

Transparency, geomorphology, and mixing regime explain variability in trends in lake temperature and stratification across northeastern North America (1975 - 2012)

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Supporting Information

Table S3: All Thiel-Sen estimators (Sen's slopes) for 1985 cohort.

Table S3. The magnitude of trends from Sen's Slope analyses for each metric of lake thermal structure for the 1985 cohort for NENA lakes. NA values indicate that criteria for calculating that slope were not satisfied for a metric within a particular lake. Buoyancy frequency is the maximum buoyancy frequency in cph units (cycles per hour).

Lake name	Near-surface temperature (°C year ⁻¹)	Deepwater temperature (°C year ⁻¹)	Mean lake temperature (°C year ⁻¹)	Temperature difference (°C year ⁻¹)	Buoyancy Frequency (cph year ⁻¹)	Density Gradient (kg m ⁻³ year ⁻¹)
MA.Quabbin	0.044	-0.039	0.065	0.002	7.914	0.0003
ME.AdamsPond.3396	0.080	-0.029	0.091	-0.058	1.077	0.0017
ME.AdamsPond.5366	0.222	0.032	0.205	NA	NA	0.0131
ME.AndroscogginLake.3836	-0.008	-0.129	0.150	-0.102	4.266	0.0033
ME.AnnabessacookLake.9961	0.051	-0.006	0.059	-0.003	2.340	0.0015
ME.AuburnLake.3748	0.109	0.009	0.096	0.027	2.114	0.0014
ME.Bear&LittleBearPds.3624	0.042	-0.109	0.116	-0.026	-0.154	0.0037
ME.BearPond.3420	0.042	0.012	0.018	0.003	1.630	0.0006
ME.BeaverPond.5582	0.079	0.020	0.038	-0.011	3.085	0.0029
ME.BeechHillPond.4352	0.145	NA	NA	0.028	3.286	NA
ME.BerryPond.3828	-0.003	-0.133	0.108	-0.064	2.209	0.0035
ME.BiscayPond.5710	-0.048	-0.030	0.030	0.015	1.083	-0.0001
ME.BranchLake.4328	0.066	NA	NA	NA	NA	NA
ME.BryantPond(LakeChristopher).3464	0.295	0.015	0.256	0.083	2.029	0.0046
ME.Bubble	0.089	-0.115	0.144	0.014	10.098	0.0035
ME.CarltonPond.5310	0.027	0.016	0.018	0.019	1.671	0.0005
ME.CathanceLake.9661	0.046	-0.106	0.108	-0.021	1.876	0.0022
ME.ChickawaukiePond.4822	0.004	-0.031	0.024	0.008	2.625	0.0006
ME.ChinaLake.5448	0.049	0.002	0.022	-0.009	2.219	0.0004
ME.Clary(Pleasant)Lake.5382	0.016	-0.086	0.080	-0.021	4.685	0.0036
ME.CobbosseeconteeLake.5236	0.038	0.004	0.020	-0.003	1.124	0.0002
ME.CochnewagonPond.3814	0.012	-0.100	0.150	-0.031	3.358	0.0053
ME.ColdRainPond.3376	0.070	-0.017	0.076	-0.067	1.502	0.0028
ME.ColdStreamPond.2146	-0.049	NA	NA	NA	NA	NA
ME.Crescent(Rattlesnake)Lake.3696	0.098	0.035	0.073	0.026	3.816	0.0019
ME.CrossLake.1674	-0.008	0.000	-0.023	0.007	2.593	-0.0003
ME.Crystal(Anonymous)Lake.3452	0.032	0.016	0.019	0.031	3.582	0.0005
ME.Crystal(Beals)Pond.3626	0.096	-0.031	0.112	-0.031	3.279	0.0028

