Appendix C: Chl-a Results

We consider the effects of Chl-a as a secondary measure of water quality, related to the amount of algae present in a lake, which serves as a disamenity through unpleasant sights and smells. A high concentration of Chl-a can be attributed to excess nutrients in the lake and has been found to have a negative effect on property sale prices (Walsh and Milon 2016; Weng et al. 2020). However, there are fewer samples and less spatial coverage available for Chl-a.

In prior studies, CVs for Chl-a range from 0.66 to 1.23 for Substate areas in Florida and Minnesota, respectively (Walsh and Milon 2016; Swedberg et al. 2022). However, there were very few Substate markets in the baseline sample that met the minimum 1,000 sample size, so we selected a lower CV requirement of 0.50 for Chl-a.

Figure C1 summarizes the effects of the baseline models for chl-a using kernal density plots analogous to Figure 3 in the manuscript and Figure A2. As high levels of Chl-a are considered a disamenity, negative elasticity estimates are expected. In Figure C1a, we can see elasticities in the Northeast are larger in magnitude than those in the Midwest or the South for the Division I models. Even after dropping the 1st and 99th percentile, the distribution in the West is relatively flat. In Figure C1b, we find the distributions of elasticities in all regions are sensitive to spatial scale. We note there are no Substate estimates available in the West. Moving to the Class II models, in Figure C1c, we observe more heterogeneity within individual region for the Division II models with some positive effects in all regions except the Northeast. Figure C1d reveals more overlap in distributions across spatial scales compared to the Class I models.

Figure C2 provides more context to the distributions in C1. As with Secchi, we find differences across regions, spatial scales, and model classes. While the Northeast has consistently negative elasticities, elasticities in the Midwest are both positive and negative. In Florida, counties with negative elasticities at Nation, Region, and Division spatial scales, have positive elasticities at State and Substate scales. In Washington Region I and Division I elasticities are positive for select counties. However, these counties are negative for all Class II models.

Figures C3 and C4, we assess the sensitivity of the Class I and Class II regional medians to spatial scale analogous to Figure 4 in the manuscript and Figure A3. Once again, we note wide variability in the regional medians in the West across all spatial scales. The size of the outliers is so large, especially for the Class I models, that it increased the range of the y-axis in Figure C3 to -1.71 to 0.59. For comparison, the range of C4 is -0.3 to 0.8. We surmise it is related to the interaction terms in Class I models and small sample sizes throughout the West. In Class II, areas with small sample sizes or too little variation are not modelled, and areas with enough samples and variation are pooled for a single estimate (i.e., no spatial heterogeneity interaction terms). In Class I, interaction terms may be overfitting the data leading to extreme outliers.

