

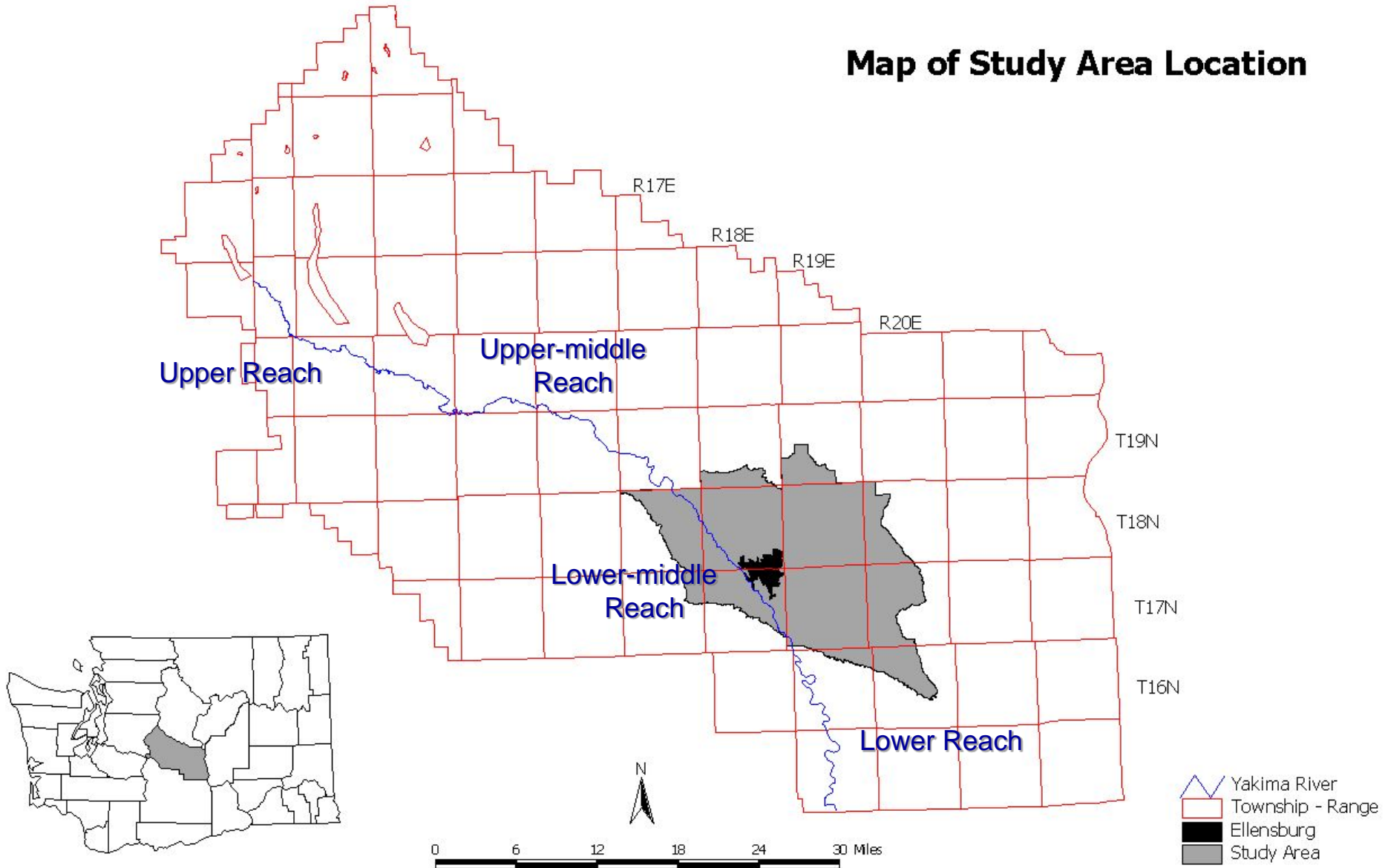
An underwater photograph of a riverbed. The water is clear, and sunlight filters through from the surface, creating shimmering patterns and bright spots on the rocky bottom. The rocks are of various sizes and shapes, some smooth and some more angular. The overall color palette is dominated by blues, greens, and browns, with the light creating a sense of depth and movement.