ME.DamariscottaLake.5400	0.050	NA	NA	0.046	-0.536	NA
ME.DexterPond.3830	0.005	-0.150	0.165	-0.071	1.664	0.0055
ME.DuckpuddlePond.5702	0.000	0.002	-0.047	-0.016	0.196	-0.0018
ME.Eagle	0.064	0.014	-0.003	0.000	0.800	0.0003
ME.EastPond.5349	0.086	0.039	0.034	0.074	3.377	0.0024
ME.EchoLake(CrotchedPond).5814	0.057	NA	NA	NA	NA	NA
ME.EchoLake.4624	0.076	-0.050	0.118	-0.006	1.528	0.0016
ME.EmbdenPond.78	0.054	NA	NA	-0.036	4.126	NA
ME.FlyingPond.5182	-0.068	-0.077	0.000	-0.061	2.130	-0.0005
ME.GreatPond.5274	0.115	0.131	0.033	0.122	0.684	0.0014
ME.GreenLake.4294	0.025	NA	NA	0.015	0.117	NA
ME.HaleyPond.3534	0.022	0.015	0.011	0.020	-3.972	0.0001
ME.HancockPond.3132	0.088	0.031	0.050	0.003	3.067	0.0013
ME.HealdPond.3222	0.117	0.110	0.044	0.094	4.768	0.0034
ME.HighlandLake.3454	0.033	-0.020	0.075	-0.032	-2.416	0.0011
ME.HighlandLake.3734	0.084	0.019	0.043	-0.022	1.165	0.0010
ME.HornePond.3408	0.164	NA	NA	0.058	-0.756	NA
ME.Ingalls(Foster's)Pond.3188	0.067	-0.120	0.158	0.004	3.887	0.0088
ME.IslandPond.3448	0.029	-0.010	0.006	-0.071	-0.006	0.0007
ME.Jordan	0.050	0.016	0.072	-0.004	0.975	0.0004
ME.KennebagoLake.2374	0.067	NA	NA	NA	NA	NA
ME.KeokaLake.3416	0.020	0.018	-0.004	-0.007	0.236	0.0008
ME.KeysPond.3232	0.061	-0.005	0.049	-0.042	1.679	0.0014
ME.KezarLake.97	0.127	NA	NA	0.020	2.015	NA
ME.LakeAnasagunticook.3604	0.174	0.058	0.069	0.081	3.076	0.0039
ME.LittleCobbosseecontee.8065	0.042	0.023	0.010	0.022	2.847	0.0013
ME.LittlePennesseewassee.367	0.067	0.015	0.033	0.001	1.585	0.0021
ME.LittleSebagoLake.3714	0.104	0.000	0.110	-0.029	1.869	0.0023
ME.LittleWilson(French,Ramsdell)Pond.3784	0.176	0.000	0.191	0.001	2.995	0.0033
ME.Long(McWain)Pond.3418	0.018	0.003	-0.003	-0.032	0.214	0.0001
ME.LongLake.5780	0.007	-0.003	0.022	0.003	1.179	0.0001
ME.LongPond.3084	-0.043	-0.055	-0.014	-0.087	5.147	-0.0010
ME.LongPond.4622	0.025	0.021	0.022	-0.008	-2.426	0.0004
ME.LongPond.5272	0.029	0.024	0.018	0.035	1.516	0.0003

