007073	<i>Fraxinus latifolia</i>	0.017034
<i>Celtis occidentalis</i>	0.018599	<i>Fraxinus pennsylvanica</i>	0.031117
<i>Celtis sinensis</i>	0.025890	<i>Fraxinus uhdei</i>	-0.006909
<i>Ceratonia siliqua</i>	-0.020249	<i>Fraxinus velutina</i>	0.001310
<i>Chilopsis linearis</i>	0.006679	<i>Ginkgo biloba</i>	-0.014228
<i>Cinnamomum camphora</i>	0.017635	<i>Gleditsia triacanthos</i>	-0.009429
<i>Citharexylum spinosum</i>	-0.042121	<i>Gymnocladus dioica</i>	0.048339

Appendix 3 (<https://doi.org/10.2737/NRS-GTR-200-2021-Appendix3>) in: Nowak, David J. 2021. Understanding i-Tree: Summary of programs and methods. Gen. Tech. Rep. NRS-200-2021. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. 100 p. [plus 14 appendixes]. <https://doi.org/10.2737/NRS-GTR-200-2021>.

Table 11.—Continued

Species	Coefficient
<i>Ilex opaca</i>	0.030095
<i>Ilex paraguayensis</i>	-0.114463
<i>Jacaranda mimosifolia</i>	0.005707
<i>Juglans nigra</i>	0.003086
<i>Juniperus virginiana</i>	0.030798
<i>Koeleruteria elegans</i>	-0.016586
<i>Koeleruteria paniculata</i>	0.027350
<i>Lagerstroemia indica</i>	-0.014415
<i>Lagerstroemia</i> sp.	-0.076014
<i>Liquidambar styraciflua</i>	0.021253
<i>Liriodendron tulipifera</i>	0.027576
<i>Magnolia grandiflora</i>	0.006197
<i>Malus</i> sp.	-0.013821
<i>Melaleuca quinquenervia</i>	-0.045497
<i>Metrosideros excelsa</i>	0.035613
<i>Morus alba</i>	0.001130
<i>Olea europaea</i>	0.012154
<i>Parkinsonia aculeata</i>	-0.061333
<i>Parkinsonia florida</i>	-0.025384
<i>Phoenix canariensis</i>	-0.081700
<i>Phoenix dactylifera</i>	-0.175857
<i>Picea pungens</i>	0.023440
<i>Pinus brutia</i>	0.008550
<i>Pinus canariensis</i>	0.012044
<i>Pinus contorta</i>	0.012737
<i>Pinus echinata</i>	-0.039363
<i>Pinus edulis</i>	0.032428
<i>Pinus elliottii</i>	-0.059779
<i>Pinus halepensis</i>	0.017895
<i>Pinus nigra</i>	0.033034
<i>Pinus ponderosa</i>	0.040393
<i>Pinus radiata</i>	0.002821
<i>Pinus sylvestris</i>	0.014577
<i>Pinus taeda</i>	-0.015568
<i>Pinus thunbergii</i>	-0.010467
<i>Pistacia chinensis</i>	0.030910
<i>Pittosporum undulatum</i>	-0.004301
<i>Platanus occidentalis</i>	0.001356
<i>Platanus racemosa</i>	0.029835
<i>Platanus x acerifolia</i>	0.013500
<i>Platyclusus orientalis</i>	0.036982
<i>Podocarpus macrophyllus</i>	-0.036235
<i>Populus angustifolia</i>	0.018432
<i>Populus fremontii</i>	0.011781

Species	Coefficient
<i>Prosopis chilensis</i>	-0.050350
<i>Prunus caroliniana</i>	-0.000254
<i>Prunus cerasifera</i>	-0.002760
<i>Prunus serrulata</i>	-0.075394
<i>Prunus</i> sp.	0.011707
<i>Prunus yedoensis</i>	-0.023468
<i>Pseudotsuga menziesii</i>	-0.017942
<i>Pyrus calleryana</i>	0.028712
<i>Pyrus kawakamii</i>	-0.056219
<i>Quercus alba</i>	0.018694
<i>Quercus laurifolia</i>	-0.003916
<i>Quercus lobata</i>	0.000927
<i>Quercus macrocarpa</i>	0.028163
<i>Quercus nigra</i>	-0.006829
<i>Quercus palustris</i>	-0.011858
<i>Quercus phellos</i>	0.005547
<i>Quercus rubra</i>	0.022225
<i>Quercus shumardii</i>	0.009522
<i>Quercus agrifolia</i>	0.021636
<i>Quercus ilex</i>	0.024552
<i>Quercus virginiana</i>	-0.016080
<i>Rhus lancea</i>	-0.031603
<i>Robinia pseudoacacia</i>	-0.023624
<i>Samanea saman</i>	-0.048322
<i>Schinus molle</i>	0.027216
<i>Schinus terebinthifolia</i>	0.019735
<i>Sequoia sempervirens</i>	0.003386
<i>Swietenia mahogany</i>	-0.032240
<i>Tabebuia aurea</i>	-0.048674
<i>Tabebuia heterophylla</i>	-0.061165
<i>Tabebuia ochracea</i> ssp. <i>neochrysantha</i>	-0.081893
<i>Tilia americana</i>	0.043399
<i>Tilia cordata</i>	0.044529
<i>Triadica sebifera</i>	-0.031487
<i>Tristanopsis conferta</i>	-0.036760
<i>Ulmus alata</i>	-0.010829
<i>Ulmus americana</i>	-0.016822
<i>Ulmus parvifolia</i>	-0.024810
<i>Ulmus pumila</i>	0.009616
<i>Veitchia merrillii</i>	-0.105305
<i>Washingtonia filifera</i>	-0.144123
<i>Washingtonia robusta</i>	-0.085184
<i>Zelkova serrata</i>	0.016636