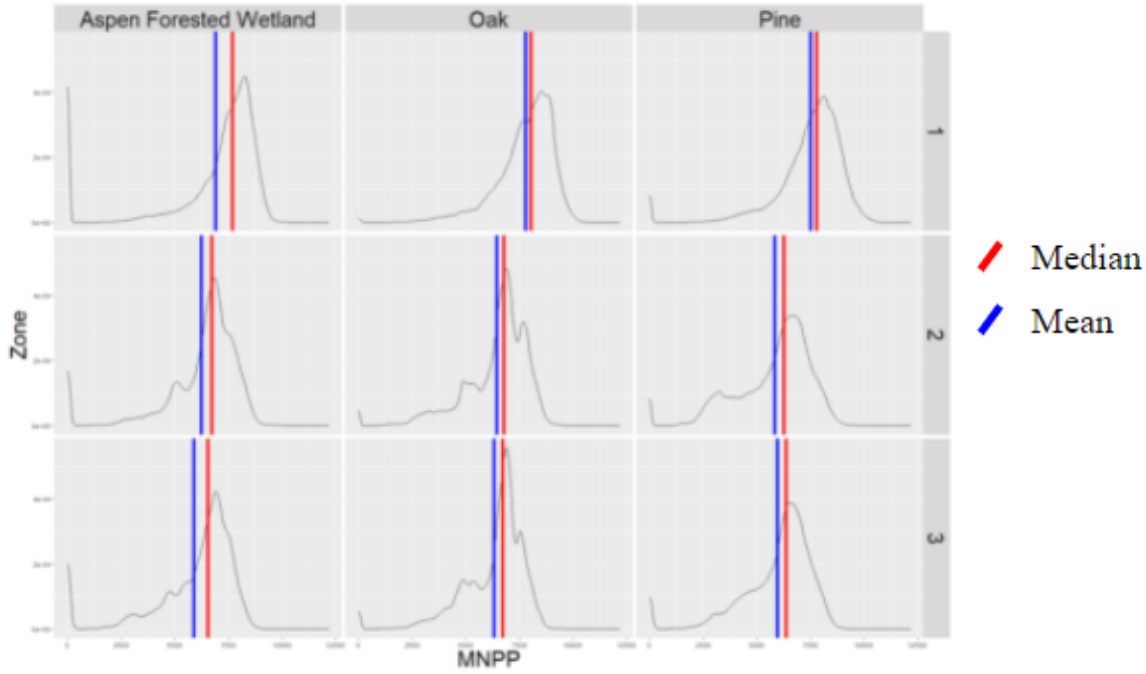
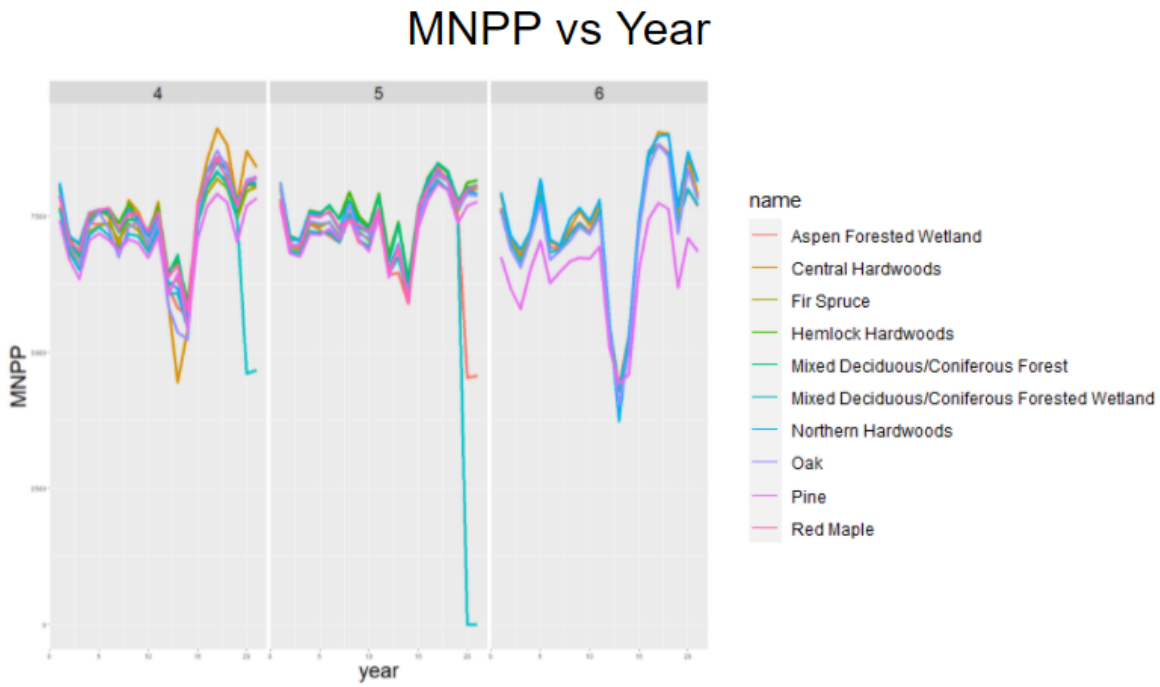
Supplemental Data and Results: Wisconsin Forest Carbon Capture

