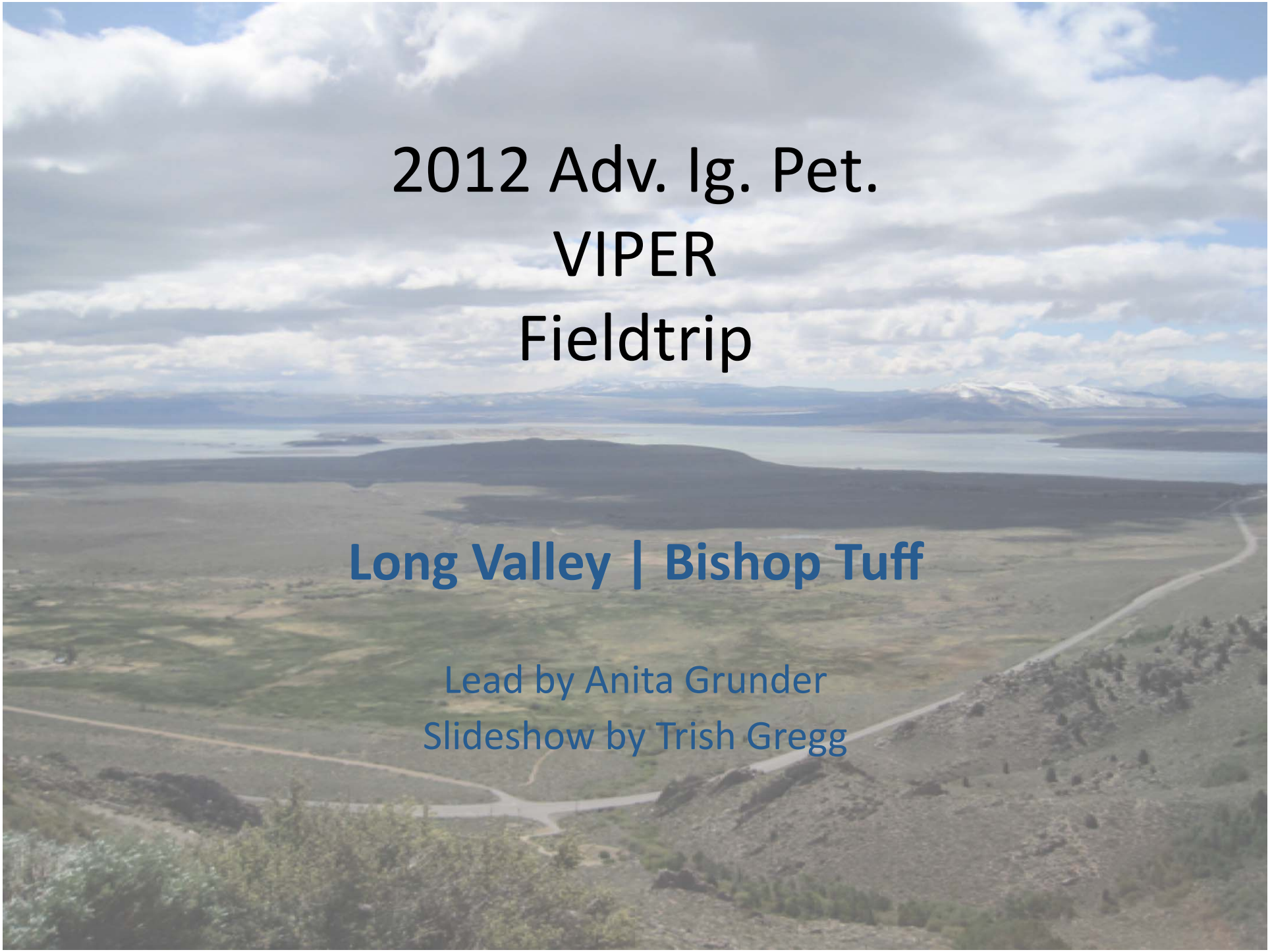
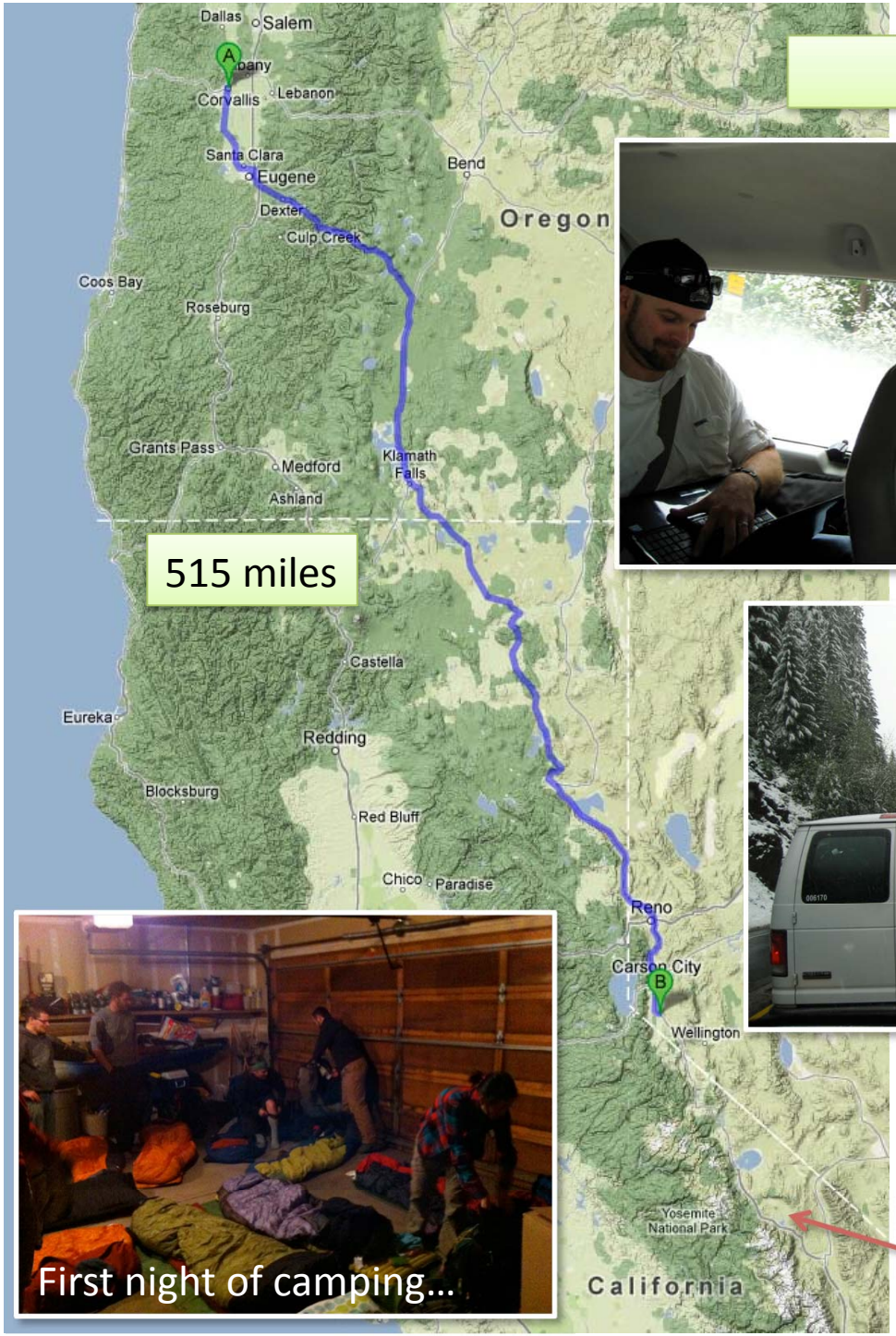