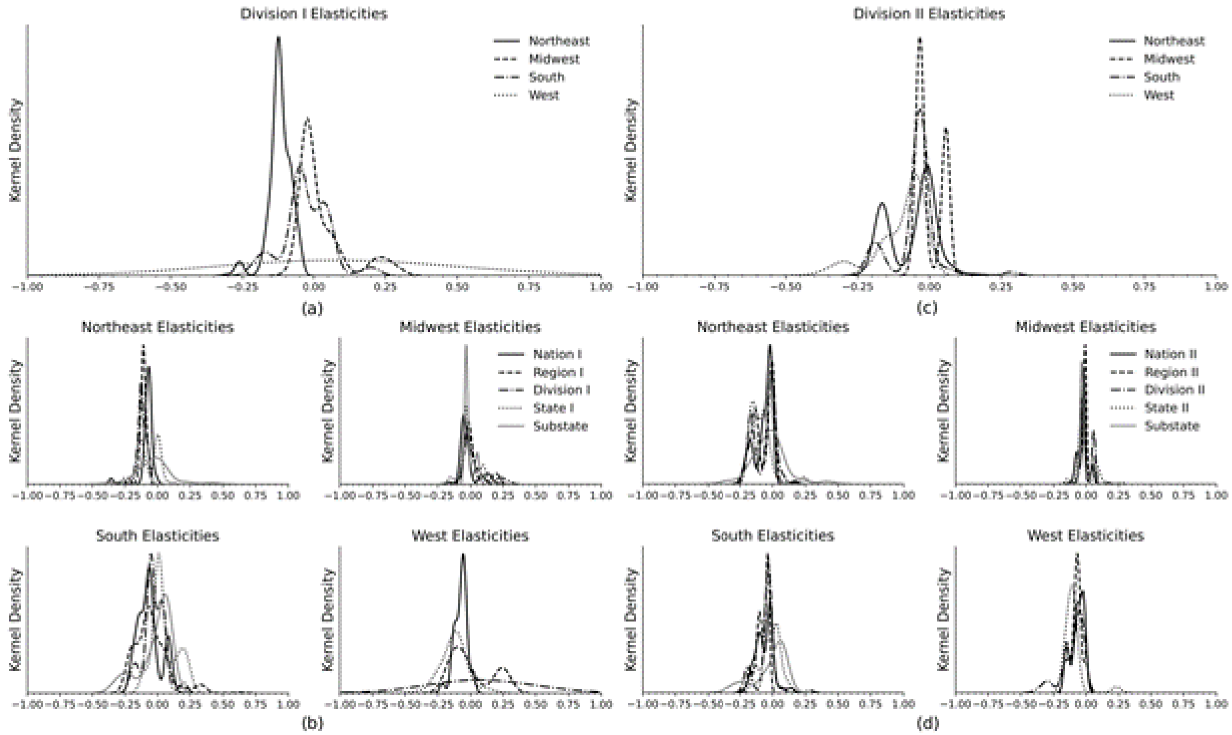

Figure C1 Distribution of Baseline Elasticity Estimates for Chl-a
Notes: Kernel density plots of elasticities of property value with respect to water quality by Region and market boundary definition. Median elasticity estimates at census tract level for properties within 150m from lakefront along x axis. Kernel density along y axis rescaled to 1 for each plot. Due to the relative magnitude of outliers, 1st and 99th percentiles are dropped from figure. Panel (a) presents the Division I results in a single plot broken out by Region. Panel (b) presents the results for each Region in separate plots broken out by spatial scale for Class I models. Panel (c) presents the Division II results in a single plot broken out by Region. Panel (b) presents the results for each Region in separate plots broken out by spatial scale for Class II models.