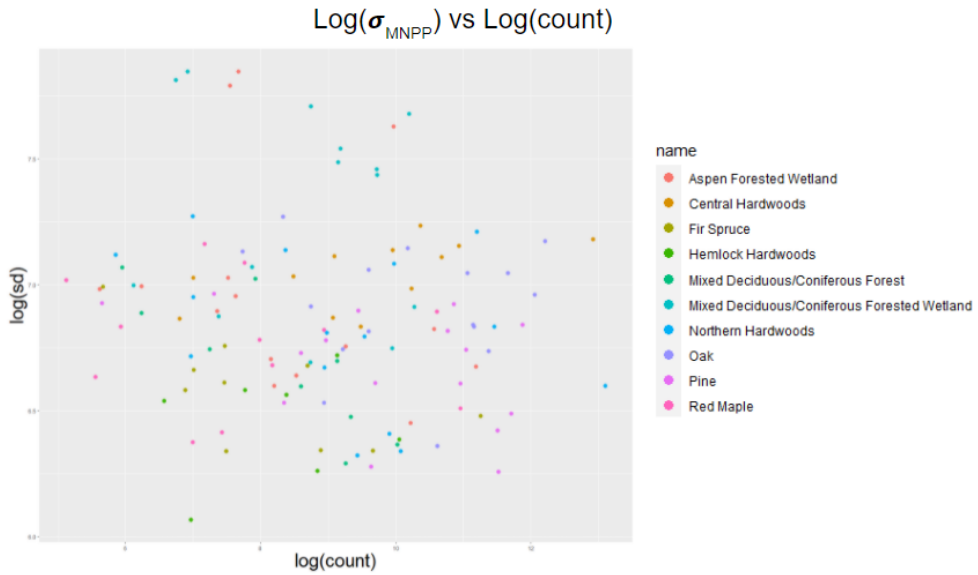
Supplemental Figure 1: Distribution of MNPP, Median vs. Mean. The figure below contains MNPP distributions for Zones 1-3 with three example forest types (Aspen, Oak, Pine), with median in red and mean in blue. In each case, the median appears to be a better estimator of the distribution's center of mass.



Supplemental Figure 2: MNPP values versus year for Zones 4-6, all species. Relative relationship between species appears fairly constant over time.



Supplemental Figure 3: Log(σ_{MNPP}) vs Log(count). There does not appear to be a clear relationship between count and standard deviation of median NPP across years.



