**Supplementary Table DR1: Outcrop and Core Locations** *Weber 1*

| Abbrev. | Location | Latitude (N) | Longitude (W) | PLSS | Note |
|---|---|---|---|---|---|
| A | Clay Valley, NE | 43º04’05.3” | 97º16’42.1” | | drainage gully into Clay Creek |
| B | Crofton Golf Course, NE | 42º50’25.4” | 97º29’06.6” | | NE Geological Survey Core |
| C | Niobrara State Park, NE | 42º46’18.0” | 98º04’03.2” | | top of slump along Missouri River |
| D | White River, NE | 43º44’45.1” | 99º36’07.6” | | cubank of gully near the White River |
| E | Lake County, SD | | | Sec.22 T106N | SD Geological Survery Core |
| F | Iroquois County, SD | | | Sec.1 T110N | SD Geological Survery Core |
| G | Crow Creek, SD | 43º58’03.7” | 99º18’19.3” | | drainage gully into Crow Creek |
| H | Sisseton, SD | | | Sec.25 T126 I | SD Geological Survery Core |

Note: Lat. & Long. taken with handheld GPS; unavailable for SDGS cores

**Supplementary Table DR4: Taxon Reference List**



| Name | Reference |
|---|---|
| *Aspidolithus parcus constrictus* | (Hattner & Wise) Perch-Nielsen 1984 |
| *Aspidolithus parcus expansus* | Wise and Watkins in Wise (1983) |
| *Biscutum blackii* | Gartner, 1968 |
| *Biscutum magnum* | Wind and Wise in Wise and Wind (1977) |
| *Biscutum zulloi* | Covington, 1994 |
| *Boletuvelum candens* | Wind and Wise in Wise and Wind (1977) |
| *Bukryaster hayi* | Bukry, 1969 |
| *Ceratolithus aculeus* | (Stradner, 1961) Prins and Sissingh in Sissingh, 1977 |
| *Eiffelithus eximius* | (Stover, 1966) Perch-Nielsen, 1968 |
| *Eprolithus floralis* | (Stradner, 1962) Stover, 1966 |
| *Lithastrinus grillii* | Stradner, 1962 |
| *Marthasterites furcatus* | Deflandre in Deflandre and Firt, 1954 |
| *Prediscosphaera grandis* | Perch-Nielsen, 1972 |
| *Reinhardites anthophourus* | (Deflandre, 1959) Perch-Nielsen, 1968 |
| *Reinhardites levis* | Prins and Sissingh in Sissingh, 1977 |
| *Seribiscutum primitivum* | (Thierstein, 1974) Filewicz et al. in Wise and Wind, 1977 |
| *Tranolithus phacelosus* | Stover, 1966 |
| *Uniplanarius trifidus* | (Stradner in Stradner and Papp, 1961) Hattner and Wise, 1980 |

