List of Supplementary Tables

Supplementary Table 1. The sedimentary pollen sites in the northeastern USA used for the calibration data set. Metadata provided includes site name (Site Name), Neotoma site and dataset identification numbers (Neotoma Site ID and Dataset ID), longitude (Lon) and latitude (Lat), settlement horizon sample depth (Depth; may be recorded as depth from the upper most sediment layer or from lake surface), settlement horizon sample number (Sample number), Fields storing Neotoma IDs are left blank for sites not in Neotoma at the time of analysis. For references see Supplementary Table S2.

Supplementary Table 2. References for the sedimentary pollen sites in the northeastern USA used for the calibration data set. References are linked to records in Supplementary Table 1 through dataset IDs.

Supplementary Table 3. Dissimilarities among PVM reconstructions and observed vegetation, shown as summary statistics of pointwise squared chord distances between observed and reconstructed vegetation. To make a direct comparison between STEPPS and REVEALS, we reduced STEPPS-based results (8 km grid) to the spatial and taxonomic resolution of REVEALS-based reconstructions (1° Lat/Lon).

List of Supplementary Figures

Supplementary Figure 1. Comparison between observed pollen proportions and observed vegetation proportions (red crosses) and observed pollen proportions and pollen proportions predicted by STEPPS (black dots).

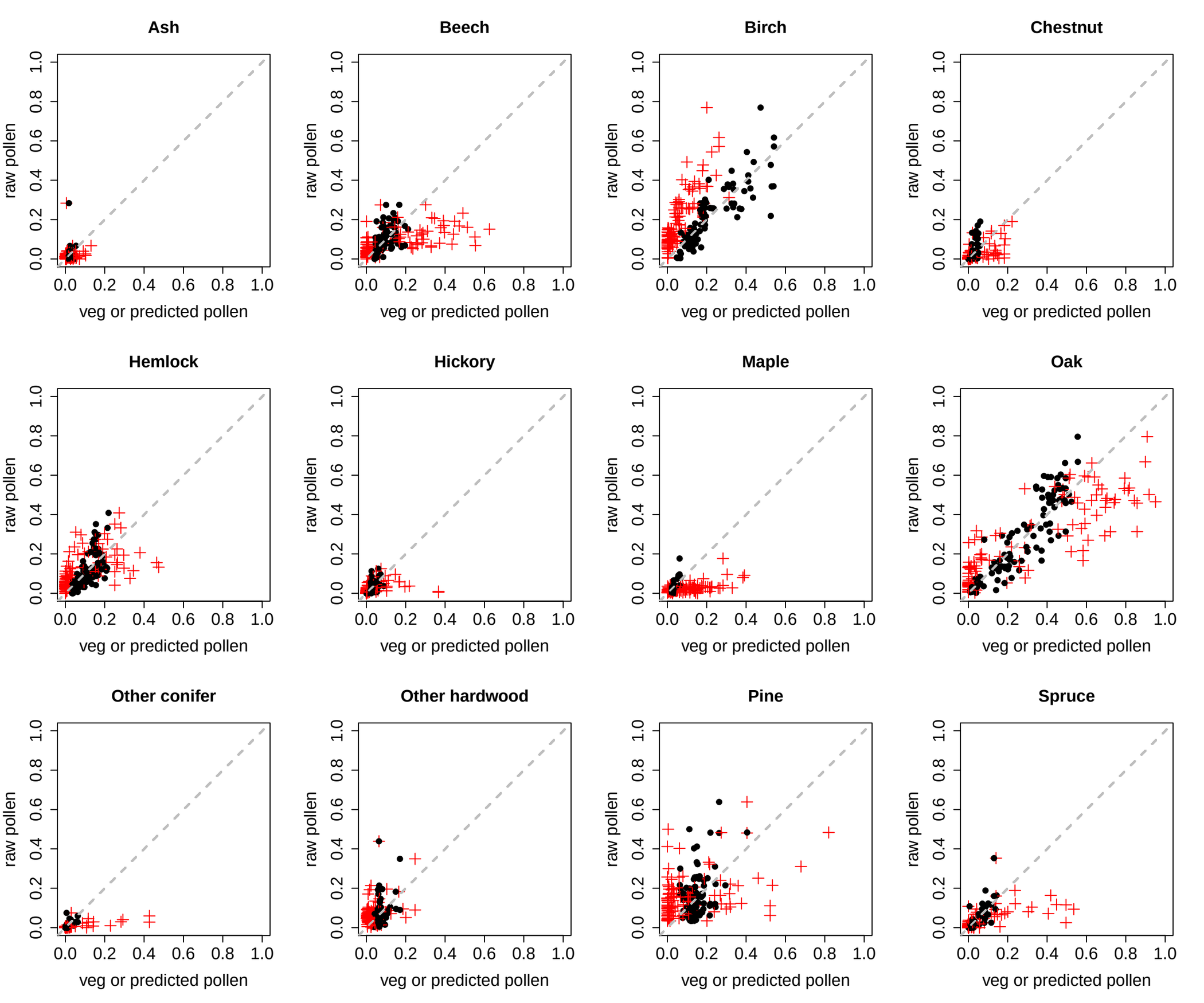
Supplementary Figure 2. As Figure 2 but for all taxa.