Surveying for Freshwater Mussels in the Yakima River

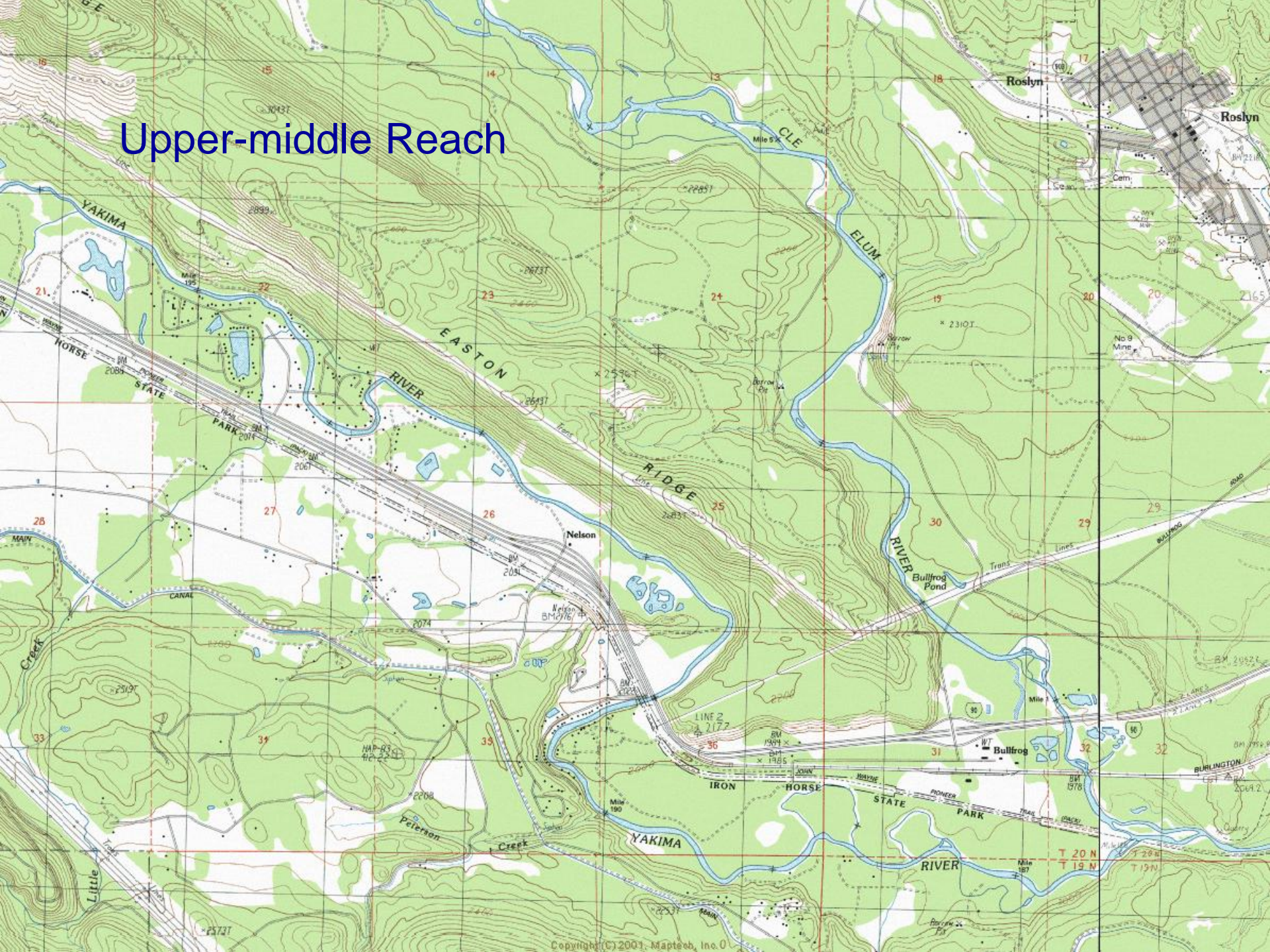
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Central Washington University

