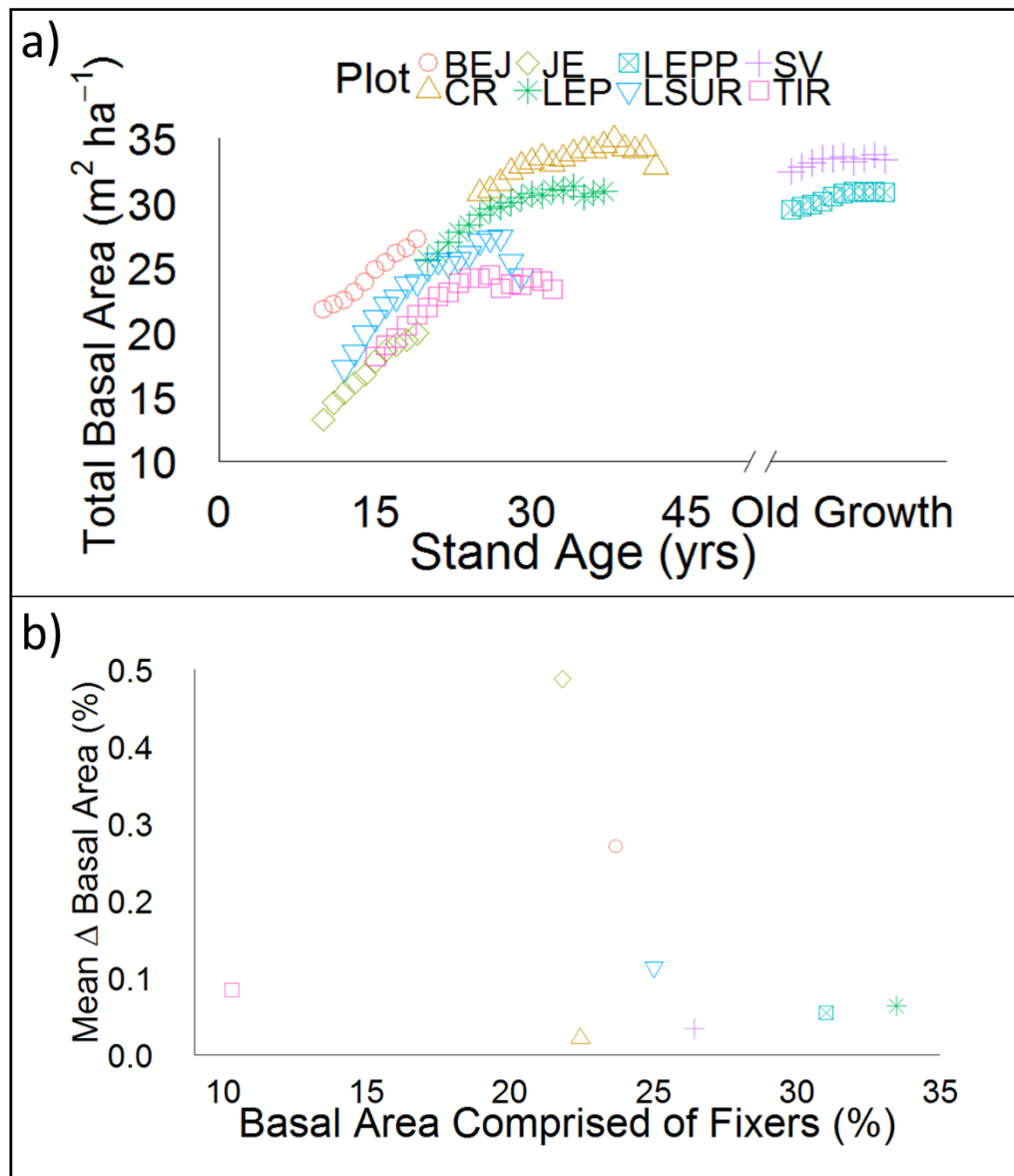
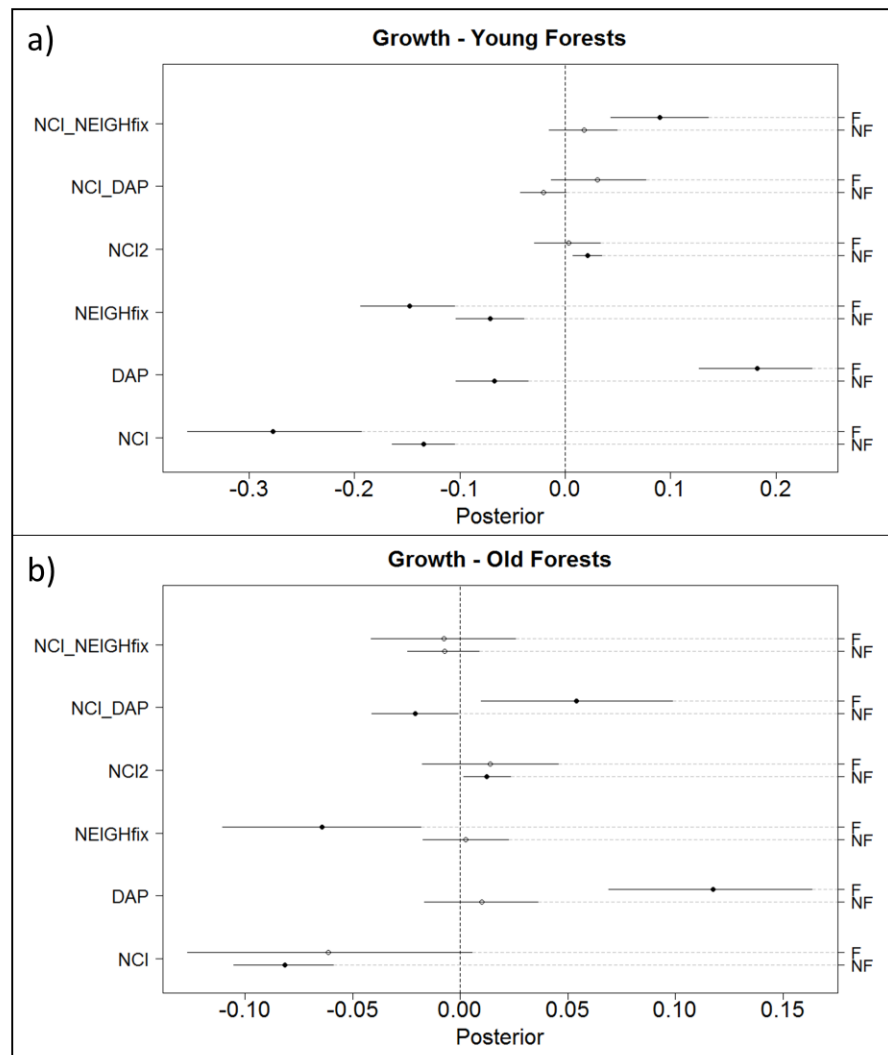