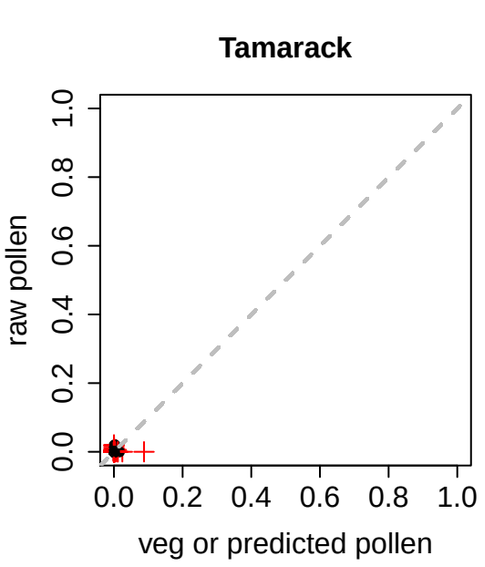
Supplementary Figure 3. Heatmaps of vegetation reconstructions along with uncertainties. Medians of posterior draws (1st column), differences between 95% and 5% quantiles (2nd column), 5% quantiles (3rd column) and 95% quantiles (4th column).

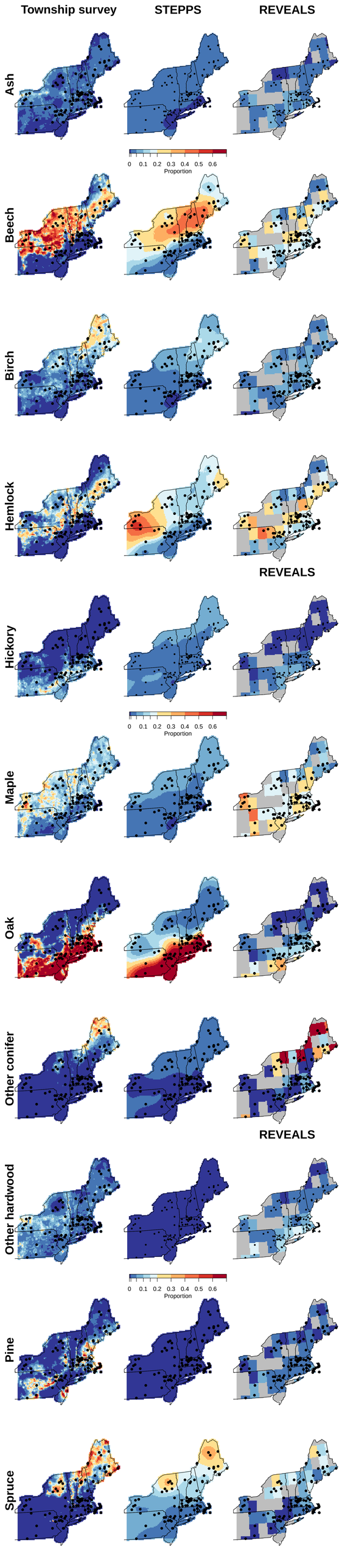
Supplementary Figure 4. As Figure 3 but for all taxa.

