**Table S1.** Extended definitions and descriptions of common ecological network metrics.

|  |  |  |  |
| --- | --- | --- | --- |
| **Metric** | **Type** | **Level** | **Definition** |
| C-score | Co-occurrence | Network | Mean (normalized) number of checkerboard combinations across all nodes |
| Closeness | Centrality | Node | Measure of centrality in a network, calculated as the reciprocal of the sum of the length of the shortest paths between the node and all other nodes in the graph. |
| Cluster coefficient | Co-occurrence | Node | Measures transitivity in connections at a local scale |
| Connectance | - | Network | The fraction of all possible links that are realized in a network |
| Degree | Centrality | Node | Sum of edge weights per node |
| Discrepancy | Nestedness | Node-class | Number of links one would have to move to achieve perfect *nestedness* (see below) |
| Interaction evenness | Specialization | Network | Measures how balanced the distribution of interactions is across species, based on Shannon’s diversity. Measured using the standard metric and the Alatalo interaction evenness metric. |
| Interaction strength asymmetry | Specialization | Network | Measures whether specialized species  interact with generalized ones in the other level |
| Niche overlap | Co-occurrence | Node-class | Mean similarity in interaction pattern between species of the same node-class, and is calculated using Horn's index |
| Nestedness | Nestedness | Network | Measures nestedness based on the overlap of interactions. Nestedness is measured using the standard nestedness metric and the NODF (Nestedness metric based on overlap and decreasing fill) value. |
| d (Blüthgen’s d) | Specialization | Node | Measures the degree of interaction specialization at the taxa/DT level. At a network level, measured by *Specialization asymmetry* (similar idea to *interaction strength asymmetry*). |
| Effective partners | Specialization | Node | Effective number of partners, if each partner were to be equally common |
| Extinction slope and robustness | - | Node-class | Slope measures tolerance of node-class to taxa/DT extinctions; *robustness* measures the area under the extinction curve. |
| Functional complementarity | Specialization | Node-class | Similar to *niche overlap*, but is based on dissimilarity of host plant usage/occurrence of DTs |
| H2’ | Specialization | Network | Measure of discrimination and calculated in comparison to no specialization in a network |
| Partner diversity | Specialization | Node-class | Weighted mean Shannon diversity of the number of interactions for the nodes (taxa/DTs) of a given node-class. |
| Proportional generality | Specialization | Node | Calculated as ‘Effective partners’ divided by effective number of resources; this is the quantitative version of proportional resource use or normalized degree |
| Proportional similarity | Specialization | Node | Specialization measured as dissimilarity between resource use and availability, calculated through abundance values |