2012 Adv. Ig. Pet.
VIPER
Fieldtrip

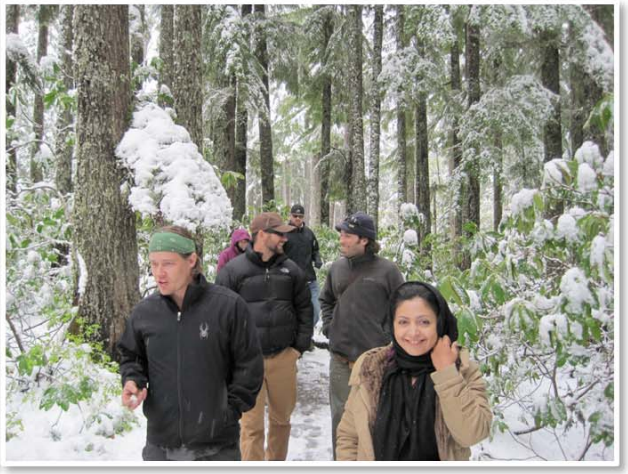
Long Valley | Bishop Tuff

Lead by Anita Grunder
Slideshow by Trish Gregg

Drive to Gardenville, NV



515 miles

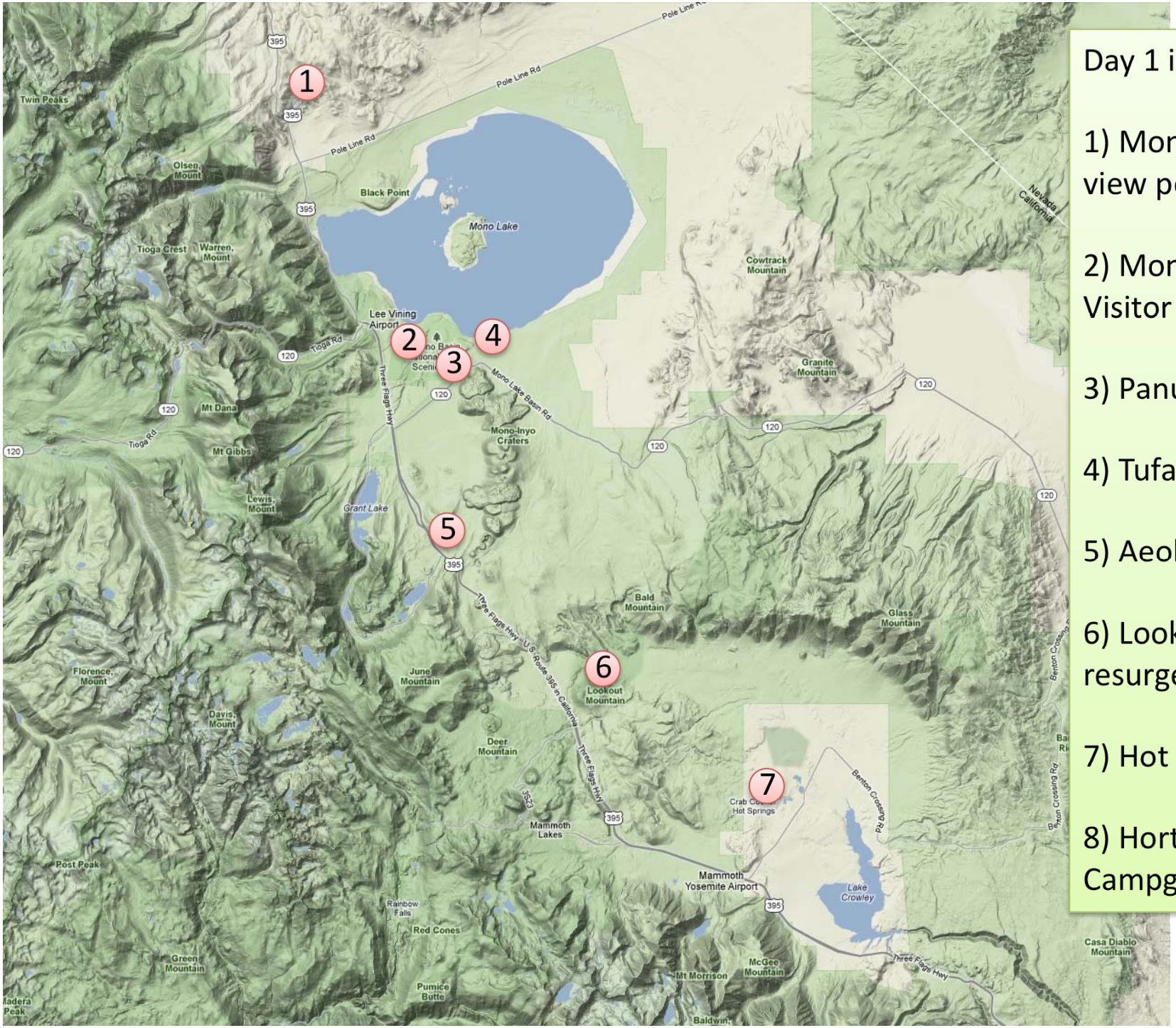


Willamette Pass snowball fight

Klamath Falls

First night of camping…

Long Valley



Day 1 in the field

1) Mono Lake view point

2) Mono Basin Visitor Center

3) Panum Crater

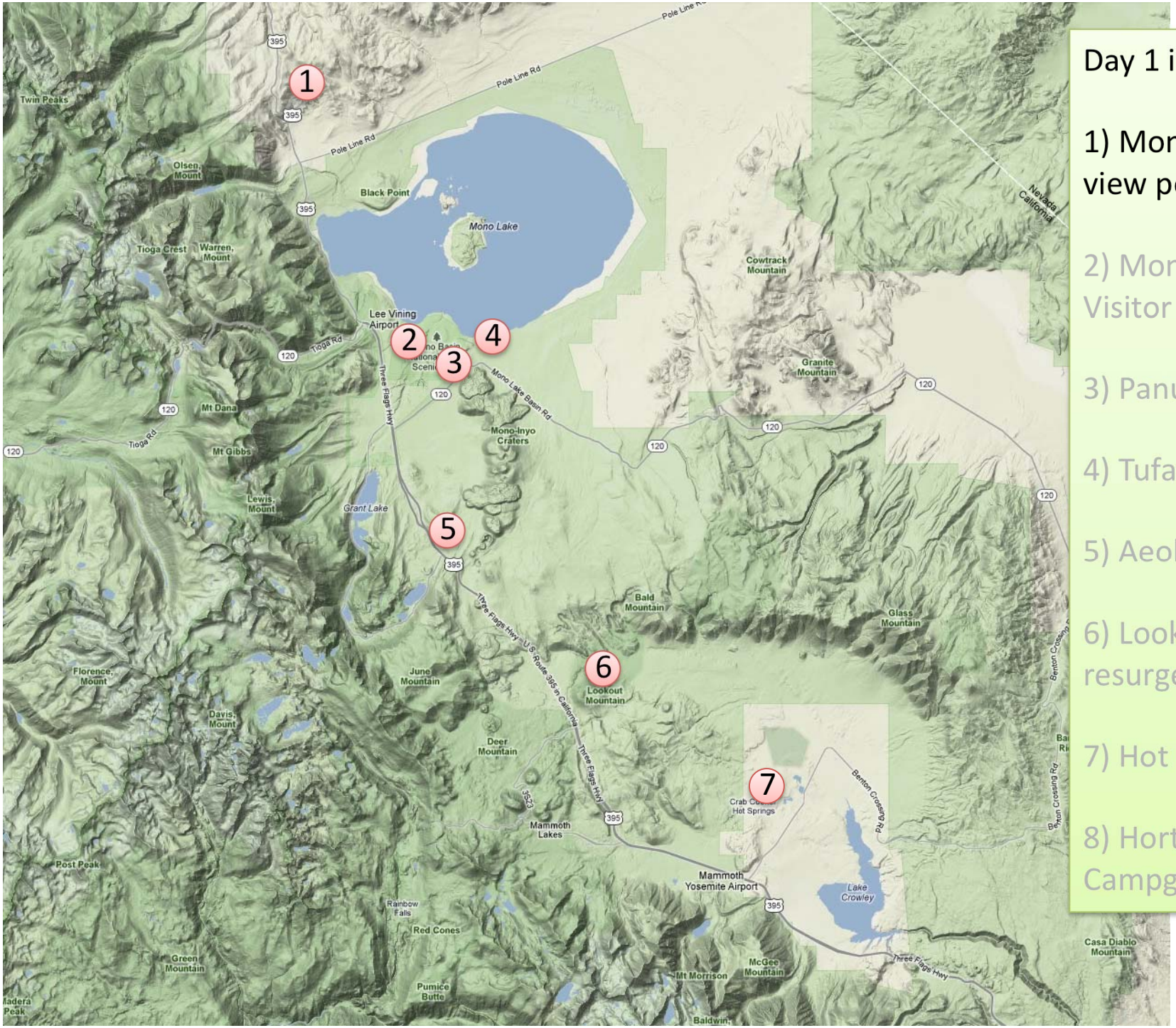
4) Tufa Towers

5) Aeolian Buttes

6) Lookout Mt resurgent dome

7) Hot Creek

8) Horten Creek Campground



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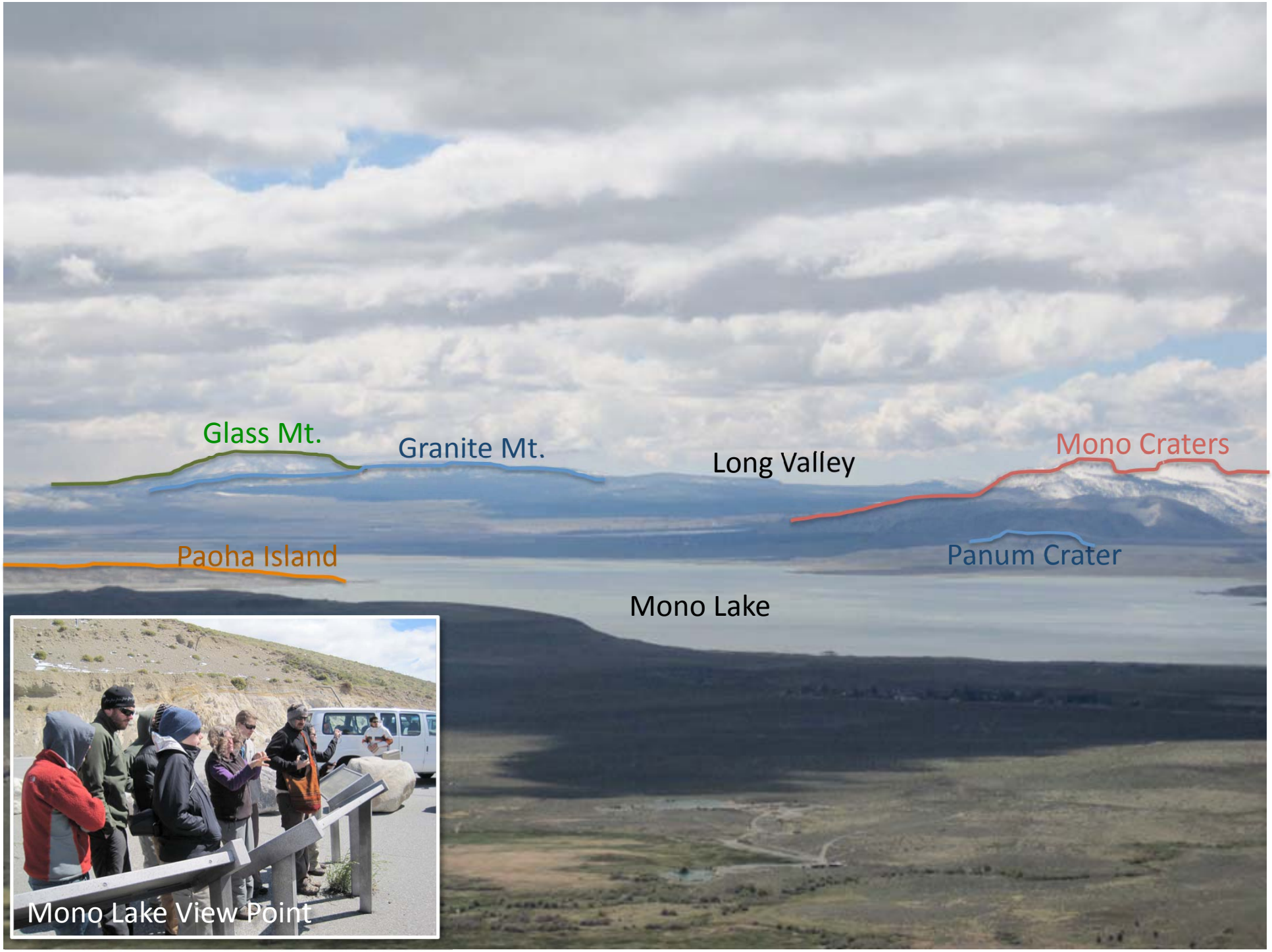
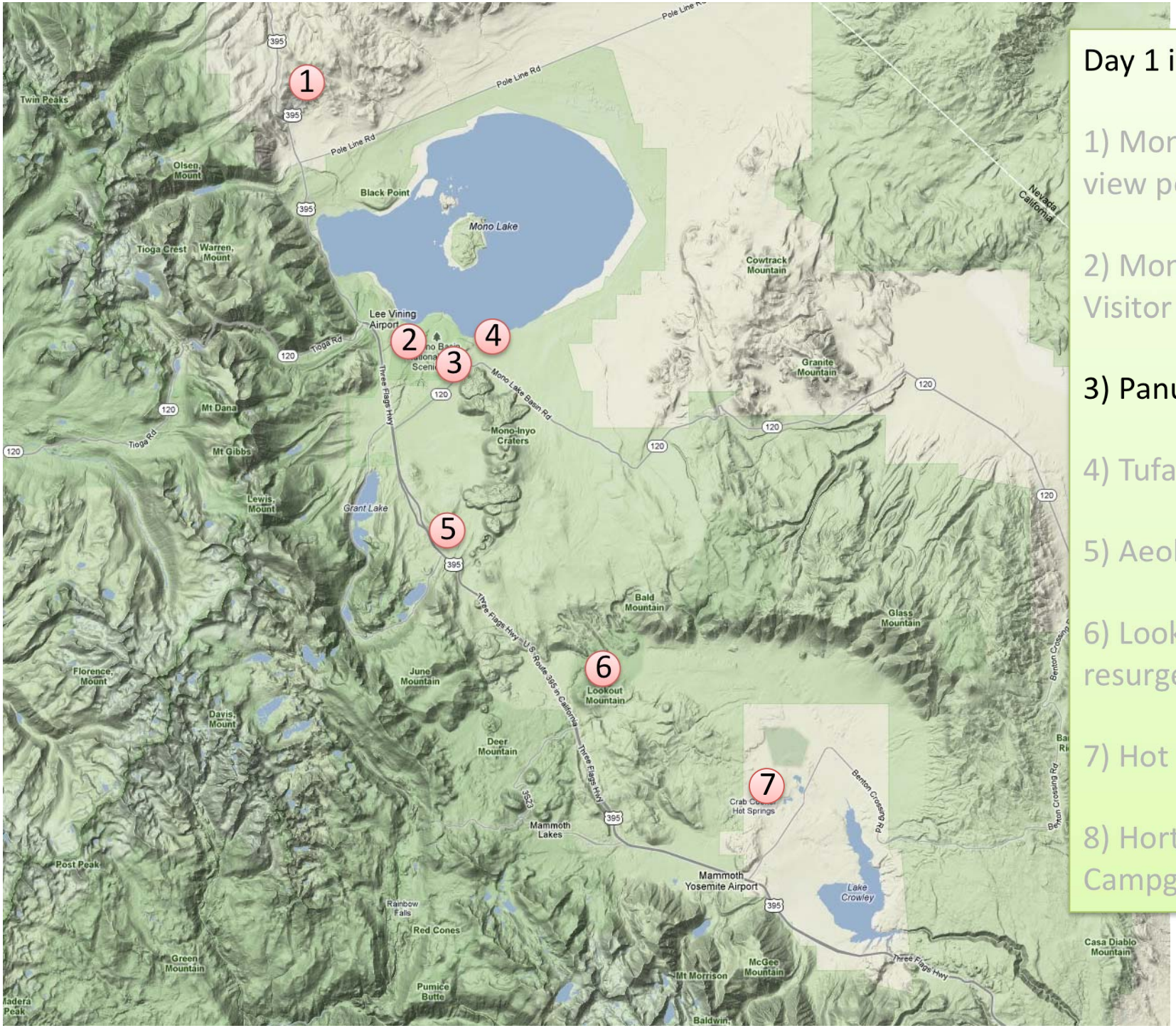

Glass Mt.
Granite Mt.
Long Valley
Mono Craters
Paoha Island
Panum Crater
Mono Lake
Mono Lake View Point



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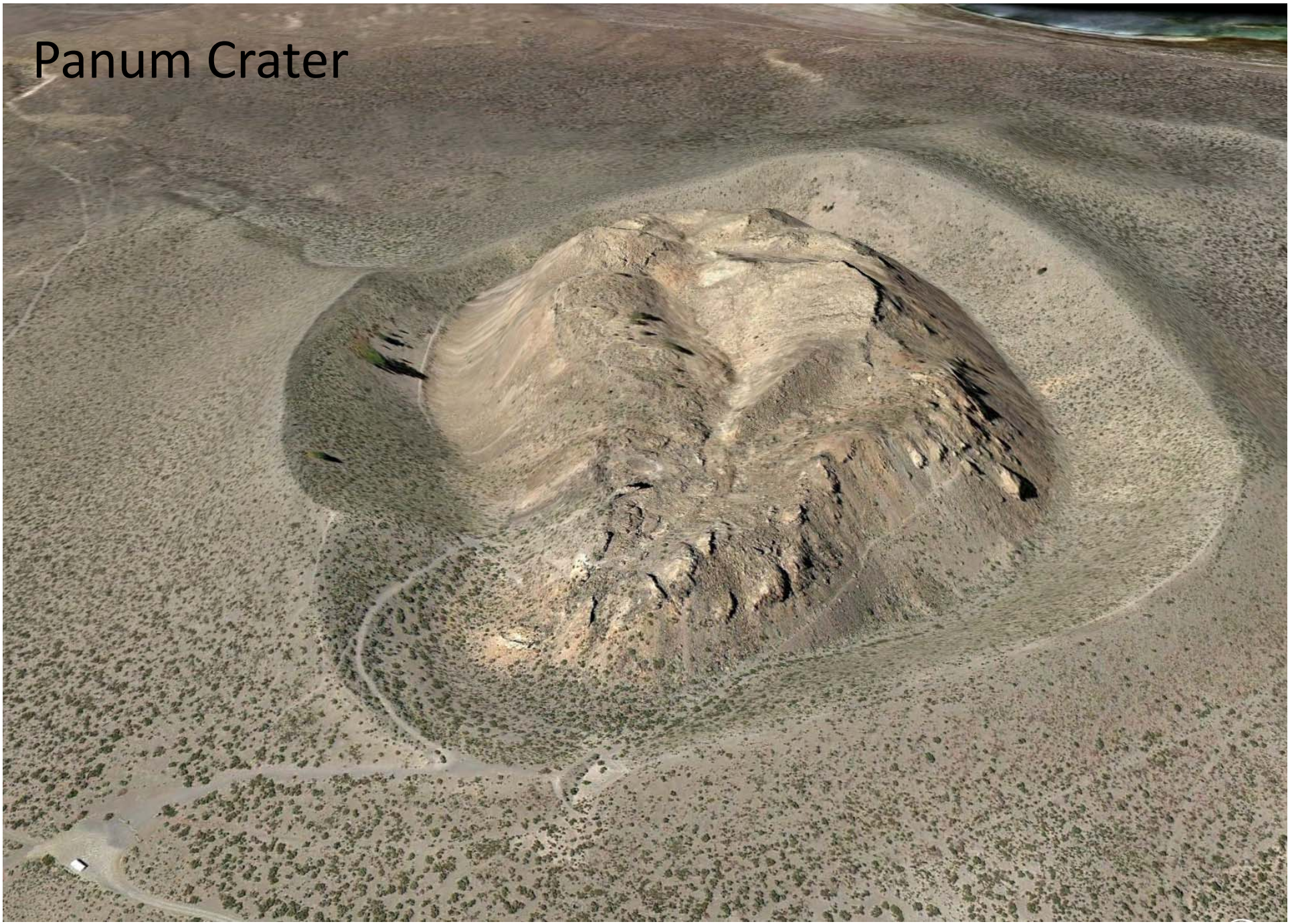
Panum Crater



Driving up to Panum Crater

sidian, a black shiny rock you will see on your hike; [illegible] pumice but erupted slowly, losing trapped air. It cooled too quickly to form crystalline structure, but formed glassy rock that has extremely sharp edges hen broken. Native Americans used hunting tools with obsidian spear and rrow points. They also used obsidian blades, drills, and scrapers. Some surgeons today use obsidian for scalpels. In time, obsidian absorbs water and becomes fine-grained rock; so, geologically speaking, obsidian is never very old!

The Mono Craters, includi
not only possible, but likel
America's youngest mount
the Earth's continuing geol

Panum formed in a sequence of rhyolitic

Stage 1

num began as a bubble
extremely hot liquid rock
magma) rising up from a
lt deep within the
rth's crust.

Stage 2

Coming into contact with the water table just below the surface of the Earth, the hot, molten magma superheated the water, creating instant steam. The sudden pressure created by the steam's expansion caused a violent explosion, blowing out rock and debris and leaving behind a gaping crater.

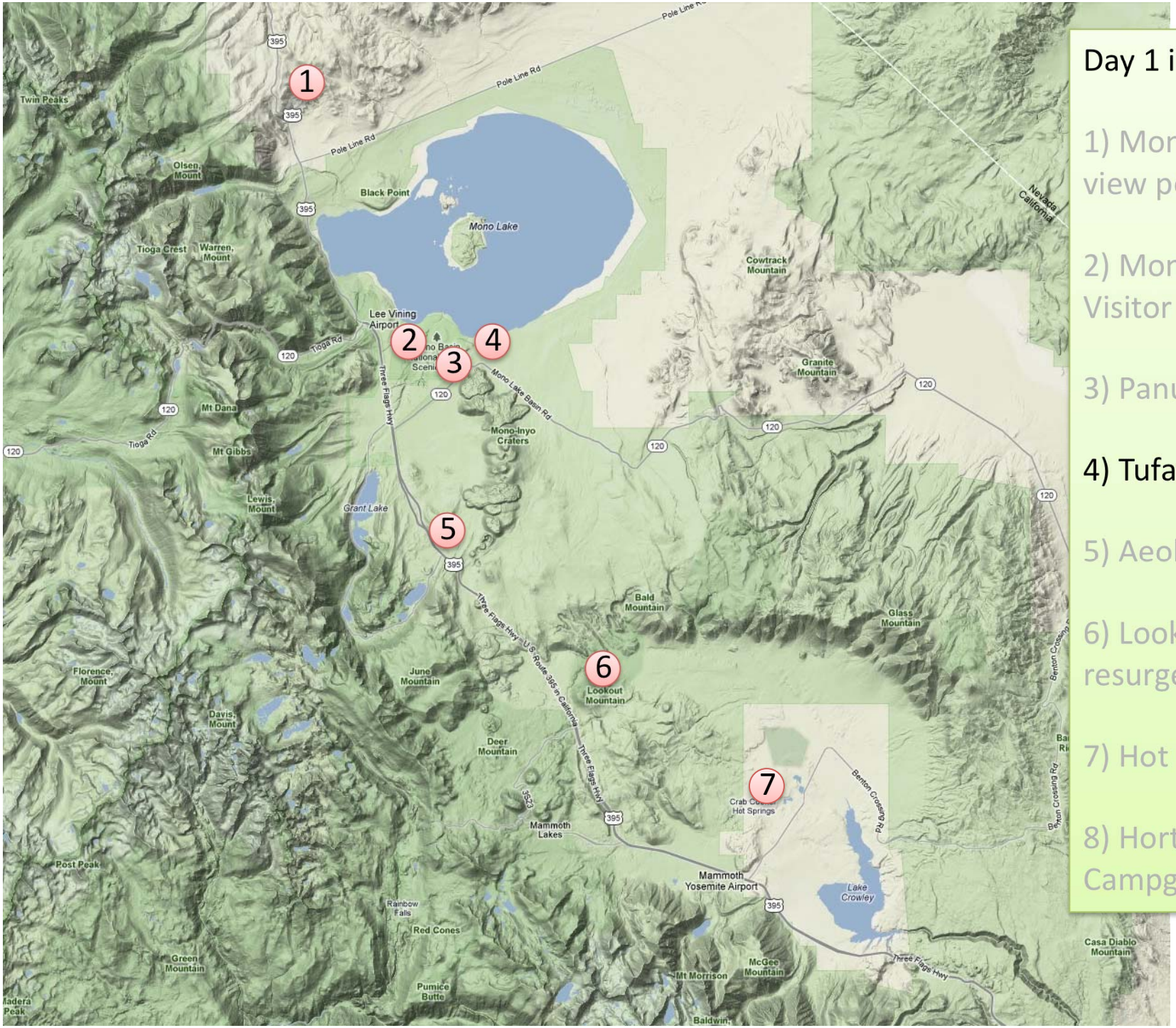
Stage 3

Pumice ash shot into the sky, then fell back around the crater. A fountain of cinders, ash and pumice continued until the large pumice ring, still visible around Panum today, was formed.

Stage 4

Thick lava continued to rise in the center of the crater, forming a dome that hardened and cracked as lava continued to ooze up. Hardened lava (crumble breccia) was pushed aside by the rising lava until the volcanic forces weakened and slowed.