Upper Yakima River

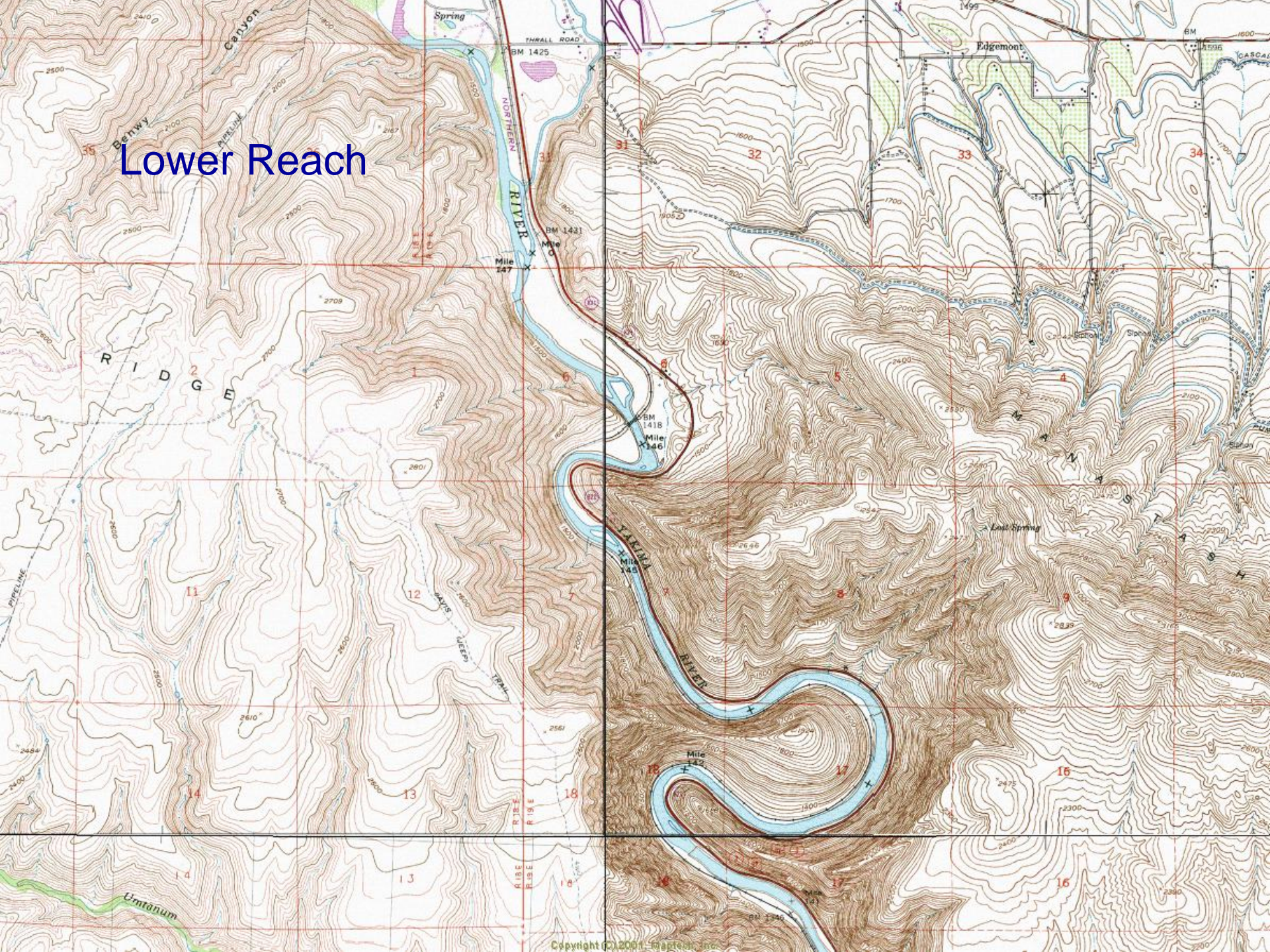
Map of Study Area Location



Upper-middle Reach



Lower Reach



Species of Interest

- ◆ Western Pearlshell (*Margaritifera falcata*)
 - ◆ cold, clear streams/ivers
 - ◆ Western Ridged (*Gonidea angulata*)
 - ◆ cold, clear streams/ivers
 - ◆ Floater (*Anodonta spp.*)
 - ◆ lentic environments (lakes, low-gradient)
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Importance