**Supplementary Table DR3:** *Weber Pg.1*

**Percentage of reworked calcareous nannofossils in the Crow Creek Member**

| Height above base of Crow Creek Member (cm) | Clay Valley (A) | NGS - Crofton core (B) | Niobrara State Park (C) | White River (D) | SDGS - Iroquois core (F) | SDGS - Lake core (E) | Crow Creek (G) |
|---|---|---|---|---|---|---|---|
| 300 | | | | 5.7 | 8.5 | | |
| 290 | | | | 9.9 | | | |
| 280 | | | | 11.9 | 7.5 | | |
| 270 | | | | 6.1 | 8.7 | | |
| 260 | | | | 8.7 | | | |
| 250 | | | | 8.1 | | | |
| 240 | | | | 8.2 | | | |
| 230 | | | | 10.0 | | | |
| 220 | | | | 5.8 | 9.1 | | |
| 210 | | | | 10.2 | | | |
| 200 | | | | 7.5 | | | |
| 190 | 10.4 | | 14.6 | 7.2 | | | |
| 180 | 9.8 | | 15.2 | 8.2 | | | |
| 170 | 13.8 | | 17 | 6.1 | | | |
| 160 | 11.1 | 16.8 | 16.6 | 5.0 | | | |
| 150 | 11.0 | 16.5 | 17.8 | 6.5 | 9.1 | 6.6 | |
| 140 | 10.4 | 17.3 | 18.8 | 6.9 | | 7.2 | 7.8 |
| 130 | 18.2 | 16.8 | 14.8 | 5.5 | | 6.4 | 7.8 |
| 120 | 20.4 | 19.5 | 17.4 | 5.2 | | 7.2 | 7.5 |
| 110 | 23.9 | 16.8 | 16.8 | 6.7 | | 5.6 | 6.1 |
| 100 | 22.1 | 19.5 | 17.6 | 8.9 | | 6.5 | 7.6 |
| 90 | 26.7 | 19.0 | 17.6 | 9.8 | | 11.4 | 7.8 |
| 80 | 25.9 | 18.3 | 19 | 9.3 | | 12.0 | 13.0 |
| 70 | 27.5 | 17.7 | 15.6 | 8.6 | | 11.6 | 9.0 |
| 60 | 18.7 | 19.7 | 15 | 6.1 | | 12.0 | 8.4 |
| 50 | 21.3 | 18.7 | 17.2 | 9.9 | | 12.9 | 6.1 |
| 40 | 23.7 | 20.7 | 18.8 | 7.3 | | | 8.4 |
| 30 | 28.3 | 23.5 | 20 | 12.6 | 9.7 | | 8.7 |
| 20 | | 20.8 | 16.4 | | | | 8.0 |
| 10 | | 22.2 | 22.2 | | | | |