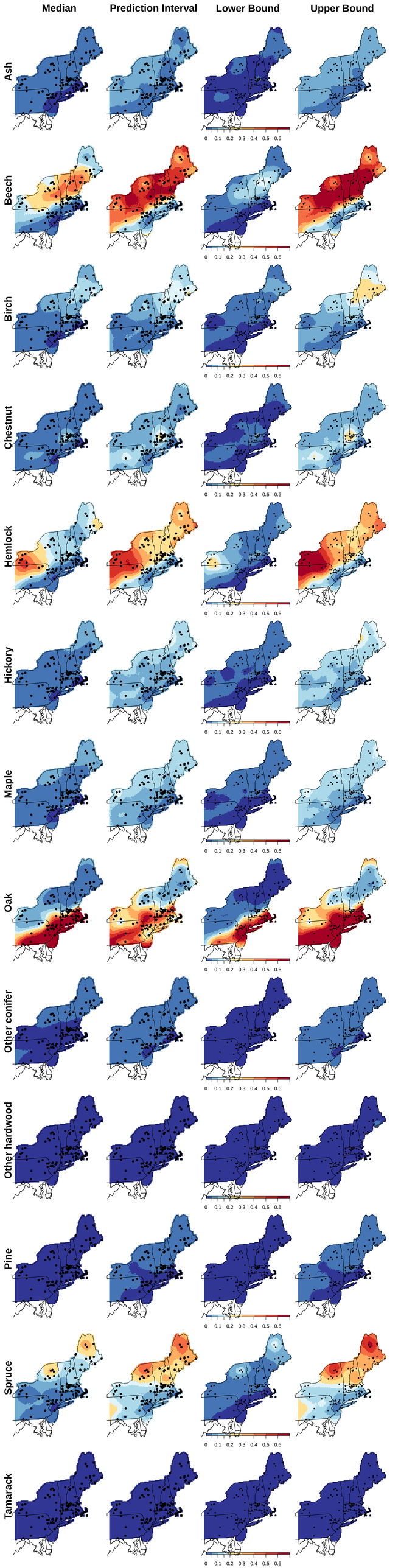
Supplementary Figure 5. Community-level dissimilarities within and among forest types, based on an analysis of forest compositional data from the Paciorek et al. (2016) spatial model of TPS data. This analysis is used to contextualize the community dissimilarities between STEPPS predictions and TPS data shown in Fig. 4. Within-type dissimilarities are calculated for oak-dominated forests (dark gray), beech-dominated forests (medium blue), and spruce-dominated forests (light gray), while between-type dissimilarities are shown in red, orange, and light yellow (overlapping histograms result in changed colors). The optimal discriminant threshold between within-type and between-type dissimilarities (Gavin et al. 2003) falls near 0.4, suggesting that data-model dissimilarities <0.4 (Fig. 4) are similar in scale to the spatial heterogeneity in composition that occurs within settlement-era forest types.

Supplementary Figure 6. As Figure 7 but for all taxa.


Ash
Beech
Birch
Chestnut
Hemlock
Hickory
Maple
Oak
Other conifer
Other hardwood
Pine
Spruce
raw pollen
veg or predicted pollen
0.0
0.2
0.4
0.6
0.8
1.0