- ◆ water quality
- ◆ food webs
- ◆ relationship with salmonids
- ◆ bio-indicators/bio-monitors
- ◆ cultural significance

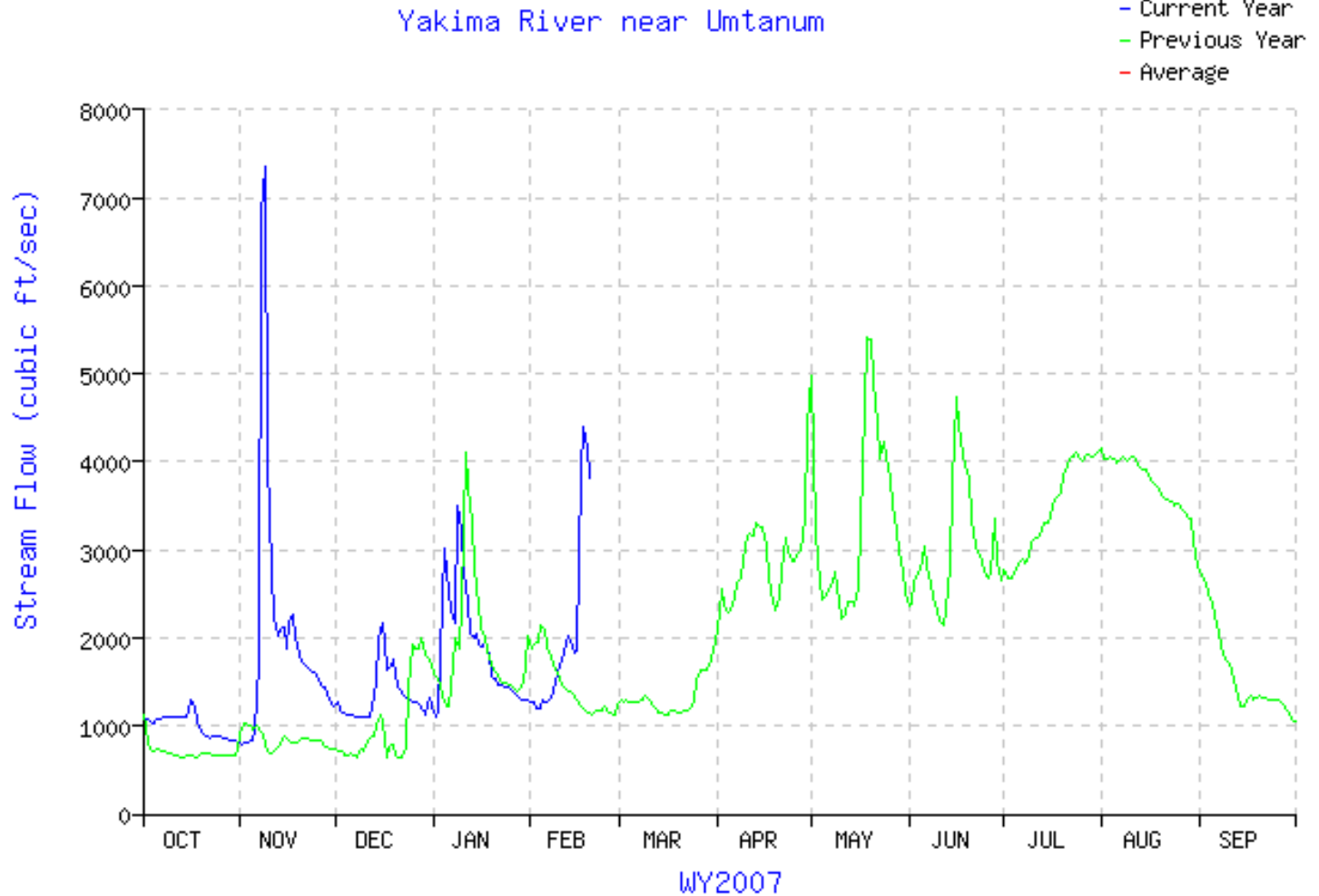
Surveying . . . or rather, Problems with....