| Species strength | Specialization | Node-class | Sum of the ‘relevance’ (based on commonness) of each species for the other class of nodes |
| Togetherness | Co-occurrence | Node | The mean number of co-occurrences across all pairwise species combinations |
| Vulnerability | Specialization | Node-class | Weighted mean effective number of higher trophic species (i.e. DTs) per lower trophic ones (i.e. plants) |
| V-ratio | Specialization | Node-class | Variance ratio of taxa numbers to interaction numbers within taxa of a node-class |

**Table S2.** Full generalized linear model results examining relationships between damage type richness and possible drivers.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Independent Variable** | **Dependent Variable** | **Regression coefficient** | **Standard error** | **T-value** | ***p*-value** | **Adjusted**  ***p*-value** |
| DT richness (DTs) | Mean annual temperature (**°**C) (MAT) | 0.5684 | 0.1426 | 3.985 | 0.000211 \*\*\* | 0.003060\*\* |
| DTs | Mean annual precipitation cm/year (MAP) | -0.0011 | 0.0024 | -0.469 | 0.642 | 0.769169 |
| DTs | Date of publication | 0.1674 | 0.1598 | 1.048 | 0.299 | 0.433550 |
| DTs | Geologic age (Ma) | -0.0098 | 0.0526 | -0.186 | 0.853 | 0.853000 |
| DTs | Shannon’s diversity index | 2.6070 | 1.1420 | 2.283 | 0.026 \* | 0.104400 |
| DTs | Pielou’s J | 5.3450 | 3.8630 | 1.383 | 0.172 | 0.277111 |
| DTs | Plant diversity at 300 specimens | 0.0922 | 0.0560 | 1.646 | 0.105 | 0.217500 |
| Specialized DTs | MAT | 0.3718 | 0.0987 | 3.768 | 0.000421 \*\*\* | 0.004070\*\* |
| Specialized DTs | MAP | -0.0014 | 0.0016 | -0.878 | 0.386 | 0.504520 |
| Specialized DTs | Date of publication | 0.0934 | 0.1077 | 0.868 | 0.389 | 0.504520 |
| Specialized DTs | Geologic age (Ma) | 0.0092 | 0.0354 | 0.260 | 0.796 | 0.824429 |
| Specialized DTs | Shannon’s diversity index | 1.4799 | 0.7874 | 1.880 | 0.065109 | 0.188816 |
| Specialized DTs | Pielou’s J | 3.8850 | 2.6220 | 1.481 | 0.143817 | 0.260668 |
| Specialized DTs | Plant diversity at 300 specimens | 0.0466 | 0.0380 | 1.226 | 0.225 | 0.343421 |
| Galling DTs | MAT | 0.1704 | 0.0565 | 3.014 | 0.00397 \*\* | 0.028780\* |
| Galling DTs | MAP | 0.0004 | 0.0009 | 0.403 | 0.6896 | 0.769169 |
| Galling DTs | Date of publication | 0.1349 | 0.0504 | 2.679 | 0.00952 \*\* | 0.055216 |
| Galling DTs | Geologic age (Ma) | -0.0296 | 0.0170 | -1.742 | 0.0866 | 0.217500 |
| Galling DTs | Shannon’s diversity index | 0.8899 | 0.3849 | 2.312 | 0.0243 \* | 0.104400 |
| Galling DTs | Pielou’s J | 2.1714 | 1.2938 | 1.678 | 0.0986 | 0.217500 |
| Galling DTs | Plant diversity at 300 specimens | 0.0314 | 0.0185 | 1.699 | 0.094558 | 0.217500 |
| Mining DTs | MAT | 0.0928 | 0.0413 | 2.249 | 0.0288 \* | 0.104400 |
| Mining DTs | MAP | -0.0005 | 0.0006 | -0.852 | 0.40014 | 0.504520 |
| Mining DTs | Date of publication | 0.0135 | 0.0400 | 0.337 | 0.737 | 0.791593 |