ME.LovejoyPond.5176	-0.188	-0.055	0.017	-0.073	-1.527	-0.0005
ME.LowerNarrowsPond.103	-0.020	0.010	-0.015	-0.010	-0.734	-0.0002
ME.MadawaskaLake.1802	0.030	-0.075	0.075	-0.010	2.881	0.0016
ME.MaranacookLake.5312	0.044	0.015	0.025	0.018	0.882	0.0003
ME.Meduxnekeag(Drews)Lake.1736	0.165	0.295	-0.040	0.262	-0.173	0.0013
ME.MegunticookLake.4852	0.100	0.000	0.038	NA	NA	0.0009
ME.MessalonskeeLake.5280	-0.024	0.138	-0.141	0.018	-0.151	-0.0014
ME.MiddleRangePond.3762	0.071	0.026	0.048	0.054	1.456	0.0007
ME.Mooselookmeguntic(Cupsuptic)Lake.3302	0.001	0.027	-0.005	0.064	3.120	0.0002
ME.MoosePond.2590	0.100	0.014	0.080	0.035	2.440	0.0016
ME.MoosePond.3134	0.031	-0.015	0.058	-0.049	2.799	0.0009
ME.MoosePond.3424	0.048	-0.009	0.044	-0.014	1.318	0.0013
ME.MountainyPond.4292	0.009	-0.030	0.021	0.027	1.526	0.0007
ME.MousamLake.3838	0.120	-0.006	0.109	0.019	0.881	0.0014
ME.NequassetLake.5222	0.103	0.017	0.089	0.036	0.460	0.0012
ME.NorthLake(LittlePond).5344	-0.002	0.011	-0.008	0.004	0.479	-0.0007
ME.NorthPond.3500	0.057	NA	NA	0.071	-1.202	NA
ME.OtterPond.3458	0.014	0.000	-0.012	0.003	1.287	-0.0010
ME.PantherPond.3694	0.100	0.000	0.093	0.013	2.371	0.0016
ME.PapoosePond.3414	-0.044	NA	NA	-0.093	1.951	NA
ME.ParkerPond.5186	-0.056	0.020	-0.061	-0.009	2.690	-0.0007
ME.PeabodyPond.3374	0.112	0.017	0.072	0.018	1.286	0.0019
ME.PemaquidPond.5704	0.100	-0.005	0.100	-0.021	-2.605	0.0019
ME.PennesseewasseeLake.3434	0.097	0.015	0.089	0.038	1.620	0.0022
ME.PleasantLake.3446	0.127	0.000	0.116	0.049	6.232	0.0023
ME.PleasantPond.3822	0.064	-0.012	0.110	-0.010	1.596	0.0010
ME.QuimbyPond.3526	0.048	NA	NA	0.047	0.000	NA
ME.Rangeley(Oquossoc)Lake.3300	0.016	NA	NA	NA	NA	NA
ME.RaymondPond.3690	0.112	-0.050	0.106	0.027	1.865	0.0023
ME.SabattusPond.3796	0.100	0.079	0.000	0.095	3.451	-0.0001
ME.SabbathdayLake.3700	0.132	0.038	0.100	0.059	1.521	0.0022
ME.SaddlebackLake.3536	0.021	NA	NA	-0.017	1.752	NA
ME.SalmonPond(EllisPond).5352	0.068	0.042	0.000	0.042	1.005	0.0007
ME.Sand(Walden)Pond.3130	0.136	0.021	0.105	-0.005	2.507	0.0030