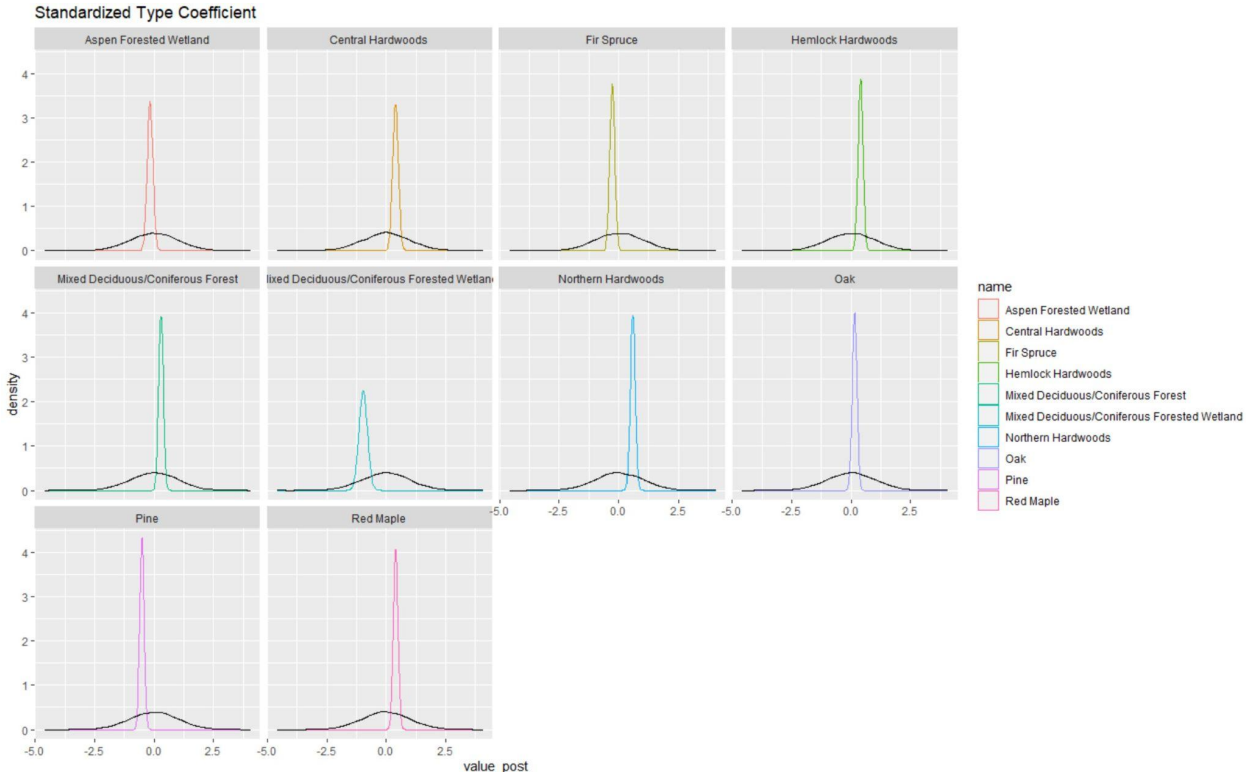
Supplemental Table 1: Exploratory OLS R^2 values. Listed below are R^2 and adjusted R^2 values for exploratory models fit using OLS regression, using the following models. We note that including both zone and type as predictors seems to capture more of the variability in both MNPP and year-to-year variability in MNPP.

$$\boldsymbol{\mu_{NPP}} \sim \tau + X\begin{bmatrix}\Delta_{type}\\ \Delta_{zone}\\ \Delta_{year}\end{bmatrix} \qquad \tau := grand\ mean\ of\ MNPP\ values = 7212$$

$$\log(\sigma_{NPP}) \sim \log(\sigma_0) + \log(\sigma_{type}) + \log(\sigma_{zone}) \quad \log(\sigma_0) := grand\ mean\ of\ \log(\sigma_{NPP})\ values = 6.854$$

	Zone		Type		Zone + Type	
	R^2	Adj-R^2	R^2	Adj-R^2	R^2	Adj-R^2
MNPP	0.486	0.481	0.474	0.467	0.567	0.560
log(σ_{MNPP})	0.389	0.342	0.536	0.472	0.779	0.727