| Mining DTs | Geologic age (Ma) | -0.0057 | 0.0131 | -0.434 | 0.665853 | 0.769169 |
| Mining DTs | Shannon’s diversity index | 0.6158 | 0.2918 | 2.111 | 0.039 \* | 0.125667 |
| Mining DTs | Pielou’s J | 1.3916 | 0.9803 | 1.420 | 0.1610 | 0.274647 |
| Mining DTs | Plant diversity at 300 specimens | 0.0218 | 0.0139 | 1.569 | 0.12197 | 0.235810 |
| Publication Date | Geologic Age | -1.535 | 0.336 | -4.569 | 2.34e-05 \*\*\* | 0.000679\*\*\* |

**Table S3.** Full generalized linear model results examining relationships between damage frequency (expressed as the percent of leaves at a site that have a given type of damage) and possible drivers.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Independent Variable** | **Dependent Variable** | **Regression coefficient** | **Standard error** | **T-value** | ***p*-value** | **Adjusted**  ***p*-value** |
| DT % | Mean annual temperature (**°**C) (MAT) | 0.8896 | 0.3247 | 2.740 | 0.00823 \*\* | 0.115220 |
| DT % | Mean annual precipitation cm/year (MAP) | 0.002577 | 0.005147 | 0.501 | 0.61946 | 0.893455 |
| DT % | Date of publication | 0.3085 | 0.3071 | 1.005 | 0.319 | 0.812000 |
| DT % | Geologic age (Ma) | 0.12040 | 0.09955 | 1.209 | 0.231 | 0.646800 |
| DT % | Shannon’s diversity index | -0.4721 | 2.2995 | -0.205 | 0.838 | 0.906660 |
| DT % | Pielou’s J | 4.360 | 7.558 | 0.577 | 0.566 | 0.893455 |
| DT % | Plant diversity at 300 specimens | -0.04508 | 0.10938 | -0.412 | 0.682 | 0.893455 |
| Specialized DT % | MAT | 0.37177 | 0.09866 | 3.768 | 0.000421 \*\*\* | 0.011788\*\* |
| Specialized DT % | MAP | -0.000442 | 0.001836 | -0.241 | 0.81123 | 0.906660 |
| Specialized DT % | Date of publication | 0.05941 | 0.13060 | 0.455 | 0.651 | 0.893455 |
| Specialized DT % | Geologic age (Ma) | 0.05369 | 0.04195 | 1.280 | 0.20560 | 0.646800 |
| Specialized DT % | Shannon’s diversity index | 0.1746 | 0.9852 | 0.177 | 0.859933 | 0.906660 |
| Specialized DT % | Pielou’s J | 0.8664 | 3.2450 | 0.267 | 0.790402 | 0.906660 |
| Specialized DT % | Plant diversity at 300 specimens | -0.01786 | 0.04638 | -0.385 | 0.702 | 0.893455 |
| Galling DT % | MAT | 0.11802 | 0.08695 | 1.357 | 0.180 | 0.646800 |
| Galling DT % | MAP | -0.0005486 | 0.000994 | -0.552 | 0.584 | 0.893455 |
| Galling DT % | Date of publication | 0.19655 | 0.07857 | 2.502 | 0.0149 \* | 0.139067 |
| Galling DT % | Geologic age (Ma) | -0.04707 | 0.02626 | -1.792 | 0.0779 | 0.436240 |
| Galling DT % | Shannon’s diversity index | 0.07095 | 0.63816 | 0.111 | 0.9118 | 0.911800 |
| Galling DT % | Pielou’s J | 1.335 | 2.096 | 0.637 | 0.5267 | 0.893455 |
| Galling DT % | Plant diversity at 300 specimens | -0.004743 | 0.029848 | -0.159 | 0.87428 | 0.906660 |
| Mining DT % | MAT | 0.06143 | 0.02915 | 2.107 | 0.0396 \* | 0.277200 |
| Mining DT % | MAP | -0.0001850 | 0.000333 | -0.555 | 0.5819 | 0.893455 |
| Mining DT % | Date of publication | -0.009808 | 0.023744 | -0.413 | 0.681 | 0.893455 |
| Mining DT % | Geologic age (Ma) | 0.005180 | 0.007758 | 0.668 | 0.5068 | 0.893455 |