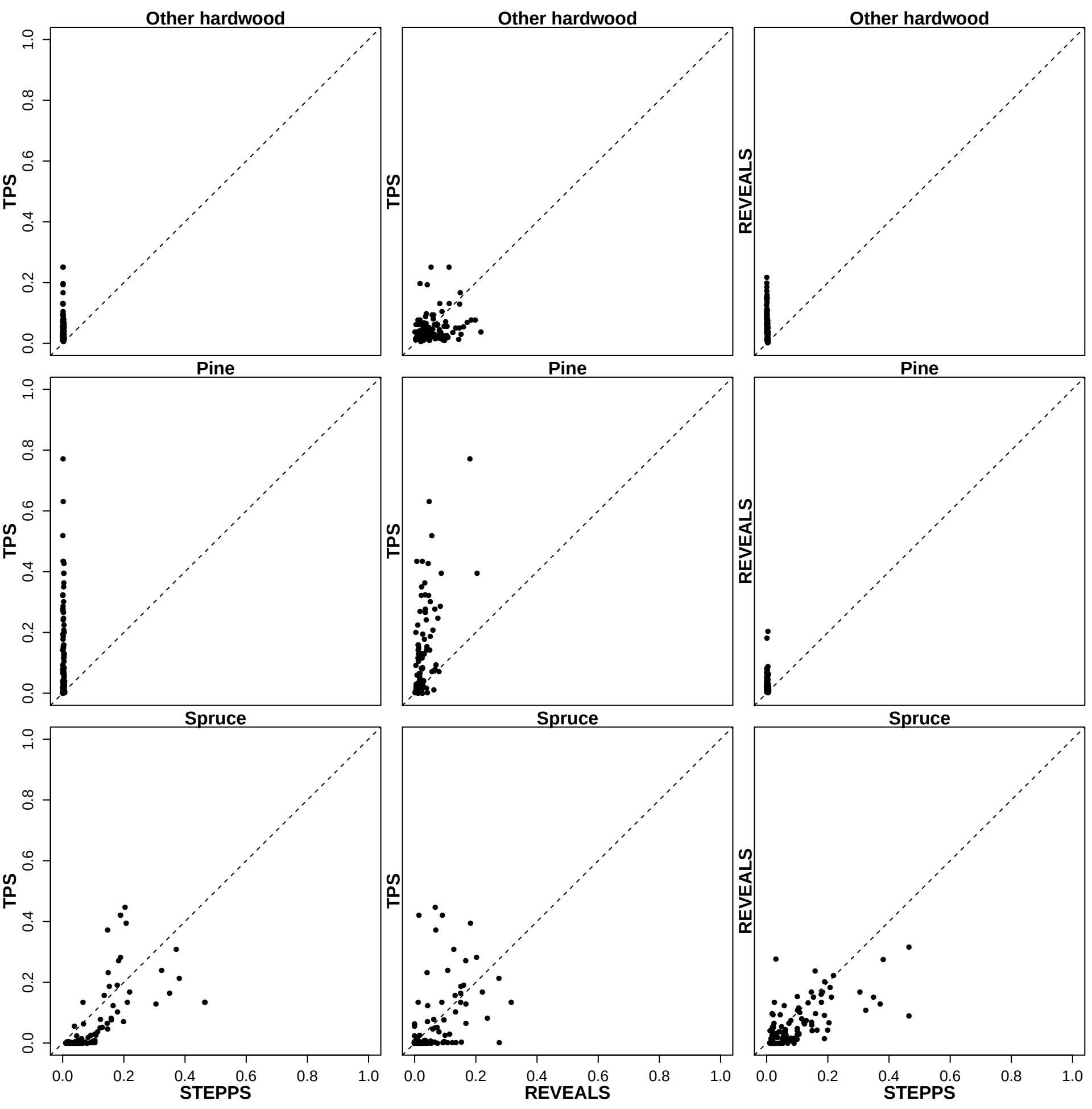

Tamarack
raw pollen
0.0
0.2
0.4
0.6
0.8
1.0
0.0
0.2
0.4
0.6
0.8
1.0
veg or predicted pollen

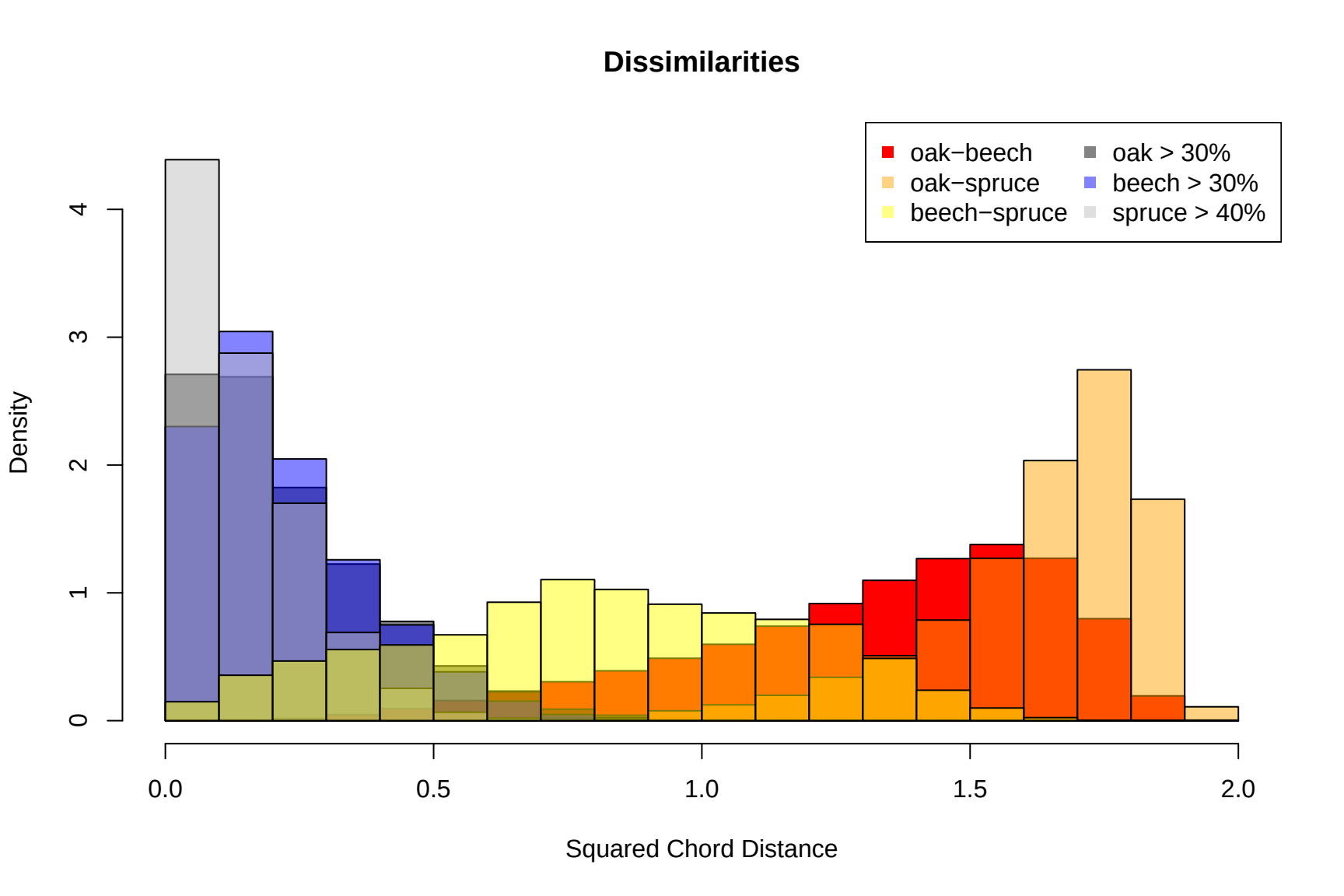

Township survey
STEPPS
REVEALS
Ash
Beech
Birch
Hemlock
Hickory
Maple
Oak
Other conifer
Other hardwood
Pine
Spruce
0 0.1 0.2 0.3 0.4 0.5 0.6
Proportion