- ◆ flow regulation
- ◆ abrupt flow changes
- ◆ cryptic?
- ◆ cold temperatures
- ◆ river access

◆ Flow regulation

◆ flip-flop

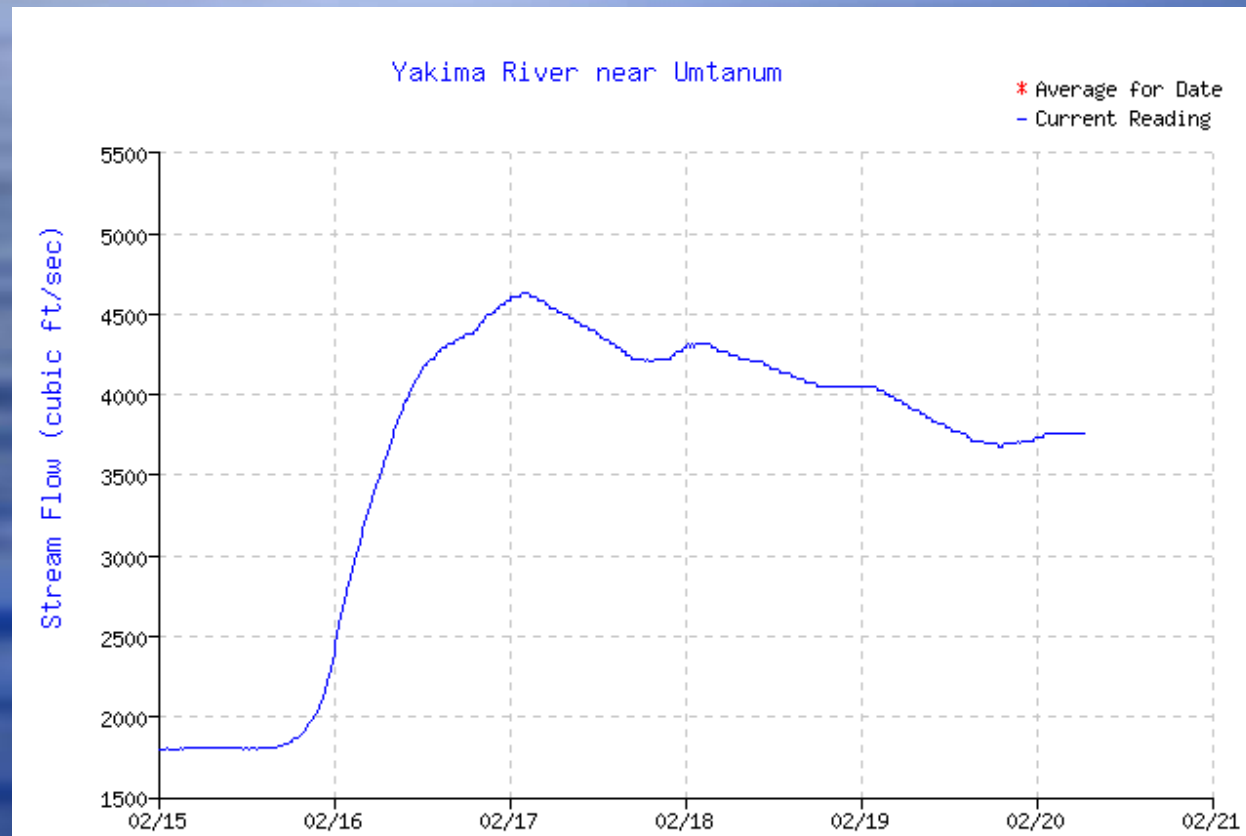
- 1000-1500 cfs optimal



◆ Abrupt flow changes

- ◆ warm spells
- ◆ rain
- ◆ rain-on-snow events
 - ◆ safety concerns
 - ◆ turbidity

• 300-500 cfs









- ◆ Cold weather
 - ◆ safety
 - ◆ air temp.
 - ◆ water temp.
 - ◆ bank ice
 - ◆ ice floes
 - ◆ anchor ice
 - ◆ survey time