**Supplementary Table DR2 Nannofossils from the Crow Creek Member at Locale C** *Weber Pg.1*

| Height above base of Crow Creek Member (cm) | *Acuturris scotus* | *Ahmuellerella octoradiata* | *Arkhangelskiella speciallata* | *Aspidolithus parcus constrictus* | *Aspidolithus parcus expansus* | *Aspidolithus parcus parcus* | *Biscutum constans* | *Biscutum magnum* | *Biscutum* sp. A | *Biscutum zulloi* | *Boletuvelum candens* | *Braarudosphaera bigelowii* | *Broinsonia signata* | *Bukryaster hayi* | *Calculites obscurus* | *Calculites ovalis* | *Ceratolithoides aculeus* | *Ceratolithoides arcuatus* | *Ceratolithoides seisquipedalis* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 0.2 | 2.4 | 0.6 | 0.0 | 0.8 | 0.8 | 1.4 | 0.4 | 11.6 | 4.8 | 0.0 | 0.0 | 0.8 | 0.2 | 1.4 | 0.6 | 0.0 | 0.0 | 0.0 |
| 20 | 0.0 | 2.0 | 0.2 | 0.0 | 0.6 | 0.2 | 0.8 | 0.6 | 8.0 | 3.8 | 0.2 | 0.2 | 0.8 | 0.0 | 4.0 | 0.8 | 0.2 | 0.0 | 0.0 |
| 30 | 0.0 | 2.6 | 0.8 | 0.0 | 1.0 | 0.6 | 0.6 | 1.0 | 10.6 | 4.6 | 0.0 | 0.0 | 1.2 | 0.0 | 3.6 | 0.8 | 0.0 | 0.0 | 0.0 |
| 40 | 0.0 | 1.6 | 0.6 | 0.0 | 0.2 | 0.8 | 0.8 | 1.6 | 11.4 | 2.8 | 0.0 | 0.2 | 0.6 | 0.0 | 2.8 | 0.6 | 1.0 | 0.0 | 0.0 |
| 50 | 0.0 | 1.6 | 0.4 | 0.0 | 0.0 | 0.4 | 0.2 | 0.8 | 9.6 | 3.2 | 0.2 | 0.0 | 0.8 | 0.0 | 3.6 | 0.6 | 0.4 | 0.0 | 0.0 |
| 60 | 0.0 | 1.4 | 0.8 | 0.0 | 0.6 | 0.6 | 0.2 | 1.0 | 7.4 | 3.6 | 0.0 | 0.4 | 0.2 | 0.0 | 4.4 | 0.8 | 0.2 | 0.2 | 0.2 |
| 70 | 0.2 | 1.8 | 0.8 | 0.0 | 0.2 | 0.2 | 0.6 | 0.8 | 7.8 | 4.0 | 0.0 | 0.0 | 1.0 | 0.8 | 5.8 | 0.8 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.6 | 0.0 | 0.0 | 0.4 | 0.8 | 0.0 | 1.2 | 9.6 | 5.4 | 0.0 | 0.0 | 0.0 | 0.2 | 3.8 | 0.6 | 0.2 | 0.0 | 0.0 |
| 90 | 0.0 | 2.8 | 0.6 | 0.2 | 0.4 | 0.4 | 0.8 | 2.0 | 7.0 | 7.4 | 0.0 | 0.0 | 0.8 | 0.0 | 2.8 | 0.2 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.4 | 1.0 | 0.0 | 1.4 | 0.6 | 0.8 | 1.8 | 5.4 | 8.0 | 0.0 | 0.0 | 0.8 | 0.2 | 3.0 | 1.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.2 | 0.8 | 0.0 | 0.4 | 1.0 | 0.4 | 1.8 | 5.4 | 7.4 | 0.4 | 0.2 | 0.8 | 0.0 | 2.2 | 1.0 | 0.0 | 0.0 | 0.2 |
| 120 | 0.0 | 1.6 | 1.0 | 0.2 | 0.4 | 1.0 | 0.6 | 1.2 | 7.0 | 7.2 | 0.2 | 0.0 | 1.0 | 0.0 | 2.4 | 0.2 | 0.2 | 0.2 | 0.0 |
| 130 | 0.2 | 1.6 | 0.4 | 0.0 | 0.2 | 0.8 | 0.4 | 1.6 | 6.4 | 4.8 | 0.0 | 0.0 | 1.2 | 0.4 | 2.0 | 0.8 | 0.0 | 0.0 | 0.0 |
| 140 | 0.4 | 1.6 | 0.8 | 0.2 | 0.6 | 1.0 | 0.6 | 1.4 | 6.2 | 8.6 | 0.0 | 0.0 | 1.0 | 0.0 | 2.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 2.2 | 0.6 | 0.2 | 0.6 | 1.0 | 0.6 | 2.0 | 8.0 | 7.0 | 0.0 | 0.0 | 0.8 | 0.0 | 2.6 | 1.0 | 0.8 | 0.2 | 0.0 |
| 160 | 0.0 | 1.4 | 0.2 | 0.2 | 0.2 | 0.2 | 0.0 | 0.8 | 6.0 | 5.8 | 0.0 | 0.0 | 1.2 | 0.0 | 3.8 | 1.0 | 0.2 | 0.0 | 0.0 |
| 170 | 0.0 | 1.0 | 0.4 | 0.2 | 0.4 | 1.0 | 0.4 | 1.0 | 8.4 | 6.2 | 0.0 | 0.0 | 0.8 | 0.0 | 2.8 | 1.4 | 0.4 | 0.0 | 0.0 |
| 180 | 0.0 | 1.8 | 0.6 | 0.6 | 0.6 | 0.4 | 0.6 | 0.8 | 6.0 | 5.4 | 0.0 | 0.2 | 1.2 | 0.0 | 4.0 | 0.2 | 0.4 | 0.2 | 0.0 |
| 190 | 0.0 | 1.6 | 1.2 | 0.2 | 0.0 | 1.2 | 1.0 | 1.2 | 6.8 | 4.8 | 0.2 | 0.0 | 1.0 | 0.0 | 1.4 | 0.0 | 0.2 | 0.0 | 0.0 |