Please, take only pictures and leave only footprints. No colle



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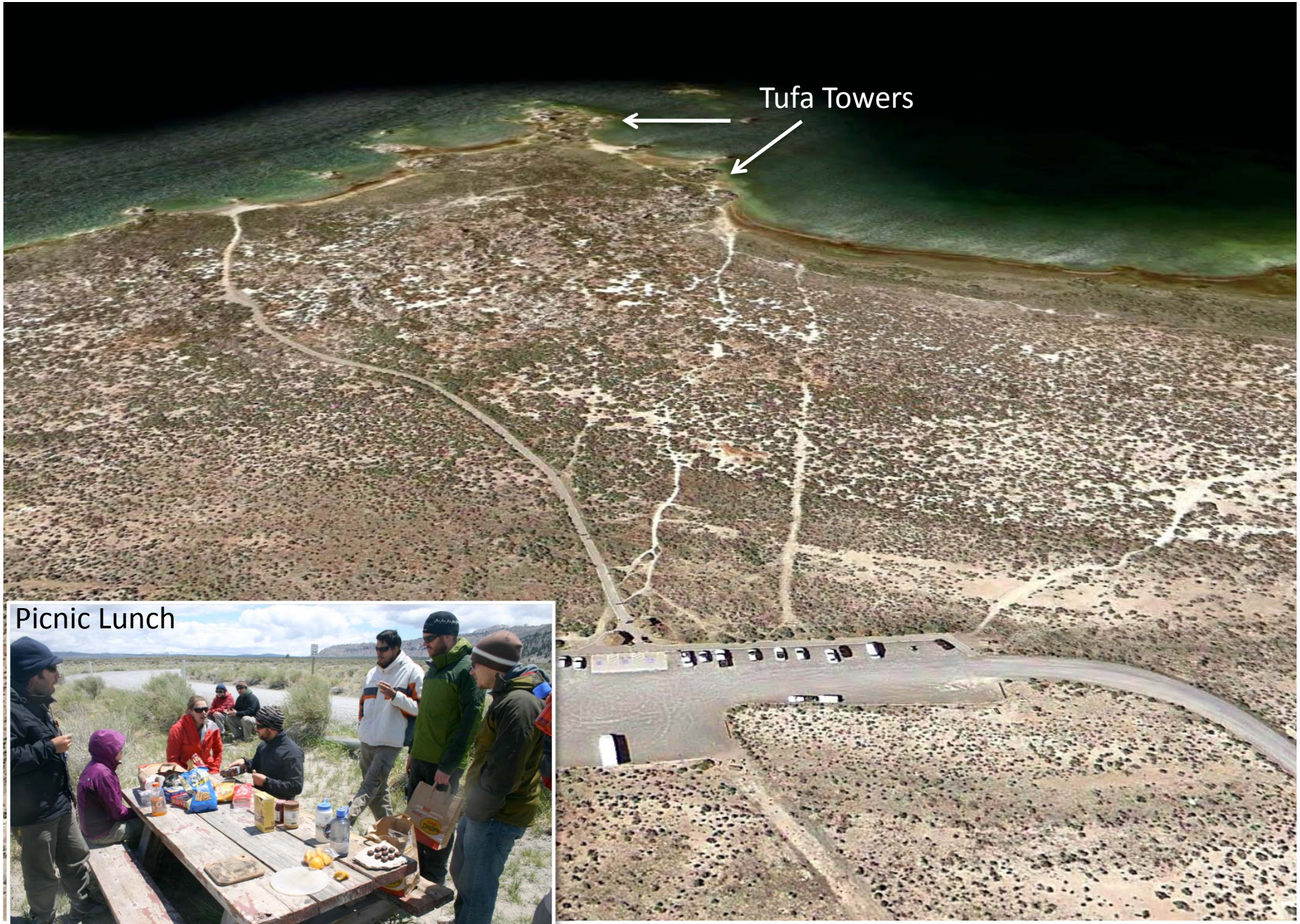
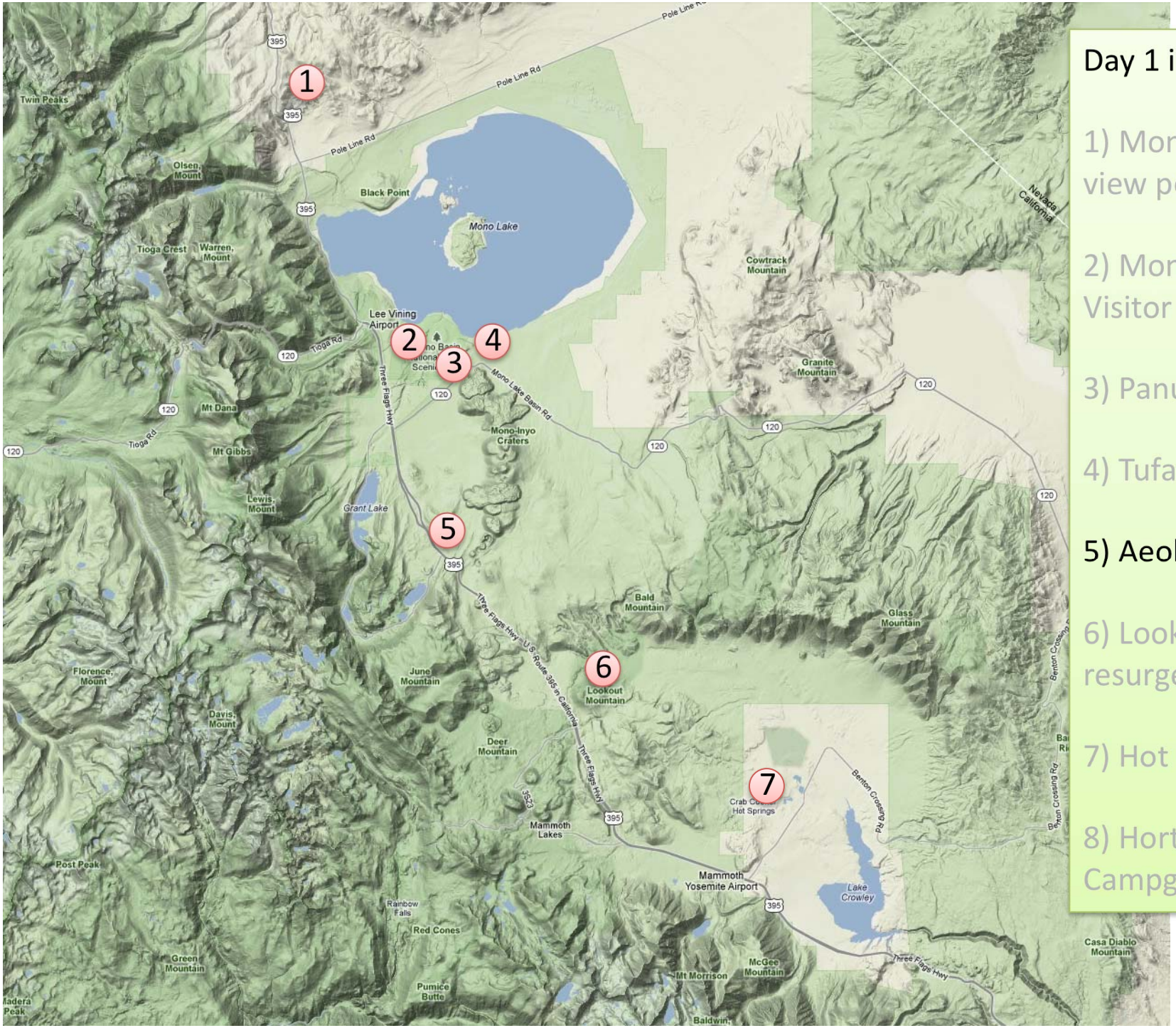

Tufa Towers

Picnic Lunch

From Wikipedia:
Tufa towers are formed from supersaturated alkaline waters, with raised pCO_2. On emergence, waters degas CO_2 due to the lower atmospheric pCO_2 (see partial pressure), resulting in an increase in pH. Since carbonate solubility decreases with increased pH, precipitation is induced (*Bialkowski*, 2004). Supersaturation may be enhanced by factors leading to a reduction in pCO_2, for example increased air-water interactions at waterfalls may be important (*Zhang et al.*, 2001), as may photosynthesis (*Riding*, 2000).

Recently it has been demonstrated that microbially induced precipitation may be more important than physico-chemical precipitation. *Pedley et al.* (2009) showed with flume experiments that precipitation does not occur unless a biofilm is present, despite supersaturation.



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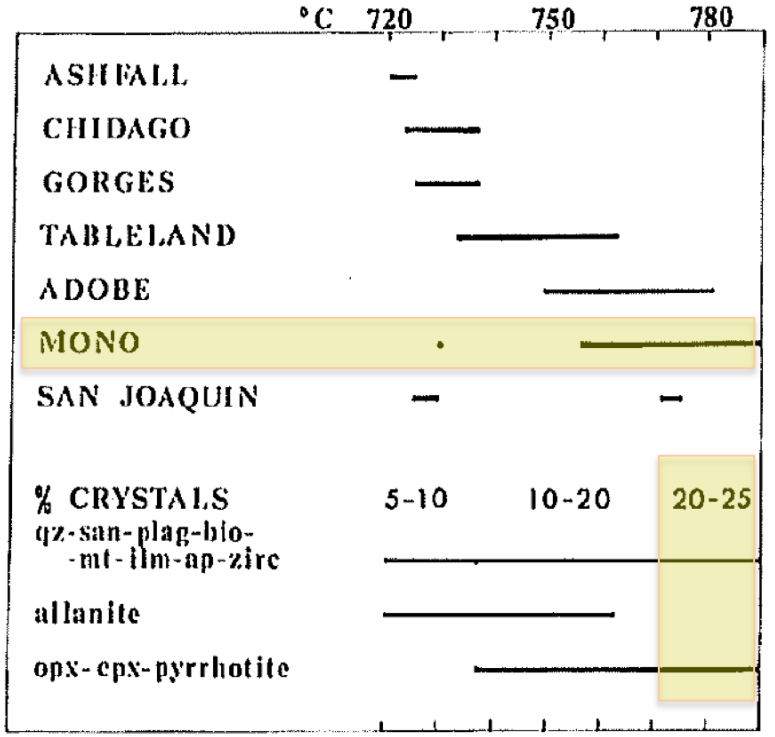
marmot

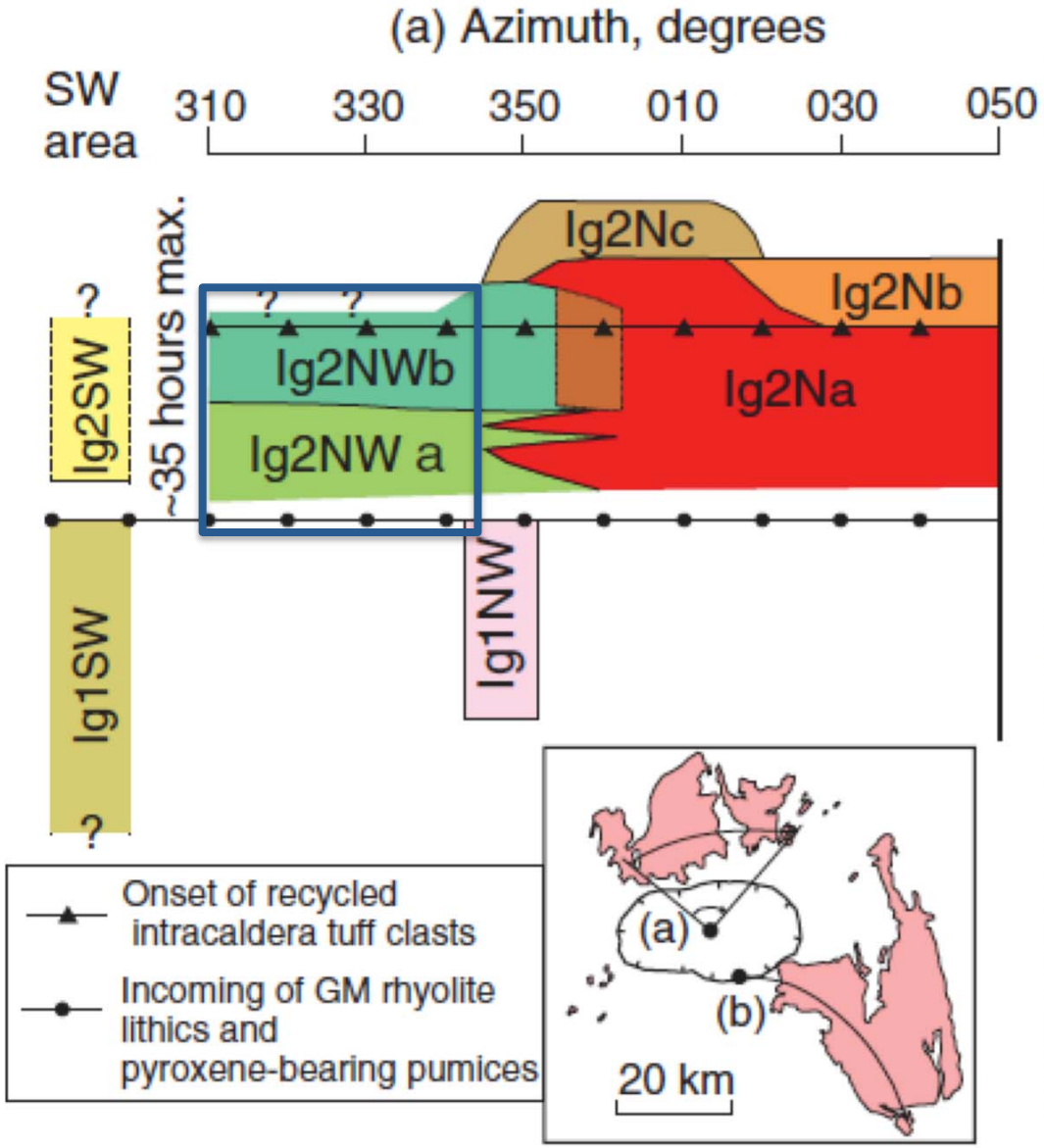
Aeolian Buttes:

Late stage Bishop Tuff, aka Mono Lobe, thought to be the bottom of the magma chamber.

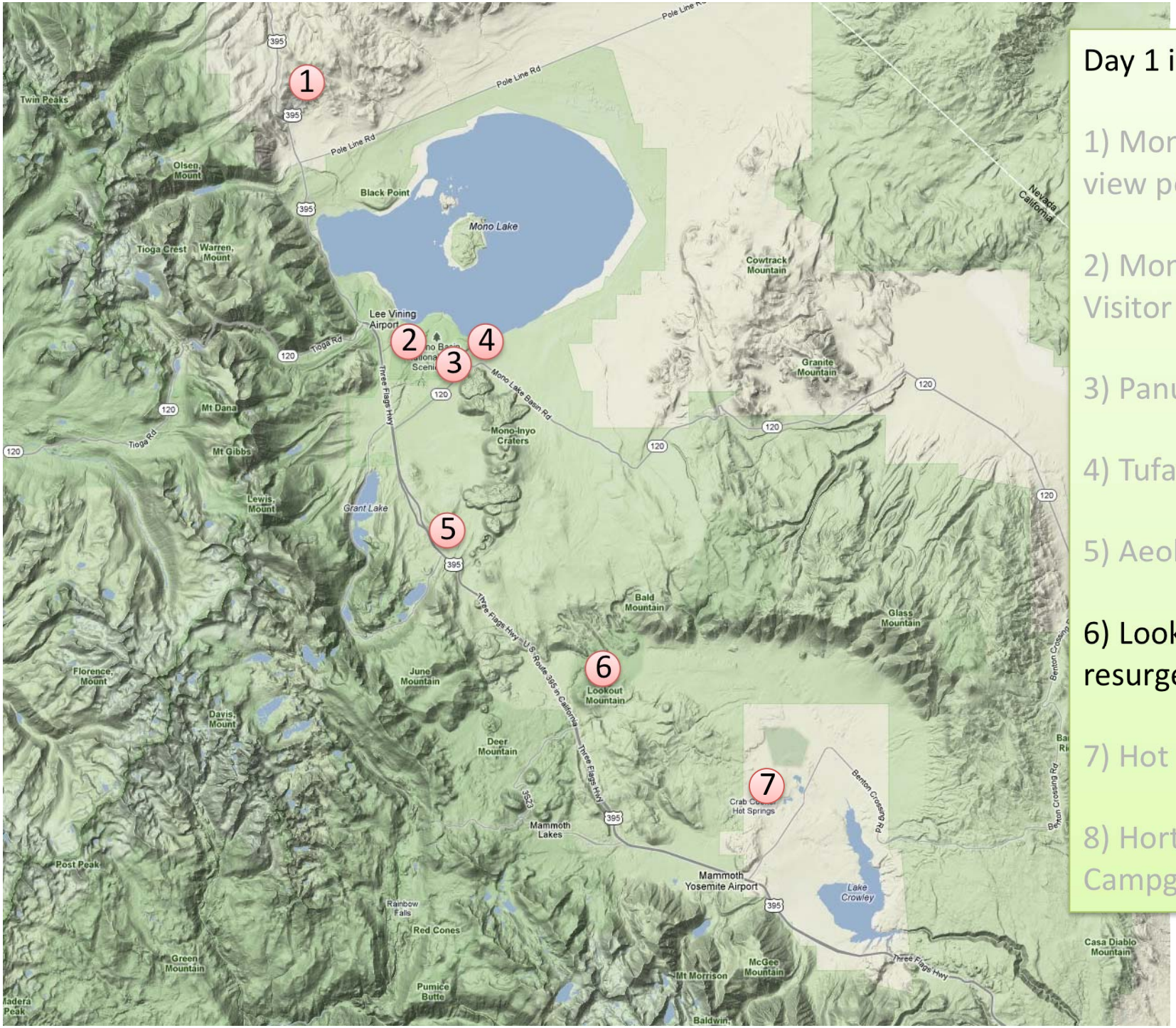
In outcrop – densely welded tuff overlain by non-welded tuff. Very crystal rich (~ 25%), includes phases such as CPX…