ME.SandPond(TacomaLakes).5238	0.050	-0.008	0.035	0.001	0.879	0.0010
ME.SandPond.3432	0.112	NA	NA	NA	NA	NA
ME.SealCovePond.4630	0.064	-0.055	0.106	-0.002	-0.191	0.0021
ME.SeabasticookLake.2264	0.004	-0.018	0.033	-0.012	-1.719	0.0004
ME.SewallPond.9943	0.124	NA	NA	0.112	2.882	NA
ME.SquarePond.3916	0.039	-0.076	0.104	-0.006	3.165	0.0027
ME.StearnsPond.3234	0.125	0.039	0.071	-0.024	1.291	0.0023
ME.StGeorgeLake.9971	0.117	0.110	0.009	0.042	-0.815	0.0016
ME.SwanLake(GoosePond).5492	0.133	0.062	0.050	0.081	3.993	0.0009
ME.TaylorPond.3750	0.069	0.000	0.079	0.020	2.260	0.0017
ME.ThomasPond.3392	0.125	-0.043	0.136	-0.034	3.000	0.0022
ME.ThompsonLake(TheHeath).3444	0.063	NA	NA	0.042	2.711	NA
ME.ThreemilePond.5416	0.053	-0.062	0.109	-0.003	1.639	0.0028
ME.TogusPond.9931	0.088	-0.004	0.119	0.026	2.972	0.0020
ME.Torsey(Greeley)Lake.5307	0.052	0.000	0.042	0.004	2.482	0.0013
ME.TrickyPond.3382	0.038	-0.030	0.094	-0.015	2.903	0.0010
ME.TrippPond.3758	0.019	-0.017	0.064	0.021	-2.217	0.0027
ME.UnityPond(WinnecookLake).5172	0.052	-0.019	0.065	0.053	2.820	0.0020
ME.UpperPleasant(Mud)Pond.5254	-0.001	-0.065	0.067	-0.011	0.939	0.0024
ME.WalkerPond.4640	0.048	-0.133	0.158	-0.046	2.181	0.0027
ME.WashingtonPond.4894	0.104	-0.046	0.113	NA	NA	0.0038
ME.Webb(Weld)Lake.3672	0.061	-0.016	0.080	0.003	1.123	0.0018
ME.WebberPond.5408	0.000	-0.050	0.010	-0.048	2.678	-0.0004
ME.WesserunsettLake.70	0.033	0.033	0.010	0.018	4.066	0.0006
ME.WilsonLake.3920	0.136	-0.002	0.125	-0.076	4.207	0.0032
ME.WilsonPond.3832	0.031	0.013	0.025	-0.022	3.006	0.0008
ME.WoodsPond.3456	0.050	-0.125	0.212	-0.015	3.963	0.0079
NH.ARMINGTONLAKE.ARMPIED	-0.042	-0.041	0.071	-0.044	-1.589	0.0017
NH.ASHUELOTPOND.ASHWASD	0.064	0.083	0.000	0.064	1.413	0.0010
NH.AYERSPOND.AYEBARD	0.000	0.000	-0.021	-0.022	-0.082	0.0005
NH.BAXTERLAKE.BAXFARD	0.052	NA	NA	0.012	1.658	NA
NH.BLAISDELLLAKE.BLASUTD	0.102	0.083	0.009	0.088	1.631	0.0017
NH.BROADBAY.BROOSSD	0.035	0.066	0.000	0.036	2.408	0.0003
NH.CANAANSTREETLAKE.CANCAND	0.067	0.091	-0.005	0.056	-1.153	-0.0005

NH.CENTERPOND.CENSTDD	0.033	0.067	-0.042	0.029	-0.044	-0.0001
NH.CHALKPOND.CHANBYD	0.176	NA	NA	0.177	0.000	NA
NH.CHASEPOND.CHAWLMD	0.047	NA	NA	0.042	-1.729	NA
NH.CLOUGHPOND.CLOLOUD	0.058	0.003	0.050	0.028	0.009	0.0013
NH.COBBETTSPOND.COBWINS	0.025	-0.011	0.033	-0.020	1.820	0.0005
NH.CRYSTALLAKE.CRYGLMD	0.007	0.041	-0.078	-0.005	0.756	-0.0006
NH.DEERINGRESERVOIR.DEEDRGD	0.051	0.088	-0.036	0.089	-0.899	-0.0004
NH.DUTCHMANPOND.DUTSPRD	0.173	NA	NA	NA	NA	NA
NH.EASTMANPOND.EASGTMD	0.014	-0.100	0.071	0.015	-1.674	0.0008
NH.FORESTLAKE.FORDALD	0.022	0.042	0.000	0.030	0.028	0.0000
NH.FORESTLAKE.FORWCHD	-0.091	0.044	-0.125	-0.030	-1.094	-0.0036
NH.GOVERNORSLAKE.GOVRAYD	0.243	NA	NA	NA	NA	NA
NH.GRANITELAKE.GRASTDD	0.081	0.028	0.052	-0.038	-0.129	0.0007
NH.HALFMOONLAKE.HALALTD	0.075	0.058	-0.061	0.063	-1.512	-0.0012
NH.HARRISVILLEPOND.HARHARD	-0.014	-0.017	-0.011	-0.071	-0.328	-0.0005
NH.HIGHLANDLAKE.HIGANDD	0.228	0.038	0.177	0.123	5.265	0.0040
NH.HIGHLANDLAKE.HIGSTDND	-0.050	-0.042	0.040	-0.012	-1.543	0.0005
NH.HILLSPOND.HILALTD	-0.025	0.060	-0.085	0.034	-1.501	-0.0008
NH.HubbardBrook.Mirror	0.067	-0.060	0.137	-0.014	1.565	0.0028
NH.ISLANDPOND.ISLDERD	0.028	0.043	-0.010	0.047	1.523	0.0000
NH.ISLANDPOND.ISLSTDVLAPD	0.009	NA	NA	0.014	-0.042	NA
NH.KEZARLAKE.KEZSUTD	0.164	-0.016	0.198	0.151	3.075	0.0093
NH.KOLELEMOOKLAKE.KOLSPRD	0.013	0.008	0.000	0.017	-0.632	0.0001
NH.LAKEWINNISQUAM.WINPLACD	0.012	NA	NA	0.073	-0.623	NA
NH.LAKEWINONA.WINNWH	0.031	0.100	-0.070	0.059	-0.905	0.0003
NH.LAURELLAKE.LAUFITD	0.087	0.017	0.105	0.033	3.473	0.0021
NH.LEAVITTBAY.LEAOSSD	0.005	0.139	-0.211	0.037	-3.050	-0.0044
NH.LONGPOND.LONLEMD	0.011	-0.094	0.100	-0.170	1.274	0.0005
NH.LOONLAKE.LOOLYD	0.040	0.125	-0.106	0.070	-2.365	-0.0009
NH.LOWERSUNCOOKPOND.SUNLBRND	0.167	NA	NA	0.192	-0.708	NA
NH.LSPA.Sunapee	0.108	0.050	0.000	0.031	1.918	0.0006
NH.MASSASECUMLAKE.MASBRAD	0.110	0.061	0.058	0.047	2.967	0.0017
NH.MOUNTAINVIEWLAKE.MOUSUND	0.104	0.058	0.042	NA	NA	0.0039
NH.NUBANUSITLAKE.NUBNELD	0.080	0.014	0.076	0.002	0.735	0.0007