Median
Prediction Interval
Lower Bound
Upper Bound
Ash
Beech
Birch
Chestnut
Hemlock
Hickory
Maple
Oak
Other conifer
Other hardwood
Pine
Spruce
Tamarack
0 0.1 0.2 0.3 0.4 0.5 0.6

Ash
Ash
Ash
Beech
Beech
Beech
Birch
Birch
Birch
Hemlock
Hemlock
Hemlock
TPS
REVEALS
0.0
0.2
0.4
0.6
0.8
1.0

Hickory
Hickory
Hickory
Maple
Maple
Maple
TPS
TPS
REVEALS
TPS
TPS
REVEALS
0.0
0.2
0.4
0.6
0.8
1.0
Oak
Oak
Oak
Other conifer
Other conifer
Other conifer


Other hardwood
Other hardwood
Other hardwood
Pine
Pine
Pine
Spruce
Spruce
Spruce
TPS
REVEALS
STEPPS
0.0
0.2
0.4
0.6
0.8
1.0


Dissimilarities
oak−beech
oak−spruce
beech−spruce
oak > 30%
beech > 30%
spruce > 40%
Density
0
1
2
3
4
0.0
0.5
1.0
1.5
2.0
Squared Chord Distance

Ash

Beech

Birch

Hemlock

Maple

Oak

Other conifer

Other hardwood

Pine

Spruce

Tamarack

Proportion of deposited pollen

0.0 0.2 0.4 0.6 0.8 1.0

0 200 400 600 800

distance [km]

Variable PLK UMW
Variable GK UMW
Variable PLK NEUS
Variable GK NEUS

Supplementary Table 1. The sediment pollen sites in the northeastern USA used for the calibration data set. Metadata provided includes site name (Site Name), Neotoma site and dataset identification numbers (Neotoma Site ID and Dataset ID), longitude (Lon) and latitude (Lat), settlement horizon sample depth (Depth; may be recorded as depth from the upper most sediment layer or from lake surface), settlement horizon sample number (Sample number), Fields storing Neotoma IDs are left blank for sites not in Neotoma at the time of analysis.
For references see supplementary table S2.

Site Name	Neotoma Site ID	Dataset ID	Lon	Lat	Settlement era depth	Settlement era Sample #	Lake area (ha)
Basin Pond	234	237	-70.05	44.47	175	17	NA
Belmont Bog	249	254	-77.92	42.25	40	6	30
Big Pond	268	274	-78.55	39.77	20	4	NA
Boundary Pond	302	308	-70.68	45.57	43	6	NA
Carbuncle Pond	331	338	-71.78	41.7	46	11	116
Caribou Bog	333	340	-68.77	44.94	57	2	780
Clear Pond	482	494	-74.02	43.75	250	7	11.6
Conroy Lake	491	503	-67.88	46.28	220	25	10.1
Deer Lake Bog	657	673	-71.83	44.03	60	4	39
Donut Pond Bog	701	721	-70.06	41.28	96	15	NA
Duck Pond	753	772	-70	41.93	55	8	4.3
Ely Lake	775	795	-75.83	41.77	180	6	22.7
Giles Lake	844	873	-75.09	41.38	47	17	47.5
Gould Pond	941	971	-69.32	44.98	840	11	3.2
Gould's Bog	942	972	-72.18	42.53	40	7	0.05
Green Pond	953	983	-74.5	41.01	62	15	393
Helmetta Bog	998	1031	-74.43	40.38	70	5	166
Houghton Bog	1080	1113	-78.67	42.54	73	8	3.43
Kinsman Pond	1481	1518	-71.73	44.13	30	7	3.57
Lake Lacawac	1530	1568	-75.29	41.38	53	26	20.7
Longswamp	1610	1661	-75.67	40.48	20	5	NA
Loon Pond	1611	1663	-68.2	45.03	1000	5	NA
Lost Pond	1615	1667	-71.25	44.25	100	6	56
Mansell Pond	1643	1698	-68.73	45.04	752	21	4
Mashapaug Pond	1656	1712	-71.43	41.78	117	30	180
Moulton Pond	1716	1773	-68.64	44.63	60	4	22
North Pond	1759	1817	-73.05	42.65	20	3	7.3
Panther Run Pond	1789	1848	-77.42	40.8	30	3	NA
Pasacaco Pond	1797	1859	-71.45	41.52	131	36	168
Poland Spring Pond	1896	1961	-70.35	44.03	395.5	6	NA
Protection Bog	1914	1980	-78.47	42.62	72.5	11	NA
Rogers Lake	2194	2270	-72.3	41.35	122.6	12	113
Sinkhole Pond	2308	2391	-70.35	43.97	1249.5	6	NA
Spring Lake	2507	2591	-76.35	41.67	120	4	44.7
Spruce Pond	2508	2593	-74.18	41.24	75	13	3.53
Sutherland Pond	2527	2617	-74.04	41.39	70	7	83
Swartswood Lake	2531	2621	-74.84	41.07	72	14	162
Szabo Pond	2533	2623	-74.48	40.4	120	5	20
Tannersville Bog	2536	2626	-75.27	41.03	136	7	300
Taupawshas Bog	2539	2629	-70.06	41.28	70	8	NA
Titicut Swamp	2554	2645	-71.03	41.95	124	8	70.8
Unknown Pond	2791	2886	-70.63	45.6	50	4	NA