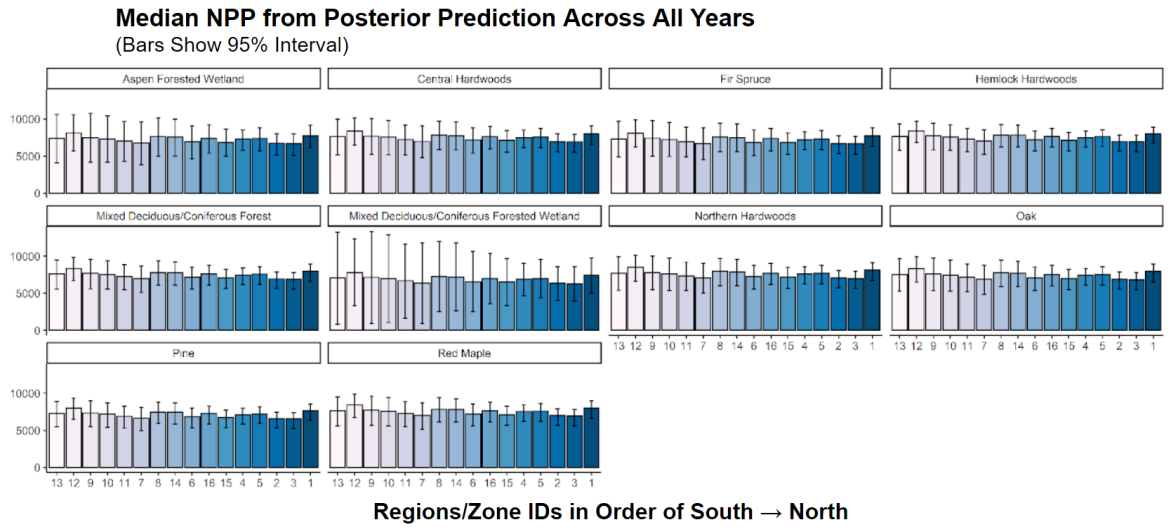
Supplemental Figure 4: Prior versus Posterior 'Type' Effect Distributions. Note prior (black) and posterior distributions (color) of standardized forest type coefficient estimates, with each color representing a forest type.



Supplemental Table 2: 25 test cases where the observed median NPP values were not in the 95% credible interval from the posterior prediction.

Year	Region/Zone	Species	Observed Median NPP	Posterior Predictive Mean Median NPP	Posterior Predicted Median NPP Lowerbound	Posterior Predicted Upper NPP Lowerbound
2009	14	Fir Spruce	5785	7362.760332	5814.282485	8887.658371
2012	6	Northern Hardwoods	3735	6398.929733	5026.803101	7765.457021
2012	7	Red Maple	3498	6167.572798	4389.706057	7947.071775
2012	10	Oak	4272	6589.223068	4649.858501	8526.110182
2012	11	Pine	3815	6066.504512	4798.900568	7343.504336
2012	15	Northern Hardwoods	4833	6323.990592	5204.17308	7454.970098
2012	16	Pine	5457	6430.196961	5560.293584	7306.871905
2013	2	Mixed Deciduous/Coniferous Forest	4961	5961.213933	5233.837507	6689.32587
2013	2	Oak	4868	5902.001044	5110.552912	6703.046742
2013	3	Fir Spruce	4788	5680.274552	4859.570252	6502.355674
2013	3	Mixed Deciduous/Coniferous Forest	4834	5934.749581	5241.504841	6643.856617
2013	3	Pine	4603	5596.06369	5049.175862	6163.713407
2013	3	Red Maple	4692	5963.145375	5269.324539	6663.740469
2013	4	Oak	5234	6418.096302	5612.283461	7199.957563
2013	16	Hemlock Hardwoods	5644	6675.033404	5770.516392	7597.148882
2013	16	Oak	5161	6568.028198	5369.549474	7765.417109
2019	7	Mixed Deciduous/Coniferous Forested Wetland	0	6843.04921	1643.341227	12073.59175
2019	8	Northern Hardwoods	10337.5	8297.105632	6633.393926	9968.338574
2019	10	Aspen Forested Wetland	0	7693.727778	4995.257935	10402.97251
2019	14	Mixed Deciduous/Coniferous Forested Wetland	0	7635.802039	3751.107756	11476.45778
2020	3	Pine	7560	6914.055096	6347.248446	7481.470581
2020	12	Mixed Deciduous/Coniferous Forested Wetland	0	8214.424484	3987.025985	12448.27184
2020	14	Mixed Deciduous/Coniferous Forested Wetland	0	7666.408031	3812.154613	11564.0871
2020	14	Northern Hardwoods	9995	8208.581941	6785.767843	9656.510691
2020	15	Mixed Deciduous/Coniferous Forested Wetland	0	6923.931112	3949.272566	9947.108879

Supplemental Figure 5: The median NPP for a particular forest species (grids) across different regions (bars) exhibit high overlap in their 95% credible interval from the posterior distribution, but southern regions exhibit greater variability in the 95% credible intervals (whiskers of each bar).



Supplemental Figure 6: Histograms of median NPP predictions from the posterior distribution for the forest species “Pine” across all years for each region.