Supplemental Appendix

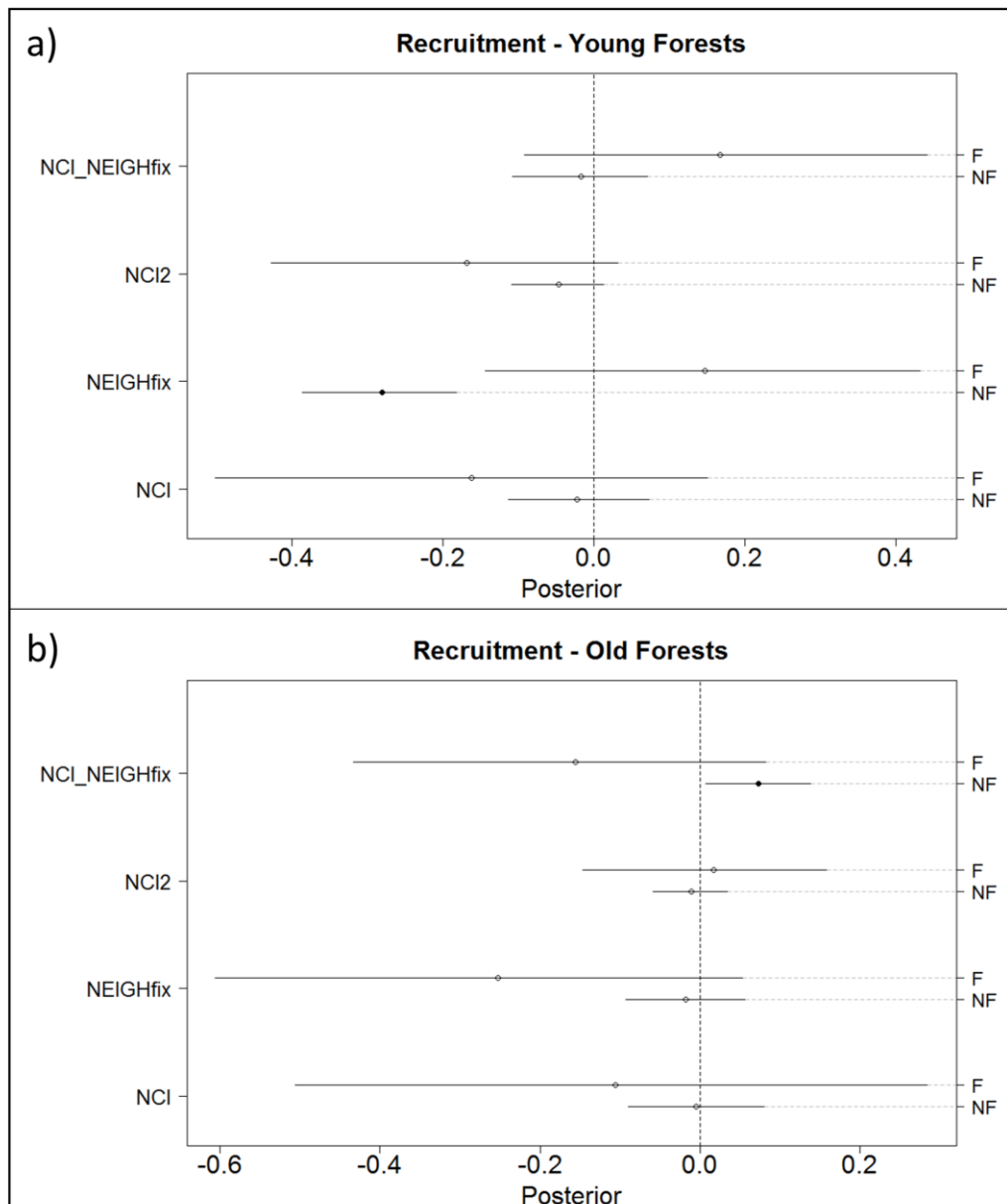
Figure S1. a) Summed basal area of each plot in each census year. b) The proportional change in the total basal area of a plot (change in basal area divided by the total basal area for each plot in each census period) averaged across the entire study duration for each plot plotted against the mean proportion of the plot's basal area comprised of N fixers.



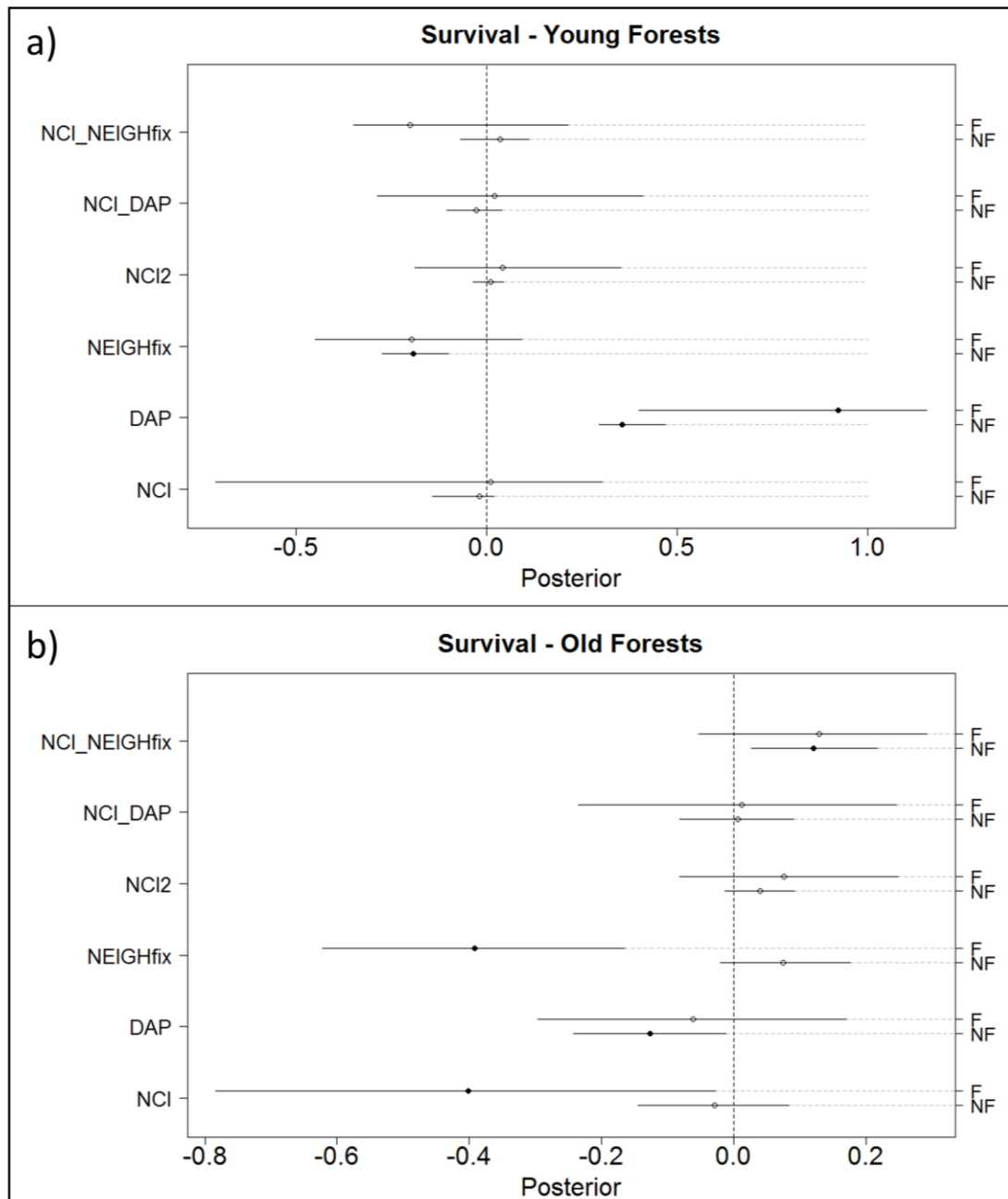
8 Figure S2. Parameter estimate plot for the effect of each model covariate (left axis) on the
9 relative growth rate of N fixers and non-fixers (right axis) in forests a) ≤ 25 yrs, and b) > 25 yrs
10 since disturbance. Covariates from bottom to top are NCI, DBH, the proportion of NCI
11 comprised of N fixers (NEIGHfix), NCI^2 , NCI x DBH, and NCI x the proportion of NCI
12 comprised of N fixers. Dots represent the parameter estimate for each covariate with the 95%
13 credible interval (CI) represented by solid lines on either side of the dot. Solid dots represent
14 covariates for which the 95% CI does not overlap 0 (which we interpret as statistical
15 significance), and open circles represent those covariates for which the 95% CI does overlap 0.