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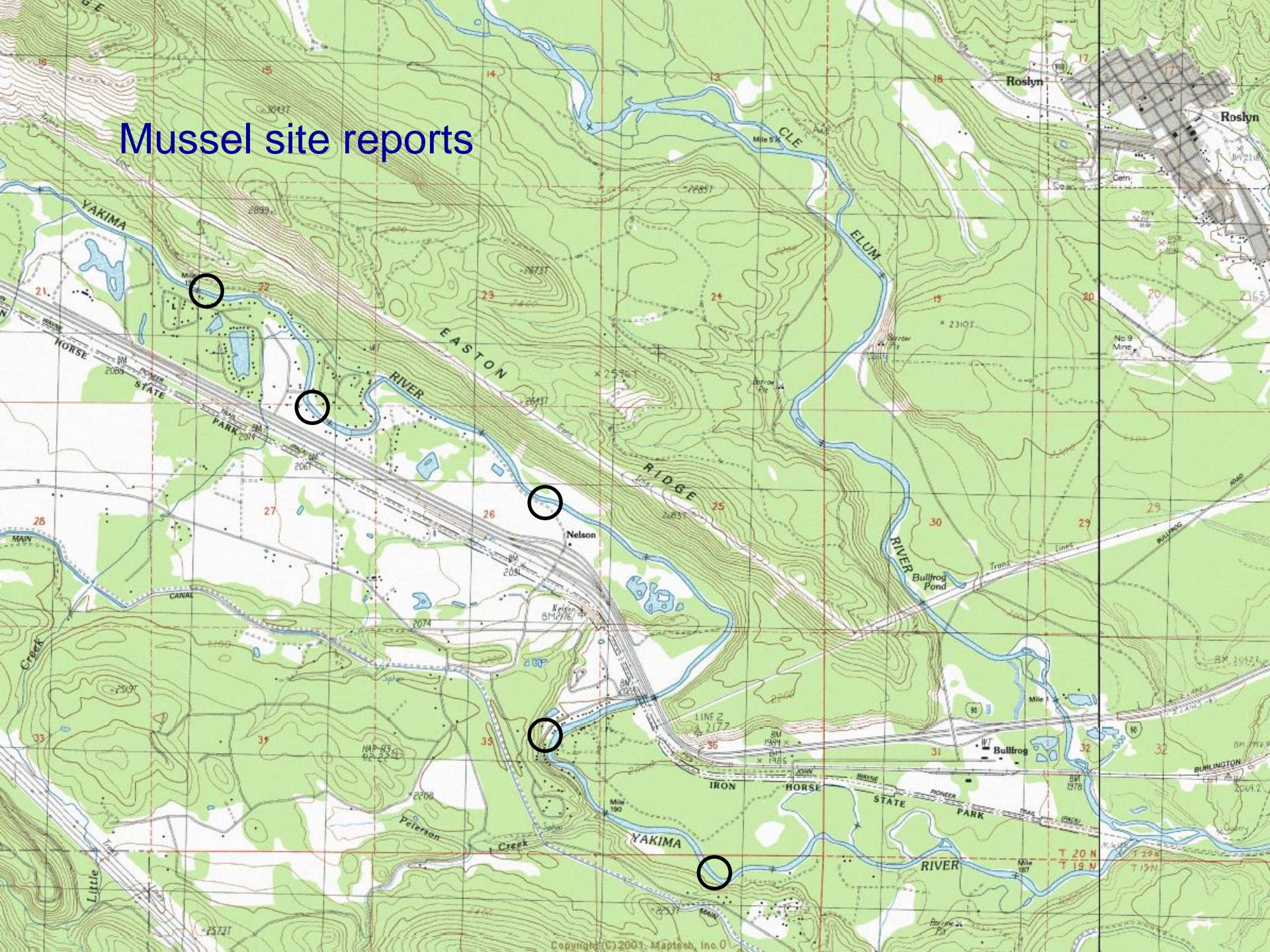
- ◆ River Access
 - ◆ private property issues
 - ◆ limited public access
 - ◆ distance to survey sites