Hildreth (1979)



Hildreth and Wilson (2007)



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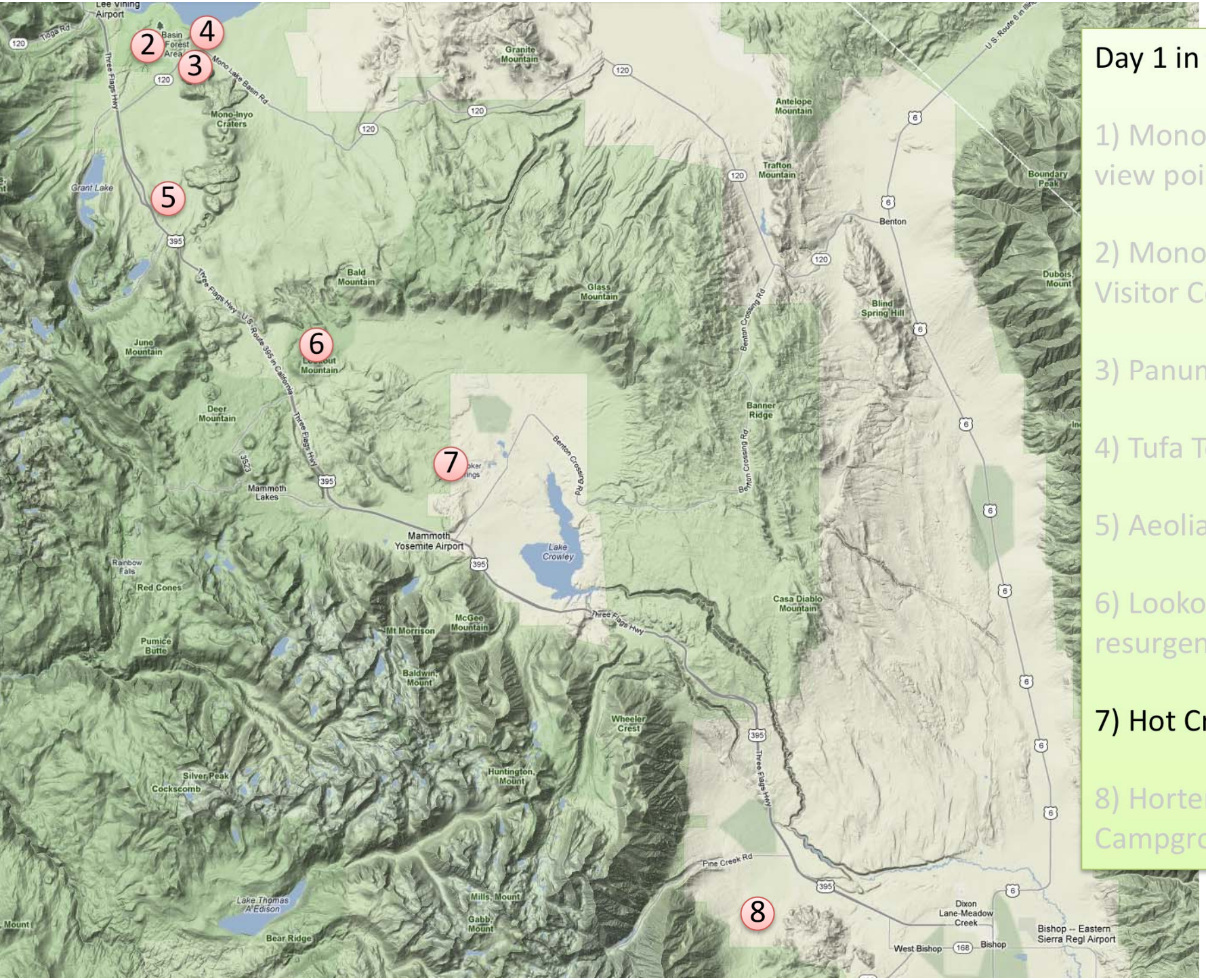
On the resurgent dome, looking across Long Valley.



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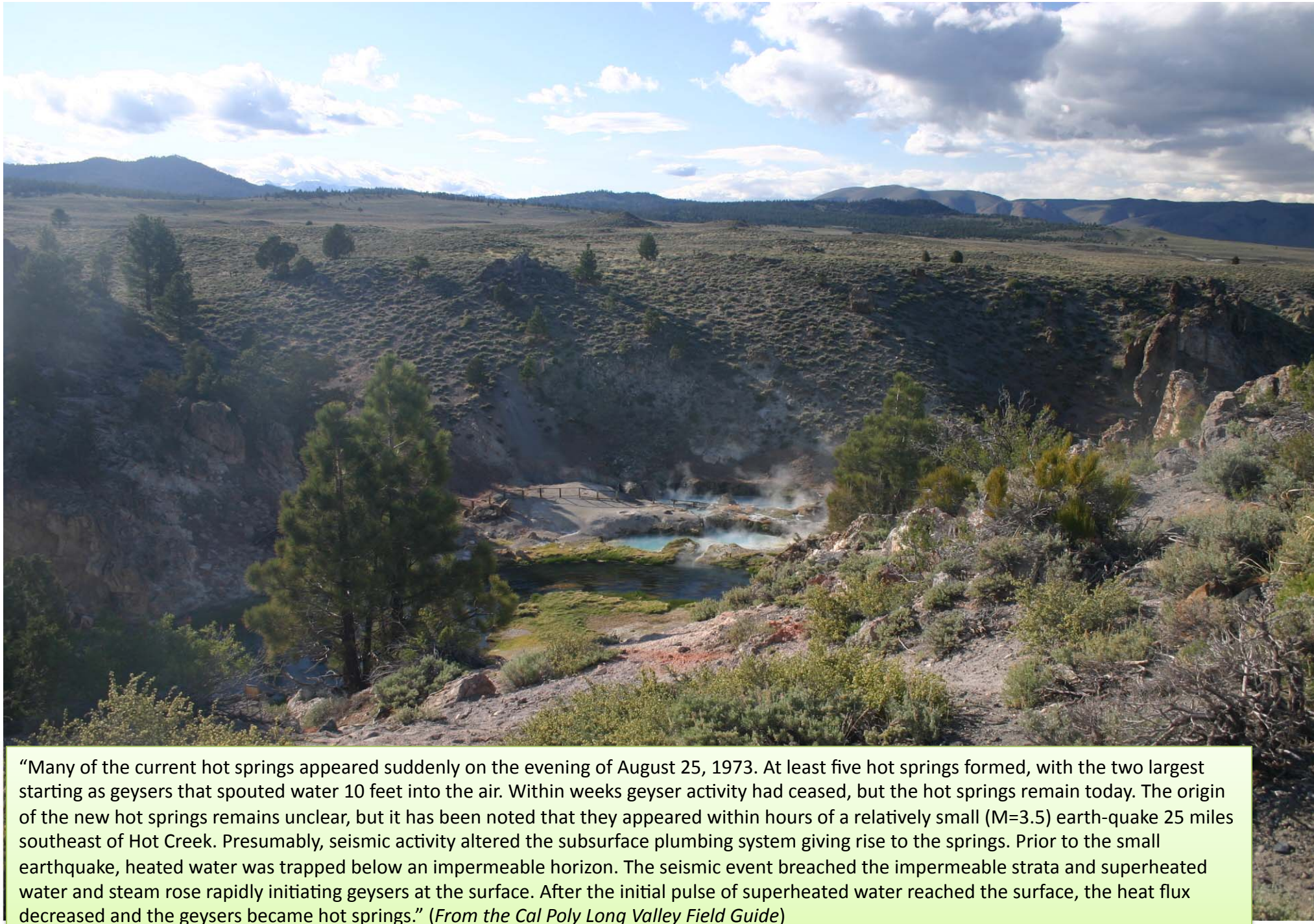
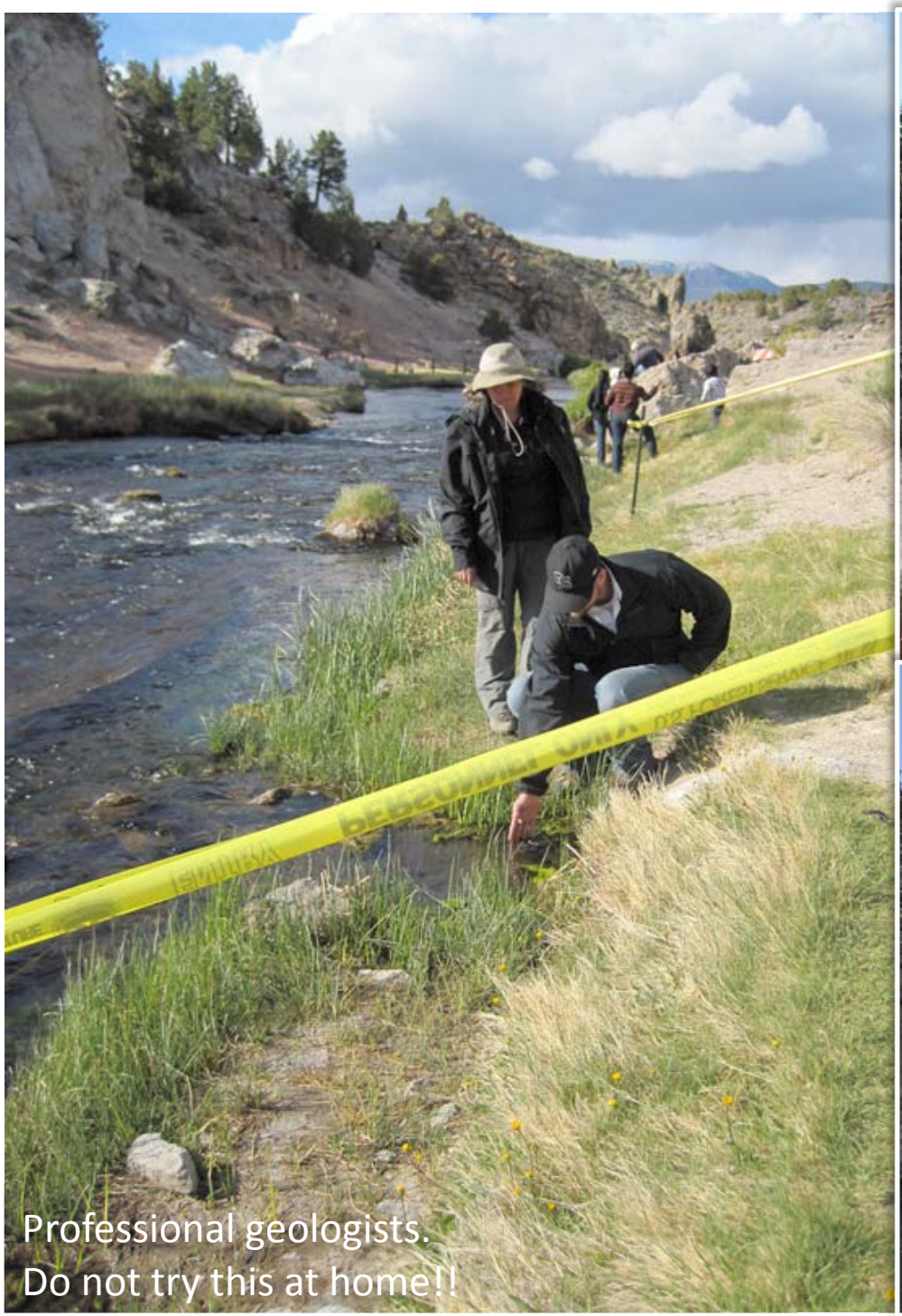
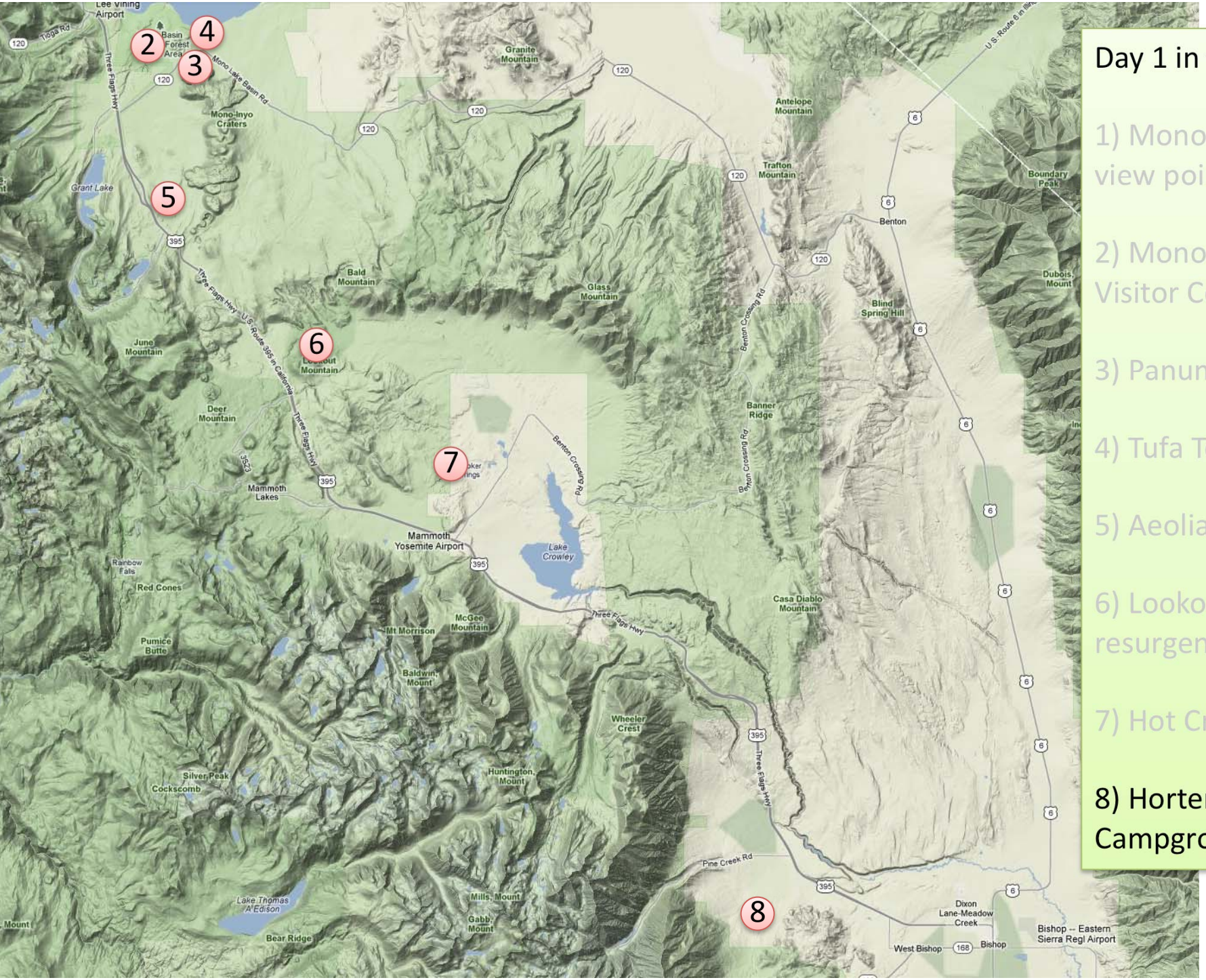


"Many of the current hot springs appeared suddenly on the evening of August 25, 1973. At least five hot springs formed, with the two largest starting as geysers that spouted water 10 feet into the air. Within weeks geyser activity had ceased, but the hot springs remain today. The origin of the new hot springs remains unclear, but it has been noted that they appeared within hours of a relatively small (M=3.5) earth-quake 25 miles southeast of Hot Creek. Presumably, seismic activity altered the subsurface plumbing system giving rise to the springs. Prior to the small earthquake, heated water was trapped below an impermeable horizon. The seismic event breached the impermeable strata and superheated water and steam rose rapidly initiating geysers at the surface. After the initial pulse of superheated water reached the surface, the heat flux decreased and the geysers became hot springs." (*From the Cal Poly Long Valley Field Guide*)



Professional geologists.
Do not try this at home!!



