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Supplementary Material

Combining canopy height and tree species information for large scale timber volume estimations under strong heterogeneity of auxiliary data and variable sample plot sizes

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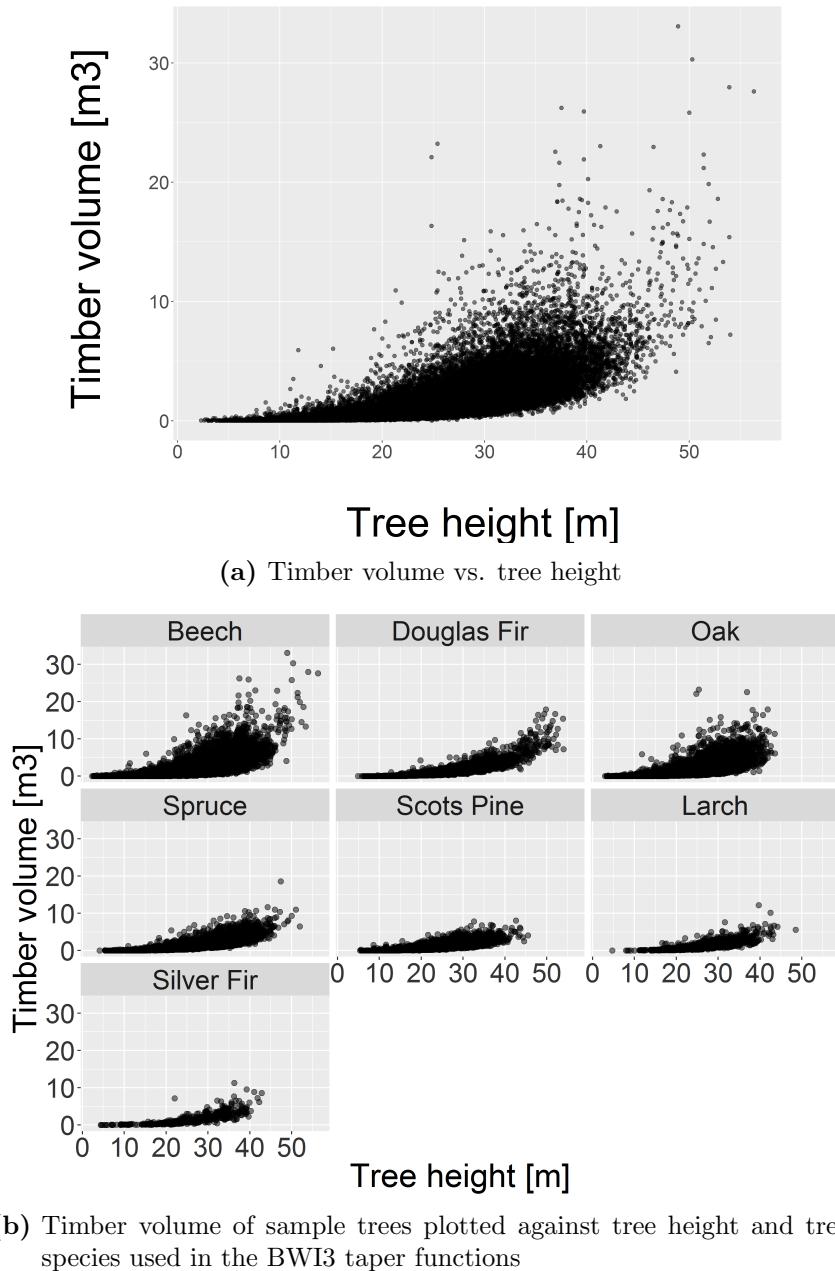
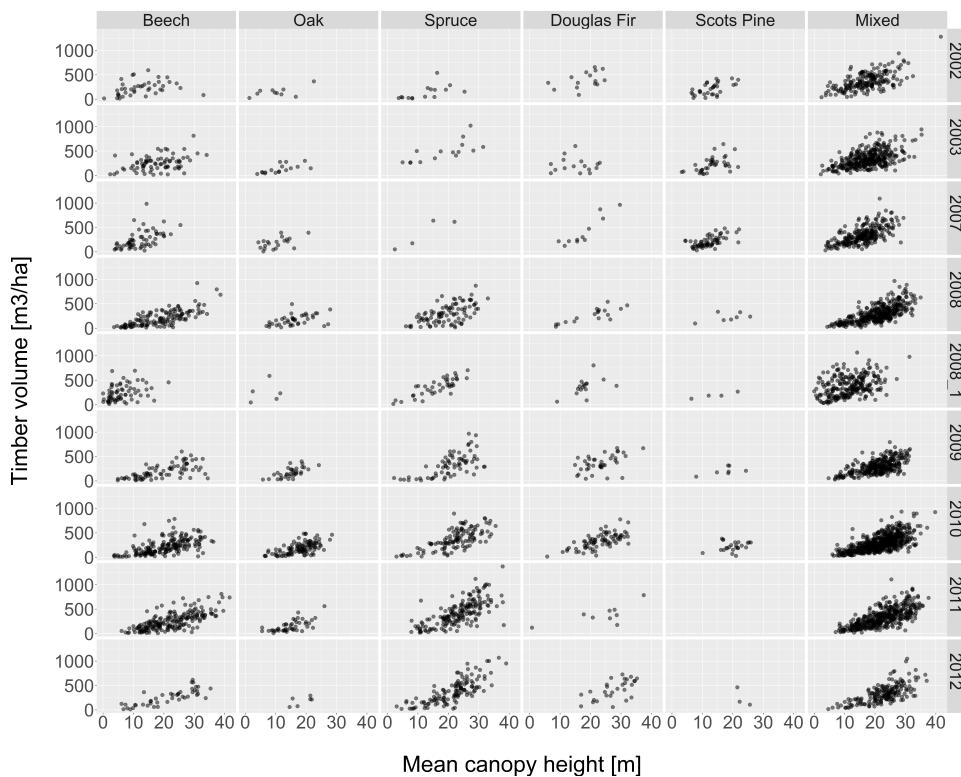
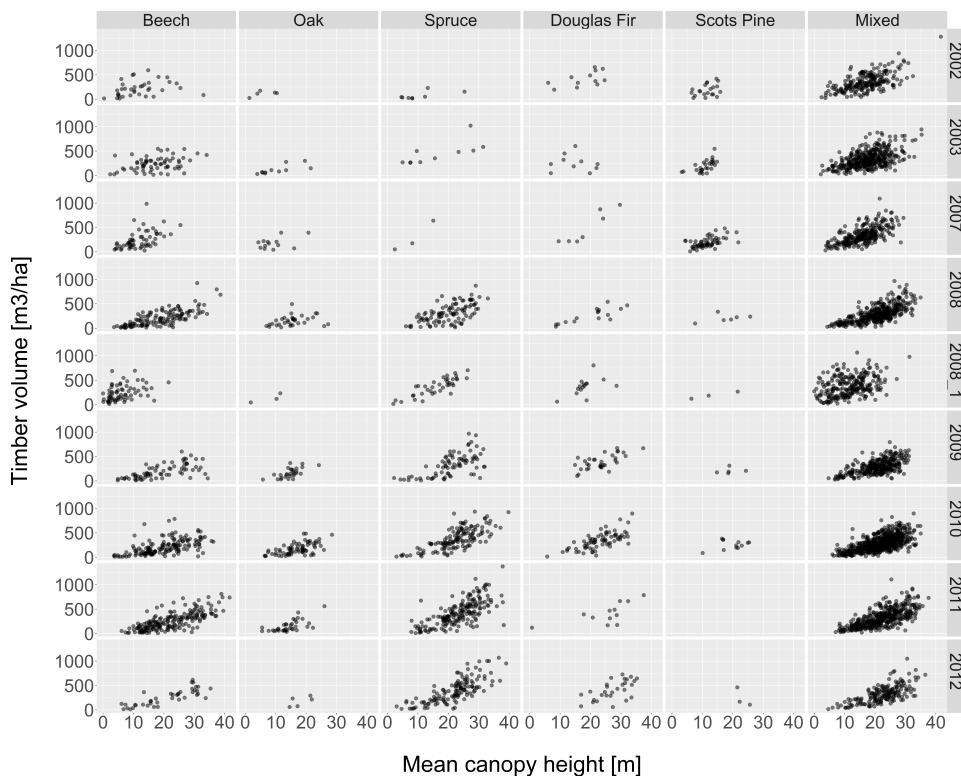
1: Timber volume - height relationship on single tree level

