**Supplementary Information: “Assessment of Heavy Metal and Metalloid Concentrations at Horicon National Wildlife Refuge”**

**In *Wetlands Ecology and Management***

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Includes tables S1 – S4

**Table S1. Percent Recovery of Standard Reference Materials**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | As | Cd | Cr | Cu | Hg | Ni | Pb | Zn |
| Buffalo River Sediment | 99.6 | 123\* | 59\* | - | - | 79\* | 109 | 87 |
| Marine Sediment | 85 | 125\* | 49\* | 59\* | 98 | - | 94 | 90 |
| Apple Leaves | 87 | - | 28\* | 92 | 92 | 86 | 85 | 87 |
| Tomato Leaves | 86 | 82 | 61\* | 83 | 95 | 99 | 90 | 88 |
| Bovine Liver | 123\* | 107 | - | 113 | 103 | 88 | 80 | 113 |
| Dogfish Liver | - | 107 | - | 109 | - | - | 87 | 103 |

Percent recovery of each element for six standard reference materials used. Empty cells represent an element that was not certified for that reference material. Values marked with asterisks are flagged for having poor recovery (i.e., outside of the 80-120% range).

**Table S2. Average Relative Percent Difference Among Analytical and Digestion Duplicates**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | As | Cd | Cr | Cu | Hg | Ni | Pb | Zn |
| Sediment analytical dup. | 27\* | 1 | 1 | 2 | 8 | 1 | 1 | 1 |
| Sediment digestion dup. | 45\* | 4 | 3 | 3 | 3 | 3 | 2 | 3 |
| Cattail analytical dup. | 7 | 2 | 3 | 2 | 6 | 2 | 1 | 2 |
| Cattail digestion dup. | 17 | 9 | 32\* | 22 | 21 | 20 | 14 | 14 |
| Liver analytical dup. | 23 | 4 | 21 | 1 | 4 | -3\* | 1 | 1 |
| Liver digestion dup. | 14 | 2 | 36\* | 1 | 13 | -37\* | 4 | 25 |

Average relative percent difference among analytical duplicates to assess for accuracy of measurement by HR-ICP-MS and among digestion duplicates to assess the repeatability of the digestion process. Values marked with asterisks fall outside of the 0-25% range for good agreement.

**Table S3. Average Percent Matrix Recovery**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | As | Cd | Cr | Cu | Hg | Ni | Pb | Zn |
| Sediment | 101 | 102 | 122\* | 92 | 101 | 93 | 115 | 138\* |
| Cattail | 97 | 91 | 90 | 125\* | 100 | 75 | -74\* | -9\* |
| Liver | 135\* | 103 | 104 | 112 | 98 | 105 | 96 | -5\* |

Average percent matrix recovery for elements to assess for potential matrix interference. Values marked with asterisks are flagged for having poor recovery (i.e., outside of the 75-120% range).

**Table S4. Results of ANOVA Comparing Concentrations Between Plots and T-tests for Subplots**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | ANOVA General Plot Difference p-values | T-test Specific Plot Comparisons | T-test General Subplot Difference p-values |
| Sediment | As | 0.04\* | - | 0.005\* |
| Cd | < 0.001\* | MPN>RAD, MPN>TEA | 0.25 |
| Cr | < 0.001\* | MPN>RAD, MPN>TEA, MPS>RAD | 0.001\* |
| Cu | < 0.001\* | MPN>RAD, MPN>TEA | 0.01\* |
| Hg | 0.96 | NA | 0.28 |
| Ni | < 0.001\* | MPN>RAD, MPN>TEA, MPS>RAD | 0.03\* |
| Pb | 0.2 | NA | 0.107 |
| Zn | 0.03\* | - | 0.03\* |
| Cattail | As | 0.93 | NA | 0.02\* |
| Cd | 0.001\* | MPN>RAD, MPN>TEA | 0.34 |
| Cr | < 0.001\* | MPN>RAD, MPS>RAD | 0.06 |
| Cu | 0.68 | NA | 0.61 |
| Hg\* | 0.8 | NA | 0.86 |
| Ni | 0.02\* | MPN>RAD, MPS>RAD | 0.09 |
| Pb | 0.56 | NA | 0.37 |
| Zn | 0.33 | NA | 0.47 |

Significance values from ANOVAs investigating differences in element concentrations in sediment and hybrid cattail roots between four plots (Main Pool North, Main Pool South, Radke, Teal) and the three subplots within each plot. Significant differences are denoted with asterisks (α < 0.05). For elements where differences between plots were significant, bonferroni-corrected *t*-tests were used to assess between which specific plots differences lay (α < 0.01).