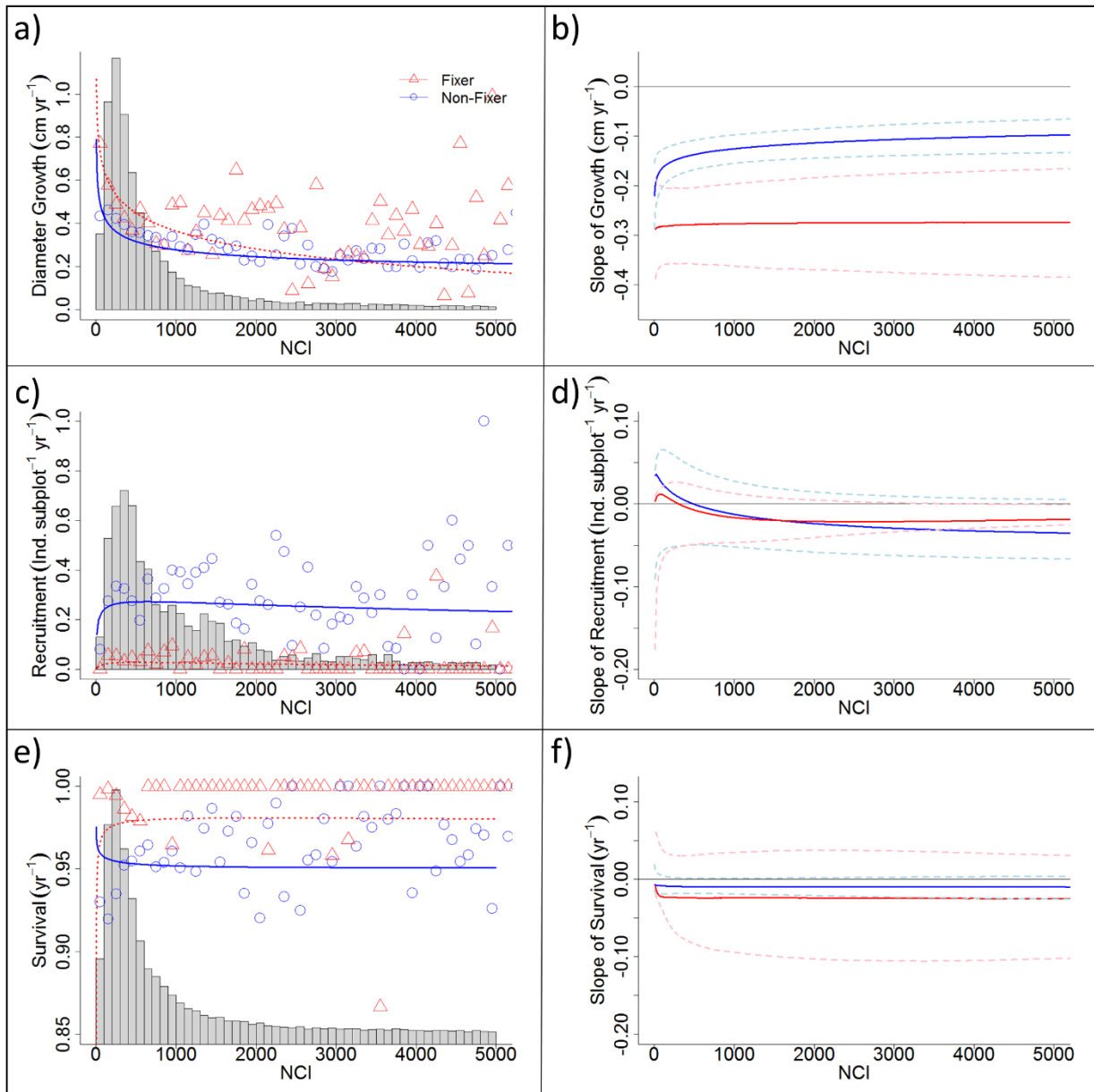
17 Figure S3. Parameter estimate plot for the effect of each model covariate (left axis) on the
 18 recruitment of N fixers and non-fixers (right axis) in forests a) ≤ 25 yrs, and b) > 25 yrs since
 19 disturbance. All covariates and symbols correspond to the description above in the caption for
 20 Figure S2.



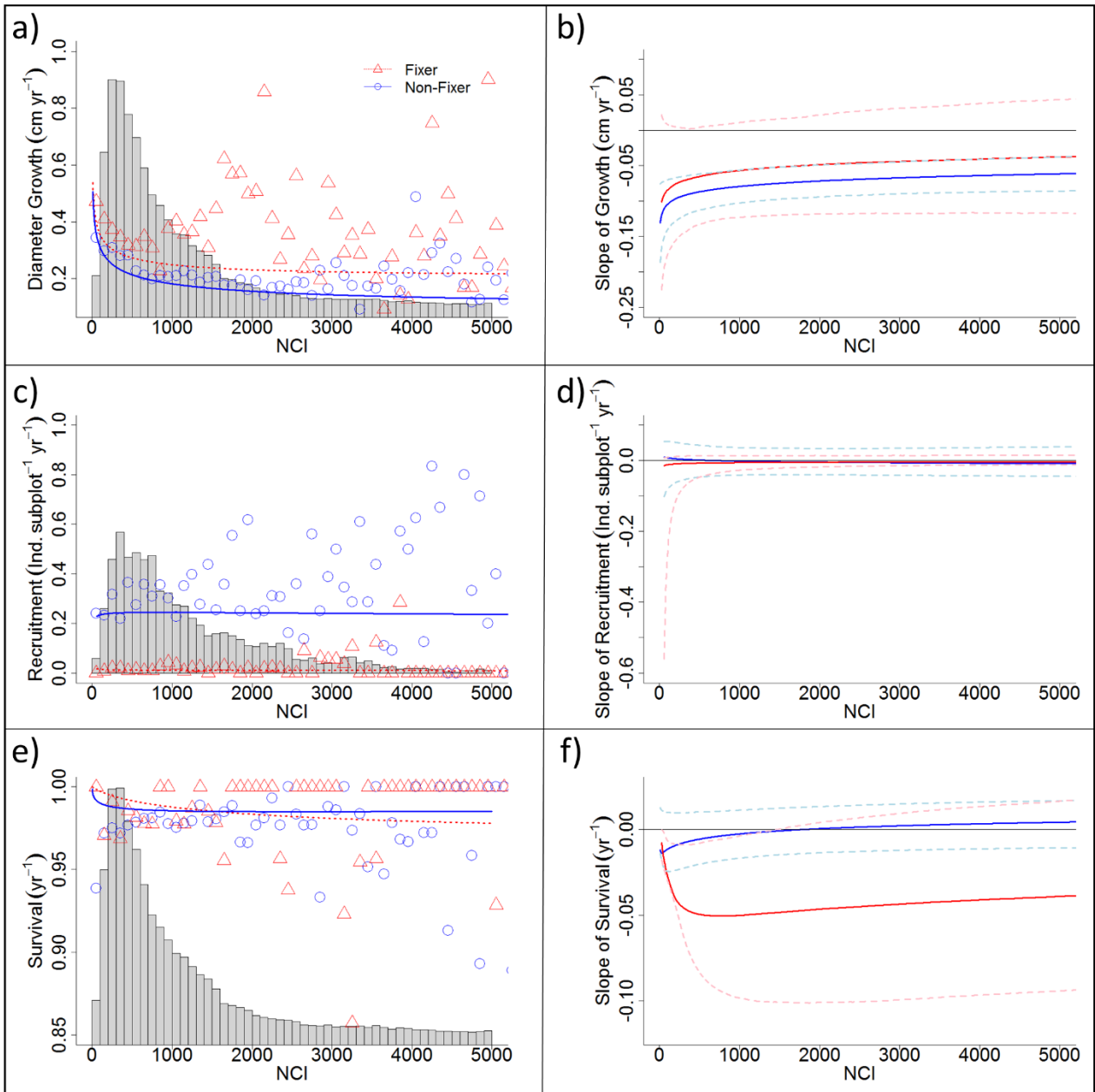
23 Figure S4. Parameter estimate plot for the effect of each model covariate (left axis) on the
 24 survival of N fixers and non-fixers (right axis) in forests a) ≤ 25 yrs, and b) > 25 yrs since
 25 disturbance. All covariates and symbols correspond to the description above in the caption for
 26 Figure S2.



28 Figure S5. Effects of NCI on N fixers and non-fixers in young (≤ 25 yr) forests. Growth (a),
 29 recruitment (c), and survival (e) of N fixers (red) and non-fixers (blue) are plotted as a function
 30 of crowding (NCI). Each symbol represents an average of trees binned across 50 NCI units.
 31 Curves represent model fit means as a function of NCI, for an average DBH and proportion of
 32 NCI coming from N fixers. Histograms represent the relative data density in each proportion
 33 bin. Median slopes are shown for growth (b), recruitment (d), and survival (f) from posterior
 34 distributions of our individual-scale models. Dashed lines show 95% credible intervals (CI's)
 35 around the median. Where 95% CI's do not overlap 0 indicates that negative or positive effects
 36 of NCI are significant. Where 95% CI's for N fixers and non-fixers do not overlap each other
 37 indicates that NCI has significantly different effects on N fixers and non-fixers.



39 Figure S6. Effects of NCI on N fixers and non-fixers in old (> 25 yr) forests. Growth (a),
 40 recruitment (c), and survival (e) of N fixers (red) and non-fixers (blue) are plotted as a function
 41 of crowding (NCI). Each symbol represents an average of trees binned across 50 NCI units.
 42 Curves represent model fit means as a function of NCI, for an average DBH and proportion of
 43 NCI coming from N fixers. Histograms represent the relative data density in each proportion
 44 bin. Median slopes are shown for growth (b), recruitment (d), and survival (f) from posterior
 45 distributions of our individual-scale models. Colors and symbols are as in Fig S5.



47 Figure S7. The effect of N fixers on plot- and individual-level growth in study plot TIR, which
 48 does not contain *Pentaclethra macroloba*, the dominant N fixer in the other 7 plots. At the plot
 49 level, the prevalence of N fixers was marginally negatively correlated with the change in basal
 50 area of a) all trees ($P = 0.08$), and b) non-fixers ($P = 0.06$). C) Effect of crowding by N fixers on
 51 the growth of individual N fixers (red; $P < 0.001$) and non-fixers (blue; $P < 0.001$). Lines
 52 represent linear regression models, and all colors and symbols for c) are as in Fig S5.