| Mining DT % | Shannon’s diversity index | 0.2757 | 0.1820 | 1.515 | 0.135 | 0.630000 |
| Mining DT % | Pielou’s J | 0.4614 | 0.6084 | 0.758 | 0.4512 | 0.893455 |
| Mining DT % | Plant diversity at 300 specimens | 0.010717 | 0.008577 | 1.25 | 0.21631 | 0.646800 |

**Table S4.** Full generalized linear model results examining relationships between selected network properties and possible drivers.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Independent Variable** | **Dependent Variable** | **Regression coefficient** | **Standard error** | **T-value** | ***p*-value** | **Adjusted**  ***p*-value** |
| C-Score (Plants) | Mean annual temperature (**°**C) (MAT) | 0.007498 | 0.005174 | 1.449 | 0.15475 | 0.6446 |
| C-Score (Plants) | Mean annual precipitation cm/year (MAP) | -7.291e-05 | 6.811e-05 | -1.071 | 0.293 | 0.6446 |
| C-Score (DTs) | MAT | 0.007712 | 0.005928 | 1.301 | 0.200203 | 0.6446 |
| C-Score (DTs) | MAP | 3.216e-05 | 7.040e-05 | 0.457 | 0.651 | 0.795667 |
| Connectance | MAT | -0.006381 | 0.003742 | -1.705 | 0.0953 | 0.6446 |
| Connectance | MAP | 4.598e-06 | 2.948e-05 | 0.156 | 0.877 | 0.908 |
| Interaction evenness | MAT | 0.0001749 | 0.0015062 | 0.116 | 0.908 | 0.908 |
| Interaction evenness | MAP | 1.387e-05 | 1.925e-05 | 0.72 | 0.477 | 0.765875 |
| Niche overlap (Plants) | MAT | -0.007813 | 0.003910 | -1.998 | 0.05 | 0.6446 |
| Niche overlap (Plants) | MAP | 7.654e-05 | 4.998e-05 | 1.531 | 0.13582 | 0.6446 |
| Niche overlap (DTs) | MAT | -0.007190 | 0.006015 | -1.195 | 0.238 | 0.6446 |
| Niche overlap (DTs) | MAP | -3.818e-05 | 6.136e-05 | -0.622 | 0.538352 | 0.765875 |
| Nestedness | MAT | -0.1414 | 0.1536 | -0.920 | 0.362 | 0.724 |
| Nestedness | MAP | 0.001349 | 0.001922 | 0.702 | 0.488 | 0.765875 |
| H2’ | MAT | -0.001319 | 0.001883 | -0.701 | 0.487 | 0.765875 |
| H2’ | MAP | -1.386e-05 | 2.333e-05 | -0.594 | 0.557 | 0.765875 |
| Partner diversity (Plants) | MAT | 0.005546 | 0.011248 | 0.493 | 0.645 | 0.795667 |
| Partner diversity (Plants) | MAP | -5.761e-05 | 1.517e-04 | -0.380 | 0.707 | 0.818632 |
| Partner diversity (DTs) | MAT | 0.01911 | 0.01495 | 1.278 | 0.208108 | 0.6446 |
| Partner diversity (DTs) | MAP | 0.0002188 | 0.0001756 | 1.246 | 0.222098 | 0.6446 |
| Vulnerability | MAT | 0.05892 | 0.05291 | 1.114 | 0.272 | 0.6446 |
| Vulnerability | MAP | -0.0002350 | 0.0007339 | -0.320 | 0.751 | 0.8261 |

**Table S5.** Full mixed effects model results.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Independent Variable** | **Dependent Variable** | **Mixed Effects Regressor** | **Coefficients** | **Regression coefficient** | **Standard error** | **T-value** | ***p*-value** |
| 1 | DT Richness | MAT | Depositional Environment | Intercept | 8.7677 | 4.1267 | 2.125 | 0.038687 \* |
| MAT | 0.5305 | 0.1386 | 3.827 | 0.000368 \*\*\* |
| Fluvial | 2.0423 | 3.5681 | 0.572 | 0.569683 |
| Lacustrine | 5.6399 | 3.6507 | 1.545 | 0.128804 |
| Mixed | 1.8696 | 4.2367 | 0.441 | 0.660958 |