Figure 1: Timber volume relationships on single tree level of all BWI3 sample trees within RLP

2: Timber volume on plot level vs. predictor variables



(a) Timber volume on plot level vs. LiDAR *meanheight* stratified by the error-free *treespecies* variable



(b) Timber volume on plot level vs. LiDAR *meanheight* stratified by calibrated *treespecies* variable

Figure 2: Timber volume on sample plot level stratified by the *lidaryears* and *treespecies*

3: Classification accuracies of *treespecies* variable

Table 1: User's accuracies realized under various support choices for deriving the major tree species of a sample location. *class*: major tree species class of sample plot, *prod.acc*: producer's accuracy, *use.acc*: user's accuracy, *oaa*: overall accuracy, *prod.acc_{cal}*: producer's accuracy after calibration (*use.acc* and *oaa* respectively), *n.ref*: number of validation data per tree species.

class	support	threshold	prod.acc	prod.acc _{cal}	use.acc	use.acc _{cal}	oaa	oaa _{cal}	n.ref
Beech	ind	0%	50.77	70.64	66.69	58.31	52.25	57.14	1873
Douglas Fir	ind	0%	53.63	41.60	43.23	51.88	52.25	57.14	399
Oak	ind	0%	65.84	41.87	42.30	48.96	52.25	57.14	843
Spruce	ind	0%	58.60	68.88	64.89	61.55	52.25	57.14	1041
Scots pine	ind	0%	69.08	62.18	45.82	60.16	52.25	57.14	595
Mixed	ind	0%	3.23	16.51	8.17	46.28	52.25	57.14	527
Beech	ind	50%	50.95	69.24	65.00	56.82	50.63	54.60	1739
Douglas Fir	ind	50%	55.35	45.72	44.52	49.85	50.63	54.60	374
Oak	ind	50%	66.79	43.40	41.52	47.92	50.63	54.60	795
Spruce	ind	50%	58.84	69.28	64.54	60.90	50.63	54.60	996
Scots pine	ind	50%	69.34	60.77	45.13	59.46	50.63	54.60	548
Mixed	ind	50%	9.93	16.83	19.48	34.49	50.63	54.60	826
Beech	ind	60%	48.63	69.64	62.97	54.67	48.07	53.20	1647
Douglas Fir	ind	60%	53.44	44.90	45.01	49.10	48.07	53.20	363
Oak	ind	60%	64.44	42.51	40.33	47.89	48.07	53.20	748
Spruce	ind	60%	57.56	69.57	64.28	62.75	48.07	53.20	966
Scots pine	ind	60%	67.07	58.94	42.86	57.43	48.07	53.20	492
Mixed	ind	60%	16.38	20.53	23.36	35.86	48.07	53.20	1062
Beech	ind	80%	42.95	38.36	51.26	52.92	46.04	54.72	1134
Douglas Fir	ind	80%	46.00	37.33	43.53	49.56	46.04	54.72	300
Oak	ind	80%	64.19	21.86	29.36	40.34	46.04	54.72	430
Spruce	ind	80%	52.78	61.36	61.38	65.06	46.04	54.72	792
Scots pine	ind	80%	64.75	43.88	31.09	56.74	46.04	54.72	278
Mixed	ind	80%	39.72	69.92	51.41	54.00	46.04	54.72	2344
Beech	ind	100%	37.42	18.29	42.78	48.10	52.18	63.45	831
Douglas Fir	ind	100%	42.98	22.37	37.69	38.64	52.18	63.45	228
Oak	ind	100%	61.09	13.45	23.43	43.02	52.18	63.45	275
Spruce	ind	100%	49.38	52.66	55.93	63.83	52.18	63.45	640
Scots pine	ind	100%	62.01	28.49	24.78	58.62	52.18	63.45	179
Mixed	ind	100%	56.00	87.07	68.33	65.90	52.18	63.45	3125
Beech	q25	0%	50.18	72.59	67.44	57.54	51.92	57.14	1923
Douglas Fir	q25	0%	54.61	43.39	42.77	50.73	51.92	57.14	401
Oak	q25	0%	65.23	39.91	41.59	50.52	51.92	57.14	857
Spruce	q25	0%	58.71	68.79	64.07	62.71	51.92	57.14	1051
Scots pine	q25	0%	68.52	60.94	44.97	61.46	51.92	57.14	594
Mixed	q25	0%	3.17	12.50	8.21	38.51	51.92	57.14	536
Beech	q25	50%	50.67	71.31	65.56	55.85	50.24	54.66	1788
Douglas Fir	q25	50%	55.05	46.54	43.58	52.24	50.24	54.66	376
Oak	q25	50%	65.64	39.93	40.60	48.57	50.24	54.66	809
Spruce	q25	50%	59.05	69.48	64.36	62.86	50.24	54.66	1006
Scots pine	q25	50%	68.56	60.33	44.22	60.11	50.24	54.66	547
Mixed	q25	50%	9.69	15.43	19.01	30.86	50.24	54.66	836
Beech	q25	60%	48.32	70.89	63.37	54.12	47.67	52.82	1697
Douglas Fir	q25	60%	52.60	45.48	43.94	49.85	47.67	52.82	365
Oak	q25	60%	64.04	39.50	39.10	46.52	47.67	52.82	762
Spruce	q25	60%	58.20	69.36	64.91	62.51	47.67	52.82	976
Scots pine	q25	60%	67.21	56.82	42.09	59.62	47.67	52.82	491
Mixed	q25	60%	14.75	19.23	21.82	33.88	47.67	52.82	1071
Beech	q25	80%	42.27	38.80	51.55	49.14	44.87	51.96	1183
Douglas Fir	q25	80%	45.36	35.10	46.13	50.96	44.87	51.96	302
Oak	q25	80%	61.09	20.59	28.01	36.84	44.87	51.96	442
Spruce	q25	80%	52.43	62.55	60.69	63.26	44.87	51.96	801
Scots pine	q25	80%	63.67	38.85	30.62	56.84	44.87	51.96	278
Mixed	q25	80%	38.29	64.56	48.47	50.85	44.87	51.96	2356
Beech	q25	100%	35.27	15.93	41.89	45.90	49.72	61.00	879
Douglas Fir	q25	100%	40.43	21.74	41.15	42.37	49.72	61.00	230
Oak	q25	100%	54.36	7.32	21.08	37.50	49.72	61.00	287
Spruce	q25	100%	49.77	52.85	56.67	59.86	49.72	61.00	649
Scots pine	q25	100%	59.78	19.55	23.83	44.30	49.72	61.00	179
Mixed	q25	100%	53.44	85.47	63.59	63.39	49.72	61.00	3138