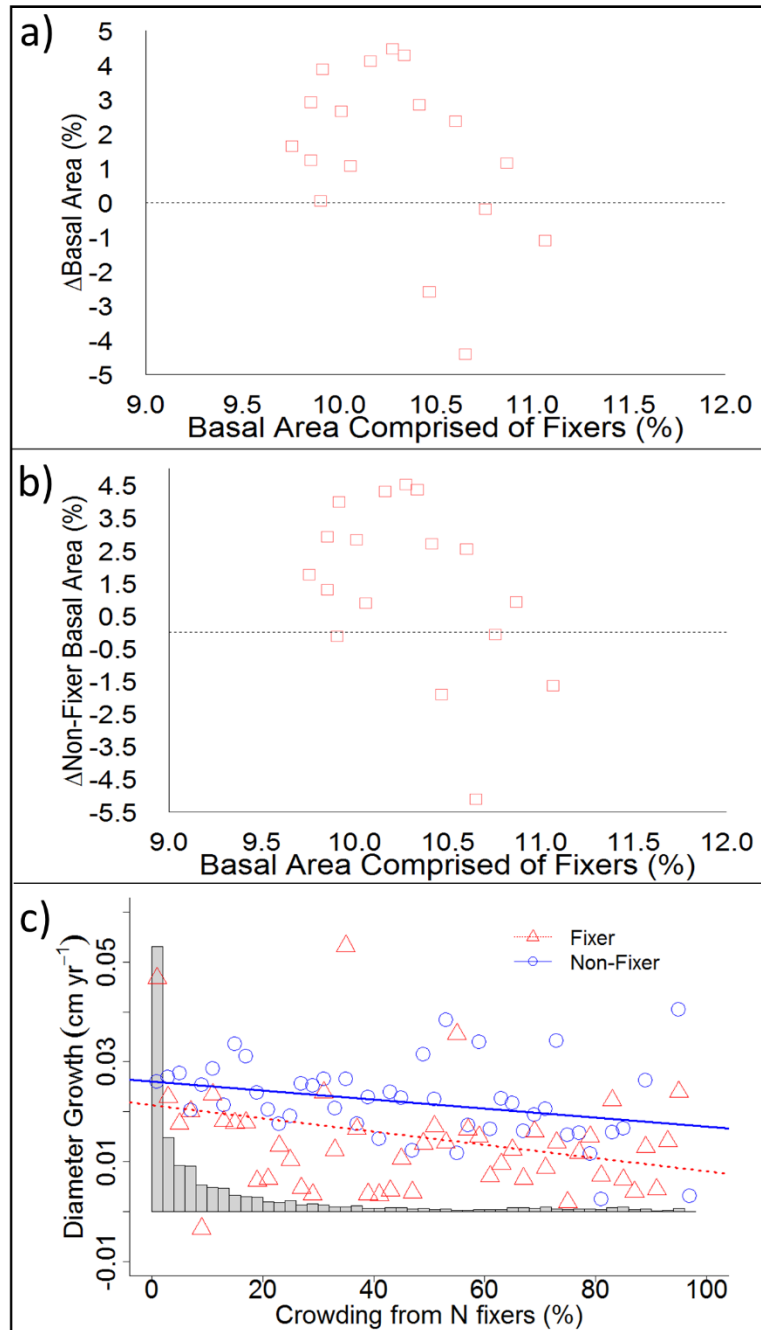


Table S1. Table of model coefficient values for growth model of assessing the impact of neighbor crowding (NCI), the proportion of crowding due to N fixers (neigh_fix), DBH, and the interactions between these variables on the growth of individual N fixers and non-fixers. Values are the parameter estimate (50%) and lower (2.5%) and upper (97.5) bounds of the credible interval in the model output for each covariate's effect on the growth of individuals based on their fixation status. Values are presented for the separate models run for young (≤ 25 years stand age) and old (> 25 years stand age) forests. These values correspond to those presented in Figure S2.

Growth in Young Forests				
Model Covariate	Fixation Status	2.50%	50%	97.50%
NCI	Non-Fixer	-0.16418094	-0.134102662	-0.104257413
DBH	Non-Fixer	-0.103423634	-0.067419913	-0.034675755
neigh_fix	Non-Fixer	-0.103728397	-0.071454147	-0.038667516
NCI ²	Non-Fixer	0.007321601	0.021485471	0.035561224
NCI x DBH	Non-Fixer	-0.042379625	-0.020651502	0.001210065
NCI x neigh_fix	Non-Fixer	-0.015345086	0.017714527	0.050194316
NCI	Fixer	-0.358381355	-0.277450844	-0.192622521
DBH	Fixer	0.127240105	0.182198306	0.234983854
neigh_fix	Fixer	-0.194316016	-0.147636904	-0.10453367
NCI ²	Fixer	-0.02908105	0.003046833	0.034010012
NCI x DBH	Fixer	-0.013363898	0.030953798	0.077401146
NCI x neigh_fix	Fixer	0.043517734	0.089533507	0.136421931
Growth in Old Forests				
Model Covariate	Fixation Status	2.50%	50%	97.50%
NCI	Non-Fixer	-0.105249342	-0.081489878	-0.058621957
DBH	Non-Fixer	-0.016836474	0.009990375	0.03638741
neigh_fix	Non-Fixer	-0.01727689	0.002397728	0.022621499
NCI ²	Non-Fixer	0.001435007	0.012393082	0.023654503
NCI x DBH	Non-Fixer	-0.041167616	-0.021043018	-0.000755745
NCI x neigh_fix	Non-Fixer	-0.024536377	-0.007380389	0.009079975
NCI	Fixer	-0.126736741	-0.061206613	0.005860932
DBH	Fixer	0.069044509	0.117456514	0.163885657
neigh_fix	Fixer	-0.110517166	-0.064197328	-0.017969619
NCI ²	Fixer	-0.017591095	0.014016779	0.045857013
NCI x DBH	Fixer	0.00967944	0.05404792	0.098911931
NCI x neigh_fix	Fixer	-0.041376023	-0.007438615	0.025897038

Table S2. Table of model coefficient values for recruitment model of assessing the impact of neighbor crowding (NCI), the proportion of crowding due to N fixers (neigh_fix), and the interactions between these variables on the frequency of individual N-fixer and non-fixer recruitment into individual 10 x 10 m subplots. Values are the parameter estimate (50%) and lower (2.5%) and upper (97.5) bounds of the credible interval in the model output for each covariate's effect on the frequency of N-fixer and non-fixer recruits. Values are presented for the separate models run for young (≤ 25 years stand age) and old (> 25 years stand age) forests. These values correspond to those presented in Figure S3.

Recruitment in Young Forests				
Model Covariate	Fixation Status	2.50%	50%	97.50%
NCI	Non-Fixer	-0.113898176	-0.0224169	0.07398544
neigh_fix	Non-Fixer	-0.386787044	-0.280389413	-0.181315198
NCI ²	Non-Fixer	-0.109266161	-0.046608219	0.013765278
NCI x neigh_fix	Non-Fixer	-0.108672516	-0.017124927	0.071095037
NCI	Fixer	-0.501886647	-0.162055515	0.151130145
neigh_fix	Fixer	-0.144741257	0.146970515	0.433011194
NCI ²	Fixer	-0.427513366	-0.168821451	0.032282261
NCI x neigh_fix	Fixer	-0.092806729	0.167381842	0.442299601
Recruitment in Old Forests				
Model Covariate	Fixation Status	2.50%	50%	97.50%
NCI	Non-Fixer	-0.089887787	-0.004677652	0.080639129
neigh_fix	Non-Fixer	-0.092932231	-0.018160485	0.056816558
NCI ²	Non-Fixer	-0.059063451	-0.010470275	0.034575821
NCI x neigh_fix	Non-Fixer	0.007322807	0.07277068	0.139009277
NCI	Fixer	-0.506362899	-0.105380147	0.284810064
neigh_fix	Fixer	-0.605860659	-0.252632135	0.054128547
NCI ²	Fixer	-0.146281631	0.016602165	0.158914944
NCI x neigh_fix	Fixer	-0.433279658	-0.156137697	0.082861559

Table S3. Table of model coefficient values for survival model of assessing the impact of neighbor crowding (NCI), the proportion of crowding due to N fixers (neigh_fix), DBH, and the interactions between these variables on the survival of individual N fixers and non-fixers. Values are the parameter estimate (50%) and lower (2.5%) and upper (97.5) bounds of the credible interval in the model output for each covariate's effect on the survival of individuals based on their fixation status. Values are presented for the separate models run for young (≤ 25 years stand age) and old (> 25 years stand age) forests. These values correspond to those presented in Figure S4.

