

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?

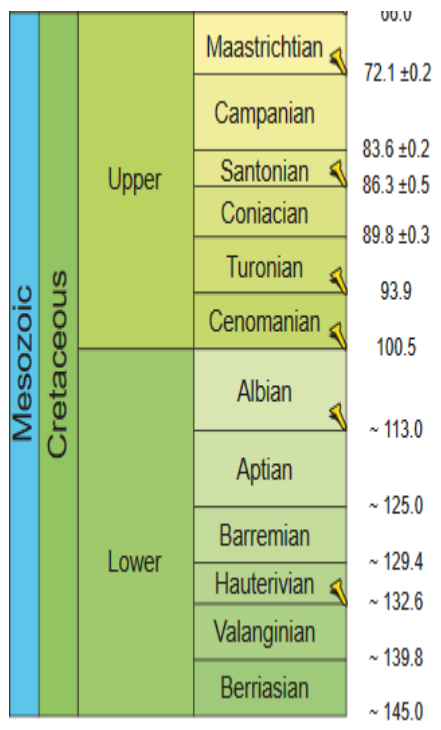
How can you tell terrestrial deposits from marine ones? **Surficial units typically continue in the subsurface!** (check out this link for an example of a good cross-section displaying this:

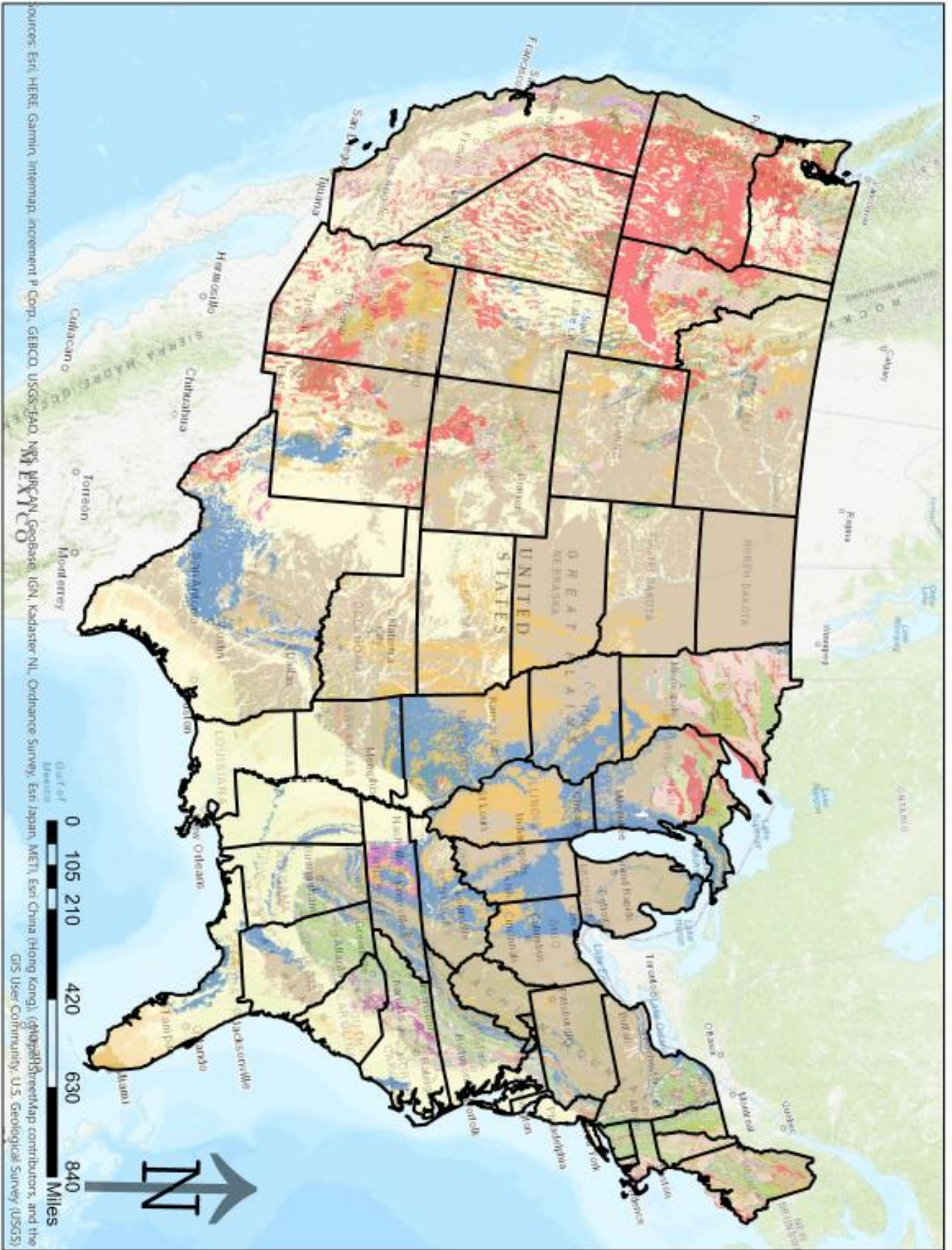
https://ngmdb.usgs.gov/ngm-bin/pdp/zui_viewer.pl?id=13055) Don't be afraid to ask for help on determining the depositional environment of a formation.

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.

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
Lenep	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		
Pictured Cliffs	Campanian/Maastrichtian	Baxter Sh	Turonian/Campanian		
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		

SS = Sandstone Sh = Shale
 Grp = Group Lmst = Limestone





Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NGA, NRC, NRCAN, Geobase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, Swisstopo contributors, and the GIS User Community, U.S. Geological Survey (USGS)

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 101° and 102° 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?