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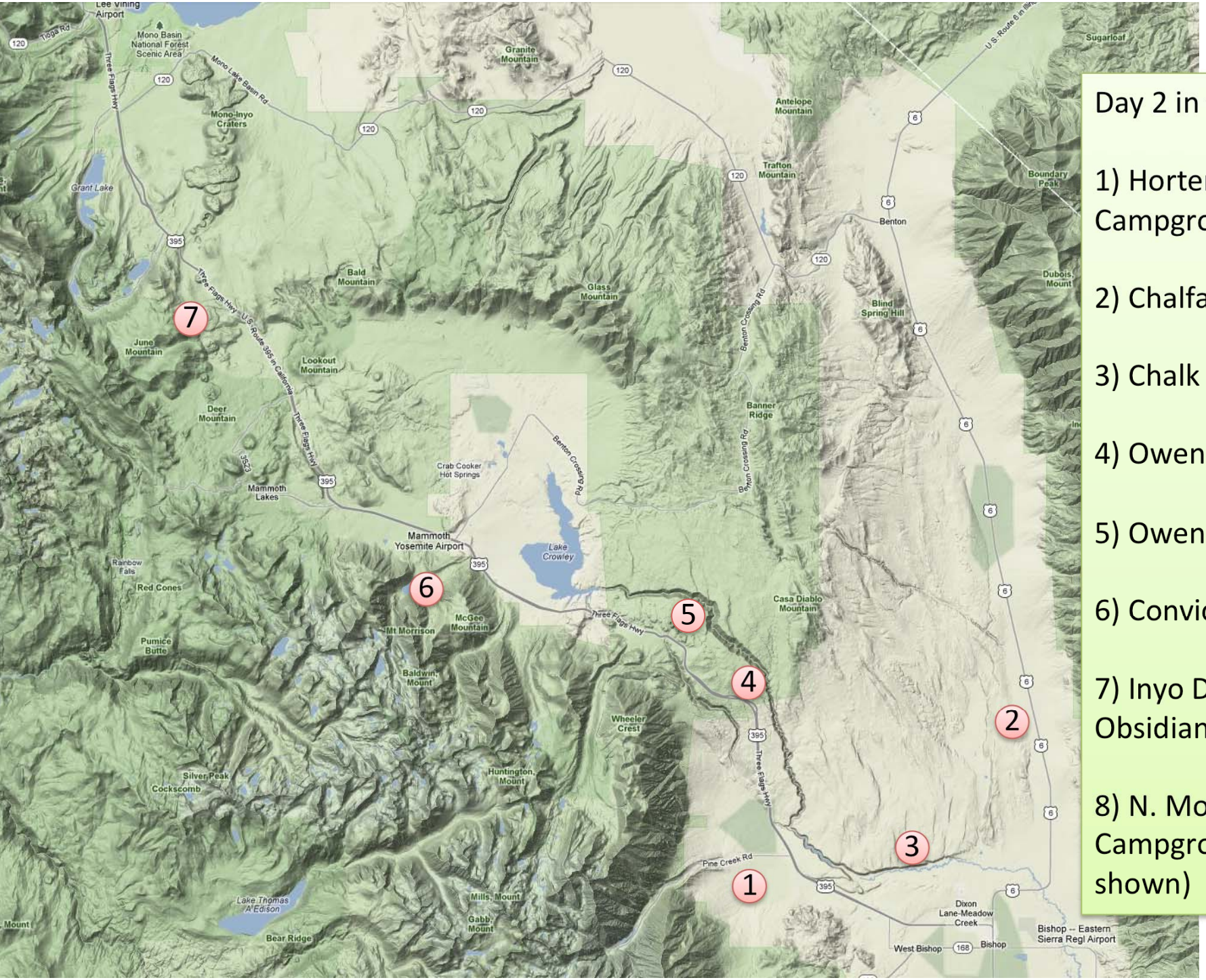
48



Day 2 in the field

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2) Chalfant Quarry

3) Chalk Bluff Rd.

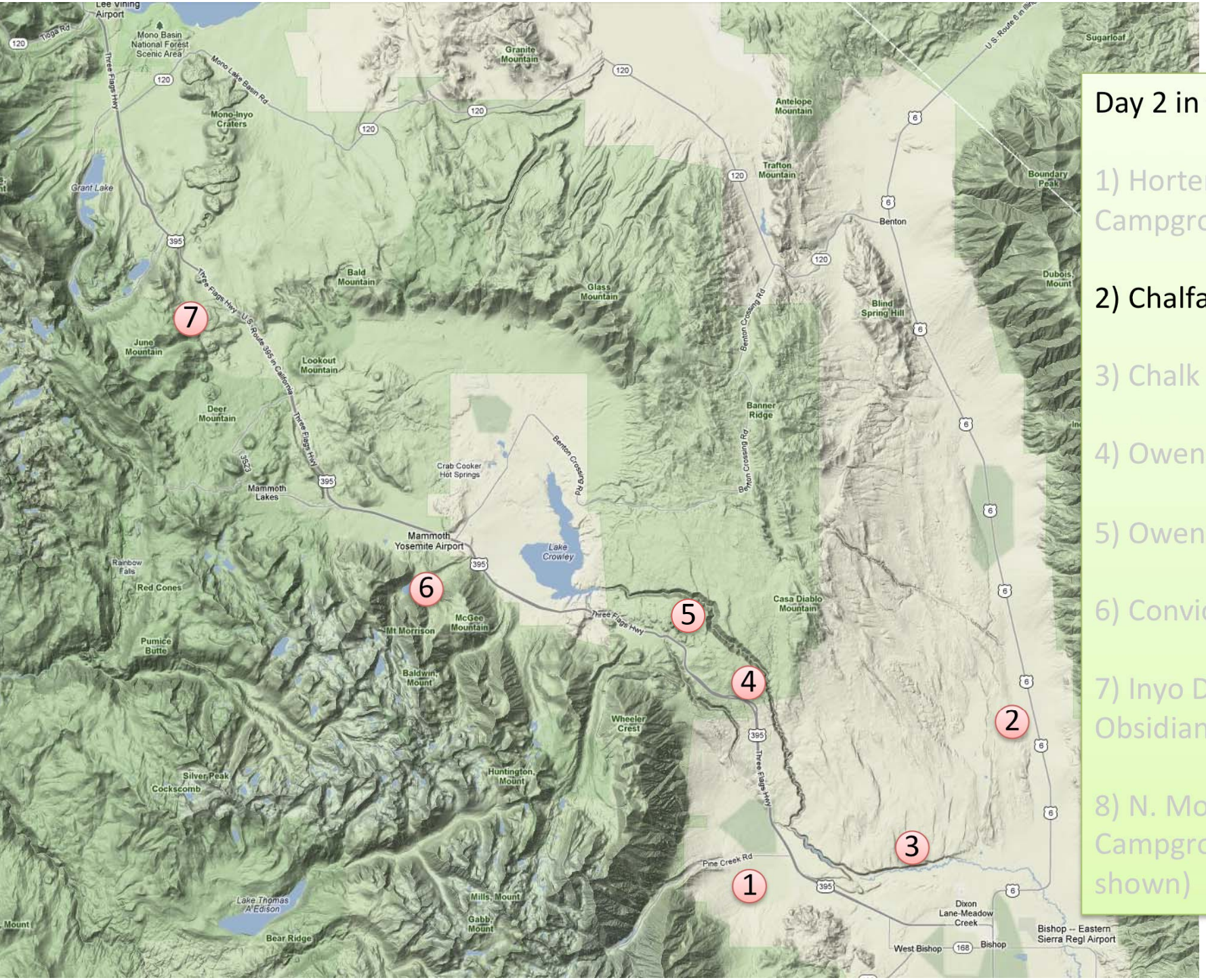
4) Owens Gorge

5) Owens Gorge 2

6) Convict Lake

7) Inyo Domes / Obsidian Dome

8) N. Mono Lake Campground (not shown)



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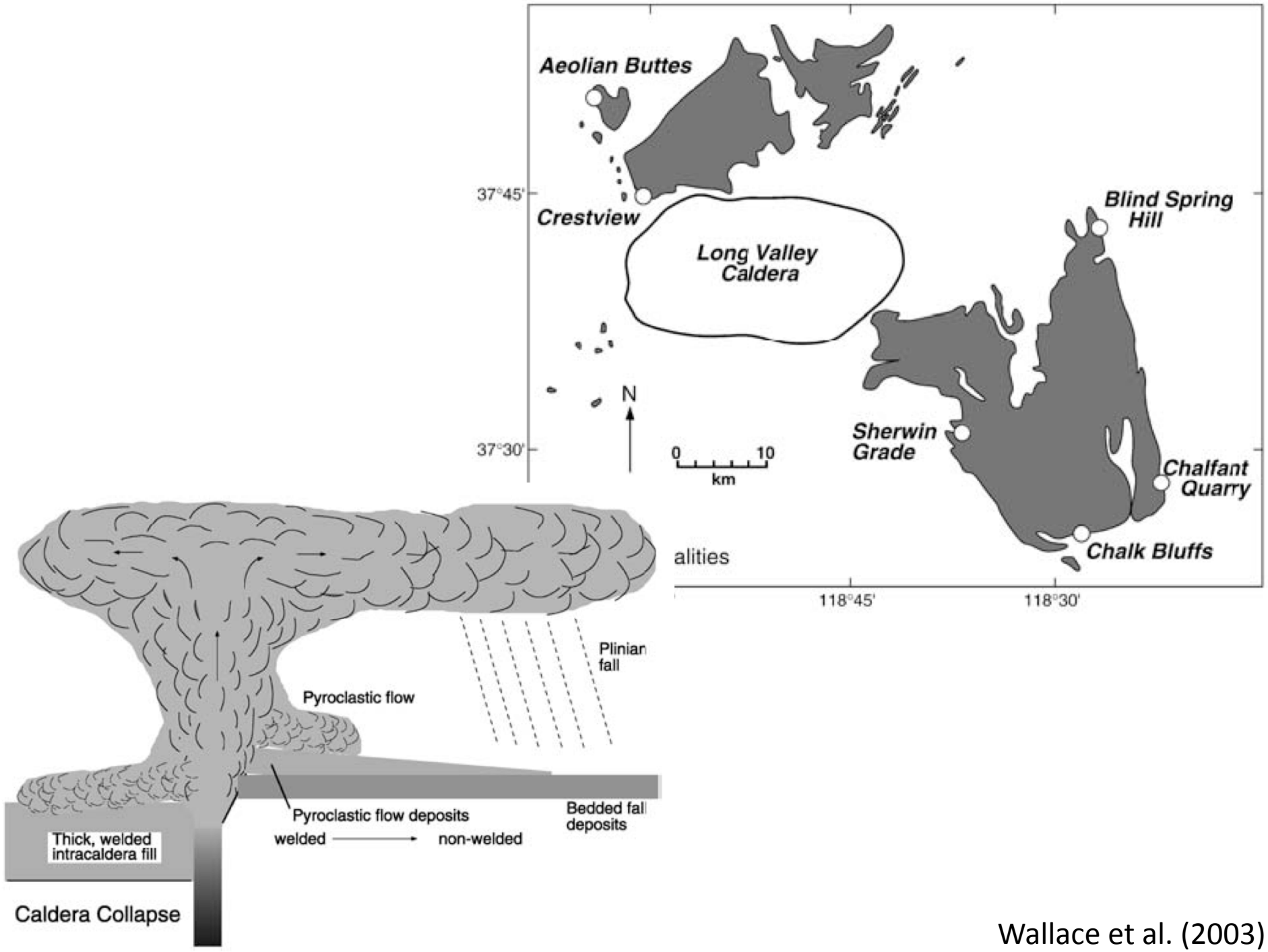
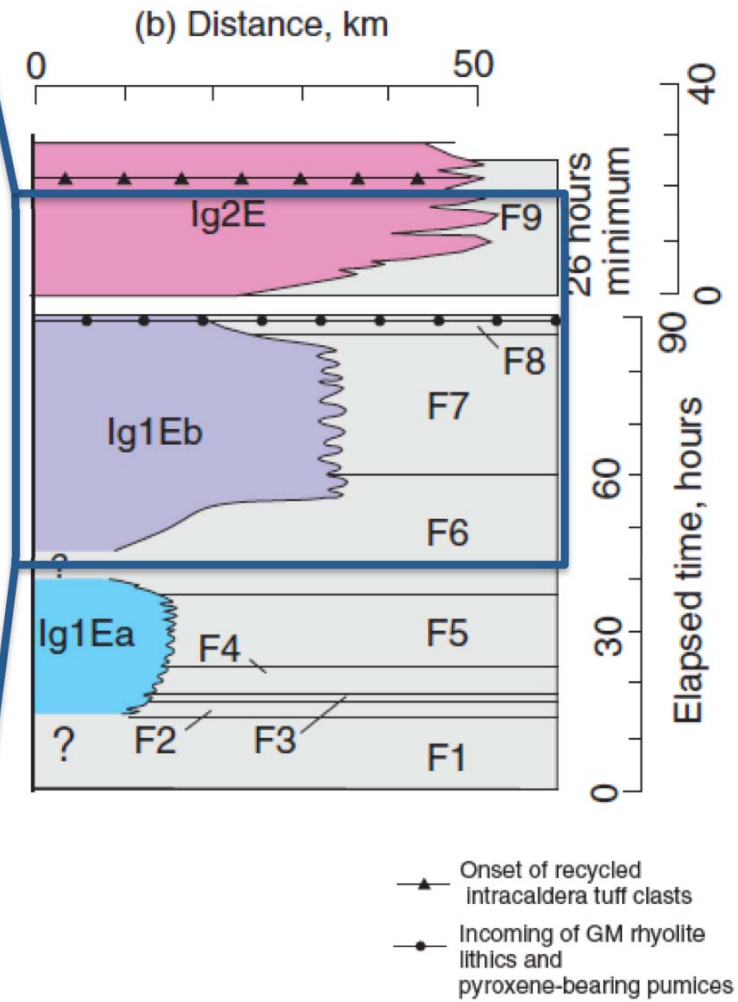
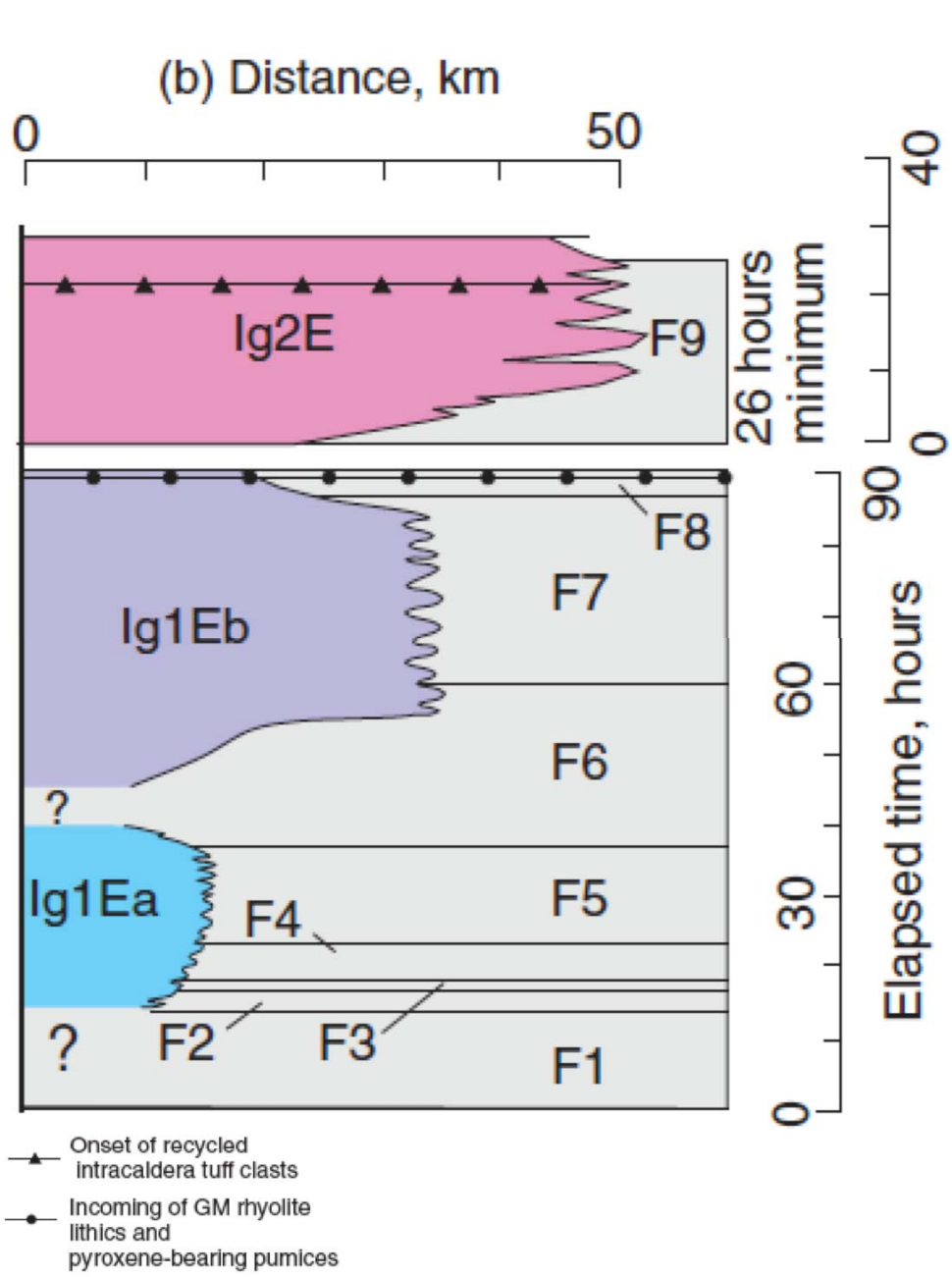
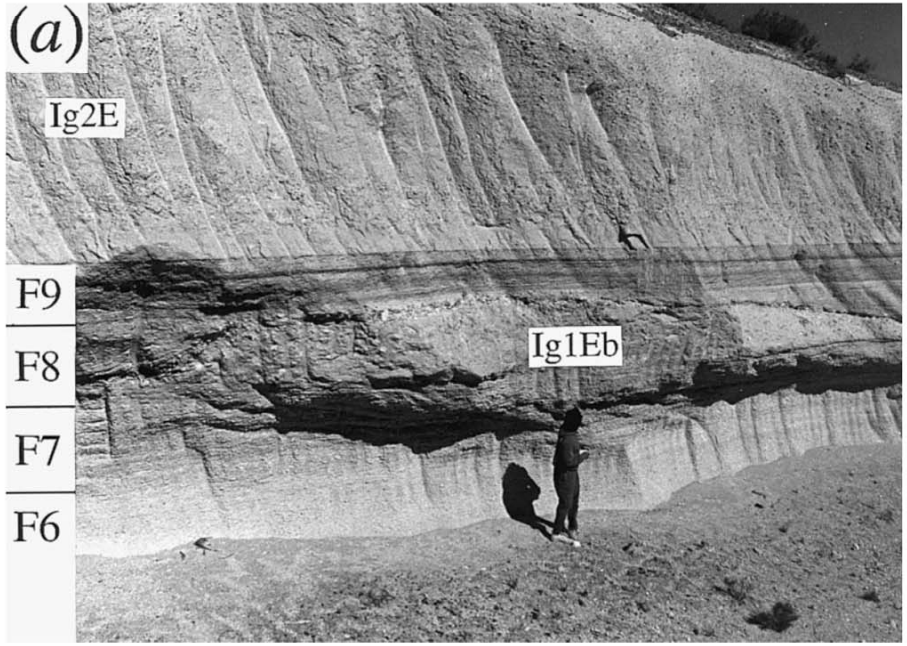