**Supplementary Table DR2 Nannofossils from the Crow Creek Member at Locale C** *Weber Pg.2*

| *Ceratolithoides verbeekii* | *Chiastozygus* spp. | *Corollithion signum* | *Cribrocorona gallica* | *Cribrosphaerella ehrenbergii* | *Cylindralithus serratus* | *Eiffellithus eximius* (early) | *Eiffellithus eximius* (late) | *Eiffellithus gorkae* | *Eiffellithus turriseiffelii* | *Eprolithus floralis* | *Gartnerago obliquum* | *Helicolithus* spp. | *Kamptnerius magnificus* | *Lithastrinus grillii* | *Lithraphidites carniolensis* | *Loxolithus armilla* | *Lucianorhabdus cayeuxii* | *Lucianorhabdus maleformis* | *Manivitella pemmatoidea* | *Marthasterites furcatus* | *Microrhabdulus belgicus* | *Microrhabdulus decoratus* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 4.6 | 1.8 | 0.2 | 4.2 | 4.0 | 2.0 | 1.0 | 0.6 | 2.0 | 0.2 | 1.2 | 2.6 | 3.2 | 1.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.0 | 0.4 | 0.0 | 0.4 |
| 0.0 | 5.6 | 2.0 | 0.0 | 3.4 | 3.6 | 1.8 | 0.6 | 2.6 | 0.4 | 0.0 | 1.0 | 2.8 | 1.6 | 0.6 | 0.0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.6 | 0.4 | 0.4 |
| 0.0 | 4.8 | 1.2 | 0.4 | 4.8 | 6.8 | 2.0 | 0.2 | 1.2 | 0.2 | 0.0 | 0.8 | 3.4 | 0.6 | 0.6 | 0.2 | 0.2 | 0.4 | 0.0 | 0.0 | 0.0 | 0.2 | 1.0 |
| 0.0 | 6.0 | 1.8 | 1.2 | 2.4 | 2.8 | 2.4 | 0.4 | 2.6 | 0.4 | 0.0 | 1.4 | 2.0 | 0.6 | 0.6 | 0.0 | 0.4 | 0.8 | 0.4 | 0.4 | 0.6 | 1.0 | 2.4 |
| 0.0 | 6.2 | 2.4 | 0.0 | 2.6 | 3.8 | 2.0 | 0.6 | 2.0 | 0.2 | 0.0 | 1.8 | 3.4 | 0.2 | 1.2 | 0.0 | 0.2 | 1.2 | 0.6 | 0.8 | 0.0 | 1.0 | 0.8 |
| 0.0 | 6.8 | 1.2 | 0.8 | 4.2 | 3.2 | 2.0 | 0.4 | 1.8 | 0.4 | 0.0 | 3.8 | 1.0 | 0.0 | 0.6 | 0.2 | 0.2 | 2.2 | 0.4 | 0.0 | 0.0 | 1.2 | 1.0 |
| 0.0 | 4.0 | 1.8 | 1.0 | 4.6 | 3.8 | 1.4 | 0.4 | 2.8 | 0.2 | 0.0 | 1.2 | 3.6 | 0.8 | 0.2 | 0.4 | 0.2 | 0.6 | 0.0 | 0.2 | 1.0 | 0.4 | 1.4 |