| 2 | Specialized DT Richness | MAT | Depositional Environment | Intercept | 1.1362 | 2.8876 | 0.393 | 0.695679 |
| MAT | 0.3507 | 0.0970 | 3.615 | 0.000707 \*\*\* |
| Fluvial | 2.2036 | 2.4968 | 0.883 | 0.381762 |
| Lacustrine | 3.9996 | 2.5545 | 1.566 | 0.123852 |
| Mixed | 0.5945 | 2.9646 | 0.201 | 0.841899 |
| 3 | Galling DT Richness | MAT | Depositional Environment | Intercept | 0.9761 | 1.6603 | 0.588 | 0.55932 |
| MAT | 0.1546 | 0.0558 | 2.771 | 0.00787 \*\* |
| Fluvial | -1.1410 | 1.4356 | -0.795 | 0.43057 |
| Lacustrine | 0.2135 | 1.4688 | 0.145 | 0.88501 |
| Mixed | -0.6432 | 1.7046 | -0.377 | 0.70756 |
| 4 | Mining DT Richness | MAT | Depositional Environment | Intercept | 0.1535 | 1.1969 | 0.128 | 0.898 |
| MAT | 0.0812 | 0.0402 | 2.019 | 0.049 \* |
| Fluvial | 0.2979 | 1.0349 | 0.288 | 0.775 |
| Lacustrine | 1.1779 | 1.0589 | 1.112 | 0.271 |
| Mixed | -0.5122 | 1.2288 | -0.417 | 0.679 |
| 5 | DT Richness | MAT | Latitude | Intercept | 10.2668 | 2.4990 | 4.108 | 0.000151 \*\*\* |
| MAT | 0.4493 | 0.1984 | 2.265 | 0.027965 \* |
| Mid-North Latitudes | 3.0310 | 2.3699 | 1.279 | 0.206925 |
| Low Latitudes | 1.9250 | 5.3634 | 0.359 | 0.721208 |
| Mid-South Latitudes | 6.9388 | 3.4243 | 2.026 | 0.048194 \* |
| 6 | Specialized DT Richness | MAT | Latitude | Intercept | 2.3162 | 1.7432 | 1.329 | 0.19010 |
| MAT | 0.3985 | 0.1384 | 2.880 | 0.00588 \*\* |
| Mid-North Latitudes | 0.7363 | 1.6531 | 0.445 | 0.65800 |
| Low Latitudes | -2.7599 | 3.7413 | -0.738 | 0.46422 |
| Mid-South Latitudes | 2.8826 | 2.3887 | 1.207 | 0.23331 |
| 7 | Galling DT Richness | MAT | Latitude | Intercept | 0.1321 | 1.0292 | 0.128 | 0.8984 |
| MAT | 0.1998 | 0.0817 | 2.446 | 0.0181 \* |
| Mid-North Latitudes | -0.4939 | 0.9760 | -0.506 | 0.6151 |
| Low Latitudes | -0.8328 | 2.2089 | -0.377 | 0.7078 |
| Mid-South Latitudes | -1.1850 | 1.4103 | -0.840 | 0.4049 |
| 8 | Mining DT Richness | MAT | Latitude | Intercept | 0.1517 | 0.7030 | 0.216 | 0.83011 |
| MAT | 0.1742 | 0.0558 | 3.121 | 0.00302 \*\* |
| Mid-North Latitudes | -1.0798 | 0.6667 | -1.620 | 0.11174 |
| Low Latitudes | -3.3527 | 1.5089 | -2.222 | 0.03093 \* |
| Mid-South Latitudes | 0.0849 | 0.9634 | 0.088 | 0.93011 |
| 9 | DT Richness | Shannon | Depositional Environment | Intercept | 19.6030 | 4.7900 | 4.093 | 0.000138 \*\*\* |
| Shannon | 1.5860 | 1.2700 | 1.249 | 0.216895 |
| Fluvial | -3.0430 | 3.7060 | -0.821 | 0.415126 |
| Lacustrine | 1.1390 | 3.7110 | 0.307 | 0.760063 |
| Mixed | -4.7230 | 5.0030 | -0.944 | 0.349215 |
| 10 | Specialized DT Richness | Shannon | Depositional Environment | Intercept | 8.7706 | 3.3109 | 2.649 | 0.0105 \* |
| Shannon | 0.9257 | 0.8778 | 1.055 | 0.2961 |
| Fluvial | -1.4452 | 2.5619 | -0.564 | 0.5749 |
| Lacustrine | 0.8603 | 2.5654 | 0.335 | 0.7386 |
| Mixed | -3.9695 | 3.4583 | -1.148 | 0.2559 |
| 11 | Galling DT Richness | Shannon | Depositional Environment | Intercept | 3.1502 | 1.6106 | 1.956 | 0.0555 |
