Assessing Salt Marsh Vulnerability using High-Resolution Hyperspectral Imagery

SUPPLEMENTAL INFORMATION

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Table S.I. - 1: Parameter estimates and confidence intervals for the greenhouse elastic net regression. Asterisk indicates significance at $p < 0.05$.

| Parameter | Estimate | Wald ChiSquare | p-value | Lower 95% CI | Upper 95% CI |
|-----------|----------|----------------|---------|--------------|--------------|
| **Leaf %N** | | | | | |
| Intercept | 5.01 | 6.91 | 0.0086* | 4.70 | 6.33 |
| 652' | 1125.58 | 0.11 | 0.74 | -284.41 | 4367.15 |
| 673' | 17681.80 | 20.63 | <.0001* | 10419.50 | 22654.70 |
| 775'' | -3767.078 | 0.84 | 0.36 | -8587.8 | -843.03 |
| 881'' | -1224.627 | 0.59 | 0.44 | -2912.7 | -1.1981 |
| 949'' | 207.29 | 0.01 | 0.93 | -249.16 | 2243.57 |
| **Salinity** | | | | | |
| Intercept | 39.55 | 31.49 | <.0001* | 27.39 | 52.29 |
| 478'' | -9256.04 | 0.43 | 0.51 | -36141 | 12790.70 |
| 622'' | -19782.16 | 0.19 | 0.66 | -94885 | 12498.10 |
| 842'' | -22090.16 | 1.32 | 0.25 | -58222 | -14960 |
| **ORP** | | | | | |
| Intercept | -139.259 | 11.51 | 0.0007* | -263.36 | -132.17 |
| 788'' | 90009.02 | 0.30 | 0.58 | -69886 | 459347.00 |
| 884'' | -75089.63 | 0.70 | 0.40 | -407330 | -61290 |
Table S.I. - 2: Parameter estimates and confidence intervals for the greenhouse stepwise regression. Asterisk indicates significance at $p < 0.05$.

| Term   | Estimate | t Ratio | p-value | Lower 95% CI | Upper 95% CI |
|--------|----------|---------|---------|--------------|--------------|
| Leaf %N | Intercept | 35.82   | 3.39    | 0.0037*      | 15.82        | 54.86        |
|        | OSAVI2   | -22.45  | -3.03   | 0.0079*      | -37.31       | -8.30        |
|        | PRI      | 60.86   | 2.54    | 0.0218*      | 20.01        | 142.15       |
|        | RVI      | 1.42    | 3.14    | 0.0063*      | 0.77         | 2.63         |
|        | GRVI     | -33.75  | -3.85   | 0.0014*      | -57.54       | -23.439      |
| Salinity | Intercept | -4037.09 | -3.15   | 0.0059       | -7455.70     | -2000.6      |
|        | REP      | 5.84    | 3.22    | 0.0051       | 3.00         | 10.63        |
|        | WI       | 297.72  | 2.20    | 0.0423       | 36.13        | 581.75       |
|        | OSAVI2   | -295.07 | -2.52   | 0.022        | -580.32      | -101.98      |
| ORP    | Intercept | -528.64 | -2.95   | 0.0086       | -808.29      | -185.03      |
|        | WI       | 396.71  | 2.29    | 0.0341       | 74.43        | 681.04       |
Table S.I. - 3: Parameter estimates included in the elastic net regression models developed from the field plots. Asterisk indicates significance at $p < 0.05$.