| 0.2 | 5.6 | 1.4 | 0.4 | 2.0 | 3.0 | 1.4 | 0.8 | 1.4 | 1.0 | 0.2 | 0.6 | 5.2 | 0.2 | 0.6 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.4 | 1.4 | 1.6 |
| 0.2 | 5.8 | 2.4 | 0.0 | 2.2 | 2.4 | 1.6 | 0.4 | 2.2 | 0.2 | 0.0 | 0.8 | 2.4 | 0.4 | 0.4 | 0.2 | 0.4 | 0.6 | 0.2 | 0.2 | 0.6 | 1.2 | 0.4 |
| 0.0 | 5.8 | 1.4 | 0.0 | 2.4 | 2.8 | 1.0 | 0.2 | 1.0 | 0.2 | 0.0 | 0.6 | 2.2 | 0.0 | 1.0 | 0.0 | 0.8 | 0.8 | 0.4 | 0.2 | 0.2 | 1.0 | 0.6 |
| 0.0 | 4.4 | 1.8 | 0.6 | 4.0 | 3.6 | 1.6 | 0.8 | 2.6 | 0.2 | 0.0 | 0.8 | 2.4 | 0.2 | 0.2 | 0.2 | 0.0 | 1.2 | 0.6 | 0.0 | 0.4 | 1.0 | 0.4 |
| 0.0 | 4.4 | 1.4 | 0.6 | 2.4 | 8.4 | 1.2 | 0.6 | 1.8 | 0.2 | 0.0 | 1.2 | 2.6 | 0.4 | 0.8 | 0.6 | 0.6 | 1.0 | 0.2 | 0.0 | 0.0 | 1.2 | 0.6 |
| 0.0 | 4.8 | 1.2 | 0.2 | 3.0 | 6.0 | 1.6 | 1.0 | 2.4 | 1.0 | 0.0 | 1.2 | 3.6 | 0.4 | 0.6 | 0.6 | 0.2 | 0.8 | 0.4 | 0.2 | 0.4 | 1.4 | 0.8 |
| 0.0 | 4.0 | 1.8 | 0.2 | 3.2 | 2.0 | 1.8 | 1.8 | 2.2 | 0.6 | 0.0 | 0.4 | 2.6 | 0.2 | 0.0 | 0.2 | 0.4 | 1.0 | 0.2 | 0.4 | 0.8 | 0.6 | 1.0 |
| 0.0 | 5.6 | 1.8 | 0.0 | 2.0 | 2.6 | 1.0 | 1.0 | 1.6 | 1.8 | 0.0 | 0.8 | 2.4 | 0.2 | 0.0 | 0.0 | 0.0 | 0.8 | 0.2 | 0.6 | 0.6 | 1.0 | 1.0 |
| 0.0 | 6.0 | 1.4 | 0.6 | 3.2 | 3.2 | 2.0 | 0.6 | 3.6 | 1.0 | 0.0 | 0.6 | 3.2 | 0.4 | 1.2 | 0.2 | 0.2 | 0.6 | 0.2 | 0.6 | 1.0 | 0.8 | 1.0 |
| 0.0 | 6.0 | 2.2 | 0.8 | 2.6 | 4.6 | 0.4 | 1.0 | 3.4 | 0.4 | 0.0 | 1.0 | 2.4 | 0.4 | 0.8 | 0.4 | 0.0 | 0.6 | 0.0 | 0.4 | 0.4 | 1.2 | 1.4 |
| 0.0 | 4.8 | 1.2 | 0.2 | 2.2 | 5.4 | 1.6 | 0.4 | 1.8 | 0.4 | 0.0 | 1.0 | 3.8 | 0.2 | 0.6 | 0.0 | 0.6 | 0.4 | 0.4 | 0.4 | 0.0 | 1.2 | 0.6 |
| 0.0 | 6.6 | 2.6 | 1.0 | 3.0 | 3.2 | 1.2 | 1.0 | 2.6 | 0.2 | 0.0 | 1.2 | 2.8 | 0.2 | 0.8 | 0.2 | 0.2 | 0.8 | 0.2 | 0.2 | 0.6 | 0.8 | 0.4 |

