

Comparison of Unconsolidated Deposits
on Areas of Anomalous Altitude and
Flatness in and around the Wind River
Basin, Fremont Co, WY

Cheryl Veggian
with Suzanne M. Smaglik
Central Wyoming College, Riverton, Wyoming

A Brief History of the Wind River Basin

Era	Period	Epoch (Cenozoic only)	Age (Millions of years)	Major Biological & Geologic Events
CENOZOIC	Quaternary	Holocene (Recent)	01	Ice Age begins and evolution of modern mammals; man reaches N.A.; general uplift of continent.
		Pleistocene	3	
	Tertiary	Pliocene	5.5	
		Miocene	25.5	
		Oligocene	36	
Cretaceous	Eocene	54	Evolution and Development of major mammal groups; Cascade Orogeny in northwestern United States; in latest Cenozoic, Eocene lake system.	
	Paleocene	65		
		130		
MESOZOIC	Jurassic		185	Extinction of dinosaurs; flowering plants flourish; height of Cordilleran Orogeny.
	Triassic		230	
			265	
PALEOZOIC	Permian		265	First birds, dinosaurs and mammals continue to evolve; beginning of Cordilleran Orogeny which formed the Rocky Mountains.
	Pennsylvanian		310	
	Mississippian		355	
	Devonian		413	
	Silurian		425	
	Ordovician		475	
	Cambrian		600	

Epochs for these periods are not definitely established

Precambrian time began 5 billion years ago.

- ▶ Precambrian (basement)
- ▶ Paleozoic and Mesozoic
 - ▶ Sedimentary layer deposition
- ▶ Laramide Orogeny
 - ▶ 80–40 Ma
- ▶ Cenozoic Basin Filling
 - ▶ Followed by Basin excavation
- ▶ Pleistocene Glaciations
 - ▶ Sacajawea Ridge (600 ka)
 - ▶ Bull Lake (300–70 ka)
 - ▶ Pinedale (50 ka)

Location



Background

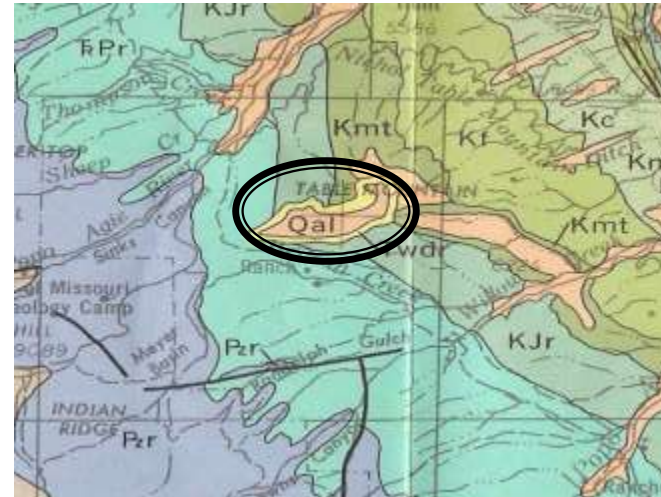
- ▶ Table Mountain's Geologic Setting
 - Extensive erosional remnant of a full basin
 - Capped with enormous granitic boulders
 - Extends beyond previously identified glacial extent
- ▶ Correlating Landforms
 - Red Butte – most comparable
 - Beaver Rim – not very comparable
- ▶ Implications of surface morphology

Age Determination

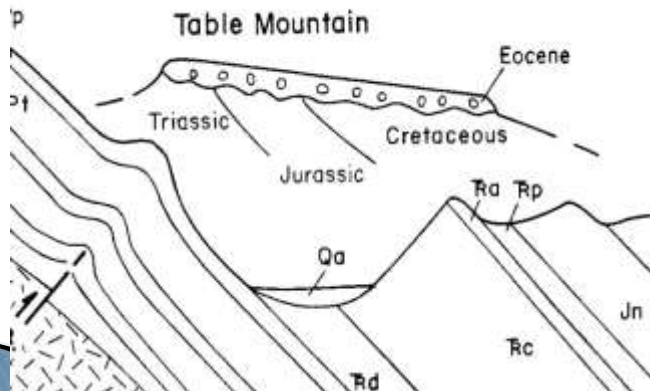
- How old is the surface of Table Mountain?



