

Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Annual Energy Benefits of Public Trees by Species

10/24/2011

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total Standard Error (\$)	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	8.2	622	1,091.5	1,070	1,692 (N/A)	14.9	19.5	62.65
Sugar maple	5.6	427	773.8	758	1,185 (N/A)	13.8	13.7	47.41
Apple	2.4	185	369.7	362	548 (N/A)	12.7	6.3	23.81
Green ash	4.7	354	625.7	613	967 (N/A)	9.9	11.1	53.74
Norway maple	4.1	313	592.5	581	894 (N/A)	9.4	10.3	52.59
Pin oak	3.6	276	488.8	479	755 (N/A)	5.5	8.7	75.51
Red maple	1.2	91	169.0	166	257 (N/A)	4.4	3.0	32.14
American sycamore	2.7	204	379.8	372	576 (N/A)	4.4	6.6	71.99
Norway spruce	1.1	84	147.8	145	229 (N/A)	3.9	2.6	32.67
Northern red oak	1.0	78	142.1	139	217 (N/A)	3.3	2.5	36.20
Northern hackberry	1.7	125	243.0	238	363 (N/A)	2.8	4.2	72.67
American basswood	1.0	77	146.8	144	221 (N/A)	2.2	2.5	55.21
White ash	0.4	33	60.6	59	92 (N/A)	1.7	1.1	30.78
Ginkgo	0.4	34	62.9	62	96 (N/A)	1.7	1.1	31.84
Honeylocust	1.0	72	123.1	121	193 (N/A)	1.7	2.2	64.28
Eastern white pine	0.6	42	73.8	72	115 (N/A)	1.7	1.3	38.17
Amur maple	0.0	3	7.6	7	11 (N/A)	1.1	0.1	5.40
Black walnut	0.6	43	73.8	72	115 (N/A)	1.1	1.3	57.57
Other street trees	0.7	56	104.3	102	158 (N/A)	3.9	1.8	22.63
Citywide total	41.1	3,121	5,676.4	5,563	8,683 (N/A)	100.0	100.0	47.97

Table 2: Annual Stormwater Benefits

Annual Stormwater Benefits of Public Trees by Species

10/24/2011

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	105,874	2,869	(N/A)	14.9	24.4	106.27
Sugar maple	52,673	1,428	(N/A)	13.8	12.1	57.10
Apple	9,219	250	(N/A)	12.7	2.1	10.86
Green ash	41,458	1,124	(N/A)	9.9	9.5	62.42
Norway maple	35,578	964	(N/A)	9.4	8.2	56.72
Pin oak	44,525	1,207	(N/A)	5.5	10.3	120.67
Red maple	8,222	223	(N/A)	4.4	1.9	27.85
American sycamore	33,284	902	(N/A)	4.4	7.7	112.76
Norway spruce	24,054	652	(N/A)	3.9	5.5	93.13
Northern red oak	9,840	267	(N/A)	3.3	2.3	44.45
Northern hackberry	14,533	394	(N/A)	2.8	3.3	78.77
American basswood	13,292	360	(N/A)	2.2	3.1	90.06
White ash	4,002	108	(N/A)	1.7	0.9	36.15
Ginkgo	2,781	75	(N/A)	1.7	0.6	25.12
Honeylocust	9,146	248	(N/A)	1.7	2.1	82.63
Eastern white pine	13,813	374	(N/A)	1.7	3.2	124.79
Amur maple	137	4	(N/A)	1.1	0.0	1.86
Black walnut	5,408	147	(N/A)	1.1	1.2	73.29
Other street trees	6,622	179	(N/A)	3.9	1.5	25.64
Citywide total	434,460	11,775	(N/A)	100.0	100.0	65.05