| Shannon | 0.4975 | 0.4270 | 1.165 | 0.2489 |
| Fluvial | -1.6886 | 1.2463 | -1.355 | 0.1809 |
| Lacustrine | -0.2343 | 1.2479 | -0.188 | 0.8518 |
| Mixed | -1.6581 | 1.6823 | -0.986 | 0.3286 |
| 12 | Mining DT Richness | Shannon | Depositional Environment | Intercept | 0.4608 | 1.2069 | 0.382 | 0.704 |
| Shannon | 0.4456 | 0.3200 | 1.392 | 0.169 |
| Fluvial | 0.4266 | 0.9339 | 0.457 | 0.650 |
| Lacustrine | 1.4053 | 0.9352 | 1.503 | 0.139 |
| Mixed | -0.6100 | 1.2606 | -0.484 | 0.630 |
| 13 | DT Richness | Shannon | Latitude | Intercept | 12.3830 | 3.2370 | 3.825 | 0.000331 \*\*\* |
| Shannon | 1.5090 | 1.0330 | 1.460 | 0.149814 |
| Mid-North Latitudes | 4.8030 | 2.6510 | 1.812 | 0.075381 |
| Low Latitudes | 6.9960 | 4.5290 | 1.545 | 0.128030 |
| Mid-South Latitudes | 14.4830 | 3.3300 | 4.350 | 5.83e-05 \*\*\* |
| 14 | Specialized DT Richness | Shannon | Latitude | Intercept | 4.7696 | 2.2951 | 2.078 | 0.042290 \* |
| Shannon | 0.8237 | 0.7327 | 1.124 | 0.265718 |
| Mid-North Latitudes | 2.8554 | 1.8795 | 1.519 | 0.134340 |
| Low Latitudes | 2.9244 | 3.2105 | 0.911 | 0.366255 |
| Mid-South Latitudes | 9.0960 | 2.3605 | 3.853 | 0.000302 \*\*\* |
| 15 | Galling DT Richness | Shannon | Latitude | Intercept | 0.7737 | 1.2417 | 0.623 | 0.5357 |
| Shannon | 0.6928 | 0.3964 | 1.748 | 0.0860 |
| Mid-North Latitudes | 0.6427 | 1.0168 | 0.632 | 0.5299 |
| Low Latitudes | 1.6212 | 1.7369 | 0.933 | 0.3546 |
| Mid-South Latitudes | 2.2284 | 1.2771 | 1.745 | 0.0865 |
| 16 | Mining DT Richness | Shannon | Latitude | Intercept | 0.9215 | 0.9285 | 0.992 | 0.3252 |
| Shannon | 0.5032 | 0.2964 | 1.698 | 0.0951 |
| Mid-North Latitudes | -0.1683 | 0.7604 | -0.221 | 0.8257 |
| Low Latitudes | -0.8681 | 1.2988 | -0.668 | 0.5067 |
| Mid-South Latitudes | 1.3496 | 0.9550 | 1.413 | 0.1631 |

**Table S6.** Acknowledging the indigenous peoples of all sample localities. The authors would like to encourage all researchers to educate themselves on the ancestral land in which they are working and support foundations and organizations that aim to financially support indigenous field scientists, specifically paleontologists.

|  |  |  |  |
| --- | --- | --- | --- |
| **Site** | **Geographic location** | **Epoch** | **Indigenous Peoples** |
| HreíÁavatn-Stafholt Fm | Iceland | Miocene | Icelandic: Íslendingar |
| Skardsstrond-Mokollsdalur Fm | Iceland | Miocene | Icelandic: Íslendingar |
| Trollatunga-Gautshamar Fm | Iceland | Miocene | Icelandic: Íslendingar |
| Brjanslaekur-Selja Fm | Iceland | Miocene | Icelandic: Íslendingar |
| Mush | Ethiopia | Miocene | Amhara |
| Hinden Maar | Otago region, New Zealand | Miocene | Māori |
| LV3 | Huesca, Spain | Oligocene | Aragoneses, Andalusians, Asturians, Basques, Castilians, Catalans, Cantabrians, Galicians, Gypsies |
| Bull's Bellow | Ethiopia | Oligocene | Amhara |
| Guang River | Ethiopia | Oligocene | Amhara |
| Florissant | Colorado | Eocene | Cheyenne and Núu-agha-tʉvʉ-pʉ̱ (Ute) |