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class	support	threshold	prod.acc	<i>prod.acc_{cal}</i>	use.acc	<i>use.acc_{cal}</i>	oaa	<i>oaa_{cal}</i>	n.ref
Beech	q50	0%	51.14	73.60	67.53	59.03	53.06	58.45	1932
Douglas Fir	q50	0%	54.59	45.16	42.23	55.49	53.06	58.45	403
Oak	q50	0%	68.29	41.93	41.79	51.94	53.06	58.45	861
Spruce	q50	0%	59.92	70.47	64.65	63.26	53.06	58.45	1053
Scots pine	q50	0%	70.59	61.68	45.16	61.06	53.06	58.45	595
Mixed	q50	0%	1.85	13.52	11.49	41.01	53.06	58.45	540
Beech	q50	50%	51.64	72.06	66.10	57.58	51.32	55.76	1797
Douglas Fir	q50	50%	56.08	47.62	43.80	54.38	51.32	55.76	378
Oak	q50	50%	68.39	44.90	41.31	51.41	51.32	55.76	813
Spruce	q50	50%	60.22	69.74	64.92	63.05	51.32	55.76	1008
Scots pine	q50	50%	70.26	60.22	44.87	60.22	51.32	55.76	548
Mixed	q50	50%	8.93	15.36	21.01	29.93	51.32	55.76	840
Beech	q50	60%	48.21	70.26	64.42	56.17	48.76	53.44	1705
Douglas Fir	q50	60%	52.86	43.60	46.08	52.12	48.76	53.44	367
Oak	q50	60%	64.75	45.17	40.66	49.50	48.76	53.44	766
Spruce	q50	60%	58.69	69.73	65.98	62.34	48.76	53.44	978
Scots pine	q50	60%	67.07	55.28	43.54	59.65	48.76	53.44	492
Mixed	q50	60%	19.42	20.35	24.91	31.51	48.76	53.44	1076
Beech	q50	80%	41.21	44.91	54.08	53.78	47.33	54.59	1189
Douglas Fir	q50	80%	44.41	37.50	47.87	56.16	47.33	54.59	304
Oak	q50	80%	61.88	24.89	30.53	39.64	47.33	54.59	446
Spruce	q50	80%	52.30	63.76	63.35	64.81	47.33	54.59	803
Scots pine	q50	80%	63.67	39.57	32.90	58.20	47.33	54.59	278
Mixed	q50	80%	44.42	65.91	50.22	53.19	47.33	54.59	2364
Beech	q50	100%	29.56	20.16	46.11	46.35	54.83	62.26	883
Douglas Fir	q50	100%	33.04	23.91	47.50	49.55	54.83	62.26	230
Oak	q50	100%	47.75	10.38	24.34	46.88	54.83	62.26	289
Spruce	q50	100%	43.63	56.99	60.81	61.94	54.83	62.26	651
Scots pine	q50	100%	55.87	20.67	29.59	49.33	54.83	62.26	179
Mixed	q50	100%	66.40	85.06	63.69	64.59	54.83	62.26	3152
Beech	q80	0%	51.91	73.58	67.25	60.45	53.98	59.64	1938
Douglas Fir	q80	0%	55.91	47.04	42.99	55.52	53.98	59.64	406
Oak	q80	0%	68.55	46.82	42.30	53.01	53.98	59.64	865
Spruce	q80	0%	61.90	69.67	66.03	65.51	53.98	59.64	1055
Scots pine	q80	0%	71.74	64.21	46.48	61.15	53.98	59.64	598
Mixed	q80	0%	1.84	15.26	14.71	43.92	53.98	59.64	544
Beech	q80	50%	50.69	72.49	66.18	58.37	51.72	57.16	1803
Douglas Fir	q80	50%	54.86	45.67	46.04	53.54	51.72	57.16	381
Oak	q80	50%	67.93	48.84	42.43	54.21	51.72	57.16	817
Spruce	q80	50%	60.79	71.19	66.81	64.14	51.72	57.16	1010
Scots pine	q80	50%	71.58	61.02	47.41	59.71	51.72	57.16	549
Mixed	q80	50%	13.12	18.44	21.55	36.79	51.72	57.16	846
Beech	q80	60%	46.05	71.07	66.39	56.51	48.85	55.07	1711
Douglas Fir	q80	60%	49.73	47.30	50.41	55.03	48.85	55.07	370
Oak	q80	60%	63.90	48.18	42.75	52.33	48.85	55.07	770
