Table S1. The F-statistics and probability levels from the marginal means mixed linear model to compare the effects of time of land conversion and soil depth on soil health attributes and CASH scores.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Surface Hardness | | | | Subsurface Hardness | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Effect | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Time | 2 | 15 | 2.43 | 0.122 | 2 | 15 | 1.903 | 0.183 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Wet Aggregate Stability | | | | Organic Matter | | | | ACE Protein | | | | Respiration | | | | Total N | | | | Total C | | | |
| Effect | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. |
| Time | 2 | 14 | 1.035 | 0.381 | 2 | 14 | 4.711 | 0.027 | 2 | 14 | 5.448 | 0.018 | 2 | 14 | 6.367 | 0.011 | 2 | 14 | 4.017 | 0.042 | 2 | 14 | 5.260 | 0.020 |
| Depth | 1 | 16 | 15.873 | 0.001 | 1 | 16 | 45.025 | 0.000 | 1 | 16 | 32.622 | 0.000 | 1 | 16 | 36.700 | 0.000 | 1 | 16 | 98.135 | 0.000 | 1 | 16 | 112.132 | 0.000 |
| Time\*Depth | 2 | 16 | 6.934 | 0.007 | 2 | 16 | 16.536 | 0.000 | 2 | 16 | 4.731 | 0.024 | 2 | 16 | 4.330 | 0.031 | 2 | 16 | 22.367 | 0.000 | 2 | 16 | 29.216 | 0.000 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | POXC | | | | CASH Score | | | | P | | | |  |  |  |  |  |  |  |  |  |  |  |  |
| Effect | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. |  |  |  |  |  |  |  |  |  |  |  |  |
| Time | 2 | 14 | 4.437 | 0.032 | 2 | 14 | 3.475 | 0.060 | 2 | 14 | 3.749 | 0.049 |  |  |  |  |  |  |  |  |  |  |  |  |
| Depth | 1 | 16 | 19.146 | 0.000 | 1 | 16 | 16.733 | 0.001 | 1 | 17 | 20.496 | 0.000 |  |  |  |  |  |  |  |  |  |  |  |  |
| Time\*Depth | 2 | 16 | 0.534 | 0.596 | 2 | 16 | 1.433 | 0.268 | 2 | 17 | 0.321 | 0.730 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | pH | | | | Fe | | | | Mn | | | | Zn | | | | K | | | | Sand | | | |
| Effect | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. |
| Time | 2 | 14 | 3.001 | 0.083 | 2 | 14 | 1.487 | 0.260 | 2 | 14 | 0.399 | 0.678 | 2 | 14 | 0.509 | 0.612 | 2 | 14 | 0.289 | 0.753 | 2 | 14 | 0.635 | 0.544 |
| Depth | 1 | 16 | 9.436 | 0.007 | 1 | 16 | 5.133 | 0.038 | 1 | 16 | 34.093 | 0.000 | 1 | 16 | 14.110 | 0.002 | 1 | 16 | 27.702 | 0.000 | 1 | 16 | 16.432 | 0.001 |
| Time\*Depth | 2 | 16 | 0.230 | 0.797 | 2 | 16 | 2.566 | 0.108 | 2 | 16 | 2.581 | 0.107 | 2 | 16 | 0.833 | 0.453 | 2 | 16 | 0.001 | 0.999 | 2 | 16 | 2.233 | 0.139 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Mg | | | | Silt | | | | Clay | | | |  |  |  |  |  |  |  |  |  |  |  |  |
| Effect | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. | Num df | Denom df | F | Sig. |  |  |  |  |  |  |  |  |  |  |  |  |
| Time | 2 | 14 | 2.235 | 0.144 | 2 | 14 | 0.470 | 0.634 | 2 | 14 | 0.342 | 0.716 |  |  |  |  |  |  |  |  |  |  |  |  |
| Depth | 1 | 16 | 2.766 | 0.116 | 1 | 16 | 4.099 | 0.060 | 1 | 16 | 0.024 | 0.880 |  |  |  |  |  |  |  |  |  |  |  |  |
| Time\*Depth | 2 | 16 | 2.327 | 0.130 | 2 | 16 | 1.099 | 0.357 | 2 | 16 | 0.107 | 0.899 |  |  |  |  |  |  |  |  |  |  |  |  |

Table S2. The *F*-statistics and probability levels from the marginal means mixed linear model to compare the effect of time of conversion on soil health indicators and scores in the 0-5 and 5-15 cm depth intervals.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0-5 cm | | | | 5-15 cm | | | |
| Attribute | Num df | Denom df | F | Sig | Num df | Denom df | F | Sig |
| Wet Aggregate Stability | 2 | 14 | 2.640 | 0.107 | 2 | 14 | 0.209 | 0.814 |
| Organic Matter | 2 | 14 | 9.066 | 0.003 | 2 | 14 | 1.547 | 0.247 |
| ACE Protein | 2 | 14 | 9.647 | 0.002 | 2 | 14 | 1.905 | 0.186 |
| Respiration | 2 | 14 | 8.180 | 0.004 | 2 | 14 | 2.184 | 0.149 |
| TN | 2 | 14 | 7.660 | 0.006 | 2 | 14 | 1.150 | 0.345 |
| TC | 2 | 14 | 8.791 | 0.003 | 2 | 14 | 1.914 | 0.184 |