Table 3: Annual Air Quality Benefits

Annual Air Quality Benefits of Public Trees by Species

10/24/2011

Species	Deposition (lb)				Total Depos. (\$)	Avoided (lb)				Total Avoided (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total (\$)	Standard Error	% of Total Trees	Avg. \$/tree
	O ₃	NO ₂	PM ₁₀	SO ₂		NO ₂	PM ₁₀	VOC	SO ₂								
Silver maple	16.8	2.9	8.5	0.7	91	38.7	5.7	5.4	37.1	242	-9.0	-34	106.8	300	(N/A)	14.9	11.10
Sugar maple	6.2	1.1	3.3	0.3	34	26.9	3.9	3.7	25.5	167	-5.0	-19	65.8	183	(N/A)	13.8	7.30
Apple	2.4	0.4	1.2	0.1	13	12.0	1.7	1.6	11.1	74	0.0	0	30.5	87	(N/A)	12.7	3.78
Green ash	4.1	0.7	2.2	0.2	23	22.2	3.2	3.1	21.2	138	0.0	0	56.8	161	(N/A)	9.9	8.94
Norway maple	6.9	1.2	3.4	0.3	37	20.0	2.9	2.8	18.7	124	-1.6	-6	54.5	155	(N/A)	9.4	9.11
Pin oak	8.3	1.4	4.2	0.4	45	17.3	2.5	2.4	16.5	108	-15.2	-57	37.7	96	(N/A)	5.5	9.58
Red maple	1.5	0.3	0.8	0.1	8	5.8	0.8	0.8	5.5	36	-0.6	-2	14.9	42	(N/A)	4.4	5.27
American sycamore	4.3	0.7	2.0	0.2	23	12.9	1.9	1.8	12.2	80	0.0	0	36.0	103	(N/A)	4.4	12.89
Norway spruce	2.9	0.6	2.3	0.4	19	5.2	0.8	0.7	5.0	33	-12.6	-47	5.2	4	(N/A)	3.9	0.58
Northern red oak	2.0	0.4	1.0	0.1	11	4.9	0.7	0.7	4.7	31	-2.9	-11	11.5	31	(N/A)	3.3	5.11
Northern hackberry	2.0	0.4	1.1	0.1	11	8.0	1.2	1.1	7.5	50	0.0	0	21.4	61	(N/A)	2.8	12.19
American basswood	2.0	0.3	1.0	0.1	11	4.9	0.7	0.7	4.6	30	-1.7	-6	12.6	35	(N/A)	2.2	8.74
White ash	0.4	0.1	0.2	0.0	2	2.1	0.3	0.3	2.0	13	0.0	0	5.3	15	(N/A)	1.7	5.03
Ginkgo	0.6	0.1	0.3	0.0	3	2.1	0.3	0.3	2.0	13	-0.2	-1	5.6	16	(N/A)	1.7	5.32
Honeylocust	1.7	0.3	0.8	0.1	9	4.5	0.7	0.6	4.3	28	-1.3	-5	11.7	32	(N/A)	1.7	10.79
Eastern white pine	1.7	0.3	1.3	0.2	11	2.6	0.4	0.4	2.5	16	-8.6	-32	0.9	-5	(N/A)	1.7	-1.58
Amur maple	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.2	1	0.0	0	0.5	1	(N/A)	1.1	0.71
Black walnut	0.6	0.1	0.3	0.0	3	2.7	0.4	0.4	2.6	17	0.0	0	7.0	20	(N/A)	1.1	9.95
Other street trees	1.1	0.2	0.6	0.1	6	3.6	0.5	0.5	3.4	22	-0.6	-2	9.3	26	(N/A)	3.9	3.71
Citywide total	65.7	11.3	34.4	3.3	362	196.6	28.6	27.3	186.3	1,224	-59.3	-222	494.1	1,363	(N/A)	100.0	7.53

Table 4: Annual Carbon Stored

Stored CO2 Benefits of Public Trees by Species

10/24/2011

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	363,891	2,729	(N/A)	14.9	24.5	101.08
Sugar maple	174,511	1,309	(N/A)	13.8	11.8	52.35
Apple	39,431	296	(N/A)	12.7	2.7	12.86
Green ash	133,367	1,000	(N/A)	9.9	9.0	55.57
Norway maple	112,445	843	(N/A)	9.4	7.6	49.61
Pin oak	222,212	1,667	(N/A)	5.5	15.0	166.66
Red maple	18,173	136	(N/A)	4.4	1.2	17.04
American	139,208	1,044	(N/A)	4.4	9.4	130.51
Norway spruce	31,694	238	(N/A)	3.9	2.1	33.96
Northern red oak	43,328	325	(N/A)	3.3	2.9	54.16
Northern	28,521	214	(N/A)	2.8	1.9	42.78
American	77,110	578	(N/A)	2.2	5.2	144.58
White ash	9,678	73	(N/A)	1.7	0.7	24.19
Ginkgo	8,880	67	(N/A)	1.7	0.6	22.20
Honeylocust	22,025	165	(N/A)	1.7	1.5	55.06
Eastern white pine	22,471	169	(N/A)	1.7	1.5	56.18
Amur maple	356	3	(N/A)	1.1	0.0	1.33
Black walnut	19,445	146	(N/A)	1.1	1.3	72.92
Other street trees	8,510	141	(N/A)	3.9	1.3	20.10
Citywide total	1,485,507	11,141	(N/A)	100.0	100.0	61.55