Spruce	q80	60%	56.53	70.41	68.23	64.97	48.85	55.07	980
Scots pine	q80	60%	66.73	58.62	47.07	58.86	48.85	55.07	493
Mixed	q80	60%	27.17	21.81	24.66	35.01	48.85	55.07	1082
Beech	q80	80%	36.77	40.37	56.65	52.05	48.69	54.37	1194
Douglas Fir	q80	80%	39.74	37.46	54.71	60.53	48.69	54.37	307
Oak	q80	80%	56.47	24.55	31.59	41.83	48.69	54.37	448
Spruce	q80	80%	48.51	64.43	65.66	64.19	48.69	54.37	804
Scots pine	q80	80%	60.57	43.73	36.98	62.89	48.69	54.37	279
Mixed	q80	80%	53.03	67.06	49.26	52.61	48.69	54.37	2374
Beech	q80	100%	21.56	20.32	49.35	46.15	57.92	61.52	886
Douglas Fir	q80	100%	25.54	22.51	55.14	46.43	57.92	61.52	231
Oak	q80	100%	34.48	12.76	26.46	41.57	57.92	61.52	290
Spruce	q80	100%	32.36	50.46	62.61	59.17	57.92	61.52	652
Scots pine	q80	100%	44.44	25.00	35.56	53.57	57.92	61.52	180
Mixed	q80	100%	78.62	84.72	62.69	64.26	57.92	61.52	3167
Beech	q100	0%	53.72	70.93	66.92	57.90	55.03	57.27	1947
Douglas Fir	q100	0%	54.77	46.94	46.28	54.24	55.03	57.27	409
Oak	q100	0%	70.92	45.75	43.06	51.49	55.03	57.27	870
Spruce	q100	0%	62.30	66.07	64.87	62.20	55.03	57.27	1061
Scots pine	q100	0%	73.88	64.89	47.64	62.30	55.03	57.27	601
Mixed	q100	0%	0.36	9.76	20.00	30.68	55.03	57.27	553
Beech	q100	50%	46.96	69.43	68.35	56.39	51.08	54.88	1812
Douglas Fir	q100	50%	48.30	49.35	55.06	56.08	51.08	54.88	383
Oak	q100	50%	66.42	47.20	45.92	53.08	51.08	54.88	822
Spruce	q100	50%	56.00	67.42	68.14	60.67	51.08	54.88	1016

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class	support	threshold	prod.acc	<i>prod.acc_{cal}</i>	use.acc	<i>use.acc_{cal}</i>	oaa	<i>oaa_{cal}</i>	n.ref
Scots pine	q100	50%	67.57	63.22	56.26	61.12	51.08	54.88	552
Mixed	q100	50%	29.79	13.67	21.74	26.47	51.08	54.88	856
Beech	q100	60%	39.48	69.30	69.50	55.86	47.86	53.30	1720
Douglas Fir	q100	60%	39.78	44.35	61.41	52.22	47.86	53.30	372
Oak	q100	60%	58.45	46.84	47.99	52.23	47.86	53.30	775
Spruce	q100	60%	49.49	66.33	70.62	61.29	47.86	53.30	986
Scots pine	q100	60%	62.50	60.08	59.96	60.82	47.86	53.30	496
Mixed	q100	60%	48.17	20.88	25.40	30.85	47.86	53.30	1092
Beech	q100	80%	25.92	40.67	64.39	51.64	51.02	51.87	1200
Douglas Fir	q100	80%	23.62	27.18	67.59	56.00	51.02	51.87	309
Oak	q100	80%	44.15	24.06	37.04	40.82	51.02	51.87	453
Spruce	q100	80%	33.95	56.01	69.54	59.01	51.02	51.87	807
Scots pine	q100	80%	55.36	42.86	53.82	55.81	51.02	51.87	280
Mixed	q100	80%	73.70	65.59	48.59	50.65	51.02	51.87	2392
Beech	q100	100%	4.15	17.51	55.22	40.52	59.42	59.22	891
Douglas Fir	q100	100%	5.60	8.62	68.42	33.33	59.42	59.22	232
Oak	q100	100%	8.19	8.87	25.53	30.23	59.42	59.22	293
Spruce	q100	100%	10.28	41.26	80.72	52.75	59.42	59.22	652
Scots pine	q100	100%	20.99	28.73	58.46	54.17	59.42	59.22	181
Mixed	q100	100%	95.68	84.56	59.73	62.71	59.42	59.22	3192