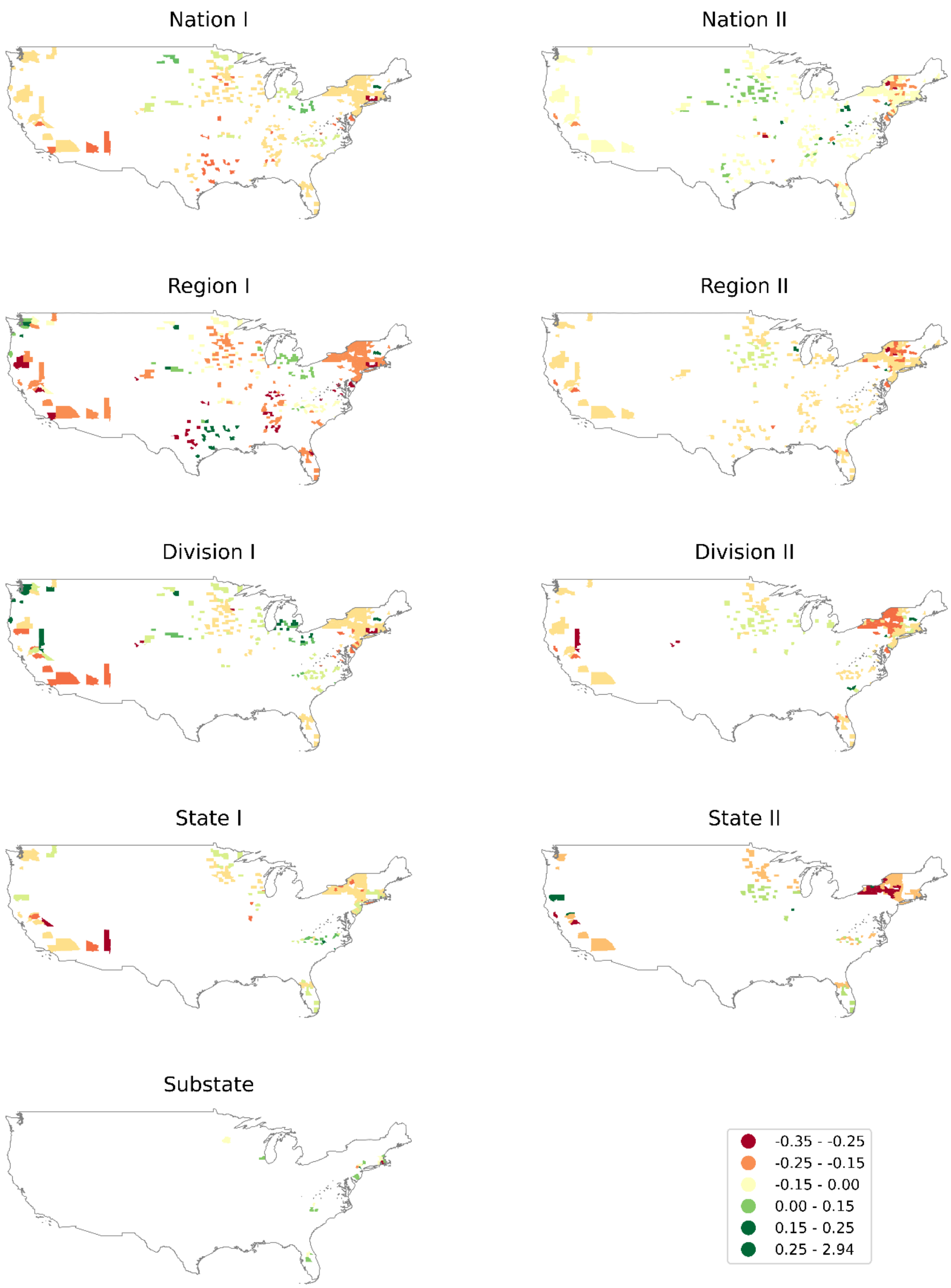

Figure C2 Spatial Distribution of Baseline Elasticity Estimates for Chl-a
Notes: Census tract median estimates for properties within 150m from lakefront are aggregated by county and the median for each county is presented on the map.

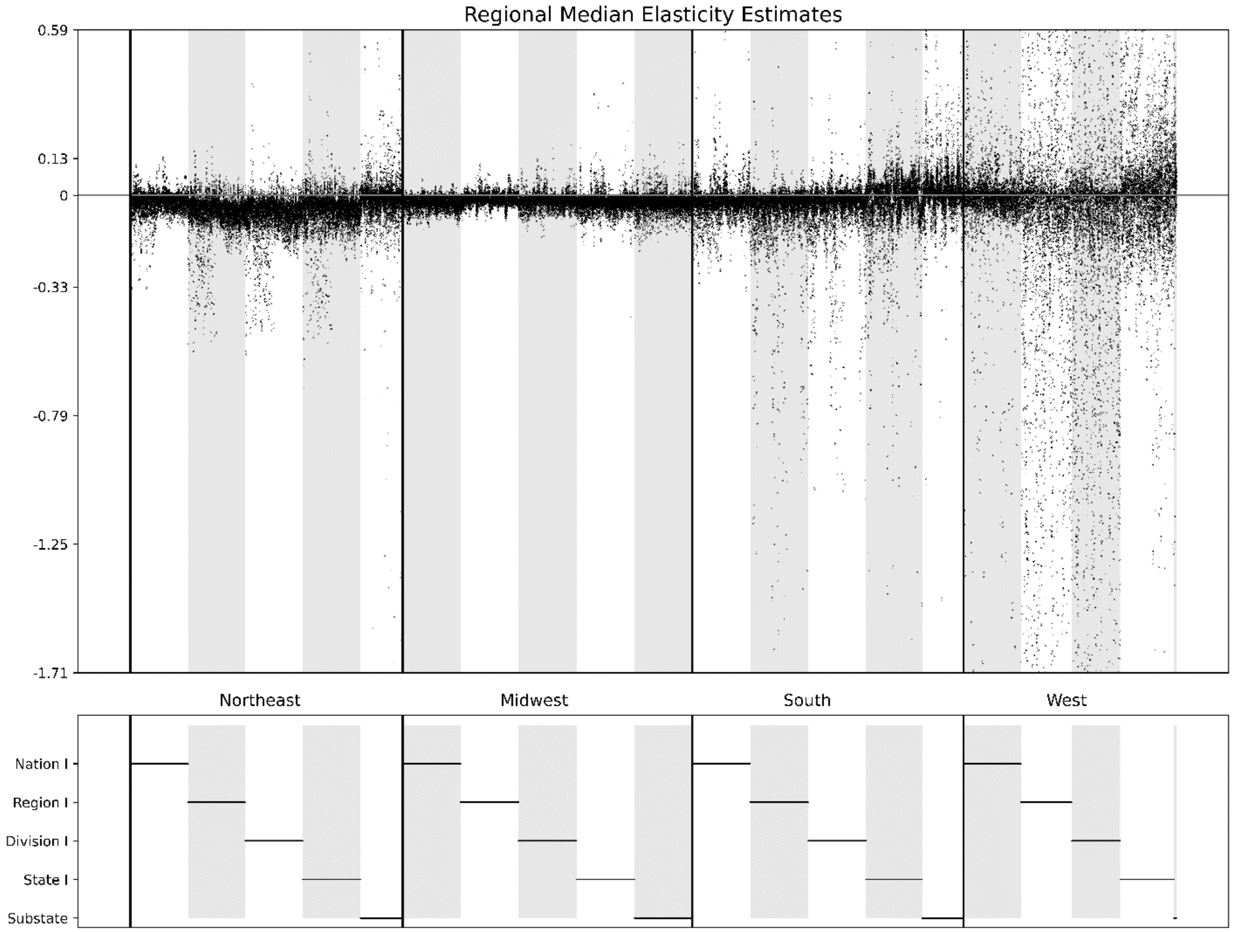

Figure C3 Regional Median Elasticity Estimates for All Chl-a Class I Models
Notes: Census tract median estimates for properties within 150m from lakefront for Class I models are divided by region for unique combinations of spatial scale, sample selection, and model choice before computing regional median. Medians are sorted by region, spatial scale, sample selection criteria, and methods. For each region and market boundary, estimates vary along different sample selection criteria and methods. Due to the relative magnitude of outliers, 1st and 99th percentiles are dropped from figure.

