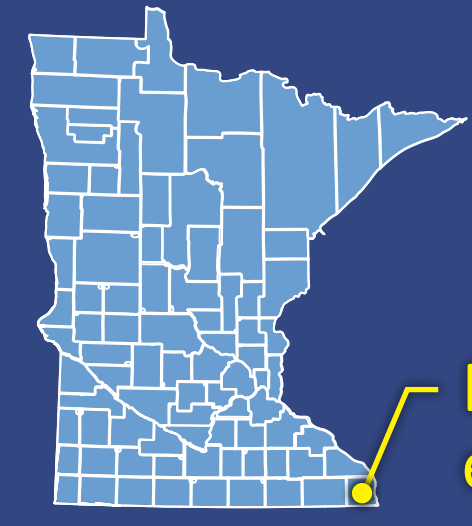
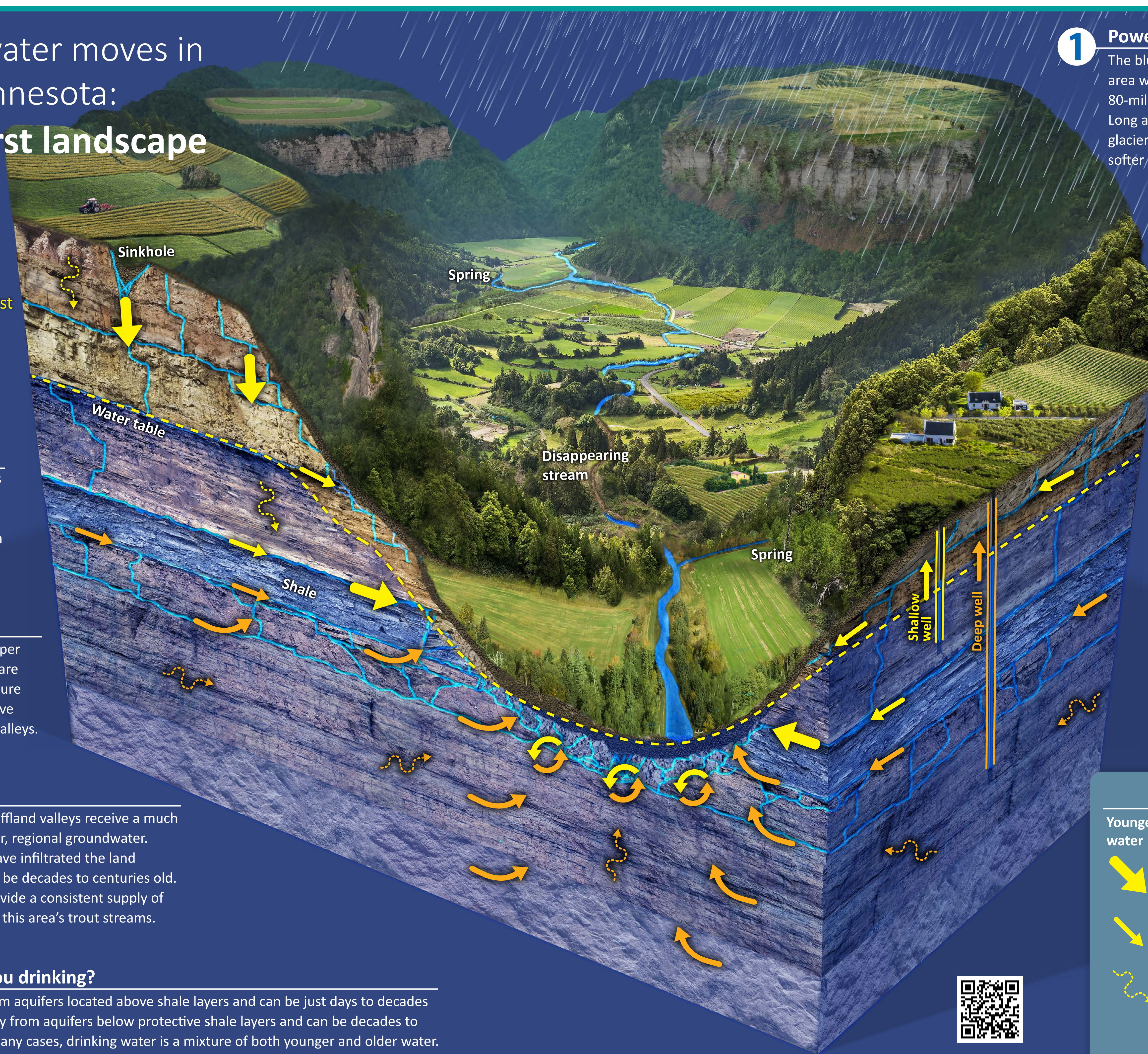


# How groundwater moves in southeast Minnesota: Bluffland karst landscape



Bluffland karst example



**1 Powerful meltwater**  
The bluffland karst landscape is the scenic area where the Root River completes its 80-mile course to the Mississippi River. Long ago, powerful meltwater from distant glaciers carved large valleys and bluffs in the softer sandstone and shale bedrock layers.

**2 Areas of rapid flow**  
Groundwater movement in the uppermost bedrock layers and near the fractured valley edges can be very fast.

**3 Disappearing stream**  
In some locations, streams can disappear underground in the shale and sandstone layers, and then reappear downstream or in a completely different valley.

**4 Shale barrier**  
Shale layers act as barriers and cause groundwater to move sideways, where it flows to the surface within the valleys.

**5 Under pressure**  
Below the shale layer, deeper sandstone bedrock layers are under pressure. This pressure forces groundwater to move upwards and toward the valleys.