| Bonanza | Uinta Basin | Eocene | Shoshone-Bannock and Eastern Shashone |
| Rio Pichileufu | Argentina | Eocene | Wallmapu (Mapuche) |
| Kissinger Lakes (WRE) | Wind River Basin, Wyoming | Eocene | Apsaalooké (Crow), Eastern Shoshone, and Cheyenne |
| Republic | NE Washington | Eocene | Syilx tmix (Okanagan) and San Poil |
| Laguna del Hunco | Chubut, Argentina | Eocene | Aónikenk (Tehuelche) and Wallmapu (Mapuche) |
| Wind River WRI | Wind River Basin, Wyoming | Eocene | Apsaalooké (Crow), Eastern Shoshone, and Cheyenne |
| Fifteenmile Creek | Bighorn Basin | Eocene | Apsaalooké (Crow), Cheyenne, Očhéthi Šakówin |
| PN | Bighorn Basin | Eocene | Apsaalooké (Crow), Cheyenne, Očhéthi Šakówin |
| Sourdough | Great Divide Basin, SW WY | Eocene | Eastern Shoshone and Cheyenne |
| Cool Period | Bighorn Basin | Eocene | Apsaalooké (Crow), Cheyenne, Očhéthi Šakówin |
| South Fork Elk Creek | Bighorn Basin | Eocene | Apsaalooké (Crow), Cheyenne, Očhéthi Šakówin |
| Hubble Bubble | Bighorn Basin | Eocene | Apsaalooké (Crow), Cheyenne, Očhéthi Šakówin |
| Dead Platypus | Bighorn Basin | Eocene | Apsaalooké (Crow), Cheyenne, Očhéthi Šakówin |
| Chickaloon | south-central Alaska | Eocene | Ahtna and Dena'ina Athabaskan |
| Parachute Creek (Gr River) | Colorado | Eocene | Núu-agha-tʉvʉ-pʉ̱ (Ute) |
| Daiye Spa | Bighorn Basin | Paleocene | Apsaalooké (Crow), Cheyenne, Očhéthi Šakówin |
| Clarkforkian | Washakie Basin, SW WY | Paleocene | Arapaho, Shashone, Crow, and Cheyenne |
| Lur'd Leaves | Bighorn Basin | Paleocene | Apsaalooké (Crow), Cheyenne, Očhéthi Šakówin |
| Cerrejon | Colombia | Paleocene | Wiwa and Wayúu |
| Skeleton Coast | Bighorn Basin | Paleocene | Apsaalooké (Crow), Cheyenne, Očhéthi Šakówin |
| Persites Paradise | Great Divide Basin, SW WY | Paleocene | Eastern Shoshone and Cheyenne |
| Kevin's Jerky | Washakie Basin, SW WY | Paleocene | Eastern Shoshone and Cheyenne |
| Haz-Mat | Washakie Basin, SW WY | Paleocene | Eastern Shoshone and Cheyenne |
| Castle Rock lower layer | Denver Basin, CO | Paleocene | Cheyenne, Núu-agha-tʉvʉ-pʉ̱ (Ute), and Očhéthi Šakówin |
| Mexican Hat | Powder River Basin, SE MT | Paleocene | Niitsítpiis-stahkoii ᖹᐟᒧᐧᐨᑯᐧ ᓴᐦᖾᐟ (Blackfoot / Niitsítapi ᖹᐟᒧᐧᒣᑯ), Michif Piyii (Métis), Apsaalooké (Crow), Cheyenne, and Očhéthi Šakówin |
| Pyramid Butte | Williston Basin, SW ND | Paleocene | Michif Piyii (Métis), Yanktonai, Assiniboine, and Očhéthi Šakówin |
| Battleship | Williston Basin, SW ND | Cretaceous | Michif Piyii (Métis), Yanktonai, Assiniboine, and Očhéthi Šakówin |
| Dean Street | Williston Basin, SW ND | Cretaceous | Michif Piyii (Métis), Yanktonai, Assiniboine, and Očhéthi Šakówin |
| Somebody's Garden+ | Williston Basin, SW ND | Cretaceous | Michif Piyii (Métis), Yanktonai, Assiniboine, and Očhéthi Šakówin |
| Luten's 4H Hadrosaur+ | Williston Basin, SW ND | Cretaceous | Michif Piyii (Métis), Yanktonai, Assiniboine, and Očhéthi Šakówin |
| Dakota | Kansas & Nebraska | Cretaceous | Omaha, Yankton, and Očhéthi Šakówin |