Love & Christiansen, 1985



Whitcomb & Lowry, 1968



Mears, et al., 1986

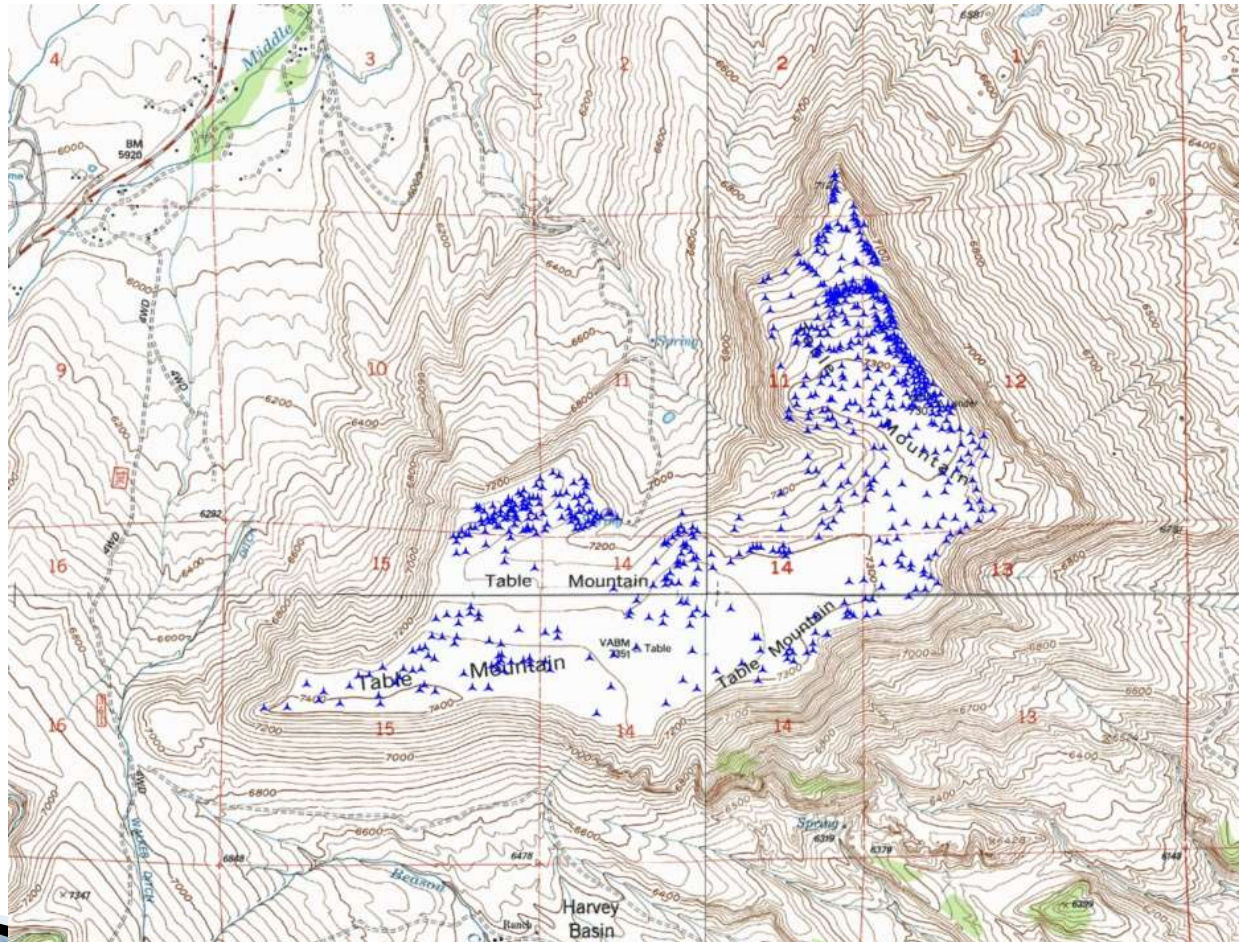
Be¹⁰ Exposure Ages of Boulders:
785–135 Ka, Dahms, et al., 2004.