4: Model accuracies

Table 2: Model accuracies realized under various support choices for the CHM- and **uncalibrated treespecies** explanatory variables

$support_{chm}$	$support_{t,spec}$	threshold	R^2_{adj}	$rmse_{cv}$	AIC	$R^2_{adj,ref}$	$rmse_{cv,ref}$	AIC_{ref}
ind	ind	0%	0.45	135.49	64565.00	0.47	133.56	64565.00
ind	ind	50%	0.45	135.57	64569.96	0.47	133.80	64569.96
ind	ind	60%	0.45	135.52	64564.50	0.47	133.73	64564.50
ind	ind	80%	0.46	135.26	64551.18	0.47	133.44	64551.18
ind	ind	100%	0.45	135.65	64584.58	0.47	133.03	64584.58
ind	q25	0%	0.46	135.37	64912.94	0.47	133.46	64912.94
ind	q25	50%	0.46	135.22	64899.31	0.47	133.81	64899.31
ind	q25	60%	0.46	135.07	64895.72	0.47	133.85	64895.72
ind	q25	80%	0.46	135.27	64896.97	0.47	133.36	64896.97
ind	q25	100%	0.46	135.42	64920.27	0.48	133.02	64920.27
ind	q50	0%	0.46	135.54	65166.10	0.47	133.61	65166.10
ind	q50	50%	0.46	135.52	65157.65	0.47	133.79	65157.65
ind	q50	60%	0.46	135.54	65168.94	0.47	133.68	65168.94
ind	q50	80%	0.46	135.35	65150.63	0.47	133.32	65150.63
ind	q50	100%	0.46	135.57	65168.81	0.48	132.93	65168.81
ind	q80	0%	0.46	135.44	65389.21	0.47	133.50	65389.21
ind	q80	50%	0.46	135.13	65367.67	0.47	133.87	65367.67
ind	q80	60%	0.46	135.21	65376.26	0.47	133.87	65376.26
ind	q80	80%	0.46	135.21	65384.06	0.47	133.44	65384.06
ind	q80	100%	0.45	136.59	65489.16	0.48	132.98	65489.16
ind	q100	0%	0.46	135.32	65722.46	0.47	133.45	65722.46
ind	q100	50%	0.46	135.32	65699.46	0.47	133.75	65699.46
ind	q100	60%	0.46	135.67	65728.34	0.47	133.69	65728.34
ind	q100	80%	0.45	136.66	65813.95	0.47	133.32	65813.95
ind	q100	100%	0.44	137.78	65919.21	0.48	132.91	65919.21
q25	ind	0%	0.46	135.53	64882.32	0.47	133.73	64882.32
q25	ind	50%	0.46	135.63	64886.16	0.47	134.07	64886.16
q25	ind	60%	0.46	135.58	64881.59	0.47	134.02	64881.59
q25	ind	80%	0.46	135.40	64869.18	0.48	133.58	64869.18
q25	ind	100%	0.46	135.58	64888.87	0.48	133.13	64888.87
q25	q25	0%	0.47	135.42	65600.99	0.48	133.37	65600.99
q25	q25	50%	0.47	135.24	65590.23	0.48	133.76	65590.23
q25	q25	60%	0.47	135.20	65586.93	0.48	133.71	65586.93
q25	q25	80%	0.47	135.21	65589.23	0.48	133.39	65589.23
q25	q25	100%	0.47	135.55	65616.63	0.49	132.97	65616.63
q25	q50	0%	0.47	135.02	65848.23	0.48	133.19	65848.23
q25	q50	50%	0.47	135.00	65842.32	0.48	133.40	65842.32
q25	q50	60%	0.46	135.28	65860.37	0.48	133.31	65860.37
q25	q50	80%	0.47	134.98	65839.14	0.48	133.00	65839.14
q25	q50	100%	0.46	135.27	65864.46	0.49	132.40	65864.46
q25	q80	0%	0.47	135.20	66065.23	0.48	133.26	66065.23
q25	q80	50%	0.47	134.93	66048.51	0.48	133.55	66048.51
q25	q80	60%	0.47	134.98	66059.78	0.48	133.53	66059.78
q25	q80	80%	0.47	135.19	66072.89	0.48	133.18	66072.89
q25	q80	100%	0.46	136.38	66178.69	0.49	132.75	66178.69
q25	q100	0%	0.47	143.40	66410.21	0.48	133.13	66410.21
q25	q100	50%	0.47	134.73	66384.24	0.48	133.39	66384.24
q25	q100	60%	0.47	135.23	66419.67	0.48	133.41	66419.67
q25	q100	80%	0.46	136.36	66511.85	0.48	133.01	66511.85
q25	q100	100%	0.45	137.67	66621.81	0.49	132.58	66621.81
q50	ind	0%	0.46	135.13	64847.79	0.48	133.11	64847.79
q50	ind	50%	0.46	135.24	64851.64	0.48	133.44	64851.64
q50	ind	60%	0.46	135.22	64847.03	0.48	133.43	64847.03
q50	ind	80%	0.46	134.96	64831.38	0.48	133.11	64831.38
q50	ind	100%	0.46	135.26	64862.89	0.48	132.62	64862.89
q50	q25	0%	0.47	134.80	65557.75	0.49	132.59	65557.75
q50	q25	50%	0.47	134.61	65546.50	0.49	132.92	65546.50
q50	q25	60%	0.47	134.57	65543.07	0.49	132.91	65543.07
q50	q25	80%	0.47	134.51	65540.80	0.49	132.69	65540.80
q50	q25	100%	0.47	134.92	65572.25	0.49	132.33	65572.25
q50	q50	0%	0.47	134.37	65805.45	0.49	132.36	65805.45
q50	q50	50%	0.47	134.34	65800.77	0.49	132.57	65800.77