Upper South Branch Pond		2795	2892	-68.9	46.08	20	11	NA	
Valhalla Hollow		2805	2902	-74.37	44.31	18	12		9
Winneconnet Pond		2862	2959	-71.12	41.97	40	7		96.4
Heart Lake		728	3130	-73.97	44.18	30	3		11.2
Mohawk Pond		558	3493	-73.29	41.81	50	2		6.95
Aino Pond		3529	4557	-71.93	42.68	71	36		1.8
Dead Frog Pond		3530	4558	-72.51	42.57	31	16		0.02
Hemlock Hollow		6510	10972	-72.18	42.54	16	17		0.006
Linsley Pond		9708	14370	-72.78	41.32	120	29		9.3
Big Reed Pond Hollow		9866	14624	-69.05	46.35	14	5		0.6
Blackwoods Hollow		9889	14674	-68.22	44.31	18	4		0.32
Buckley Pond Hollow		9890	14676	-69.05	46.33	15	7		0.0002
South Bog		9944	14797	-67.2	44.72	25	25	NA	
Round Pond		10020	14997	-70.01	41.97	30	16		2.3
Deep Pond		10021	14999	-69.99	41.74	84	22		1.6
Icehouse Pond		10023	15003	-69.96	41.8	152	20		1.9
Eagle Pond		10025	15007	-70.14	41.7	36	10		2.8
Jemima Pond		10026	15009	-69.98	41.83	112	15		2.2
Sandy Hill Pond		10028	15020	-70.36	41.69	64	9		2.4
Fresh Pond		10029	15022	-70.53	41.59	32	17		5.4
Byron-Bergen Swamp (Site 2)		10155	15292	-78	43.1	20	3		800
Byron-Bergen Swamp (Site 1)		10157	15296	-78.01	43.1	40	4		800
Black Gum Swamp		10172	15325	-72.18	42.54	17	8		6.9
Lily Pond		10362	15764	-72.35	42.42	50	21		2.3
Prospect Hill II		10389	15820	-72.18	42.56	21	15	NA	
Slab City		10400	15857	-72.18	42.51	19	19	NA	
Tannersville Bog		2536	15866	-75.27	41.03	240	24		300
Divers Lake		10422	15904	-78.4	43.04	81	11		3
Ballston Lake		10424	15909	-73.85	42.95	235	7		65
Little Mirror Lake		10435	15935	-71.61	42.52	53	27		2.6
Silver Lake		10438	15944	-72.23	42.6	47	24		4.2
Binnewater Pond		10515	16175	-74.55	41.41	60	6		77
Lost Swamp		11805	17880	-72.42	42.83	29	13	NA	
Lake Grinnell		13583	20515	-74.64	41.1	16	3		20
Quag Pond		13629	20618	-71.96	42.57	46	23		0.423
Snake Pond		13633	20627	-72.02	42.56	43	22		2.4
Heart's Content Bog		10188	15352	-73.98	42.24	70	8		310
Allenberg Bog		10287	15598	-78.88	42.25	37.5	9		158
Rose Lake		2212	2289	-77.93	41.92	78	2	NA	
Crider's Pond		510	523	-77.55	39.97	25	3	NA	
Barnes	Whitehead and Jackson (1990)			-75.23	43.56	11	37		1
Big Moose Lake	Whitehead and Jackson (1990)			-74.85	43.81	19	29		520
Bloomingdale Bog Upper	Booth et al. in prep)			-74.14	44.38	18	41	NA	
Blood Pond	Oswald et al. (in press)			-71.96	42.08	25	60		8.5
Deep Lake	Whitehead and Jackson (1990)			-74.66	43.61	25	18		1
Knob Hill	Oswald et al. (in press)			-72.37	44.36	24	92		7.1
Larkum	Paciorek and McLachlan (2009)			-73.06	42.17	13	48		10
Little Willey Pond	Oswald et al. (in press)			-71.18	43.29	8	24		11.4
Little Royalston	Oswald et al. (in press)			-72.19	42.68	15	80		4
North Round Pond	Paciorek and McLachlan (2009)			-72.45	42.85	21	40.5		4
Pecker	Paciorek and McLachlan (2009)			-71.97	42.71	27	53		6
Pickerel	Paciorek and McLachlan (2009)			-72.48	42.17	26	100		1
Uncas	Paciorek and McLachlan (2009)			-71.38	42.06	20	76		3