Survival in Young Forests				
Model Covariate	Fixation Status	2.50%	50%	97.50%
NCI	Non-Fixer	-0.020836856	0.019010394	0.141736029
DBH	Non-Fixer	-0.470285359	-0.35583688	-0.29499912
neigh_fix	Non-Fixer	0.09977168	0.192149015	0.274575392
NCI ²	Non-Fixer	-0.045635487	-0.009900515	0.035112159
NCI x DBH	Non-Fixer	-0.041118099	0.027606086	0.104739243
NCI x neigh_fix	Non-Fixer	-0.111492709	-0.034132167	0.069400179
NCI	Fixer	-0.302547946	-0.010808257	0.71128891
DBH	Fixer	-1.154464216	-0.922759952	-0.399401099
neigh_fix	Fixer	-0.091861221	0.197977736	0.449237138
NCI ²	Fixer	-0.351842072	-0.041930587	0.188479978
NCI x DBH	Fixer	-0.409102606	-0.021330851	0.286060579
NCI x neigh_fix	Fixer	-0.211824753	0.200588751	0.349449829
Survival in Old Forests				
Model Covariate	Fixation Status	2.50%	50%	97.50%
NCI	Non-Fixer	-0.084042625	0.029387412	0.144510804
DBH	Non-Fixer	0.011358366	0.126916717	0.243061532
neigh_fix	Non-Fixer	-0.176862724	-0.073848598	0.021254437
NCI ²	Non-Fixer	-0.092670035	-0.03939129	0.01366022
NCI x DBH	Non-Fixer	-0.091697314	-0.005506539	0.08217381
NCI x neigh_fix	Non-Fixer	-0.217975717	-0.120630146	-0.025872088
NCI	Fixer	0.027934381	0.401842926	0.783572587
DBH	Fixer	-0.169199369	0.062252245	0.296572807
neigh_fix	Fixer	0.164908907	0.392357934	0.622249847
NCI ²	Fixer	-0.248014146	-0.075279998	0.082372637
NCI x DBH	Fixer	-0.24534621	-0.012076941	0.234946439
NCI x neigh_fix	Fixer	-0.291619738	-0.128485222	0.053620839

84 Table S4. Species represented in our dataset. Each of the 366 species and its putative fixation status is listed in order of the frequency
85 of stems represented in our full dataset. The relative abundance (percent of stems) of each species for each plot is presented as the
86 average over the census period for that plot.

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Pentaclethra macroloba</i>	Fixer	14024	11.49	18.76	24.61	0.00	14.73	5.75	6.49
<i>Miconia affinis</i>	Non-Fixer	7495	0.08	18.88	14.53	5.16	10.67	0.22	0.00
<i>Casearia arborea</i>	Non-Fixer	6897	8.13	7.24	2.67	2.76	2.93	1.04	0.51
<i>Socratea exorrhiza</i>	Non-Fixer	4338	1.32	3.64	1.42	0.08	0.16	1.99	0.34
<i>Goethalsia meiantha</i>	Non-Fixer	4134	1.09	10.34	0.48	0.25	0.61	0.73	0.00
<i>Euterpe precatoria</i> var. <i>longevaginata</i>	Non-Fixer	4099	8.24	5.82	0.15	0.01	0.08	4.41	4.03
<i>Anaxagorea</i> <i>crassipetala</i>	Non-Fixer	3932	15.76	0.22	0.00	0.00	0.00	0.11	0.00
<i>Virola sebifera</i>	Non-Fixer	3414	2.27	4.89	1.07	1.94	4.06	1.47	0.45
<i>Vochysia ferruginea</i>	Non-Fixer	3316	1.45	1.06	3.52	10.08	4.05	0.31	0.45
<i>Laetia procera</i>	Non-Fixer	3110	6.46	0.36	0.68	0.40	0.29	0.45	0.26
<i>Iriartea deltoidea</i>	Non-Fixer	2806	0.63	1.03	0.10	0.00	0.00	4.79	3.50
<i>Dendropanax arboreus</i>	Non-Fixer	2787	2.05	1.03	1.48	5.52	2.16	2.24	2.40
<i>Simarouba amara</i>	Non-Fixer	2702	0.31	1.23	4.02	5.84	6.00	0.62	0.13
<i>Warszewiczia coccinea</i>	Non-Fixer	2701	5.49	0.06	2.17	1.41	0.09	1.57	0.90
<i>Miconia elata</i>	Non-Fixer	2692	0.00	0.65	12.33	2.38	8.05	0.17	0.04
<i>Cordia bicolor</i>	Non-Fixer	2023	2.16	0.03	0.20	2.12	0.97	0.00	0.00
<i>Piper colonense</i>	Non-Fixer	1910	4.16	2.29	0.20	1.89	0.20	0.02	0.25

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Inga cocleensis</i>	Fixer	1775	0.07	0.09	0.40	8.68	0.38	0.00	0.09
<i>Xylopia sericophylla</i>	Non-Fixer	1561	2.67	2.48	1.82	0.11	1.75	0.10	0.09
<i>Welfia regia</i>	Non-Fixer	1503	0.41	0.00	0.00	0.00	0.09	5.19	7.71
<i>Miconia prasina</i>	Non-Fixer	1331	0.00	0.00	7.67	0.00	5.26	0.00	0.00
<i>Cespedesia spathulata</i>	Non-Fixer	1225	0.49	0.21	1.16	3.25	1.33	0.48	0.76
<i>Miconia multispicata</i>	Non-Fixer	1144	0.32	0.15	0.04	4.02	0.11	0.22	0.39
<i>Hampea appendiculata</i>	Non-Fixer	919	0.18	0.70	0.20	1.42	4.02	0.00	0.00
<i>Guatteria amplifolia</i>	Non-Fixer	874	0.18	2.10	0.16	0.89	0.52	0.33	0.62
<i>Hernandia didymantha</i>	Non-Fixer	825	0.37	0.33	0.15	1.50	0.41	0.00	0.17
<i>Cryosophila warscewiczii</i>	Non-Fixer	812	0.00	0.00	0.00	0.00	0.00	4.20	0.00
<i>Annona papilionella</i>	Non-Fixer	799	1.09	1.24	0.40	0.40	1.82	0.00	0.00
<i>Protium confusum</i>	Non-Fixer	781	0.18	0.01	0.00	2.23	0.08	1.07	1.60
<i>Protium ravenii</i>	Non-Fixer	754	0.31	0.16	0.02	0.03	0.00	0.87	4.15
<i>Handroanthus chrysanthus</i>	Non-Fixer	752	0.16	0.00	1.57	1.56	2.44	0.00	0.00
<i>Virola koschnyi</i>	Non-Fixer	737	0.24	0.69	1.44	0.70	1.40	0.61	0.23
<i>Ryania speciosa</i>	Non-Fixer	736	0.00	0.00	0.46	0.00	0.18	4.19	0.00
<i>Capparis pittieri</i>	Non-Fixer	679	1.06	0.34	0.00	0.00	0.00	2.61	0.09
<i>Guatteria aeruginosa</i>	Non-Fixer	670	0.51	1.04	0.09	0.99	0.05	0.43	0.10
<i>Apeiba membranacea</i>	Non-Fixer	667	0.75	0.03	0.00	1.26	0.10	0.10	0.09
<i>Faramaea parvibractea</i>	Non-Fixer	656	0.00	0.00	0.00	0.00	0.00	1.80	4.14
<i>Jacaranda copaia</i>	Non-Fixer	608	0.00	2.71	0.17	0.16	0.26	0.00	0.00
<i>Inga peizizifera</i>	Fixer	581	0.36	0.09	0.14	0.17	0.08	0.21	0.00
<i>Brosimum lactescens</i>	Non-Fixer	558	0.19	0.15	0.10	0.00	0.18	2.18	1.67
<i>Cupania glabra</i>	Non-Fixer	557	0.13	0.00	0.01	1.99	0.04	0.00	1.24
<i>Inga alba</i>	Fixer	554	0.44	0.00	0.00	0.09	0.09	0.24	0.64