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$support_{chm}$	$support_{t_{spec}}$	threshold	R^2_{adj}	$rmse_{cv}$	AIC	$R^2_{adj,ref}$	$rmse_{cv,ref}$	AIC_{ref}
q50	q50	60%	0.47	134.53	65815.15	0.49	132.54	65815.15
q50	q50	80%	0.47	134.21	65789.54	0.49	132.25	65789.54
q50	q50	100%	0.47	134.66	65825.59	0.49	131.74	65825.59
q50	q80	0%	0.47	134.57	66019.32	0.49	132.53	66019.32
q50	q80	50%	0.47	134.36	66006.32	0.49	132.82	66006.32
q50	q80	60%	0.47	134.41	66015.77	0.49	132.79	66015.77
q50	q80	80%	0.47	134.57	66025.39	0.49	132.62	66025.39
q50	q80	100%	0.46	135.80	66132.10	0.49	132.18	66132.10
q50	q100	0%	0.47	137.56	66365.96	0.49	132.48	66365.96
q50	q100	50%	0.47	134.21	66345.91	0.49	132.72	66345.91
q50	q100	60%	0.47	134.69	66381.21	0.49	132.72	66381.21
q50	q100	80%	0.46	135.78	66468.28	0.49	132.46	66468.28
q50	q100	100%	0.45	137.06	66575.44	0.49	132.03	66575.44
q80	ind	0%	0.46	135.78	64898.36	0.47	133.82	64898.36
q80	ind	50%	0.46	135.90	64900.98	0.47	134.21	64900.98
q80	ind	60%	0.46	135.85	64895.77	0.47	134.20	64895.77
q80	ind	80%	0.46	135.70	64890.76	0.47	133.79	64890.76
q80	ind	100%	0.45	136.06	64925.51	0.48	133.26	64925.51
q80	q25	0%	0.47	135.53	65611.68	0.48	133.44	65611.68
q80	q25	50%	0.47	135.36	65600.46	0.48	133.78	65600.46
q80	q25	60%	0.47	135.29	65595.97	0.48	133.76	65595.97
q80	q25	80%	0.47	135.35	65599.65	0.48	133.53	65599.65
q80	q25	100%	0.46	135.78	65634.33	0.49	133.04	65634.33
q80	q50	0%	0.46	135.09	65860.84	0.48	133.11	65860.84
q80	q50	50%	0.47	135.10	65857.40	0.48	133.40	65857.40
q80	q50	60%	0.46	135.25	65869.26	0.48	133.39	65869.26
q80	q50	80%	0.47	135.08	65857.71	0.48	133.06	65857.71
q80	q50	100%	0.46	135.52	65890.97	0.49	132.45	65890.97
q80	q80	0%	0.47	135.29	66078.42	0.48	133.27	66078.42
q80	q80	50%	0.47	135.06	66063.08	0.48	133.60	66063.08
q80	q80	60%	0.47	135.20	66077.30	0.48	133.60	66077.30
q80	q80	80%	0.47	135.38	66089.20	0.48	133.33	66089.20
q80	q80	100%	0.45	136.64	66197.34	0.49	132.82	66197.34
q80	q100	0%	0.47	136.20	66438.48	0.48	133.22	66438.48
q80	q100	50%	0.47	135.00	66413.28	0.48	133.51	66413.28
q80	q100	60%	0.46	135.43	66445.71	0.48	133.51	66445.71
q80	q100	80%	0.46	136.63	66538.24	0.48	133.16	66538.24
q80	q100	100%	0.44	137.89	66642.87	0.49	132.64	66642.87
q100	ind	0%	0.39	143.82	65494.94	0.41	142.07	65494.94
q100	ind	50%	0.39	143.93	65496.27	0.40	142.38	65496.27
q100	ind	60%	0.39	143.83	65492.62	0.40	142.41	65492.62
q100	ind	80%	0.39	143.83	65494.72	0.41	142.00	65494.72
q100	ind	100%	0.39	143.98	65512.77	0.41	141.55	65512.77
q100	q25	0%	0.40	143.88	66234.56	0.41	141.95	66234.56
q100	q25	50%	0.40	143.64	66219.68	0.41	142.27	66219.68
q100	q25	60%	0.40	143.56	66214.76	0.41	142.30	66214.76
q100	q25	80%	0.40	143.77	66225.18	0.41	141.99	66225.18
q100	q25	100%	0.40	144.09	66251.66	0.42	141.48	66251.66
q100	q50	0%	0.40	143.49	66484.62	0.41	141.65	66484.62
q100	q50	50%	0.40	143.52	66483.55	0.41	141.96	66483.55
q100	q50	60%	0.40	143.69	66495.93	0.41	141.97	66495.93
q100	q50	80%	0.40	143.62	66491.72	0.41	141.63	66491.72
q100	q50	100%	0.39	143.87	66506.91	0.42	140.99	66506.91
q100	q80	0%	0.40	143.60	66712.36	0.41	141.85	66712.36
q100	q80	50%	0.40	143.35	66693.16	0.41	142.18	66693.16
q100	q80	60%	0.40	143.66	66712.41	0.41	142.19	66712.41
q100	q80	80%	0.40	143.86	66719.35	0.41	141.86	66719.35
q100	q80	100%	0.39	145.04	66822.81	0.42	141.32	66822.81
q100	q100	0%	0.39	145.21	67092.26	0.41	142.01	67092.26
q100	q100	50%	0.40	143.61	67060.58	0.41	142.24	67060.58
q100	q100	60%	0.40	144.01	67086.87	0.41	142.25	67086.87
q100	q100	80%	0.39	145.17	67169.91	0.41	141.79	67169.91
q100	q100	100%	0.37	146.66	67284.45	0.42	141.22	67284.45