| Model   | Term       | Estimate | Wald ChiSquare | p-value    | Lower 95% CI  | Upper 95% CI |
|---------|------------|----------|----------------|------------|---------------|--------------|
| Leaf %N | Intercept  | 1.47     | 180.84         | <.0001*    | 1.37          | 1.98         |
|         | 448.691'' | 3924.16  | 23.91          | <.0001*    | 396.31        | 6244.14      |
|         | 930.999'  | -69.68   | 16.53          | <.0001*    | -142.38       | -21.26       |
|         | 869.289'' | 976.74   | 8.60           | 0.0034*    | 180.81        | 2107.55      |
|         | 825.443'' | 769.28   | 5.36           | 0.0207*    | -1006.4       | 1758.22      |
|         | 624.076'' | -749.54  | 1.41           | 0.23       | -2701         | 3135.85      |
|         | 802.708'' | 482.70   | 1.02           | 0.31       | -171.37       | 2845.56      |
|         | 908.264'  | -102.68  | 0.34           | 0.56       | -654.85       | 306.20       |
|         | 414.589'' | -186.05  | 0.18           | 0.67       | -6440.5       | 847.71       |
|         | 906.64'   | -12.94   | 0.02           | 0.90       | -475.46       | 527.32       |
| Salinity| Intercept  | 38.97    | 3653.35        | <.0001*    | 38.31         | 42.03        |
|         | 474.674'' | 65786.96 | 52.11          | <.0001*    | 38780.80      | 124047.00    |
|         | 802.708'' | -15871.62| 32.21          | <.0001*    | -41059        | -11272.00    |
|         | 843.306'' | -13913.96| 32.03          | <.0001*    | -41833        | -3943.50     |
|         | 434.076'' | 20277.00 | 17.38          | <.0001*    | 7764.61       | 40614.50     |
|         | 464.931'' | -42458.85| 16.18          | <.0001*    | -69800        | 54835.50     |
|         | 598.093'' | -15228.37| 7.12           | 0.0076*    | -13402        | 16151.00     |
|         | 849.802'' | 2526.70  | 3.67           | 0.06       | -94892        | 5786.76      |
|         | 698.777'' | -3666.25 | 2.07           | 0.15       | -13402        | 16151.00     |
|         | 628.948'' | 11556.70 | 1.80           | 0.18       | -103302       | 33510.60     |
|         | 916.383'' | 758.20   | 0.49           | 0.48       | -22312        | 4082.31      |
|         | 607.836'' | 3122.85  | 0.35           | 0.56       | -10864        | 67110.10     |
| ORP     | Intercept  | -200.84  | 884.29         | <.0001*    | -223.09       | 849.12       |
|         | 830.315'' | 325765.90| 52.34          | <.0001*    | -486245       | 462125.00    |
|         | 961.853'' | -76765.24| 40.88          | <.0001*    | -212502       | -34411       |
|         | 473.05''  | 1063163.00| 19.87         | <.0001*    | -9987.9       | 3028879.00   |
|         | 809.204'' | -182613.6| 11.16          | 0.0008*    | -3.7e+6       | -110516      |
|         | 794.588'' | 219443.60| 7.22           | 0.0072*    | -276264       | 725618.00    |
|         | 883.905'' | 30716.75 | 5.42           | 0.0199*    | -33860        | 110778.00    |
|         | 463.307'' | -656804.8| 4.15           | 0.0416*    | -2.2e+6       | 614063.00    |
|         | 851.426'' | -94781.92| 3.77           | 0.05       | -528534       | -25875       |
|         | 867.665'' | -51418.93| 0.40           | 0.53       | -538338       | 135719.00    |
|         | 955.357'' | 5311.25  | 0.14           | 0.71       | -209894       | 59833.20     |
|         | 857.922'' | 12511.06 | 0.13           | 0.72       | -286222       | 231113.00    |
**Table S.I. - 4:** Parameter estimates and confidence intervals for models developed from field vegetation indices. Asterisk indicates significance at \( p < 0.05 \).

| Term       | Estimate | t Ratio | p-value   | Lower 95% CI | Upper 95% CI |
|------------|----------|---------|-----------|--------------|--------------|
| **Leaf %N** |          |         |           |              |              |
| Intercept  | -8.0     | 2.39    | 0.0029*   | -12.98       | 4.98         |
| WI         | 3.88     | 0.98    | 0.0007*   | -1.41        | 5.94         |
| OSAVI      | 4.52     | 1.59    | 0.0095*   | -1.68        | 8.34         |
| GRVI       | -3.29    | 0.59    | <.0001*   | -4.72        | -1.31        |
| MSAVI2     | -2.39    | 1.01    | 0.0267*   | -4.53        | 2.19         |
| **Salinity** |         |         |           |              |              |
| Intercept  | 154.59   | 5.96    | <.0001*   | 70.48        | 228.87       |
| NDVI       | -130.66  | -4.47   | 0.0002*   | -283.08      | -22.49       |
| WI         | -30.31   | -1.80   | 0.08      | -63.43       | 2.72         |
| WDR_NDVI   | 65.06    | 3.66    | 0.0012*   | 19.12        | 179.92       |
| **ORP**    |          |         |           |              |              |
| Intercept  | -199.84  | -7.25   | <.0001*   | -236.40      | -148.69      |
| PRI        | -2785.24 | -2.58   | 0.0161*   | -5888.10     | -1191.40     |