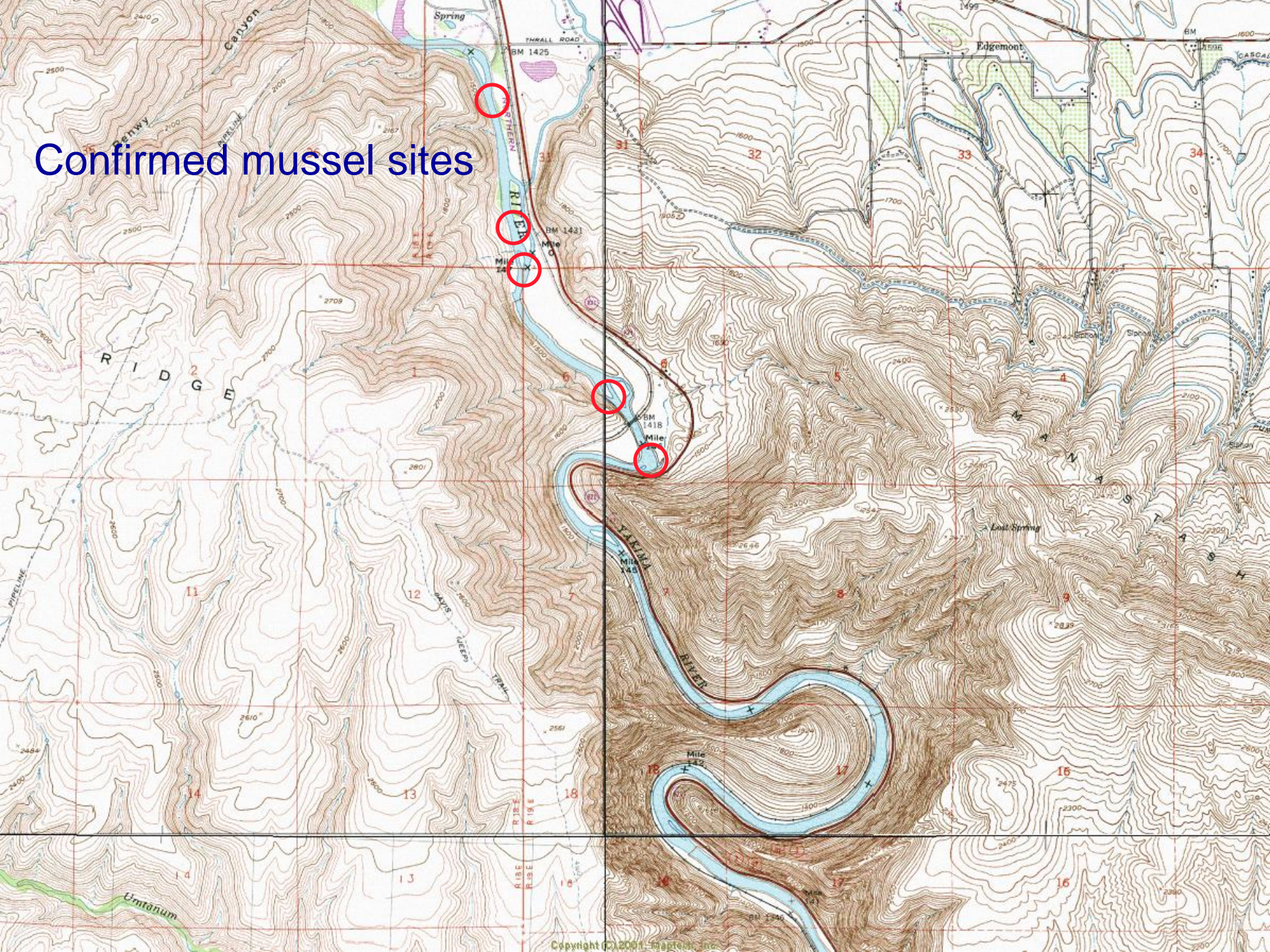
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- ◆ Increasing initial survey efficiency
 - ◆ fly-fishing guides
 - ◆ WDFW fisheries biologists
 - ◆ Yakama Nation fisheries biologists

Mussel site reports



Confirmed mussel sites





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