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Vochysia guatemalensis</i>	Non-Fixer	552	0.00	0.00	0.00	2.83	0.15	0.00	0.00
<i>Ocotea leucoxylon</i>	Non-Fixer	545	0.54	0.83	0.00	0.12	0.03	0.48	0.30
<i>Casearia commersoniana</i>	Non-Fixer	544	0.36	0.00	0.00	2.07	0.00	0.10	0.17
<i>Pourouma bicolor</i>	Non-Fixer	540	0.88	0.00	0.24	0.00	0.06	0.87	0.70
<i>Inga thibaudiana</i>	Fixer	533	0.04	0.44	0.12	0.42	0.47	0.10	0.00
<i>Protium pittieri</i>	Non-Fixer	525	0.37	0.41	0.00	0.01	0.00	2.57	0.27
<i>Minquartia guianensis</i>	Non-Fixer	516	0.80	0.06	0.36	0.30	0.10	0.86	0.96
<i>Byrsonima crassifolia</i>	Non-Fixer	458	0.40	0.12	0.10	0.00	0.00	0.10	0.43
<i>Pausandra trianae</i>	Non-Fixer	428	0.00	0.00	0.00	0.00	0.00	0.00	3.67
<i>Psychotria elata</i>	Non-Fixer	419	0.00	0.18	1.03	0.03	1.40	0.00	0.16
<i>Psychotria panamensis</i>	Non-Fixer	415	0.52	0.59	0.00	0.01	0.00	0.30	0.00
<i>Tetragastris panamensis</i>	Non-Fixer	415	0.34	0.00	0.20	0.30	0.00	0.10	2.06
<i>Miconia punctata</i>	Non-Fixer	409	0.08	0.00	0.68	0.00	0.44	0.00	2.36
<i>Alibertia atlantica</i>	Non-Fixer	404	0.08	0.00	0.00	0.04	0.00	0.60	2.75
<i>Carapa nicaraguensis</i>	Non-Fixer	388	0.08	0.00	1.21	0.00	0.72	0.83	0.79
<i>Quararibea ochrocalyx</i>	Non-Fixer	387	0.00	0.00	0.00	0.00	0.00	2.70	1.08
<i>Alchorneopsis floribunda</i>	Non-Fixer	368	0.16	1.05	0.19	0.04	0.56	0.20	0.00
<i>Protium panamense</i>	Non-Fixer	366	0.54	0.08	0.00	0.43	0.00	0.91	0.17
<i>Guarea guidonia</i>	Non-Fixer	350	0.22	0.09	0.00	0.05	0.00	2.09	0.45
<i>Stryphnodendron microstachyum</i>	Fixer	343	0.03	0.87	0.00	0.01	0.00	0.00	0.00
<i>Zanthoxylum panamense</i>	Non-Fixer	342	0.07	0.00	1.44	0.47	0.74	0.00	0.00
<i>Croton smithianus</i>	Non-Fixer	341	0.00	0.00	0.57	0.43	1.21	0.00	0.61
<i>Pterocarpus rohrii</i>	Fixer	341	0.14	0.00	0.00	0.02	0.00	0.21	0.09
<i>Alchornea latifolia</i>	Non-Fixer	336	0.23	0.00	0.00	1.44	0.01	0.00	0.07

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Brosimum guianensis</i>	Non-Fixer	332	0.15	0.00	0.10	0.14	0.09	0.60	1.13
<i>Tapirira guianensis</i>	Non-Fixer	332	0.22	0.00	0.00	0.00	0.00	0.75	1.38
<i>Cordia alliodora</i>	Non-Fixer	321	0.00	0.00	0.90	0.00	2.14	0.00	0.00
<i>Rauvolfia purpurascens</i>	Non-Fixer	319	0.07	0.00	0.00	0.38	0.00	0.41	0.04
<i>Euterpe oleracea</i>	Non-Fixer	301	0.00	0.00	0.63	1.05	0.35	0.00	0.00
<i>Vitex cooperi</i>	Non-Fixer	301	0.16	0.00	0.10	0.89	0.00	0.21	0.00
<i>Vismia baccifera</i>	Non-Fixer	297	0.00	0.04	0.04	0.79	1.27	0.00	0.00
<i>Conceveiba pleiostemona</i>	Non-Fixer	283	0.86	0.06	0.00	0.00	0.00	0.00	0.00
<i>Zanthoxylum ekmanii</i>	Non-Fixer	275	1.21	0.00	0.00	0.00	0.00	0.00	0.00
<i>Erythroxylum macrophyllum</i>	Non-Fixer	262	0.09	0.11	0.00	1.12	0.00	0.00	0.00
<i>Ocotea laetevirens</i>	Non-Fixer	259	0.10	0.00	0.00	0.02	0.00	0.80	0.35
<i>Inga acuminata</i>	Fixer	254	0.00	0.00	0.00	1.05	0.00	0.01	0.00
<i>Ocotea cernua</i>	Non-Fixer	249	0.00	0.12	0.00	0.60	0.00	0.00	0.00
<i>Inga leiocalycina</i>	Fixer	244	0.49	0.01	0.00	0.10	0.06	0.00	0.00
<i>Licaria sarapiquensis</i>	Non-Fixer	230	0.04	0.00	0.10	0.50	0.00	0.35	0.61
<i>Vismia macrophylla</i>	Non-Fixer	222	0.00	0.17	0.10	0.72	0.40	0.00	0.00
<i>Prestoea decurrens</i>	Non-Fixer	217	0.59	0.02	0.00	0.00	0.00	0.56	0.21
<i>Byrsonima arthropoda</i>	Non-Fixer	216	0.00	0.00	0.06	0.00	1.94	0.00	0.00
<i>Cecropia insignis</i>	Non-Fixer	212	0.07	0.42	0.00	0.04	0.09	0.00	0.02
<i>Clethra costaricensis</i>	Non-Fixer	207	0.24	0.00	0.00	0.00	0.18	0.00	0.09
<i>Pouteria calistophylla</i>	Non-Fixer	206	0.07	0.00	0.00	0.03	0.00	1.00	0.75
<i>Vismia billbergiana</i>	Non-Fixer	206	0.05	0.00	0.01	0.04	1.73	0.00	0.00
<i>Calophyllum brasiliense</i>	Non-Fixer	205	0.00	0.00	0.00	0.09	0.13	0.29	1.24
<i>Pourouma minor</i>	Non-Fixer	205	0.49	0.09	0.00	0.03	0.00	0.66	0.06
<i>Guarea bullata</i>	Non-Fixer	196	0.00	0.05	0.00	0.04	0.00	1.39	0.35

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Naucleopsis naga</i>	Non-Fixer	194	0.08	0.00	0.00	0.00	0.00	0.92	0.75
<i>Neea laetevirens</i>	Non-Fixer	194	0.08	0.00	0.10	0.77	0.09	0.00	0.09
<i>Cupania pseudostipularis</i>	Non-Fixer	189	0.00	0.55	0.00	0.00	0.00	0.31	0.00
<i>Guarea rhopalocarpa</i>	Non-Fixer	189	0.13	0.10	0.00	0.45	0.00	0.44	0.11
<i>Inga umbellifera</i>	Fixer	187	0.08	0.00	0.00	0.03	0.00	0.00	0.17
<i>Colubrina spinosa</i>	Non-Fixer	182	0.11	0.00	0.00	0.16	0.00	0.31	0.40
<i>Rhodostemonodaphne kunthiana</i>	Non-Fixer	180	0.00	0.26	0.06	0.18	0.52	0.00	0.00
<i>Hirtella racemosa</i>	Non-Fixer	175	0.00	0.00	0.00	0.00	0.00	0.00	1.50
<i>Swartzia ochnea</i>	Fixer	173	0.00	0.00	0.00	0.05	0.00	1.50	0.00
<i>Neea popenoei</i>	Non-Fixer	172	0.16	0.00	0.00	0.66	0.00	0.00	0.09
<i>Siparuna cuspidata</i>	Non-Fixer	163	0.30	0.00	0.00	0.11	0.00	0.00	0.52
<i>Casearia sylvestris</i>	Non-Fixer	158	0.00	0.00	0.00	0.78	0.00	0.00	0.09
<i>Aspidosperma desmanthum</i>	Non-Fixer	157	0.08	0.00	0.10	0.00	0.00	0.00	1.11
<i>Ormosia velutina</i>	Fixer	153	0.00	0.00	0.00	0.65	0.00	0.00	0.26
<i>Ocotea macropoda</i>	Non-Fixer	150	0.18	0.00	0.02	0.24	0.31	0.29	0.00
<i>Pseudolmedia spuria</i>	Non-Fixer	150	0.08	0.00	0.00	0.34	0.00	0.10	0.38
<i>Ferdinandusa panamensis</i>	Non-Fixer	149	0.00	0.00	0.00	0.00	0.00	1.54	0.00
<i>Lacunaria panamensis</i>	Non-Fixer	149	0.03	0.00	0.00	0.08	0.00	0.18	0.85
<i>Miconia stevensiana</i>	Non-Fixer	149	0.00	0.00	0.00	0.02	0.06	0.54	0.75
<i>Lacmellea panamensis</i>	Non-Fixer	146	0.08	0.00	0.01	0.25	0.00	0.10	0.21
<i>Psychotria luxurians</i>	Non-Fixer	146	0.00	0.01	0.15	0.40	0.13	0.11	0.00
<i>Cordia dwyeri</i>	Non-Fixer	142	0.00	0.00	0.00	0.00	0.00	0.41	0.42
<i>Ampelocera macrocarpa</i>	Non-Fixer	141	0.00	0.00	0.00	0.05	0.00	0.10	1.05