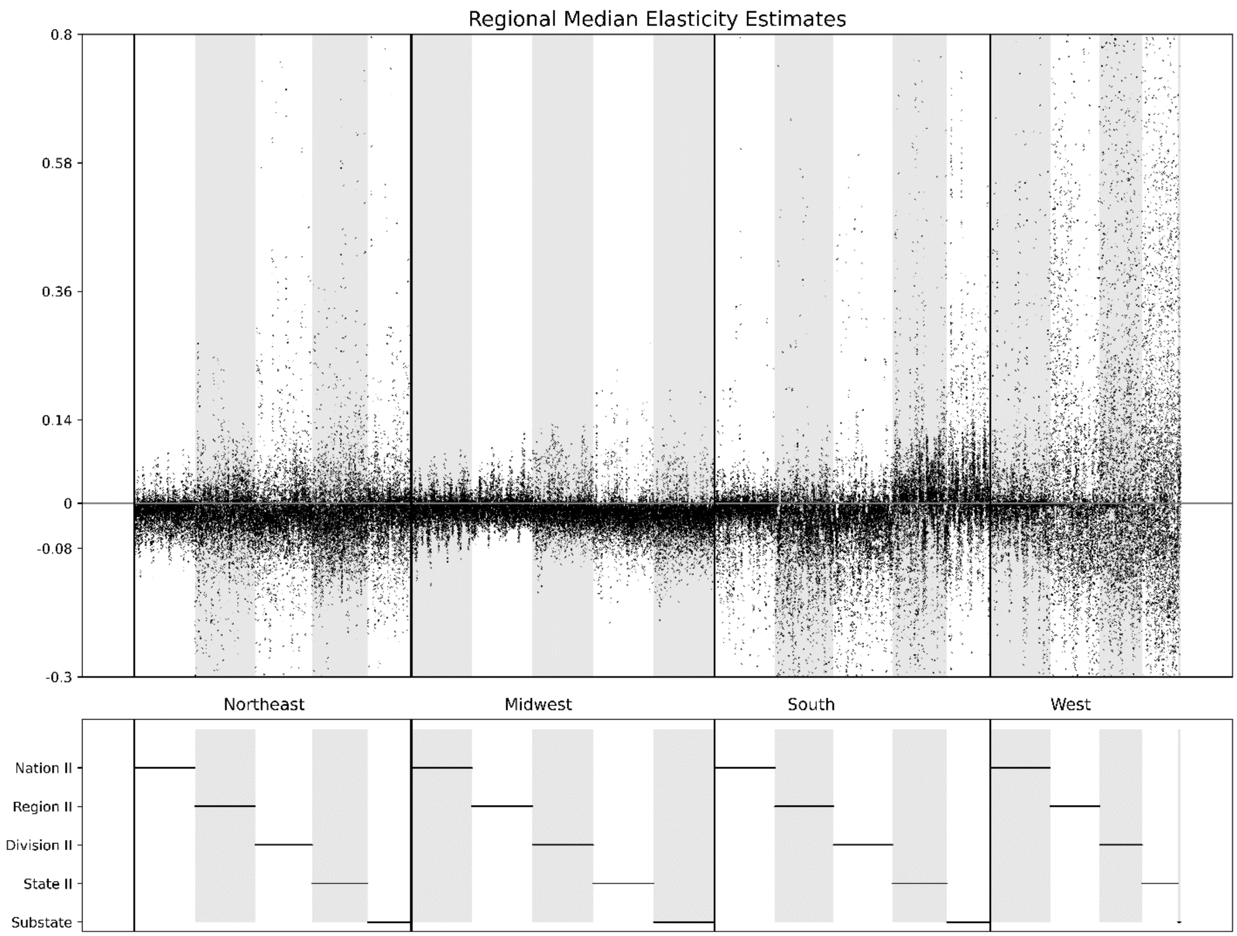

Figure C4 Regional Median Elasticity Estimates for All Chl-a Class II Models
Notes: Census tract median estimates for properties within 150m from lakefront for Class II models are divided by region for unique combinations of spatial scale, sample selection, and model choice before computing regional median. Medians are sorted by region, spatial scale, sample selection criteria, and methods. For each region and market boundary, estimates vary along different sample selection criteria and methods. Due to the relative magnitude of outliers, 1st and 99th percentiles are dropped from figure.