Table 3: Model accuracies realized under various support choices for the CHM- and calibrated *treespecies* explanatory variables

<i>support_{chm}</i>	<i>support_{tspec}</i>	threshold	R^2_{adj}	$rmse_{cv}$	AIC	$R^2_{adj,ref}$	$rmse_{cv,ref}$	AIC_{ref}
ind	ind	0%	0.46	134.23	64480.01	0.47	133.56	64480.01
ind	ind	50%	0.46	134.42	64491.42	0.47	133.80	64491.42
ind	ind	60%	0.46	134.39	64485.07	0.47	133.73	64485.07
ind	ind	80%	0.47	133.90	64445.55	0.47	133.44	64445.55
ind	ind	100%	0.46	134.15	64476.36	0.47	133.03	64476.36
ind	q25	0%	0.47	134.16	64829.60	0.47	133.46	64829.60
ind	q25	50%	0.46	134.40	64847.07	0.47	133.81	64847.07
ind	q25	60%	0.47	134.24	64831.79	0.47	133.85	64831.79
ind	q25	80%	0.47	133.68	64791.42	0.47	133.36	64791.42
ind	q25	100%	0.47	133.81	64796.95	0.48	133.02	64796.95
ind	q50	0%	0.47	133.96	65056.48	0.47	133.61	65056.48
ind	q50	50%	0.47	134.14	65070.88	0.47	133.79	65070.88
ind	q50	60%	0.46	134.27	65080.88	0.47	133.68	65080.88
ind	q50	80%	0.47	133.75	65038.93	0.47	133.32	65038.93
ind	q50	100%	0.47	133.41	65011.19	0.48	132.93	65011.19
ind	q80	0%	0.47	133.95	65287.34	0.47	133.50	65287.34
ind	q80	50%	0.47	134.16	65300.34	0.47	133.87	65300.34
ind	q80	60%	0.47	134.08	65293.82	0.47	133.87	65293.82
ind	q80	80%	0.47	133.77	65275.66	0.47	133.44	65275.66
ind	q80	100%	0.47	133.32	65246.11	0.48	132.98	65246.11
ind	q100	0%	0.47	133.53	65586.83	0.47	133.45	65586.83
ind	q100	50%	0.47	133.94	65618.19	0.47	133.75	65618.19
ind	q100	60%	0.47	133.70	65603.53	0.47	133.69	65603.53
ind	q100	80%	0.47	133.32	65576.24	0.47	133.32	65576.24
ind	q100	100%	0.48	132.92	65542.94	0.48	132.91	65542.94
q25	ind	0%	0.47	134.41	64780.16	0.47	133.73	64780.16
q25	ind	50%	0.47	134.61	64794.59	0.47	134.07	64794.59
q25	ind	60%	0.47	134.33	64777.60	0.47	134.02	64777.60
q25	ind	80%	0.47	133.93	64756.34	0.48	133.58	64756.34
q25	ind	100%	0.47	134.29	64791.96	0.48	133.13	64791.96
q25	q25	0%	0.48	134.03	65504.85	0.48	133.37	65504.85
q25	q25	50%	0.47	134.42	65534.10	0.48	133.76	65534.10
q25	q25	60%	0.48	134.02	65502.59	0.48	133.71	65502.59
q25	q25	80%	0.48	133.76	65475.16	0.48	133.39	65475.16
q25	q25	100%	0.48	133.67	65467.58	0.49	132.97	65467.58
q25	q50	0%	0.48	133.77	65744.39	0.48	133.19	65744.39
q25	q50	50%	0.47	134.06	65767.28	0.48	133.40	65767.28
q25	q50	60%	0.48	133.98	65763.30	0.48	133.31	65763.30
q25	q50	80%	0.48	133.34	65715.59	0.48	133.00	65715.59
q25	q50	100%	0.48	133.00	65694.99	0.49	132.40	65694.99
q25	q80	0%	0.48	133.60	65960.24	0.48	133.26	65960.24
q25	q80	50%	0.48	133.87	65973.16	0.48	133.55	65973.16
q25	q80	60%	0.48	133.77	65963.19	0.48	133.53	65963.19
q25	q80	80%	0.48	133.52	65950.49	0.48	133.18	65950.49
q25	q80	100%	0.48	133.30	65934.08	0.49	132.75	65934.08
q25	q100	0%	0.48	133.18	66271.97	0.48	133.13	66271.97
q25	q100	50%	0.48	133.52	66295.64	0.48	133.39	66295.64
q25	q100	60%	0.48	133.52	66290.29	0.48	133.41	66290.29
q25	q100	80%	0.48	133.04	66266.45	0.48	133.01	66266.45
q25	q100	100%	0.49	132.59	66221.95	0.49	132.58	66221.95
q50	ind	0%	0.47	133.79	64739.35	0.48	133.11	64739.35
q50	ind	50%	0.47	133.95	64745.34	0.48	133.44	64745.34
q50	ind	60%	0.47	133.88	64738.45	0.48	133.43	64738.45
q50	ind	80%	0.47	133.58	64730.79	0.48	133.11	64730.79
q50	ind	100%	0.47	133.54	64739.74	0.48	132.62	64739.74
q50	q25	0%	0.48	133.26	65448.81	0.49	132.59	65448.81
q50	q25	50%	0.48	133.75	65481.44	0.49	132.92	65481.44
q50	q25	60%	0.48	133.43	65453.59	0.49	132.91	65453.59
q50	q25	80%	0.48	133.21	65432.13	0.49	132.69	65432.13
q50	q25	100%	0.49	132.99	65414.52	0.49	132.33	65414.52
q50	q50	0%	0.48	133.16	65703.73	0.49	132.36	65703.73
q50	q50	50%	0.48	133.31	65716.88	0.49	132.57	65716.88
q50	q50	60%	0.48	133.26	65712.36	0.49	132.54	65712.36
q50	q50	80%	0.48	132.81	65683.06	0.49	132.25	65683.06
q50	q50	100%	0.49	132.07	65629.14	0.49	131.74	65629.14