NH.OTTERPOND.OTTSTUND	0.067	-0.005	0.092	0.058	2.474	0.0039
NH.PARTRIDGELAKE.PARLTLD	0.090	0.049	0.033	0.006	0.338	0.0017
NH.PAWTUCKAWAYLAKE.PAWNOTND	-0.020	0.014	-0.034	-0.009	-0.089	-0.0011
NH.PEARLYLAKE.PEARIND	0.089	NA	NA	0.070	3.946	NA
NH.PERKINSPOND.PERSUND	0.068	NA	NA	0.062	-1.928	NA
NH.PINERIVERPOND.PINWAKD	-0.148	0.103	-0.224	-0.010	-3.664	-0.0033
NH.PLEASANTLAKE.PLEDEED	0.051	0.038	0.005	0.031	1.231	0.0007
NH.PROVINCELAKE.PROEFFD	-0.114	NA	NA	-0.119	-1.295	NA
NH.RANDPOND.RANGOSD	0.042	0.021	-0.020	0.023	-0.179	-0.0006
NH.ROCKPOND.ROCWIND	-0.072	-0.073	-0.005	-0.062	0.377	-0.0008
NH.ROCKYBOUNDPOND.ROCCROD	-0.054	-0.095	0.100	-0.048	-1.660	0.0024
NH.RUSTPOND.RUSWOLD	-0.033	0.044	-0.113	-0.027	0.951	-0.0017
NH.SANDPOND.SANMLWD	0.183	-0.042	0.199	0.044	2.319	0.0034
NH.SEBBINSPOUND.SEBBEDD	-0.101	-0.051	-0.057	-0.074	-1.339	-0.0064
NH.SPOFFORDLAKE.SPOCHED	0.056	0.000	0.044	0.037	-0.741	0.0007
NH.STINSONLAKE.STIRUMD	0.075	0.013	0.041	-0.006	-1.076	0.0010
NH.STOCKERPOND.STOGTMD	0.058	-0.042	0.093	0.040	3.800	0.0067
NH.SUNSETLAKE.SUNALTD	0.010	0.028	0.031	0.030	-0.353	0.0011
NH.SWANZEYLAKE.SWASWAD	0.096	0.050	0.025	0.015	-1.433	0.0007
NH.THORNDIKEPOND.THOFJAFD	-0.058	-0.069	-0.006	-0.061	-2.100	-0.0004
NH.TODDLAKE.TODNBYD	-0.125	-0.158	0.015	-0.136	-1.735	-0.0003
NH.TOMPOND.TOMWRND	-0.009	NA	NA	-0.035	2.325	NA
NH.TUCKERPOND.TUCSBYD	0.050	0.078	-0.014	0.105	-2.892	-0.0010
NH.UPPERSUNCOOKPOND.SUNUBRND	0.061	-0.004	0.083	-0.006	-0.039	0.0019
NH.WEBSTERLAKE.WEBFRKD	0.090	-0.043	0.075	0.042	-0.308	0.0024
NH.WHITEOAKPOND.WHIHOLD	0.082	0.043	-0.002	0.029	-0.231	0.0014
NY.ADK.EastLake	0.038	-0.041	0.096	-0.059	3.071	0.0015
NY.ADK.FirstBisbyLake	0.100	-0.051	0.150	-0.061	3.806	0.0016
NY.ADK.HonnedagaLake	0.084	-0.164	0.227	-0.107	5.343	0.0013
NY.ADK.LittleMooseLake	0.074	-0.024	0.082	-0.028	2.594	0.0006
NY.ADK.LowerSylvanPond	0.108	NA	NA	0.069	3.566	NA
NY.ADK.PantherLake	0.053	-0.036	0.030	0.014	5.274	0.0017
NY.ADK.RockLake	0.104	0.064	0.022	0.070	4.744	0.0018
NY.CanadaragoLake	0.100	-0.021	0.138	-0.033	4.588	0.0026