**6 Old water mixing**  
Streams and springs in bluffland valleys receive a much greater proportion of older, regional groundwater. Some of this water may have infiltrated the land surface from far away and be decades to centuries old. These deeper aquifers provide a consistent supply of water that is distinctive to this area's trout streams.

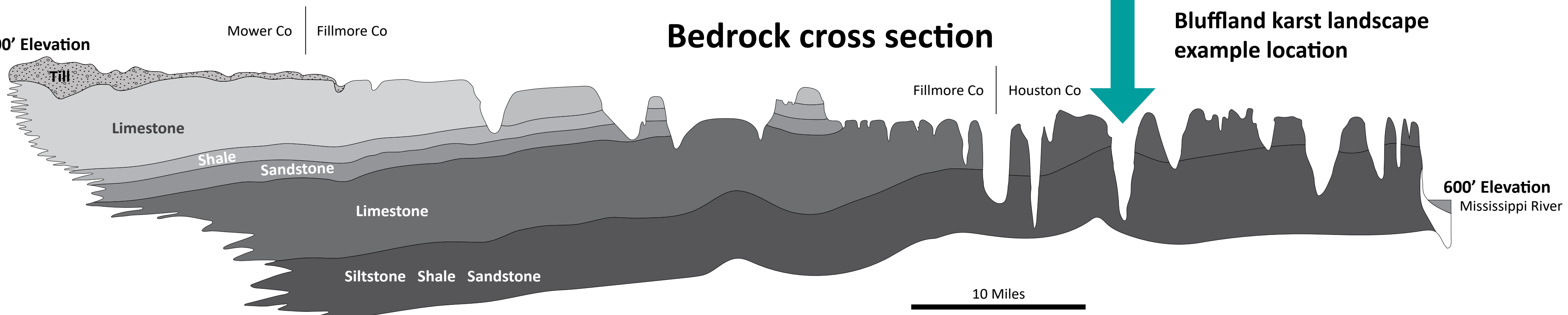
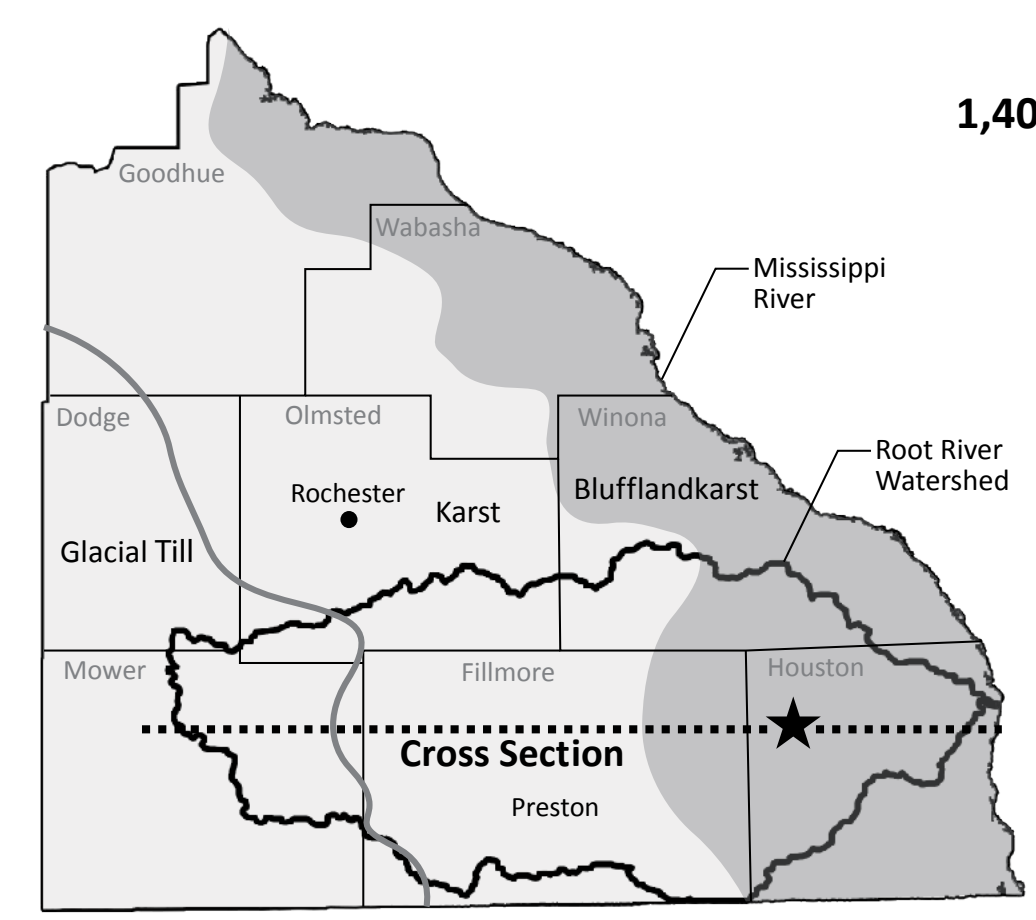
**7 What decade are you drinking?**  
Younger water is often from aquifers located above shale layers and can be just days to decades old. Older water is typically from aquifers below protective shale layers and can be decades to several centuries old. In many cases, drinking water is a mixture of both younger and older water.

**Legend**

Younger water	Older water	
		Fast movement of water
		Moderate movement of water
		Slow movement of water
		Mixing of younger and older water



Watch the Video!



**Root River Field to Stream Partnership**

Minnesota Department of Agriculture  
Minnesota Agricultural Water Resource Center  
The Nature Conservancy

Mower SWCD  
Fillmore SWCD  
Root River SWCD

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