Wallace et al. (2003)



Hildreth and Wilson (2007)





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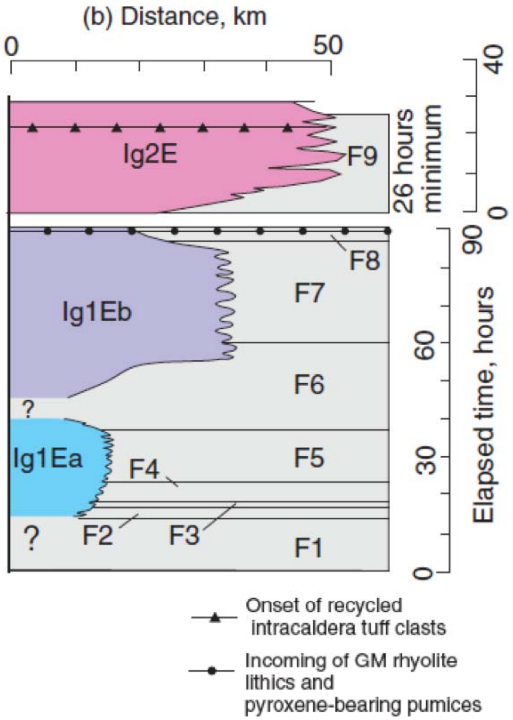

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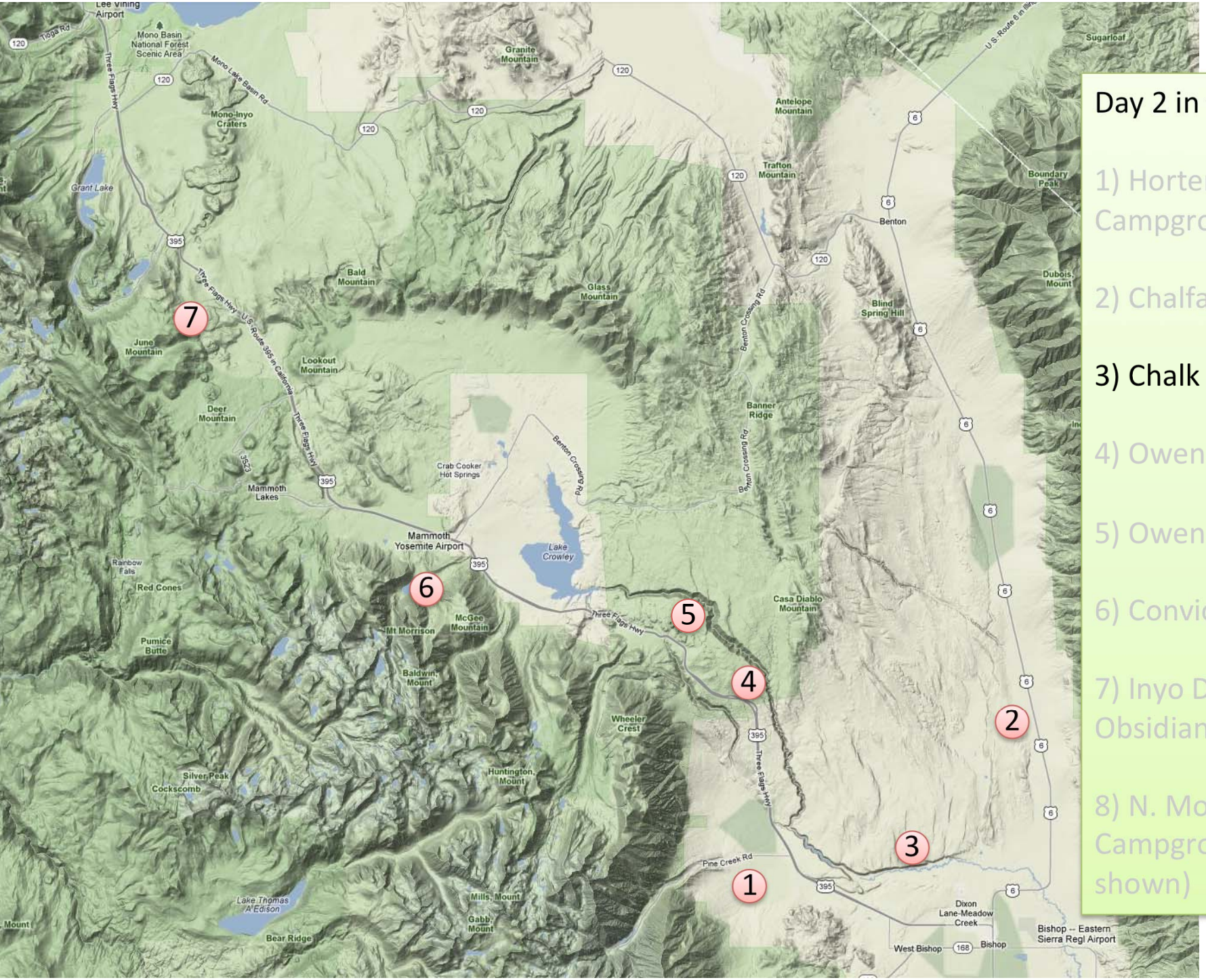

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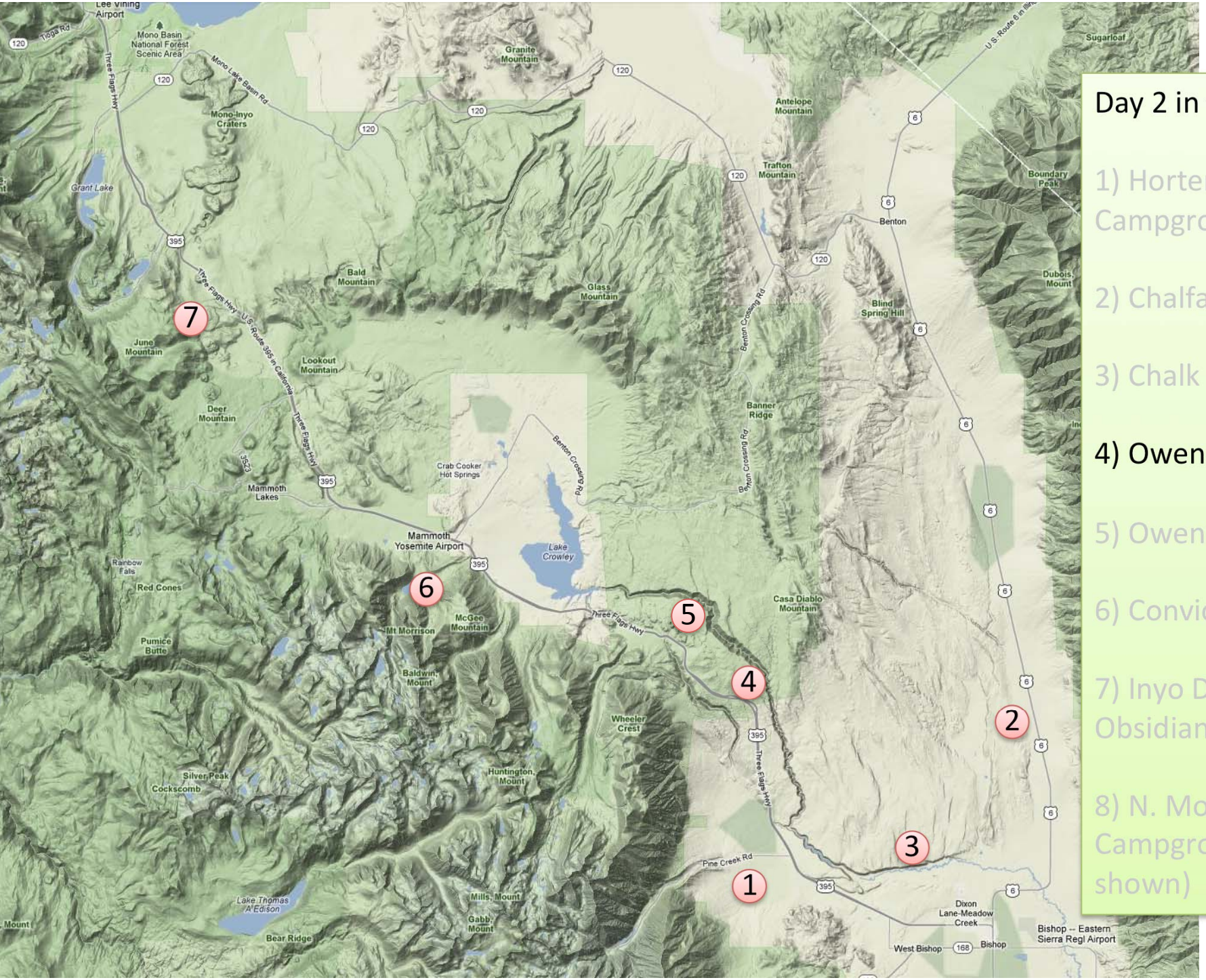
Middle Bishop Tuff lake deposit along Chalk Bluff Rd.



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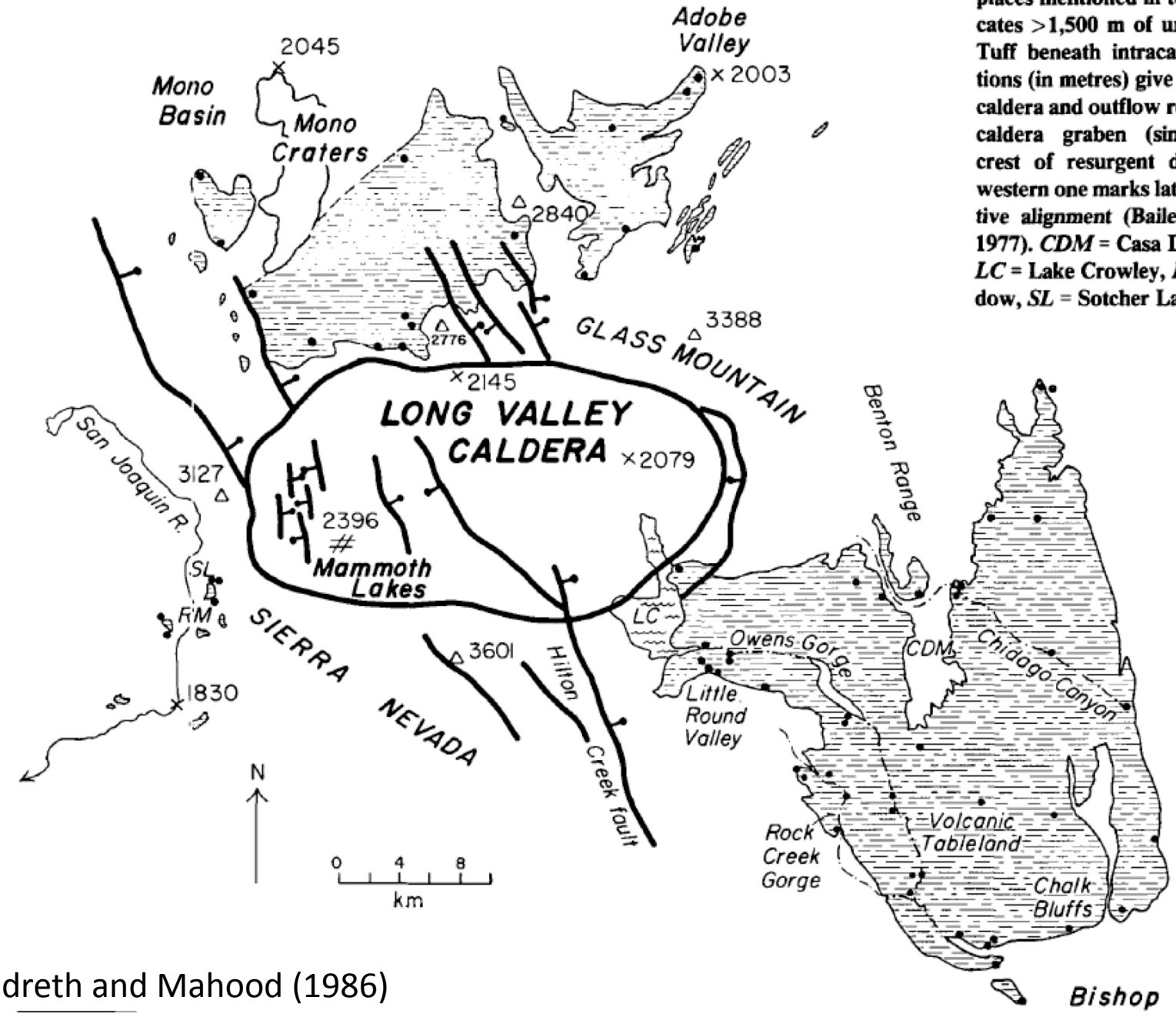


Figure 1. Present outcrop of Bishop Tuff, lithic sample locations (dots), and places mentioned in text. Drilling indicates >1,500 m of unexposed Bishop Tuff beneath intracaldera fill. Elevations (in metres) give an impression of caldera and outflow relief. Large intracaldera graben (simplified) crosses crest of resurgent dome, and small western one marks late Holocene eruptive alignment (Bailey and Koeppen, 1977). *CDM* = Casa Diablo Mountain, *LC* = Lake Crowley, *RM* = Reds Meadow, *SL* = Sotcher Lake.

Hildreth and Mahood (1986)

Google Earth view of the hike

Wilson and Hildreth (1997)

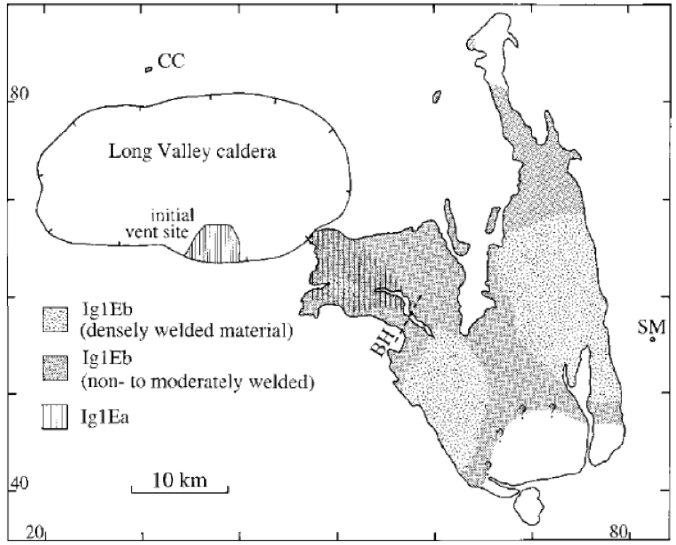


Figure 6. Geographic distribution of Ig1 deposits. The small outcrops marked at Clark Canyon (CC) and Sacramento Mine (SM) represent outliers of Ig1 material discussed in text. BH = basement high.