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$support_{chm}$	$support_{t,spec}$	threshold	R^2_{adj}	$rmse_{cv}$	AIC	$R^2_{adj,ref}$	$rmse_{cv,ref}$	AIC_{ref}
q50	q80	0%	0.48	132.97	65907.36	0.49	132.53	65907.36
q50	q80	50%	0.48	133.24	65921.57	0.49	132.82	65921.57
q50	q80	60%	0.48	133.13	65916.29	0.49	132.79	65916.29
q50	q80	80%	0.48	133.03	65908.22	0.49	132.62	65908.22
q50	q80	100%	0.49	132.72	65887.21	0.49	132.18	65887.21
q50	q100	0%	0.49	132.60	66219.82	0.49	132.48	66219.82
q50	q100	50%	0.49	132.78	66236.92	0.49	132.72	66236.92
q50	q100	60%	0.49	132.81	66234.74	0.49	132.72	66234.74
q50	q100	80%	0.49	132.55	66222.37	0.49	132.46	66222.37
q50	q100	100%	0.49	132.06	66177.66	0.49	132.03	66177.66
q80	ind	0%	0.47	134.57	64803.25	0.47	133.82	64803.25
q80	ind	50%	0.47	134.71	64807.20	0.47	134.21	64807.20
q80	ind	60%	0.47	134.60	64797.25	0.47	134.20	64797.25
q80	ind	80%	0.47	134.16	64773.29	0.47	133.79	64773.29
q80	ind	100%	0.47	134.25	64795.59	0.48	133.26	64795.59
q80	q25	0%	0.48	134.25	65515.53	0.48	133.44	65515.53
q80	q25	50%	0.47	134.54	65537.15	0.48	133.78	65537.15
q80	q25	60%	0.48	134.29	65517.64	0.48	133.76	65517.64
q80	q25	80%	0.48	133.94	65484.54	0.48	133.53	65484.54
q80	q25	100%	0.48	133.89	65481.53	0.49	133.04	65481.53
q80	q50	0%	0.48	133.76	65751.41	0.48	133.11	65751.41
q80	q50	50%	0.47	133.96	65768.65	0.48	133.40	65768.65
q80	q50	60%	0.47	133.95	65766.20	0.48	133.39	65766.20
q80	q50	80%	0.48	133.52	65734.51	0.48	133.06	65734.51
q80	q50	100%	0.48	132.80	65683.87	0.49	132.45	65683.87
q80	q80	0%	0.48	133.61	65964.09	0.48	133.27	65964.09
q80	q80	50%	0.48	133.91	65986.91	0.48	133.60	65986.91
q80	q80	60%	0.48	133.75	65973.94	0.48	133.60	65973.94
q80	q80	80%	0.48	133.65	65964.87	0.48	133.33	65964.87
q80	q80	100%	0.48	133.25	65931.80	0.49	132.82	65931.80
q80	q100	0%	0.48	133.29	66282.17	0.48	133.22	66282.17
q80	q100	50%	0.48	133.58	66307.14	0.48	133.51	66307.14
q80	q100	60%	0.48	133.69	66308.78	0.48	133.51	66308.78
q80	q100	80%	0.48	133.19	66281.98	0.48	133.16	66281.98
q80	q100	100%	0.49	132.68	66234.70	0.49	132.64	66234.70
q100	ind	0%	0.40	142.64	65410.22	0.41	142.07	65410.22
q100	ind	50%	0.40	142.88	65422.90	0.40	142.38	65422.90
q100	ind	60%	0.40	142.72	65407.17	0.40	142.41	65407.17
q100	ind	80%	0.40	142.34	65386.95	0.41	142.00	65386.95
q100	ind	100%	0.40	142.91	65434.69	0.41	141.55	65434.69
q100	q25	0%	0.41	142.73	66160.90	0.41	141.95	66160.90
q100	q25	50%	0.40	143.01	66179.74	0.41	142.27	66179.74
q100	q25	60%	0.41	142.73	66160.25	0.41	142.30	66160.25
q100	q25	80%	0.41	142.68	66141.80	0.41	141.99	66141.80
q100	q25	100%	0.41	142.34	66116.49	0.42	141.48	66116.49
q100	q50	0%	0.41	142.42	66407.67	0.41	141.65	66407.67
q100	q50	50%	0.40	142.65	66424.41	0.41	141.96	66424.41
q100	q50	60%	0.40	142.62	66421.19	0.41	141.97	66421.19
q100	q50	80%	0.41	142.29	66396.88	0.41	141.63	66396.88
q100	q50	100%	0.41	141.58	66346.14	0.42	140.99	66346.14
q100	q80	0%	0.41	142.10	66605.90	0.41	141.85	66605.90
q100	q80	50%	0.41	142.34	66622.90	0.41	142.18	66622.90
q100	q80	60%	0.41	142.23	66613.83	0.41	142.19	66613.83
q100	q80	80%	0.41	142.07	66603.97	0.41	141.86	66603.97
q100	q80	100%	0.42	141.53	66562.97	0.42	141.32	66562.97
q100	q100	0%	0.41	141.98	66941.24	0.41	142.01	66941.24
q100	q100	50%	0.41	142.27	66965.61	0.41	142.24	66965.61
q100	q100	60%	0.41	142.08	66949.79	0.41	142.25	66949.79
q100	q100	80%	0.41	141.67	66923.58	0.41	141.79	66923.58
q100	q100	100%	0.42	141.24	66885.59	0.42	141.22	66885.59