**Supplementary Table DR2 Nannofossils from the Crow Creek Member at Locale C** *Weber Pg.3*

| *Microrhabdulus helicoideus* | *Microrhabdulus undosus* | *Micula concava* | *Micula decussata* | *Micula swastica* | *Percivalia porosa* | *Percivalia* spp. | *Pharus simulacrum* | *Prediscosphaera arkhangel* | *Prediscosphaera columnata* | *Prediscosphaera cretacea* | *Prediscosphaera grandis* | *Prediscosphaera spinosa* | *Prediscosphaera stoveri* | *Reinhardtites anthophorus* (early) | *Reinhardtites anthophorus* (late) | *Reinhardtites levis* | *Repagulum parvidentatum* | *Retacapsa crenulata* | *Rhagodiscus angustus* | *Rhagodiscus reniformis* | *Rotelappilus laffittei* | *Scapholithus fossilis* | *Seibiscutum primitivum* | *Staurolithites mielnicensis* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.6 | 2.2 | 0.2 | 0.2 | 0.2 | 0.0 | 0.2 | 2.0 | 6.0 | 0.6 | 3.4 | 0.8 | 1.2 | 0.6 | 0.4 | 0.0 | 1.0 | 0.4 | 0.0 | 0.8 | 0.0 | 0.0 | 2.0 |
| 0.0 | 0.0 | 0.4 | 1.8 | 0.0 | 0.2 | 2.0 | 0.0 | 0.6 | 1.6 | 5.4 | 1.6 | 5.2 | 0.4 | 0.8 | 0.6 | 0.4 | 0.2 | 2.6 | 1.8 | 0.2 | 1.2 | 0.0 | 0.0 | 1.4 |
| 0.0 | 0.0 | 0.0 | 1.6 | 0.0 | 0.0 | 0.6 | 0.0 | 0.6 | 1.0 | 6.6 | 0.8 | 3.2 | 0.0 | 1.2 | 0.8 | 0.4 | 0.0 | 1.0 | 1.6 | 0.0 | 1.4 | 0.0 | 0.0 | 1.4 |
| 0.6 | 0.0 | 0.2 | 2.8 | 0.0 | 0.4 | 1.2 | 0.0 | 0.6 | 0.8 | 5.6 | 1.0 | 4.2 | 0.2 | 0.8 | 0.0 | 0.4 | 0.0 | 0.8 | 1.8 | 0.2 | 0.2 | 0.0 | 0.8 | 0.8 |
| 0.4 | 0.0 | 0.0 | 3.4 | 0.0 | 0.2 | 0.8 | 0.2 | 0.2 | 2.0 | 7.0 | 0.2 | 2.8 | 0.6 | 1.0 | 0.6 | 1.4 | 0.0 | 1.4 | 1.8 | 0.8 | 1.0 | 0.0 | 0.6 | 2.0 |
| 0.4 | 0.2 | 1.0 | 2.2 | 0.0 | 0.4 | 1.6 | 0.0 | 0.4 | 3.0 | 6.4 | 1.0 | 2.8 | 0.2 | 0.8 | 0.4 | 0.6 | 0.0 | 1.4 | 1.2 | 0.6 | 1.2 | 0.2 | 0.2 | 1.8 |
| 0.4 | 0.2 | 0.0 | 2.2 | 0.0 | 0.6 | 1.0 | 0.0 | 0.8 | 2.0 | 5.4 | 0.6 | 2.8 | 0.0 | 0.2 | 0.8 | 0.8 | 0.0 | 1.8 | 1.8 | 0.4 | 1.4 | 0.2 | 0.2 | 3.0 |