Surface Boulders

- ▶ Large Size
 - Up to 3m³
- ▶ Faceting
- ▶ Glacial Polish
- ▶ Composition
 - Medium grained leucocratic granite



Boulder Distribution



Harvey, 2007

Surface Images of Table Mountain



Extensive boulder field on NE slope

Western side, boulders present,
but not exposed





Red Butte



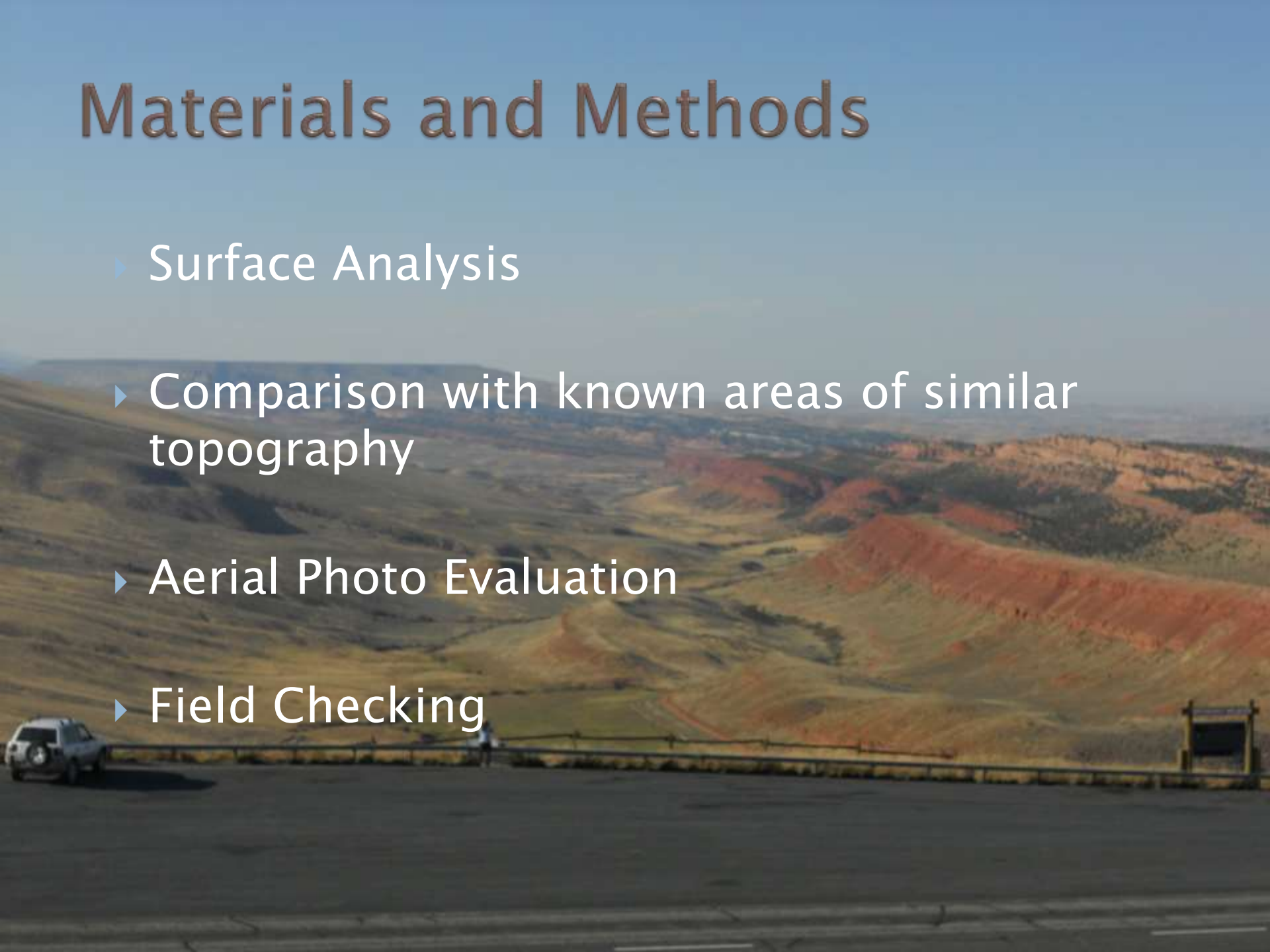
Glacial polish on faceted boulders

Glacial terraces, Red Butte
seen in background

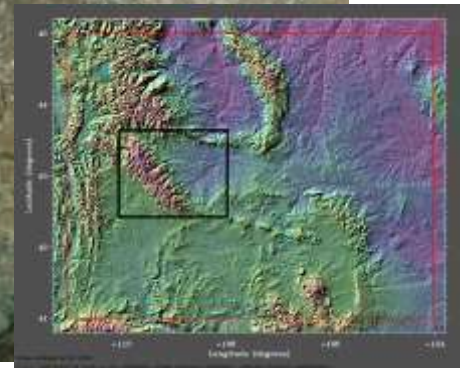
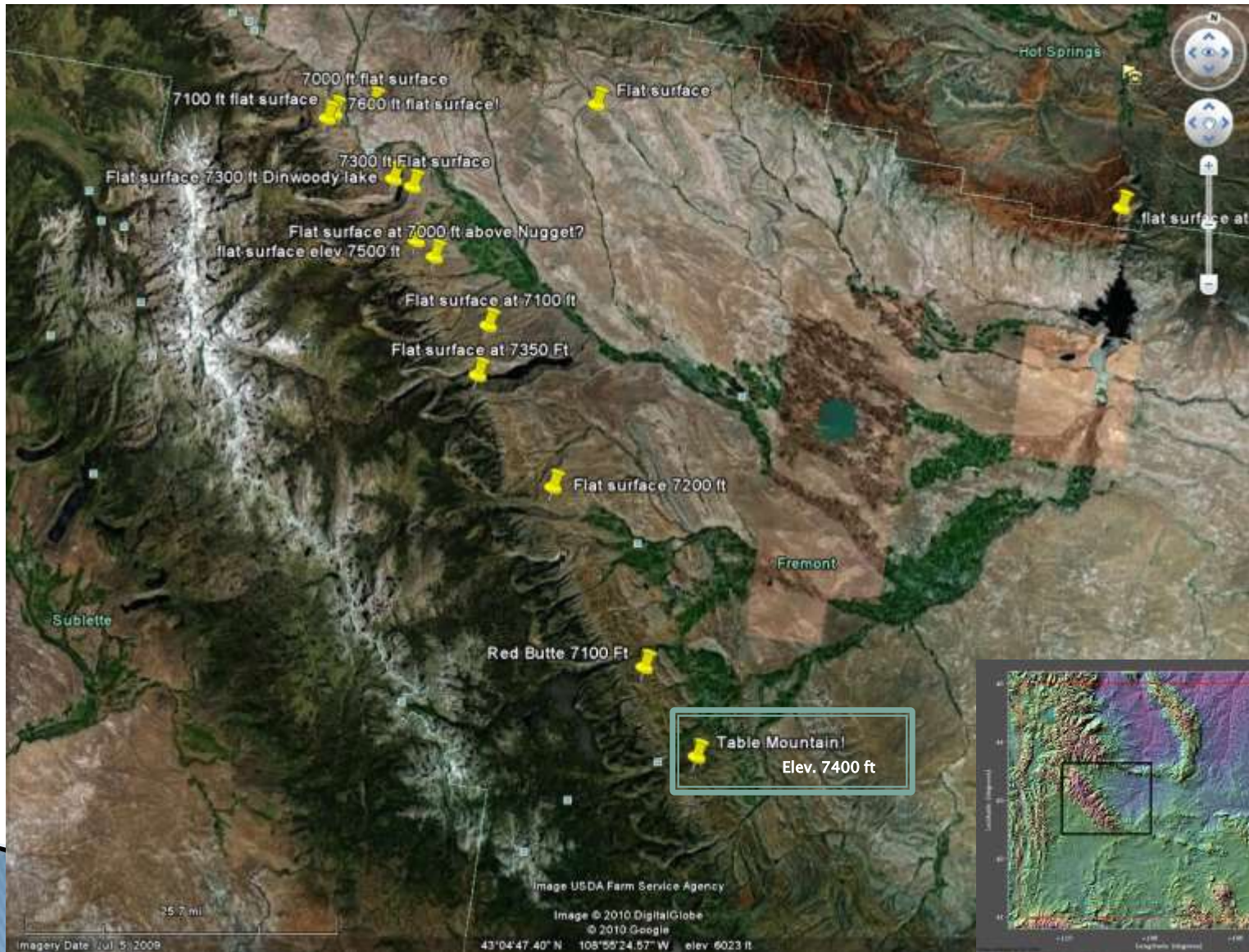


Materials and Methods

- ▶ Surface Analysis
- ▶ Comparison with known areas of similar topography
- ▶ Aerial Photo Evaluation
- ▶ Field Checking



Basin Overview



Results

- ▶ Boulder source
 - Bear's Ears Pluton
- ▶ Glacial History
 - Boulder characteristics
 - Pre-canyon Glaciation (pre-Sacajawea Ridge; <600Ka)
 - Elevation 7400 ft

Future Work

- ▶ Continued Basin Exploration and Evaluation
 - Anomalous flat surfaces
- ▶ Cosmogenic Dating of Boulders
 - Surface exposure dating technique
 - Measures isotope concentrations
- ▶ Collaboration with other researchers
 - Southern and Central Wind River Mountains

References

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