Walden	Paciorek and McLachlan (2009)	-71.34	42.44	17	32	10
Wickett	Paciorek and McLachlan (2009)	-72.43	42.55	20	39.5	9
Benson	Oswald et al. (in press)	-73.1	42.38	5	20	2.3
Berry-andover	Oswald et al. (in press)	-71.09	42.62	18	68	1.6
Black Pond	Oswald et al. (in press)	-70.79	41.33	19	108	1.4
Blaney's Pond	Oswald et al. (in press)	-70.77	41.47	16	36	1
Deep-falmouth	Oswald et al. (in press)	-70.64	41.56	22	84	1
Deep-taunton	Oswald et al. (in press)	-71.01	41.88	3	96	1.5
Doe	Oswald et al. (in press)	-72.7	42.18	14	52	1.4
Guilder	Oswald et al. (in press)	-73.44	42.11	4	24	6.3
Sears	Oswald et al. (in press)	-72.58	40.88	5	56	6.1
Umpawaug	Oswald et al. (in press)	-73.45	41.31	8	70	5.3
Uncle Seth's	Oswald et al. (in press)	-70.66	41.43	7	30	4.6
Ware	Oswald et al. (in press)	-70.88	42.48	22	173	1.1
Westside	Oswald et al. (in press)	-73.26	41.86	3	48	15.7

Supplementary Table 2. References for the sediment pollen sites in the northeastern USA used for the calibration data set. References are linked to records in Supplementary Table 1 through dataset IDs.