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Ilex skutchii</i>	Non-Fixer	141	0.13	0.18	0.00	0.31	0.00	0.00	0.00
<i>Rinorea deflexiflora</i>	Non-Fixer	141	0.00	0.00	0.00	0.01	0.00	0.00	0.72
<i>Trichilia septentrionalis</i>	Non-Fixer	141	0.00	0.08	0.02	0.00	0.03	1.00	0.21
<i>Hieronyma alchorneoides</i>	Non-Fixer	139	0.13	0.01	0.00	0.41	0.00	0.00	0.26
<i>Coccoloba tuerckheimii</i>	Non-Fixer	137	0.00	0.00	0.00	0.72	0.00	0.00	0.00
<i>Faramea multiflora</i>	Non-Fixer	137	0.00	0.00	0.00	0.00	0.00	1.01	0.33
<i>Compsoeura mexicana</i>	Non-Fixer	135	0.08	0.00	0.00	0.00	0.00	0.31	0.75
<i>Pouteria durlandii</i>	Non-Fixer	130	0.00	0.00	0.00	0.00	0.00	0.93	0.34
<i>Pera arborea</i>	Non-Fixer	128	0.00	0.00	0.50	0.00	0.72	0.00	0.00
<i>Pouteria sp1</i>	Non-Fixer	128	0.04	0.00	0.10	0.00	0.00	0.21	0.76
<i>Annona amazonica</i>	Non-Fixer	124	0.05	0.24	0.00	0.35	0.00	0.00	0.00
<i>Maranthes panamensis</i>	Non-Fixer	124	0.08	0.00	0.00	0.19	0.00	0.21	0.43
<i>Inga sertulifera</i>	Fixer	121	0.00	0.00	0.00	0.32	0.00	0.10	0.27
<i>Dussia macrophyllata</i>	Fixer	119	0.08	0.00	0.00	0.10	0.00	0.00	0.15
<i>Ocotea hartshorniana</i>	Non-Fixer	119	0.19	0.19	0.00	0.03	0.00	0.25	0.00
<i>Posoqueria maxima</i>	Non-Fixer	119	0.00	0.00	0.00	0.00	0.00	0.62	0.51
<i>Balizia elegans</i>	Fixer	118	0.00	0.00	0.40	0.00	0.00	0.21	0.26
<i>Unonopsis pittieri</i>	Non-Fixer	116	0.00	0.00	0.00	0.02	0.00	0.41	0.62
<i>Quararibea bracteolosa</i>	Non-Fixer	115	0.07	0.00	0.00	0.00	0.00	0.30	0.45
<i>Bactris gasipaes</i>	Non-Fixer	112	0.00	0.00	0.31	0.00	0.75	0.00	0.00
<i>Inga spectabilis</i>	Fixer	109	0.00	0.00	0.00	0.00	1.01	0.00	0.00
<i>Hirtella media</i>	Non-Fixer	107	0.00	0.00	0.12	0.04	0.12	0.21	0.46

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Nectandra umbrosa</i>	Non-Fixer	105	0.00	0.00	0.18	0.10	0.05	0.00	0.54
<i>Licaria misantlae</i>	Non-Fixer	104	0.00	0.00	0.00	0.36	0.00	0.20	0.15
<i>Talisia nervosa</i>	Non-Fixer	104	0.00	0.27	0.00	0.02	0.00	0.00	0.26
<i>Chrysophyllum colombianum</i>	Non-Fixer	103	0.00	0.00	0.10	0.00	0.00	0.13	0.69
<i>Persea americana</i>	Non-Fixer	103	0.00	0.00	0.00	0.00	0.00	0.75	0.26
<i>Beilschmiedia sp.A</i>	Non-Fixer	102	0.08	0.08	0.00	0.00	0.00	0.12	0.19
<i>Inga venusta</i>	Fixer	102	0.00	0.00	0.00	0.00	0.00	0.52	0.29
<i>Ocotea insularis</i>	Non-Fixer	102	0.05	0.41	0.00	0.00	0.00	0.10	0.00
<i>Richeria dressleri</i>	Non-Fixer	102	0.00	0.00	0.00	0.00	0.00	0.50	0.09
<i>Sacoglottis trichogyna</i>	Non-Fixer	102	0.16	0.00	0.00	0.14	0.00	0.31	0.09
<i>Nephelium mutabile</i>	Non-Fixer	98	0.00	0.00	0.40	0.00	0.54	0.00	0.00
<i>Lozania pittieri</i>	Non-Fixer	97	0.12	0.00	0.06	0.12	0.00	0.21	0.17
<i>Marila pluricostata</i>	Non-Fixer	97	0.07	0.00	0.00	0.11	0.00	0.00	0.52
<i>Ossaea brenesii</i>	Non-Fixer	95	0.00	0.00	0.00	0.50	0.00	0.00	0.00
<i>Loreya mespiloides</i>	Non-Fixer	94	0.00	0.00	0.00	0.00	0.87	0.00	0.00
<i>Callicarpa acuminata</i>	Non-Fixer	93	0.33	0.00	0.10	0.00	0.06	0.00	0.00
<i>Cinnamomum chavarrianum</i>	Non-Fixer	92	0.21	0.00	0.00	0.00	0.00	0.09	0.00
<i>Meliosma donnellsmithii</i>	Non-Fixer	92	0.00	0.00	0.00	0.28	0.07	0.10	0.17
<i>Terminalia amazonia</i>	Non-Fixer	91	0.08	0.00	0.00	0.28	0.00	0.00	0.17
<i>Eugenia hammelii</i>	Non-Fixer	90	0.00	0.00	0.00	0.00	0.00	0.00	0.77
<i>Phyllanthus skutchii</i>	Non-Fixer	90	0.24	0.19	0.00	0.00	0.00	0.00	0.00
<i>Qualea polychroma</i>	Non-Fixer	88	0.00	0.00	0.10	0.00	0.00	0.00	0.67
<i>Andira inermis</i>	Fixer	86	0.00	0.05	0.20	0.19	0.00	0.21	0.00
<i>Ardisia fimbrillifera</i>	Non-Fixer	84	0.14	0.00	0.00	0.00	0.00	0.17	0.00
<i>Maquira guianensis</i>	Non-Fixer	83	0.00	0.03	0.00	0.02	0.00	0.29	0.15

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Cecropia obtusifolia</i>	Non-Fixer	82	0.00	0.00	0.15	0.01	0.61	0.00	0.00
<i>Hieronyma oblonga</i>	Non-Fixer	82	0.08	0.00	0.00	0.00	0.00	0.00	0.09
<i>Virola multiflora</i>	Non-Fixer	81	0.04	0.00	0.00	0.00	0.01	0.00	0.62
<i>Zygia gigantifoliola</i>	Fixer	80	0.00	0.00	0.00	0.28	0.00	0.24	0.00
<i>Vouarana anomala</i>	Non-Fixer	78	0.16	0.00	0.00	0.00	0.00	0.00	0.09
<i>Chrysophyllum venezuelanense</i>	Non-Fixer	77	0.08	0.00	0.00	0.26	0.00	0.10	0.00
<i>Senna papillosa</i>	Non-Fixer	75	0.00	0.11	0.00	0.13	0.26	0.00	0.00
<i>Abarema adenophora</i>	Fixer	74	0.24	0.00	0.00	0.00	0.00	0.00	0.17
<i>Eugenia sp</i>	Non-Fixer	71	0.00	0.00	0.00	0.00	0.00	0.00	0.17
<i>Coussarea hondensis</i>	Non-Fixer	70	0.00	0.04	0.00	0.00	0.00	0.28	0.00
<i>Dystovomita paniculata</i>	Non-Fixer	70	0.00	0.00	0.00	0.00	0.00	0.31	0.34
<i>Ocotea mollifolia</i>	Non-Fixer	70	0.17	0.00	0.00	0.00	0.00	0.00	0.00
<i>Psidium guajava</i>	Non-Fixer	70	0.00	0.00	0.10	0.04	0.49	0.00	0.00
<i>Licania sp. A</i>	Non-Fixer	69	0.00	0.00	0.00	0.00	0.00	0.51	0.17
<i>Mabea occidentalis</i>	Non-Fixer	69	0.00	0.00	0.00	0.00	0.00	0.00	0.15
<i>Psychotria calidicola</i>	Non-Fixer	69	0.00	0.00	0.00	0.00	0.00	0.71	0.00
<i>Sorocea pubivena</i>	Non-Fixer	69	0.00	0.00	0.08	0.13	0.00	0.00	0.00
<i>Pouteria campechiana</i>	Non-Fixer	67	0.00	0.00	0.04	0.07	0.00	0.31	0.17
<i>Dipteryx panamensis</i>	Non-Fixer	66	0.00	0.00	0.10	0.00	0.33	0.00	0.17
<i>Perebea hispidula</i>	Non-Fixer	66	0.00	0.00	0.00	0.04	0.00	0.01	0.50
<i>Pouteria torta</i>	Non-Fixer	65	0.08	0.00	0.00	0.00	0.00	0.21	0.17
<i>Hirtella lemsii</i>	Non-Fixer	64	0.16	0.00	0.00	0.00	0.00	0.21	0.00
<i>Swartzia nicaraguensis</i>	Fixer	64	0.16	0.00	0.00	0.09	0.00	0.10	0.00
<i>Quiina macrophylla</i>	Non-Fixer	63	0.04	0.00	0.00	0.08	0.00	0.18	0.17
<i>Ocotea sp1</i>	Non-Fixer	58	0.00	0.00	0.00	0.00	0.00	0.08	0.43
<i>Pouteria reticulata</i>	Non-Fixer	58	0.08	0.00	0.00	0.00	0.00	0.10	0.26