NY.Honeoye	0.078	0.024	0.030	0.032	2.231	0.0014
NY.LakeGeorge	0.116	NA	NA	0.024	0.151	NA
NY.Mohonk	0.052	-0.051	0.106	-0.034	1.091	0.0013
NY.NorthChautauqua	0.115	-0.033	0.167	0.015	2.965	0.0035
NY.Oneida	0.085	0.053	0.026	0.093	0.967	0.0008
NY.SouthChautauqua	-0.036	0.000	0.000	-0.025	0.000	0.0000
NY.UpperSaranac	0.069	0.050	0.000	0.065	1.148	0.0006
ON.BlueChalk	-0.042	-0.009	-0.029	-0.044	2.054	-0.0005
ON.Chub	0.006	0.012	0.000	-0.004	2.061	0.0001
ON.Crosson	-0.018	0.010	-0.029	-0.004	2.634	-0.0002
ON.Dickie	-0.019	-0.007	-0.028	-0.014	0.341	-0.0004
ON.Harp	0.032	0.020	0.014	0.023	0.402	0.0002
ON.Heney	-0.011	-0.029	0.000	-0.018	1.622	0.0003
ON.Opeongo	-0.026	-0.101	0.059	-0.055	1.088	0.0001
ON.Plastic	0.040	-0.009	0.032	-0.013	0.871	0.0005
ON.RedChalkMain	-0.006	0.000	-0.006	-0.020	-0.294	0.0000
PA.Beltzville	0.073	-0.039	0.126	0.030	1.225	0.0006
PA.BlueMarsh	0.131	0.049	0.098	0.074	-0.264	0.0021
PA.Giles	0.071	-0.158	0.224	-0.129	3.126	0.0012
PA.Lacawac	0.069	-0.052	0.082	-0.031	1.613	0.0018
PA.Wallenpaupack	0.028	-0.060	0.115	-0.019	1.267	0.0016
RI.DeepCharlestown	0.069	NA	NA	NA	NA	NA
RI.Georgiaville	0.056	NA	NA	NA	NA	NA
RI.HundredAcre	0.000	NA	NA	NA	NA	NA
RI.SchoolhouseLower	0.000	NA	NA	-0.075	6.531	NA
RI.Watchaug	-0.015	NA	NA	NA	NA	NA
RI.White	0.000	NA	NA	NA	NA	NA
RI.Yawgoo	0.109	NA	NA	NA	NA	NA