Name: Date:

**Stratigraphic Evidence For The Cretaceous Western Interior Seaway**

Goals: During this lab you will learn how to interpret evidence from geologic maps and use it to reconstruct a feature from Earth’s geologic past.

The Western Interior Seaway covered what is now the American Great Plains during most of the Cretaceous Period, from 113-66 Ma. **But how do we know?** Using geologic maps, we can infer which states contain sedimentary units from the Western Interior Seaway, and we can even approximate the boundaries of the seaway, which is what you’ll be doing today.

To Do:

<https://ngmdb.usgs.gov/mapview/>

The link above goes to comprehensive USGS map of the United States. Your job is to mark two approximate coastline boundaries of the Western Interior Seaway on the map below. One set of boundaries will be for during the Maastrichtian (the last stage of the Cretaceous) and one for the Cenomanian (an earlier stage). Here are some things to keep in mind; What letter symbolizes the Cretaceous? Are all Cretaceous deposits from the Western Interior Seaway? How can you tell terrestrial deposits from marine ones? **Surficial units typically continue in the subsurface! (check out this link for an example of a good cross-section displaying this:** <https://ngmdb.usgs.gov/ngm-bin/pdp/zui_viewer.pl?id=13055>)Don’t be afraid to ask for help on determining the depositional environment of a formation.

The table on the next page contains the names of all formations known to be associated with the Western Interior Seaway. If you are unsure about if a unit on the map is associated, try to find it within the table.

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| --- | --- | --- | --- | --- | --- |
| **Formation** | **Age** | **Formation** | **Age** | **Formation** | **Age** |
| Corsicana | Maastrichtian | Brownstone | Santonian/Campanian | Eagle Mountain SS | Cenomanian |
| Escondido | Maastrichtian | Eagle | Santonian/Campanian | Woodbine | Cenomanian |
| Fox Hills SS | Maastrichtian | Everts | Santonian/Campanian | Dakota SS | Albian/Cenomanian |
| Hell Creek | Maastrichtian | Point Lookout | Santonian/Campanian | Mowry Sh | Albian/Cenomanian |
| Kemp Clay | Maastrichtian | Telegraph Creek | Santonian/Campanian | Purgatoire | Albian/Cenomanian |
| Olmos | Maastrichtian | Virgelle | Santonian/Campanian | Washita Grp | Albian/Cenomanian |
| Trinidad | Maastrichtian | Blossom SS | Santonian | Caddo | Albian |
| Vermejo | Maastrichtian | Austin Sh | Coniacian/Campanian | Edwards Lmst | Albian |
| Aguja | Campanian/Maastrichtian | Bacon Ridge SS | Coniacian/Campanian | Fredricksburg Grp | Albian |
| Bearpaw Sh | Campanian/Maastrichtian | Cody Sh | Coniacian/Campanian | Kiamichi | Albian |
| Horsethief | Campanian/Maastrichtian | Niobrara Sh | Coniacian/Campanian | Newcastle SS | Albian |
| Lennep | Campanian/Maastrichtian | Pen | Coniacian/Campanian | Skull Creek Sh | Albian |
| Lewis Sh | Campanian/Maastrichtian | Blind Bull | Coniacian/Santonian | Thermopolis Sh | Albian |
| Mesaverde | Campanian/Maastrichtian | Bonham | Coniacian/Santonian | Weno | Albian |
| Nacatoch SS | Campanian/Maastrichtian | Hillard Sh | Coniacian/Santonian |  |  |
| Navarro Grp | Campanian/Maastrichtian | Tokio | Coniacian | SS = Sandstone  | Sh = Shale |
| Pictured Cliffs | Campanian/Maastrichtian | Baxter Sh | Turonian/Campanian | Grp = Group | Lmst = Limestone |
| Pierre Sh | Campanian/Maastrichtian | Henefer | Turonian/Campanian |  |  |
| San Miguel | Campanian/Maastrichtian | Straight Cliffs | Turonian/Campanian |  |  |
| Anacacho Lmst | Campanian | Gallup SS | Turonian/Coniacian |  |  |
| Blair | Campanian | Atarque SS | Turonian |  |  |
| Castlegate | Campanian | Moreno Hill | Turonian |  |  |
| Claggett | Campanian | Tres Hermanos | Turonian |  |  |
| Cliff House | Campanian | Colorado Grp | Cenomanian/Campanian |  |  |
| Elk Basin SS | Campanian | Mancos | Cenomanian/Campanian |  |  |
| Gober Sh | Campanian | Ojinaga | Cenomanian/Campanian |  |  |
| Iles | Campanian | Marias River Sh | Cenomanian/Santonian |  |  |
| Marlbrook | Campanian | Benton Grp | Cenomanian/Turonian |  |  |
| Menefee | Campanian | Boquillas | Cenomanian/Turonian |  |  |
| Mount Garfield | Campanian | Carlile Sh | Cenomanian/Turonian |  |  |
| Ozan | Campanian | Eagle Ford | Cenomanian/Turonian |  |  |
| Pecan Gap | Campanian | Frontier | Cenomanian/Turonian |  |  |
| Roxton Lmst | Campanian | Graneros Sh | Cenomanian/Turonian |  |  |
| Sego SS | Campanian | Greenhorn | Cenomanian/Turonian |  |  |
| Sprinkle | Campanian | Tropic Sh | Cenomanian/Turonian |  |  |
| Talyor Grp | Campanian | Belle Fourche | Cenomanian |  |  |
| Wolfe City | Campanian | Buda Lmst | Cenomanian |  |  |
| Montana Grp | Santonian/Maastrichtian | Del Rio Clay | Cenomanian |  |  |



Reflection: Now that you’ve made your composite map, it’s time to reflect on how you did in drawing your boundaries on the state maps.

* South Dakota’s surficial units from the Cretaceous stop at the Missouri River. Did the Western Interior Seaway stop there as well? What evidence might support your answer?
* Some states were once completely covered in sediment from the Cretaceous. Which states? What events might have happened since the Cretaceous that might have removed (or covered) some of this material?
* Look back at the online map. Find the Nebraska/Kansas border around the 101̊ and 102̊ longitude lines (on their western side). Do the formations match up perfectly between the maps? What is the Nebraska map missing that the Kansas map has? How might this affect the boundaries you drew?
* Below is a section of a map from a renowned paleomap maker, Dr. Ron Blakey. This map is his projection of the Western Interior Seaway 75 Ma during the Cenomanian (between the two stages you drew). What kinds of geological evidence might have led Dr. Blakey to place a coastline where he did on this map?