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Inga marginata</i>	Fixer	20	0.00	0.00	0.00	0.11	0.00	0.00	0.00
<i>Ossaea macrophylla</i>	Non-Fixer	20	0.00	0.00	0.00	0.04	0.00	0.12	0.00
<i>Pouteria glomerata</i>	Non-Fixer	20	0.00	0.00	0.00	0.00	0.00	0.21	0.00
<i>Ruptiliocarpon caracolito</i>	Non-Fixer	20	0.00	0.00	0.00	0.00	0.00	0.00	0.17
<i>Xylopia bocatorena</i>	Non-Fixer	20	0.00	0.00	0.00	0.00	0.00	0.00	0.17
<i>Dussia sp. A</i>	Fixer	19	0.00	0.00	0.00	0.05	0.00	0.10	0.00
<i>Inga ruiziana</i>	Fixer	19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Nectandra reticulata</i>	Non-Fixer	19	0.00	0.00	0.00	0.00	0.18	0.00	0.00
<i>Calatola costaricensis</i>	Non-Fixer	18	0.08	0.00	0.00	0.00	0.00	0.00	0.00
<i>Casearia tacanensis</i>	Non-Fixer	18	0.08	0.00	0.00	0.00	0.00	0.00	0.00
<i>Chimarrhis parviflora</i>	Non-Fixer	18	0.08	0.00	0.00	0.00	0.00	0.00	0.00
<i>Chrysophyllum brenesii</i>	Non-Fixer	18	0.08	0.00	0.00	0.00	0.00	0.00	0.00
<i>Cinnamomum sp1</i>	Non-Fixer	18	0.08	0.00	0.00	0.00	0.00	0.00	0.00
<i>Cordia correae</i>	Non-Fixer	18	0.08	0.00	0.00	0.00	0.00	0.00	0.00
<i>Freziera grisebachii</i>	Non-Fixer	18	0.00	0.00	0.00	0.09	0.00	0.00	0.00
<i>Guarea chiricana</i>	Non-Fixer	18	0.00	0.09	0.00	0.00	0.00	0.00	0.00
<i>Henrietella tuberculosa</i>	Non-Fixer	18	0.00	0.00	0.00	0.00	0.00	0.19	0.00
<i>Herrania purpurea</i>	Non-Fixer	18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Maquira costaricana</i>	Non-Fixer	18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Nectandra belizensis</i>	Non-Fixer	18	0.08	0.00	0.00	0.00	0.00	0.00	0.00
<i>Ormosia subsimplex</i>	Fixer	18	0.00	0.00	0.00	0.09	0.00	0.00	0.00
<i>Piper auritifolium</i>	Non-Fixer	18	0.00	0.00	0.00	0.00	0.00	0.07	0.00
<i>Symplocos striata</i>	Non-Fixer	18	0.08	0.00	0.00	0.00	0.00	0.00	0.00
<i>Vochysia allenii</i>	Non-Fixer	18	0.08	0.00	0.00	0.00	0.00	0.00	0.00
<i>Vernonia patens</i>	Non-Fixer	17	0.00	0.00	0.00	0.00	0.16	0.00	0.00
<i>Conostegia lasiopoda</i>	Non-Fixer	16	0.03	0.00	0.00	0.00	0.00	0.10	0.00

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Cymbopetalum costaricense</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Drypetes standleyi</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Elaeoluma glabrescens</i>	Non-Fixer	10	0.00	0.00	0.10	0.00	0.00	0.00	0.00
<i>Garcinia sp1</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Genipa americana</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.09	0.00	0.00
<i>Geonoma interrupta</i>	Non-Fixer	10	0.00	0.00	0.10	0.00	0.00	0.00	0.00
<i>Guarea grandiflora</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.10	0.00
<i>Guarea pilosa</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.10	0.00
<i>Licania hypoleuca</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.10	0.00
<i>Licania kallunkiae</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Maytenus guyanensis</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Miconia bubalina</i>	Non-Fixer	10	0.00	0.00	0.00	0.05	0.00	0.00	0.00
<i>Miconia sparrei</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.07	0.03
<i>Mouriri gleasoniana</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Myrcia aliena</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Ocotea bijuga</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.10	0.00
<i>Persea silvatica</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.10	0.00
<i>Posoqueria latifolia</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Randia mira</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Spachea correae</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Spondias mombin</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Tabernaemontana arborea</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.10	0.00

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Tetrorchidium gorgonae</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Theobroma simiarum</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Zanthoxylum sp</i>	Non-Fixer	10	0.00	0.00	0.00	0.00	0.00	0.00	0.09
<i>Luehea seemannii</i>	Non-Fixer	9	0.00	0.00	0.00	0.05	0.00	0.00	0.00
<i>Ouratea valerioi</i>	Non-Fixer	9	0.00	0.00	0.00	0.00	0.00	0.00	0.08
<i>Pradosia atrovioleacea</i>	Non-Fixer	9	0.00	0.00	0.00	0.05	0.00	0.00	0.00
<i>Tetrorchidium euryphyllum</i>	Non-Fixer	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Neea urophylla</i>	Non-Fixer	8	0.00	0.00	0.00	0.00	0.00	0.08	0.00
<i>Hirtella sp</i>	Non-Fixer	7	0.00	0.00	0.00	0.00	0.00	0.00	0.06
<i>Mangifera indica</i>	Non-Fixer	7	0.00	0.00	0.07	0.00	0.00	0.00	0.00
<i>Miconia minutiflora</i>	Non-Fixer	7	0.00	0.00	0.07	0.00	0.00	0.00	0.00
<i>Psychotria poeppigiana</i>	Non-Fixer	7	0.00	0.00	0.00	0.00	0.05	0.00	0.00
<i>Quararibea parvifolia</i>	Non-Fixer	7	0.00	0.00	0.00	0.00	0.00	0.00	0.06
<i>Theobroma mammosum</i>	Non-Fixer	7	0.00	0.00	0.00	0.00	0.00	0.07	0.00
<i>Cestrum microcalyx</i>	Non-Fixer	6	0.01	0.02	0.00	0.00	0.00	0.00	0.00
<i>Clusia flava</i>	Non-Fixer	6	0.00	0.00	0.00	0.00	0.06	0.00	0.00
<i>Ficus insipida</i>	Non-Fixer	6	0.00	0.00	0.06	0.00	0.00	0.00	0.00
<i>Inga densiflora</i>	Fixer	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Siparuna pauciflora</i>	Non-Fixer	6	0.03	0.00	0.00	0.00	0.00	0.00	0.00
<i>Inga edulis</i>	Fixer	5	0.00	0.00	0.00	0.00	0.05	0.00	0.00
<i>Miconia nervosa</i>	Non-Fixer	5	0.00	0.00	0.00	0.03	0.00	0.00	0.00
<i>Crescentia cujete</i>	Non-Fixer	4	0.00	0.00	0.04	0.00	0.00	0.00	0.00
<i>Trophis racemosa</i>	Non-Fixer	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Eschweilera costaricensis</i>	Non-Fixer	3	0.01	0.00	0.00	0.00	0.00	0.00	0.00

Species	Fixer Status	Frequency	CR Relative Abundance	LSUR Relative Abundance	BEJ Relative Abundance	TIR Relative Abundance	JE Relative Abundance	LEPP Relative Abundance	SV Relative Abundance
<i>Macrolobium costaricense</i>	Non-Fixer	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Ocotea atirrensis</i>	Non-Fixer	3	0.00	0.00	0.00	0.00	0.00	0.00	0.03
<i>Persea sp</i>	Non-Fixer	3	0.00	0.00	0.00	0.00	0.00	0.00	0.03
<i>Peschiera arborea</i>	Non-Fixer	3	0.00	0.00	0.00	0.00	0.00	0.03	0.00
<i>Psychotria sp1</i>	Non-Fixer	3	0.01	0.00	0.00	0.00	0.00	0.00	0.00
<i>Spondias radlkoferi</i>	Non-Fixer	3	0.01	0.00	0.00	0.00	0.00	0.00	0.00
<i>Zygia longifolia</i>	Fixer	3	0.01	0.00	0.00	0.00	0.00	0.00	0.00
<i>Cassipourea elliptica</i>	Non-Fixer	2	0.00	0.00	0.00	0.00	0.00	0.00	0.02
<i>Solanum novo-granatense</i>	Non-Fixer	2	0.00	0.01	0.00	0.00	0.00	0.00	0.00