| 0.4 | 0.4 | 0.2 | 2.0 | 0.0 | 0.4 | 1.4 | 0.2 | 0.2 | 2.4 | 7.0 | 0.6 | 3.6 | 0.2 | 0.8 | 0.2 | 0.4 | 0.0 | 1.0 | 1.8 | 0.4 | 0.8 | 0.4 | 0.0 | 1.2 |
| 0.6 | 0.6 | 0.0 | 3.0 | 0.0 | 0.2 | 1.0 | 0.0 | 0.2 | 2.6 | 7.4 | 1.6 | 4.4 | 0.6 | 0.2 | 0.2 | 0.0 | 0.0 | 1.8 | 0.0 | 0.8 | 0.4 | 0.0 | 0.0 | 1.2 |
| 0.6 | 1.2 | 0.0 | 2.0 | 0.0 | 0.0 | 1.0 | 0.2 | 0.2 | 2.8 | 5.8 | 1.6 | 3.0 | 1.0 | 0.4 | 0.8 | 0.4 | 0.0 | 1.0 | 2.0 | 1.0 | 1.0 | 0.0 | 0.2 | 1.4 |
| 0.6 | 0.8 | 0.0 | 1.2 | 0.0 | 0.2 | 0.8 | 0.2 | 0.2 | 2.4 | 7.4 | 0.6 | 4.4 | 0.4 | 1.0 | 1.2 | 0.0 | 0.0 | 1.8 | 1.0 | 1.2 | 1.2 | 0.2 | 0.0 | 0.6 |
| 1.4 | 1.2 | 0.2 | 1.0 | 0.0 | 0.0 | 0.8 | 0.6 | 0.2 | 3.0 | 6.2 | 1.6 | 2.0 | 0.2 | 0.6 | 0.8 | 0.2 | 0.0 | 1.0 | 1.2 | 0.0 | 0.4 | 0.2 | 0.0 | 1.8 |
| 0.6 | 1.2 | 0.8 | 1.8 | 0.2 | 0.0 | 0.4 | 0.4 | 0.2 | 2.8 | 5.4 | 0.8 | 2.0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.0 | 1.0 | 0.8 | 1.0 | 0.6 | 0.2 | 0.2 | 2.4 |
| 0.2 | 0.8 | 0.8 | 2.0 | 0.0 | 0.4 | 0.0 | 0.2 | 0.2 | 1.8 | 7.0 | 2.0 | 3.6 | 0.2 | 0.8 | 0.6 | 0.6 | 0.0 | 2.0 | 0.6 | 0.8 | 0.8 | 0.2 | 0.0 | 1.4 |
| 0.8 | 0.8 | 0.4 | 2.0 | 0.0 | 0.0 | 0.6 | 0.4 | 0.2 | 1.8 | 6.4 | 2.2 | 5.2 | 0.6 | 0.6 | 0.6 | 0.6 | 0.0 | 1.6 | 0.6 | 0.6 | 0.0 | 0.0 | 0.4 | 2.2 |
| 0.2 | 0.8 | 0.6 | 2.0 | 0.0 | 0.2 | 0.8 | 0.0 | 0.2 | 3.2 | 6.8 | 1.0 | 4.2 | 0.2 | 0.4 | 0.4 | 0.2 | 0.0 | 2.4 | 1.0 | 0.0 | 0.6 | 0.0 | 0.2 | 0.8 |
| 1.2 | 0.2 | 0.2 | 2.6 | 0.0 | 0.0 | 0.4 | 0.2 | 0.2 | 3.6 | 6.2 | 1.2 | 3.8 | 0.0 | 0.4 | 0.2 | 0.2 | 0.0 | 2.0 | 1.2 | 0.2 | 0.8 | 0.6 | 0.0 | 1.0 |
| 0.6 | 1.2 | 0.6 | 2.2 | 0.0 | 0.4 | 0.0 | 0.2 | 1.0 | 3.4 | 7.8 | 1.4 | 3.4 | 0.0 | 1.0 | 0.6 | 0.0 | 0.0 | 1.8 | 0.6 | 0.4 | 0.8 | 0.6 | 0.2 | 1.2 |
| 0.8 | 0.8 | 0.8 | 2.0 | 0.0 | 0.2 | 0.6 | 0.0 | 0.8 | 2.4 | 5.0 | 1.0 | 2.6 | 0.4 | 0.2 | 0.6 | 0.4 | 0.0 | 2.4 | 1.4 | 0.6 | 0.4 | 0.6 | 0.2 | 2.0 |