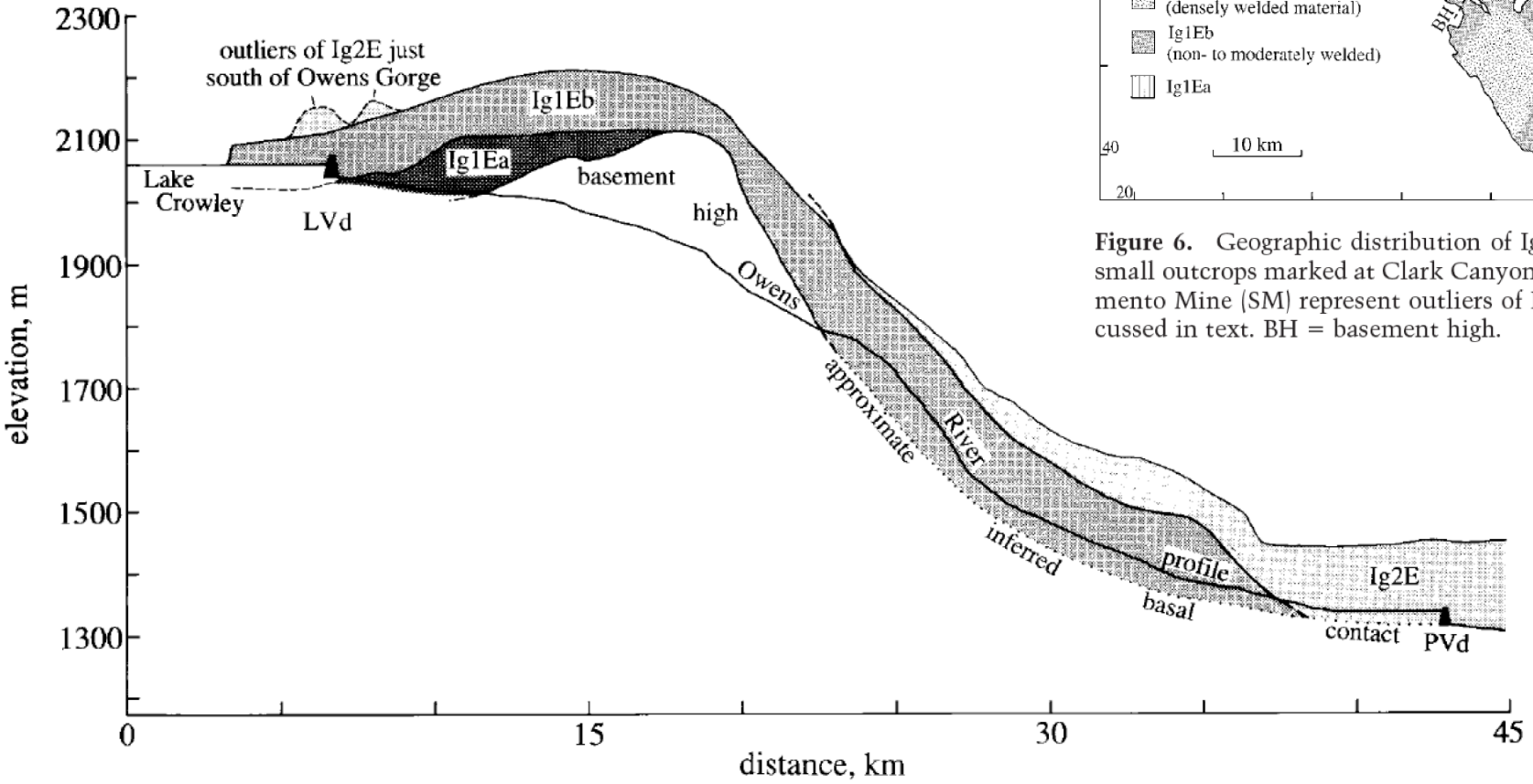
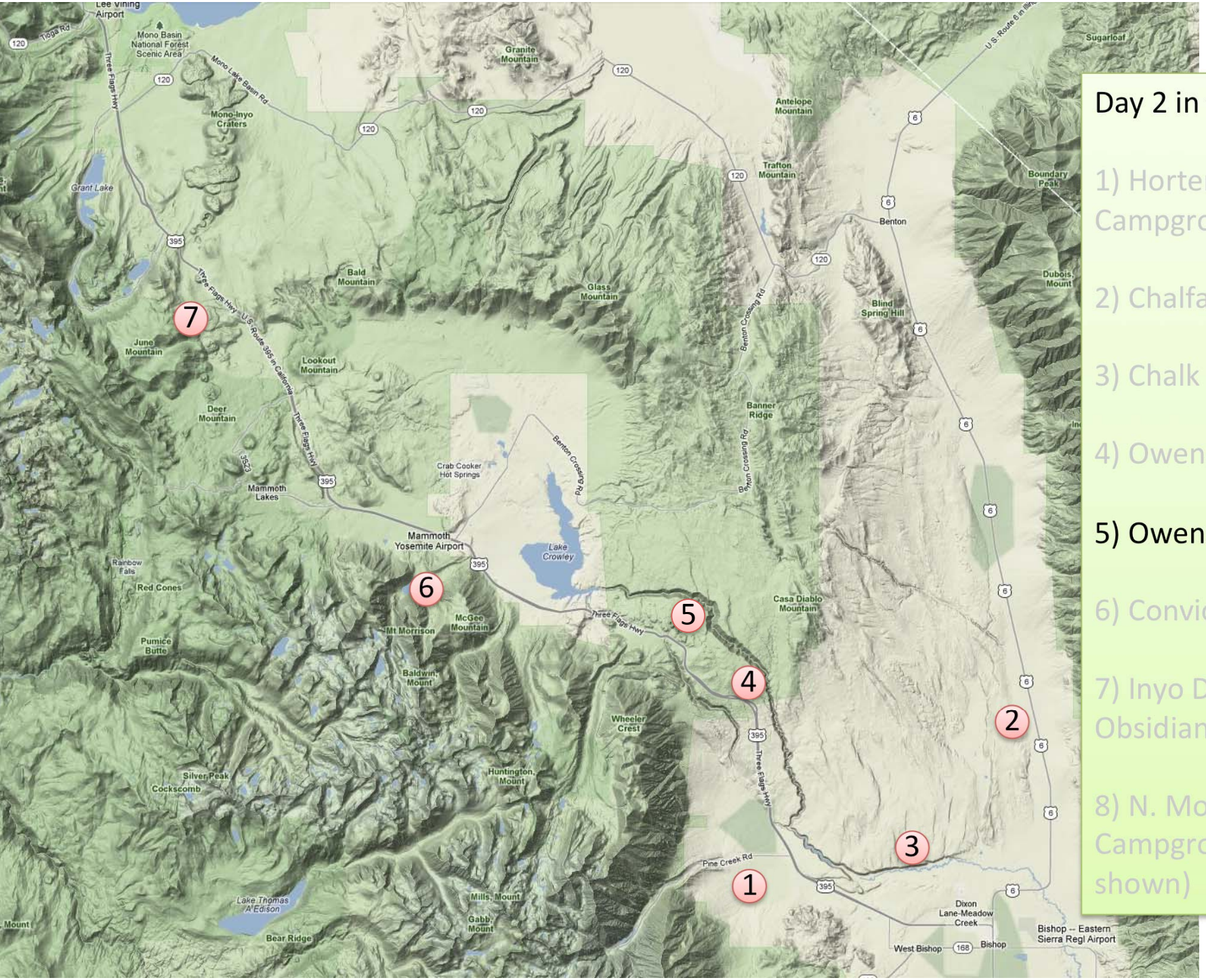


Figure 8. Scaled cross section (vertical exaggeration approx × 20) along the line of Owens River, to show thicknesses of Bishop ignimbrite packages Ig1Ea, Ig1Eb, and Ig2E as seen on the walls of Owens Gorge, projected onto the true left side. Note the off-lapping relationships such that the thickest exposures of each package occur successively farther from the caldera. LVd = Long Valley dam; PVd = Pleasant Valley dam. Vertical scale is meters above sea level; horizontal scale from an arbitrary datum in the centre of Lake Crowley.



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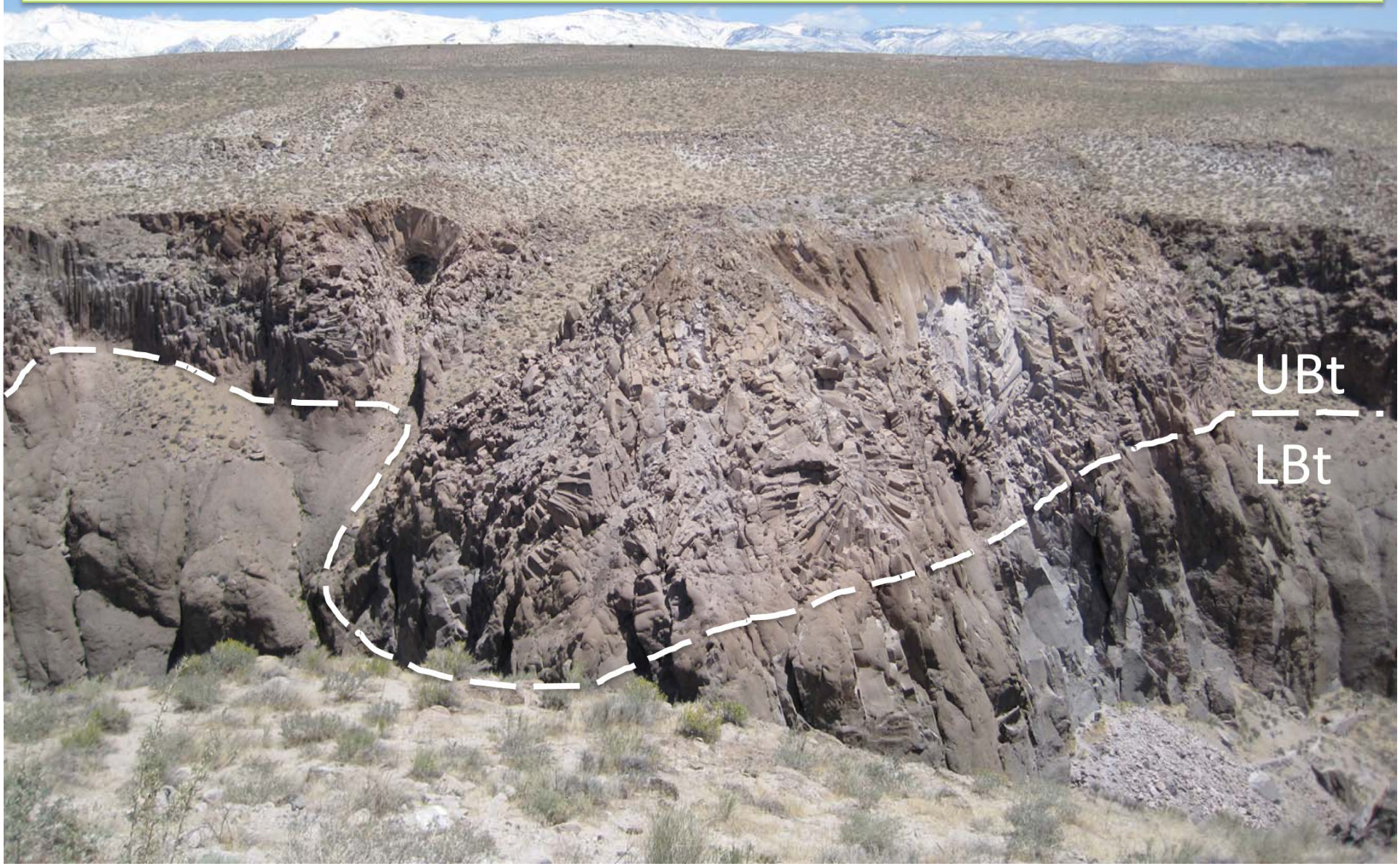
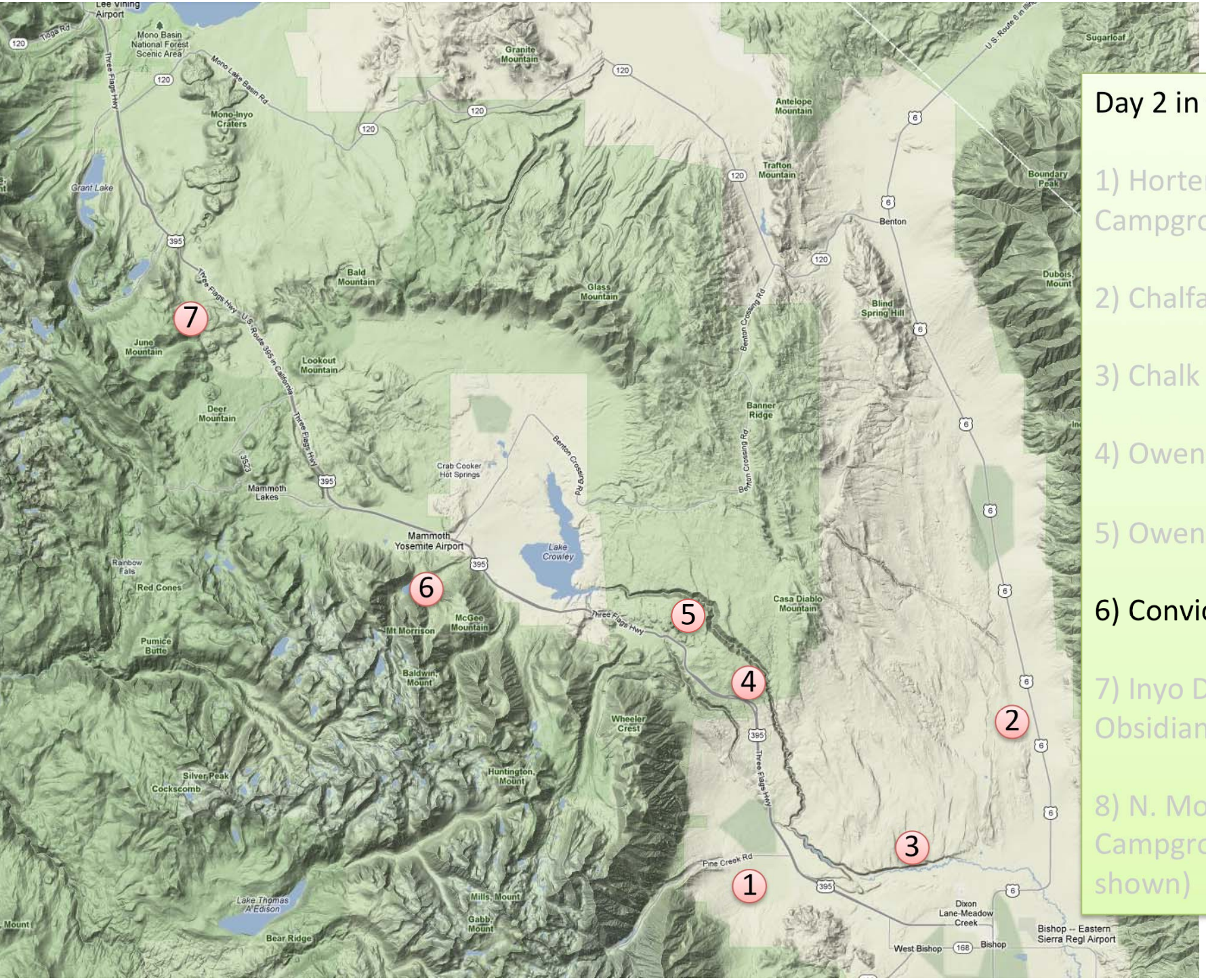
"The Owens River has eroded downward 500 feet entirely through Bishop Tuff at this locality. The Tuff is comprised of two lithologies. The upper unit (UBt) is poorly indurated and has striking radial columnar jointing. Column diameters typically range between 3 and 5 feet (Gilbert, 1938). Most columns are oriented in a radial pattern. The lower Bishop Tuff (LBt) is a strongly-welded, massive tuff with irregularly developed vertical jointing." (*From the Cal Poly Long Valley Field Guide*)