Table S3. The F-statistics and probability levels from a one-way ANOVA model to compare the effect of soil depth on soil health indicators in the time since conversion categories.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | < 10 y agriculture | | > 50 y agriculture | | Forest | |
| Attribute | F | Sig. | F | Sig. | F | Sig. |
| Wet Aggregate Stability | 0.058 | 0.814 | 0.046 | 0.835 | 4.337 | 0.064 |
| Organic Matter | 1.764 | 0.214 | 0.070 | 0.797 | 8.204 | 0.017 |
| ACE Protein | 3.918 | 0.076 | 0.863 | 0.375 | 6.269 | 0.031 |
| Respiration | 1.045 | 0.331 | 4.256 | 0.066 | 16.048 | 0.002 |
| TN | 2.100 | 0.178 | 0.959 | 0.351 | 12.085 | 0.006 |
| TC | 2.231 | 0.166 | 0.713 | 0.418 | 9.682 | 0.011 |

Table S4. Pearson correlation coefficients for CASH indicators. NS is not statistically significant at alpha=0.05. Correlations are significant at the 0.01 level unless indicated otherwise.



PR15, Penetration Resistance 0-15 cm; PR45, Penetration Resistance 15-45 cm; WAS, Wet Aggregate Stability; TN, Total Nitrogen; TC, Total Carbon; OM, Organic Matter; ACE-Protein, Soil Protein; Resp, Soil Respiration; POXC, Active Carbon.

Table S5. Farm management history for 2019 soil sample collections, according to CASH sampling assessment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Farm field** | **Depth** | **Time** | **Area** | **Crop information** | |
| **2016/2017/2018** | **2019** |
| 1 | 5 | B | Murrillo | alfalfa/barley/corn | wheat |
| 2 | 15 | B | Murrillo | alfalfa/barley/corn | wheat |
| 3 | 5 | C | Murrillo | alfalfa/wheat/corn | corn |
| 4 | 15 | C | Murrillo | alfalfa/wheat/corn | corn |
| 5 | 5 | A | Murrillo | forest | forest |
| 6 | 15 | A | Murrillo | forest | forest |
| 7 | 5 | A | Murrillo | forest | forest |
| 8 | 15 | A | Murrillo | forest | forest |
| 9 | 5 | B | Murrillo | alfalfa/alfalfa/corn | corn |
| 10 | 15 | B | Murrillo | alfalfa/alfalfa/corn | corn |
| 11 | 5 | C | Murrillo | wheat//barley/corn | barley |
| 12 | 15 | C | Murrillo | wheat//barley/corn | barley |
| 13 | 5 | A | Murrillo | forest | forest |
| 14 | 15 | A | Murrillo | forest | forest |
| 15 | 5 | B | Murrillo | alfalfa/wheat/corn | corn |
| 16 | 15 | B | Murrillo | alfalfa/wheat/corn | corn |
| 17 | 5 | C | Murrillo | wheat/alfalfa/alfalfa | alfalfa |
| 18 | 15 | C | Murrillo | wheat/alfalfa/alfalfa | alfalfa |
| 19 | 5 | A | Slate River | forest | forest |
| 20 | 15 | A | Slate River | forest | forest |
| 21 | 5 | B | Slate River | wheat/corn/alfalfa | alfalfa |
| 22 | 15 | B | Slate River | wheat/corn/alfalfa | alfalfa |
| 23 | 5 | C | Slate River | wheat/alfalfa/alfalfa | alfalfa |
| 24 | 15 | C | Slate River | wheat/alfalfa/alfalfa | alfalfa |
| 25 | 5 | A | Slate River | forest | forest |
| 26 | 15 | A | Slate River | forest | forest |
| 27 | 5 | C | Slate River | alfalfa/alfalfa/corn | barley |
| 28 | 15 | C | Slate River | alfalfa/alfalfa/corn | barley |
| 29 | 5 | C | Slate River | alfalfa/wheat/corn | corn |
| 30 | 15 | C | Slate River | alfalfa/wheat/corn | corn |
| 31 | 5 | A | Slate River | forest | forest |
| 32 | 15 | A | Slate River | forest | forest |
| 33 | 5 | B | Slate River | wheat/corn/alfalfa | alfalfa |
| 34 | 15 | B | Slate River | wheat/corn/alfalfa | alfalfa |
| 35 | 5 | B | Slate River | alfalfa/alfalfa/corn | corn |
| 36 | 15 | B | Slate River | alfalfa/alfalfa/corn | corn |