**Supplementary Table DR2 Nannofossils from the Crow Creek Member at Locale C**



| *Tranolithus exiguus* | *Tranolithus gabalus* | *Tranolithus manifestus* | *Tranolithus phacelosus* | *Uniplanarius gothicus* | *Uniplanarius sissinghii* | *Uniplanarius trifidus* | *Watznaueria barnesae* | *Watznaueria biporta* | *Watznaueria quadriradiata* | *Zeugrhabdotus bicrescenticus* | *Zeugrhabdotus diplogrammus* | *Zeugrhabdotus erectus* | *Zeugrhabdotus* spp. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.6 | 0.2 | 1.0 | 1.8 | 0.0 | 0.2 | 0.0 | 11.2 | 0.6 | 0.0 | 0.6 | 0.4 | 0.6 | 1.2 |
| 3.0 | 1.2 | 0.4 | 2.0 | 0.0 | 0.2 | 0.0 | 8.4 | 0.8 | 0.0 | 0.6 | 0.4 | 0.4 | 3.0 |
| 1.2 | 1.4 | 0.8 | 1.8 | 0.4 | 0.0 | 0.0 | 9.4 | 0.2 | 0.6 | 0.2 | 0.8 | 0.0 | 4.6 |
| 1.0 | 0.8 | 0.2 | 2.0 | 0.0 | 0.0 | 0.0 | 11.2 | 0.0 | 0.2 | 1.6 | 0.8 | 1.8 | 1.4 |
| 1.0 | 0.4 | 0.2 | 1.6 | 0.0 | 0.2 | 0.0 | 11.0 | 0.0 | 0.2 | 1.0 | 0.6 | 2.2 | 1.2 |
| 1.4 | 1.0 | 0.2 | 2.0 | 0.2 | 0.0 | 0.0 | 11.6 | 0.2 | 0.2 | 0.2 | 0.4 | 0.4 | 0.8 |
| 2.2 | 0.2 | 0.6 | 1.4 | 0.0 | 0.0 | 0.2 | 10.6 | 0.0 | 0.6 | 0.8 | 1.0 | 1.4 | 0.6 |
| 2.0 | 0.2 | 0.8 | 1.6 | 0.2 | 0.2 | 0.2 | 9.4 | 0.4 | 1.0 | 0.4 | 1.0 | 3.0 | 0.4 |
| 1.0 | 1.4 | 0.0 | 3.2 | 0.2 | 0.0 | 0.0 | 8.8 | 0.0 | 1.4 | 1.0 | 1.0 | 1.8 | 2.8 |
| 1.8 | 0.8 | 1.4 | 2.2 | 0.0 | 0.0 | 0.0 | 8.8 | 0.4 | 0.2 | 0.2 | 0.6 | 4.4 | 2.6 |
| 3.2 | 0.4 | 1.2 | 2.4 | 0.0 | 0.0 | 0.0 | 9.0 | 0.0 | 0.2 | 0.6 | 0.4 | 3.0 | 2.0 |
| 2.6 | 0.2 | 0.6 | 2.6 | 0.2 | 0.0 | 0.0 | 7.8 | 0.2 | 0.4 | 0.2 | 0.6 | 3.0 | 2.4 |
| 2.6 | 0.4 | 0.8 | 3.0 | 0.0 | 0.0 | 0.4 | 8.2 | 0.2 | 0.6 | 0.4 | 1.2 | 3.2 | 2.0 |
| 2.0 | 0.6 | 0.2 | 2.6 | 0.0 | 0.2 | 0.2 | 13.0 | 0.2 | 1.0 | 0.2 | 0.6 | 1.6 | 0.6 |
| 3.0 | 0.4 | 0.8 | 2.6 | 0.0 | 0.0 | 0.2 | 7.6 | 0.2 | 0.6 | 0.4 | 0.6 | 2.0 | 0.4 |
| 3.4 | 0.8 | 1.0 | 3.0 | 0.0 | 0.0 | 0.2 | 8.8 | 0.4 | 0.2 | 0.2 | 0.4 | 2.2 | 0.6 |
| 2.2 | 0.4 | 0.4 | 1.8 | 0.0 | 0.0 | 0.0 | 8.0 | 0.0 | 0.4 | 0.6 | 0.6 | 2.8 | 1.6 |
| 3.4 | 0.4 | 1.0 | 2.0 | 0.0 | 0.2 | 0.0 | 6.8 | 0.2 | 0.2 | 0.4 | 0.8 | 3.2 | 1.8 |
| 3.8 | 0.4 | 1.6 | 1.6 | 0.0 | 0.2 | 0.0 | 6.8 | 0.2 | 0.0 | 0.2 | 0.6 | 5.6 | 2.2 |