Table 5: Annual Carbon Sequestered

Annual CO₂ Benefits of Public Trees by Species

10/24/2011

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	30,634	230	-1,747	-5	-13	13,743	103	42,625	320(N/A)	14.9	25.6	11.84
Sugar maple	11,204	84	-838	-5	-6	9,433	71	19,795	148(N/A)	13.8	11.9	5.94
Apple	3,832	29	-189	-4	-1	4,096	31	7,734	58(N/A)	12.7	4.7	2.52
Green ash	10,768	81	-640	-4	-5	7,827	59	17,952	135(N/A)	9.9	10.8	7.48
Norway maple	6,507	49	-540	-3	-4	6,924	52	12,888	97(N/A)	9.4	7.8	5.69
Pin oak	16,356	123	-1,067	-2	-8	6,101	46	21,388	160(N/A)	5.5	12.9	16.04
Red maple	2,398	18	-87	-2	-1	2,021	15	4,331	32(N/A)	4.4	2.6	4.06
American sycamore	6,863	51	-668	-2	-5	4,503	34	10,696	80(N/A)	4.4	6.4	10.03
Norway spruce	1,449	11	-152	-1	-1	1,854	14	3,149	24(N/A)	3.9	1.9	3.37
Northern red oak	1,185	9	-208	-1	-2	1,723	13	2,700	20(N/A)	3.3	1.6	3.37
Northern hackberry	2,061	15	-137	-1	-1	2,768	21	4,691	35(N/A)	2.8	2.8	7.04
American basswood	4,129	31	-370	-1	-3	1,701	13	5,459	41(N/A)	2.2	3.3	10.23
White ash	1,092	8	-46	-1	0	729	5	1,774	13(N/A)	1.7	1.1	4.44
Ginkgo	509	4	-43	-1	0	749	6	1,214	9(N/A)	1.7	0.7	3.03
Honeylocust	2,896	22	-106	-1	-1	1,596	12	4,386	33(N/A)	1.7	2.6	10.96
Eastern white pine	256	2	-108	-1	-1	933	7	1,080	8(N/A)	1.7	0.7	2.70
Amur maple	76	1	-2	0	0	74	1	148	1(N/A)	1.1	0.1	0.56
Black walnut	1,302	10	-93	0	-1	945	7	2,154	16(N/A)	1.1	1.3	8.08
Other street trees	974	7	-90	-1	-1	1,243	9	2,126	16(N/A)	3.9	1.3	2.28
Citywide total	104,493	784	-7,130	-35	-54	68,964	517	166,291	1,247(N/A)	100.0	100.0	6.89

Table 6: Annual Social and Aesthetic Benefits

Annual Aesthetic/Other Benefits of Public Trees by Species

10/24/2011

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Silver maple	2,515	(N/A)	14.9	25.8	93.16
Sugar maple	1,245	(N/A)	13.8	12.8	49.80
Apple	220	(N/A)	12.7	2.3	9.57
Green ash	971	(N/A)	9.9	10.0	53.96
Norway maple	624	(N/A)	9.4	6.4	36.71
Pin oak	1,234	(N/A)	5.5	12.6	123.35
Red maple	354	(N/A)	4.4	3.6	44.25
American sycamore	519	(N/A)	4.4	5.3	64.86
Norway spruce	288	(N/A)	3.9	3.0	41.13
Northern red oak	93	(N/A)	3.3	1.0	15.53
Northern hackberry	284	(N/A)	2.8	2.9	56.78
American basswood	275	(N/A)	2.2	2.8	68.70
White ash	148	(N/A)	1.7	1.5	49.18
Ginkgo	42	(N/A)	1.7	0.4	13.90
Honeylocust	686	(N/A)	1.7	7.0	228.74
Eastern white pine	26	(N/A)	1.7	0.3	8.75
Amur maple	4	(N/A)	1.1	0.0	2.06
Black walnut	111	(N/A)	1.1	1.1	55.72
Other street trees	126	(N/A)	3.9	1.3	17.98
Citywide total	9,765	(N/A)	100.0	100.0	53.95

Table 7: Summary of Benefits in Dollars

Total Annual Benefits of Public Trees by Species (\$)

10/24/20

Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Standard Error	% of Total \$
Silver maple	1,692	320	300	2,869	2,515	7,696	(±0)	23.4
Sugar maple	1,185	148	183	1,428	1,245	4,189	(±0)	12.8
Apple	548	58	87	250	220	1,163	(±0)	3.5
Green ash	967	135	161	1,124	971	3,358	(±0)	10.2
Norway maple	894	97	155	964	624	2,734	(±0)	8.3
Pin oak	755	160	96	1,207	1,233	3,452	(±0)	10.5
Red maple	257	32	42	223	354	909	(±0)	2.8
American sycamore	576	80	103	902	519	2,180	(±0)	6.6
Norway spruce	229	24	4	652	288	1,196	(±0)	3.6
Northern red oak	217	20	31	267	93	628	(±0)	1.9
Northern hackberry	363	35	61	394	284	1,137	(±0)	3.5
American basswood	221	41	35	360	275	932	(±0)	2.8
White ash	92	13	15	108	148	377	(±0)	1.1
Ginkgo	96	9	16	75	42	238	(±0)	0.7
Honeylocust	193	33	32	248	686	1,192	(±0)	3.6
Eastern white pine	115	8	-5	374	26	519	(±0)	1.6
Amur maple	11	1	1	4	4	21	(±0)	0.1
Black walnut	115	16	20	147	111	409	(±0)	1.2
Other street trees	158	16	26	179	126	506	(±0)	1.5
Citywide Total	8,683	1,247	1,363	11,775	9,765	32,833	(±0)	100.0