Dataset ID	Publication
237	Backman, A.E. 1984. 1000-year record of fire-vegetation interactions in the northeastern United States: A comparison between coastal and inland regionss. Doctoral dissertation. University of Massachusetts, Amherst, Massachusetts, United States.
237	Gajewski, K., editor. 1985. Late-Holocene pollen data from lakes with varved sediments in northeastern and northcentral United States. IES Report 124, Center for Climatic Research, University of Wisconsin, Madison, Wisconsin, USA.
237	Gajewski, K. 1987. Climatic impacts on the vegetation of eastern North America during the past 2000 years. Vegetatio 68(3):179-190. [DOI: 10.1007/BF00114719]
237	Gajewski, K. 1988. Late Holocene climate changes in eastern North America estimated from pollen data. Quaternary Research 29(3):255-262. [DOI: 10.1016/0033-5894(88)90034-8]
237	Gajewski, K., A.M. Swain, and G.M. Peterson. 1987. Late Holocene pollen stratigraphy in four northeastern United States lakes. Geographie Physique et Quaternaire 41:377-386.
237	Gajewski, K.J. 1983. On the interpretation of climatic change from the fossil record: climatic change in central and eastern United States over the past 2000 years estimated from pollen data. Dissertation. University of Wisconsin-Madison, Madison, Wisconsin, USA.
254	Spear, R.W., and N.G. Miller. 1976. A radiocarbon dated pollen diagram from the Allegheny Plateau of New York State. Journal of the Arnold Arboretum 57(3):369-403.
274	Watts, W.A. 1979. Late Quaternary vegetation of central Appalachia and the New Jersey coastal plain. Ecological Monographs 49:427-469.
308	Mott, R.J. 1977. Late-Pleistocene and Holocene palynology in southeastern Québec. Géographie physique et Quaternaire 31:139-149.
338	NA
340	Gajewski, K. 1987. Environmental history of Caribou Bog, Penobscot Co., Maine. Le Naturaliste Canadien 114:133-140.
340	Gajewski, K. 1979. Environmental history of Caribou Bog, Penobscot Co., Maine. Thesis. Master's thesis. University of Maine, Orono, Maine, USA.
494	Gajewski, K., editor. 1985. Late-Holocene pollen data from lakes with varved sediments in northeastern and northcentral United States. IES Report 124, Center for Climatic Research, University of Wisconsin, Madison, Wisconsin, USA.
494	Gajewski, K. 1987. Climatic impacts on the vegetation of eastern North America during the past 2000 years. Vegetatio 68(3):179-190. [DOI: 10.1007/BF00114719]
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	Research, University of Wisconsin, Madison, Wisconsin, USA.
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503	Gajewski, K.J. 1983. On the interpretation of climatic change from the fossil record: climatic change in central and eastern United States over the past 2000 years estimated from pollen data. Dissertation. University of Wisconsin-Madison, Madison, Wisconsin, USA.
673	Spear, R.W. 1981. The history of high-elevation vegetation in the White Mountains of New Hampshire. Dissertation. University of Minnesota, Minneapolis, Minnesota, USA.
721	Dunwiddie, P.W. 1989. Forest and health: the shaping of the vegetation on Nantucket Island. Journal of Forest History 33:126-133.
721	Dunwiddie, P.W. 1990. Postglacial vegetation history of coastal islands in southeastern New England. National Geographic Research 6:178-195.
772	Winkler, M.G. 1985. A 12,000-year history of vegetation and climate for Cape Cod, Massachusetts. Quaternary Research 23:301-312.
772	Winkler, M.G. 1988. Paleolimnology of a Cape Cod kettle pond: diatoms and reconstructed pH. Ecological Monographs 58:197-214.
795	Gajewski, K., editor. 1985. Late-Holocene pollen data from lakes with varved sediments in northeastern and northcentral United States. IES Report 124, Center for Climatic Research, University of Wisconsin, Madison, Wisconsin, USA.
795	Gajewski, K. 1987. Climatic impacts on the vegetation of eastern North America during the past 2000 years. Vegetatio 68(3):179-190. [DOI: 10.1007/BF00114719]
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795	Gajewski, K., A.M. Swain, and G.M. Peterson. 1987. Late Holocene pollen stratigraphy in four northeastern United States lakes. Geographie Physique et Quaternaire 41:377-386.
873	Russell, E.W.B., R.B. Davis, R.S. Anderson, T.E. Rhodes, and D.S. Anderson. 1993. Recent centuries of vegetational change in the glaciated north-eastern United States. Journal of Ecology 81(4):647-664. [DOI: 10.2307/2261663]
971	Jacobson, G.L., Jr., T. Webb III, and E.C. Grimm. 1987. Patterns and rates of vegetation change during the deglaciation of eastern North America. Pages 277-288 in W.F. Ruddiman and H.E. Wright, Jr., editors. North America and adjacent oceans during the last deglaciation. The Geology of North America K-3. Geological Society of America, Boulder, Colorado, USA.
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972	Davis, M.B. 1958. Three pollen diagrams from central Massachusetts. American Journal of Science 256:540-570. http://www.ajsonline.org/content/256/8/540.citation. [DOI: 10.2475/ajs.256.8.540]
983	Russell, E.W.B. 1980. Vegetational change in northern New Jersey from precolonization to the present: a palynological interpretation. Bulletin of the Torrey Botanical Club

	107(3):432-446. [DOI: 10.2307/2484166]
983	Russell, E.W.B., R.B. Davis, R.S. Anderson, T.E. Rhodes, and D.S. Anderson. 1993. Recent centuries of vegetational change in the glaciated north-eastern United States. Journal of Ecology 81(4):647-664. [DOI: 10.2307/2261663]
1031	Watts, W.A. 1979. Late Quaternary vegetation of central Appalachia and the New Jersey coastal plain. Ecological Monographs 49:427-469.
1113	Miller, N.G. 1973. Late-glacial and postglacial vegetation change in southwestern New York State. Bulletin 420. New York State Museum and Science Service, The State Education Department, Albany, New York, USA.
1518	Spear, R.W. 1981. The history of high-elevation vegetation in the White Mountains of New Hampshire. Dissertation. University of Minnesota, Minneapolis, Minnesota, USA.
1568	Russell, E.W.B., R.B. Davis, R.S. Anderson, T.E. Rhodes, and D.S. Anderson. 1993. Recent centuries of vegetational change in the glaciated north-eastern United States. Journal of Ecology 81(4):647-664. [DOI: 10.2307/2261663]
1661	Watts, W.A. 1979. Late Quaternary vegetation of central Appalachia and the New Jersey coastal plain. Ecological Monographs 49:427-469.
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Supplementary Table 3. Dissimilarities among PVM reconstructions and observed vegetation, shown as summary statistics of pointwise squared chord distances between observed and reconstructed vegetation. To make a direct comparison between STEPPS and REVEALS, we reduced STEPPS-based results (8 km grid) to the spatial and taxonomic resolution of REVEALS-based reconstructions (1° Lat/Lon).

	STEPPS	STEPPS *	REVEALS
Min.	0.05	0.05	0.02
1st Qu.	0.22	0.19	0.18
Median	0.31	0.29	0.33
Mean	0.35	0.33	0.39
3rd Qu.	0.45	0.45	0.54
Max.	1.18	1.143	1.33

*STEPPS data reduced to spatial and taxonomic resolution of REVEALS