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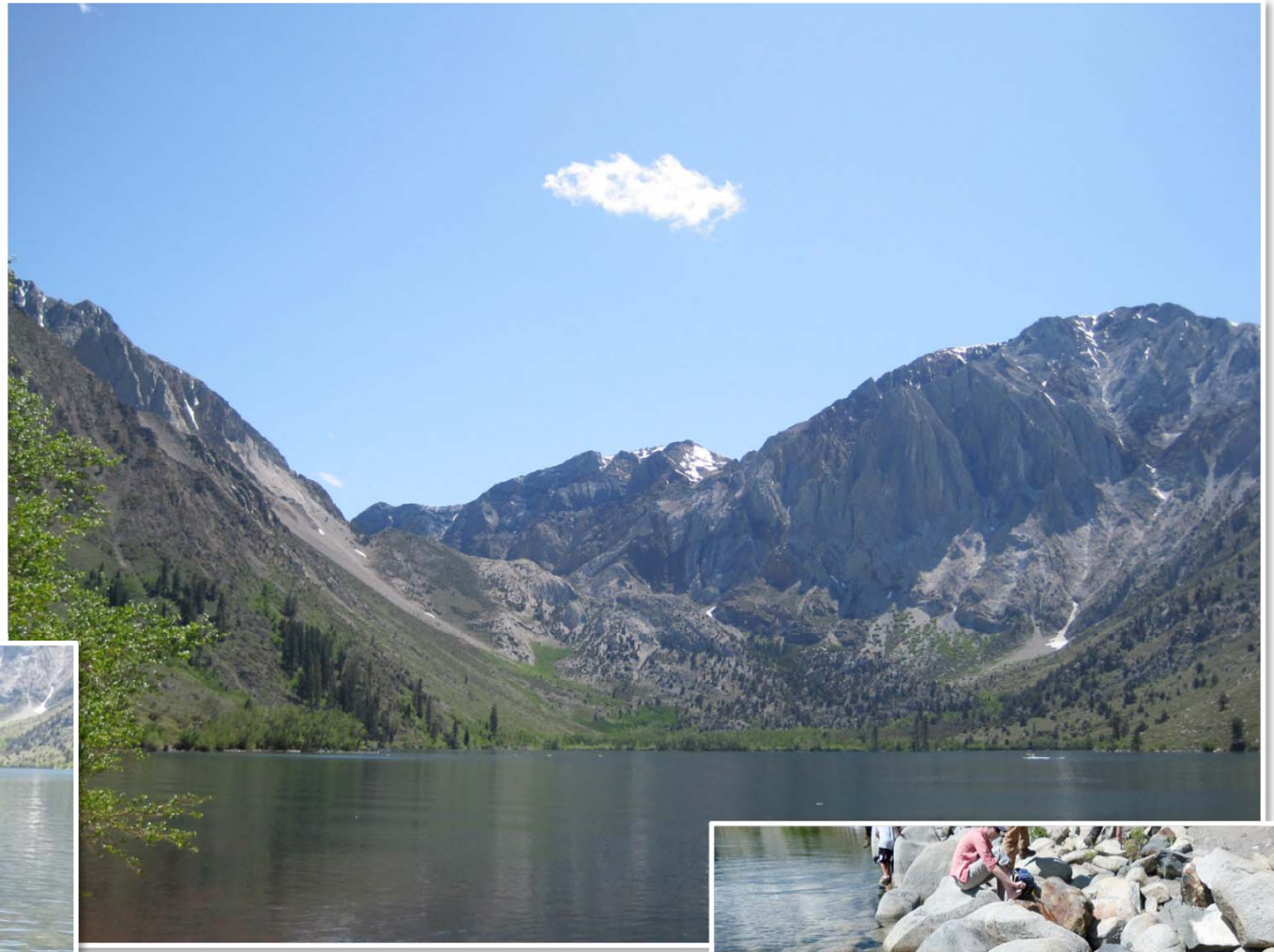
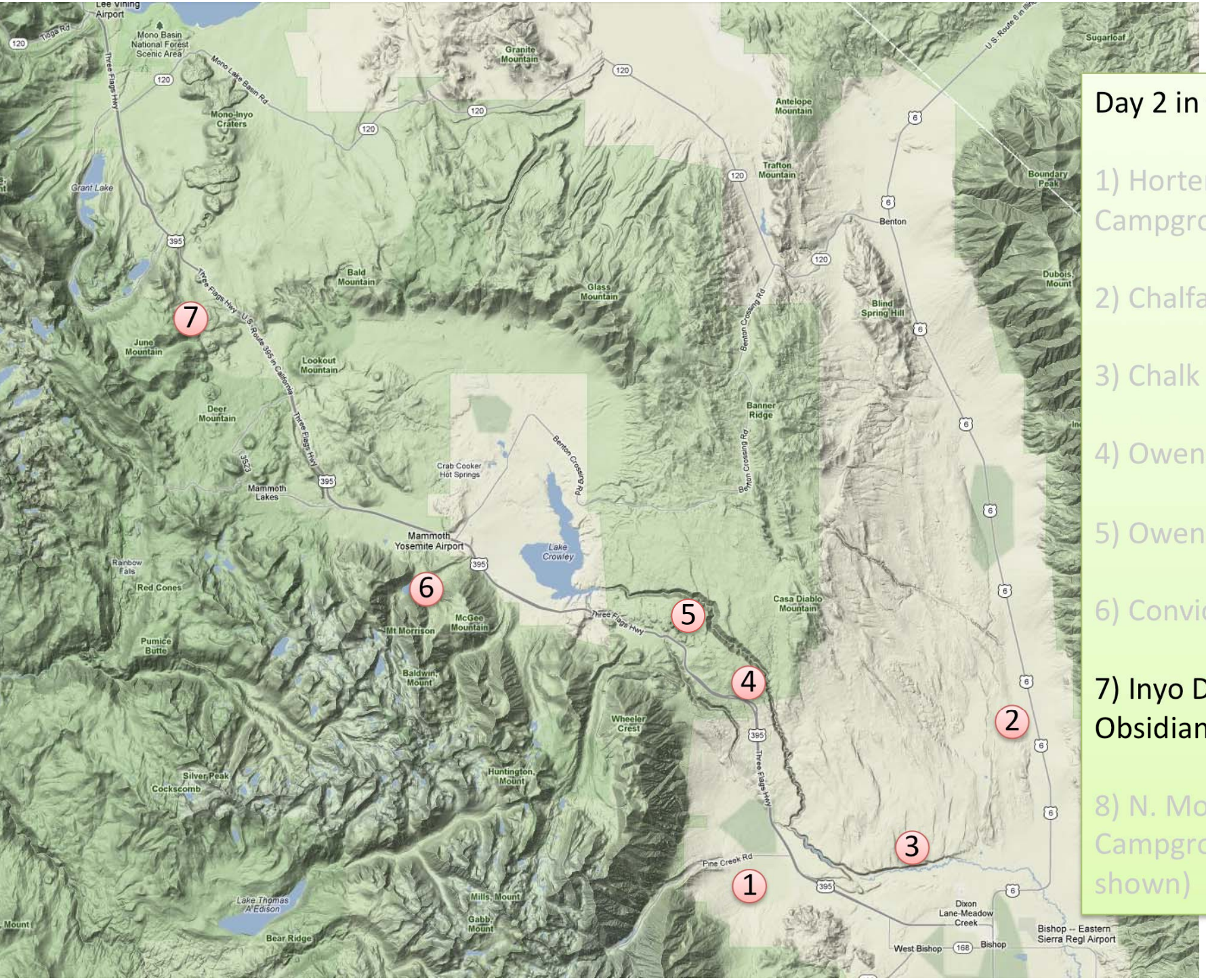
Convict Lake

The lake was named after an incident on September 23, 1871, where a group of convicts escaped from prison in Carson City. A posse, from Benton, led by Deputy Sheriff George Hightower, encountered the convicts near the head of what is now Convict Creek. Posse member Robert Morrison, a Benton merchant and Wells Fargo Agent, was killed in the encounter, and Mount Morrison was named after him.





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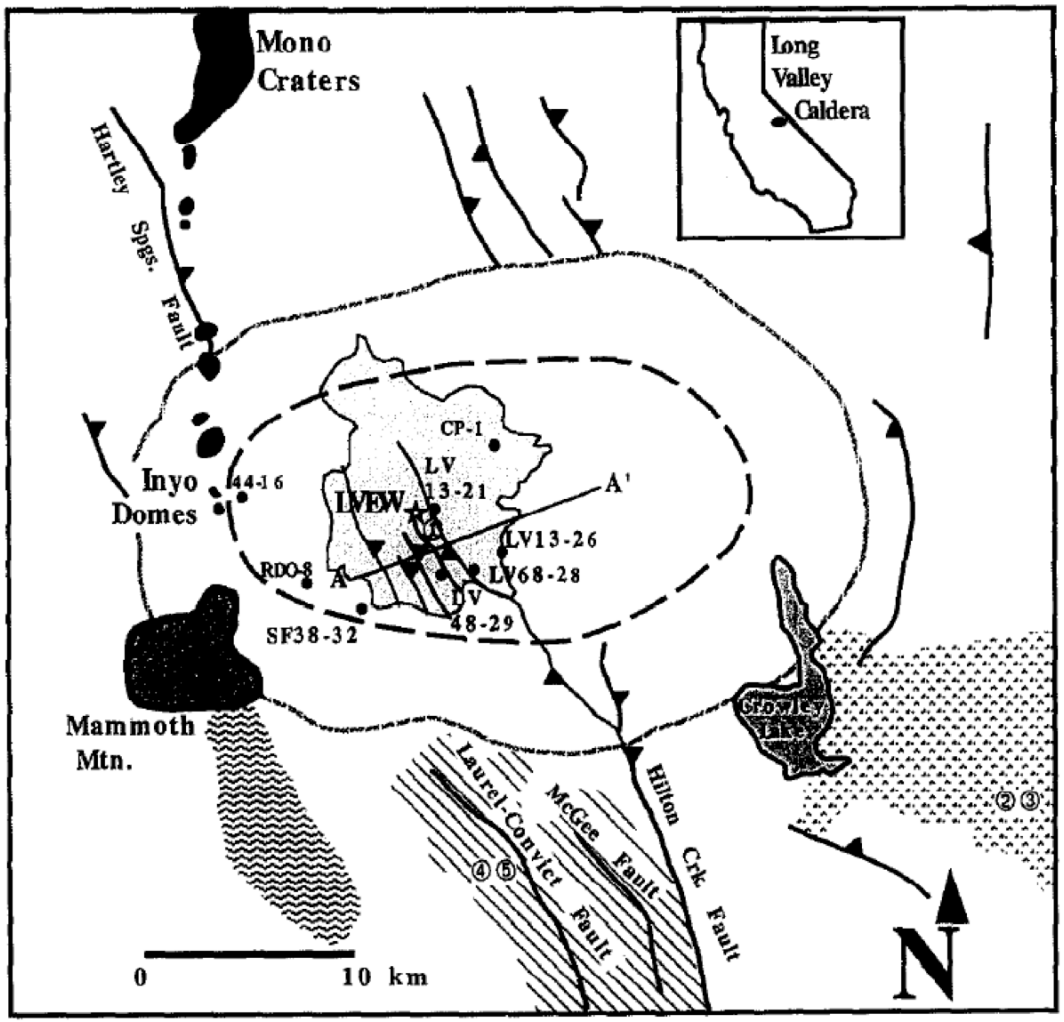
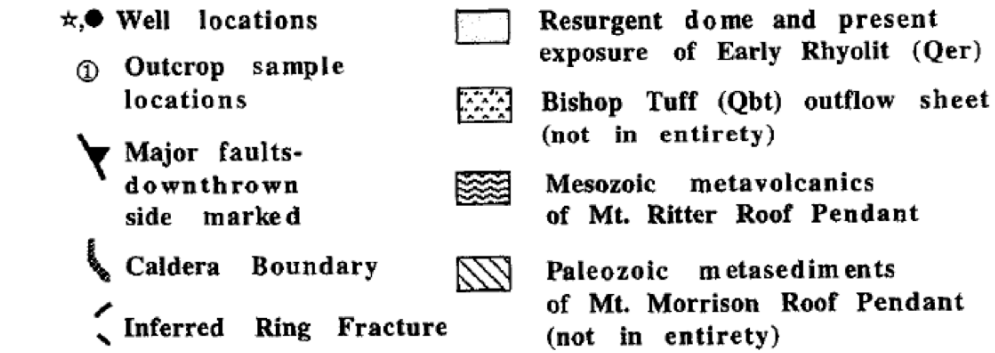
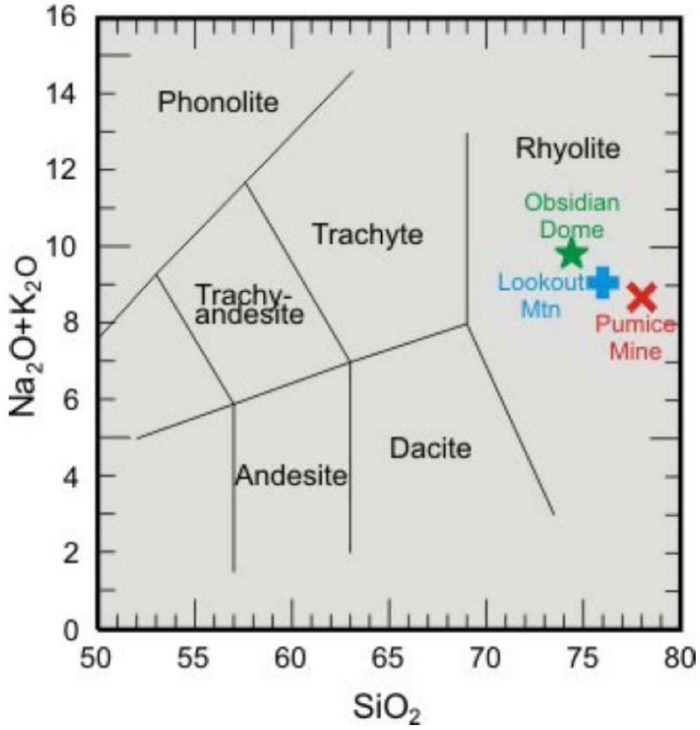


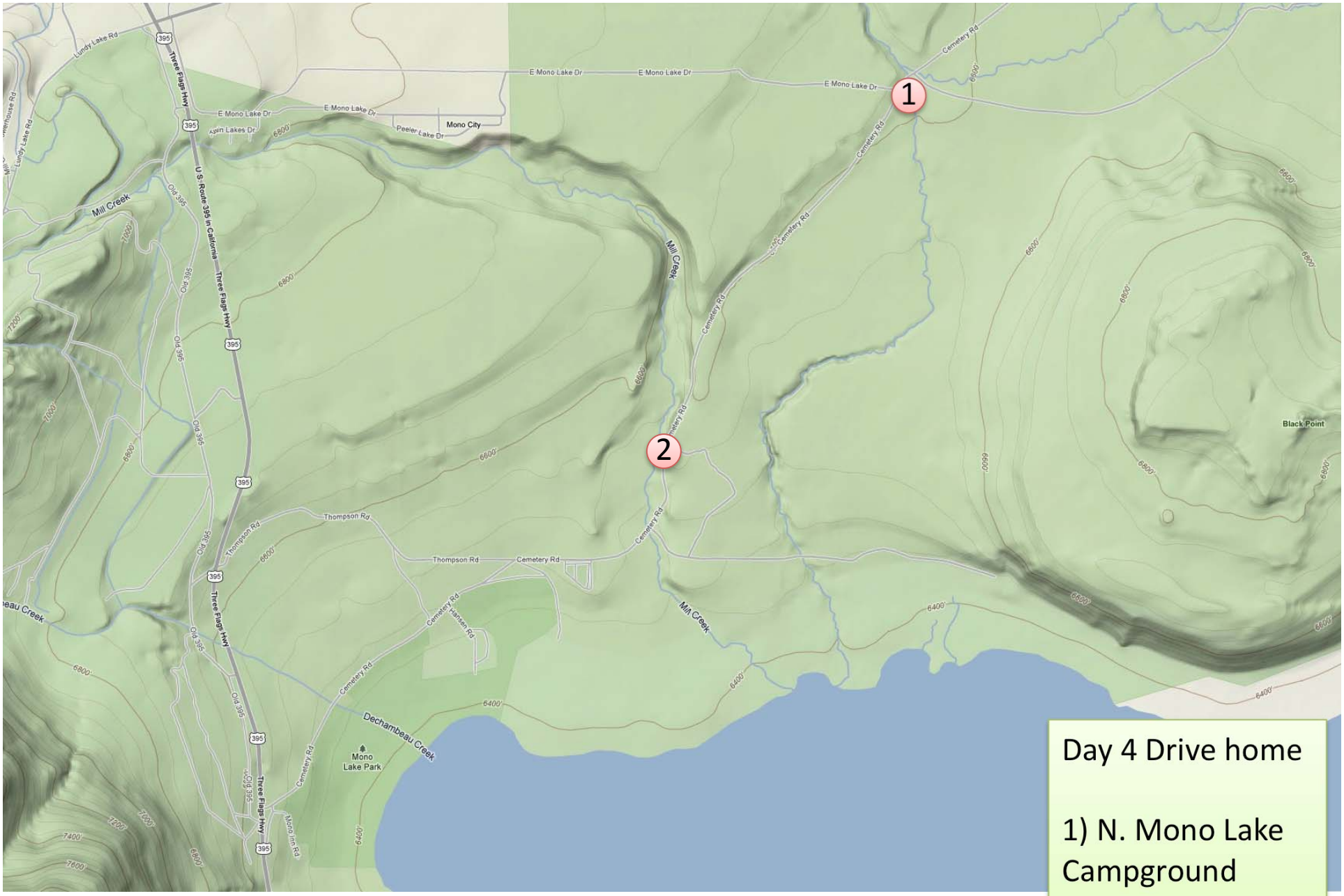


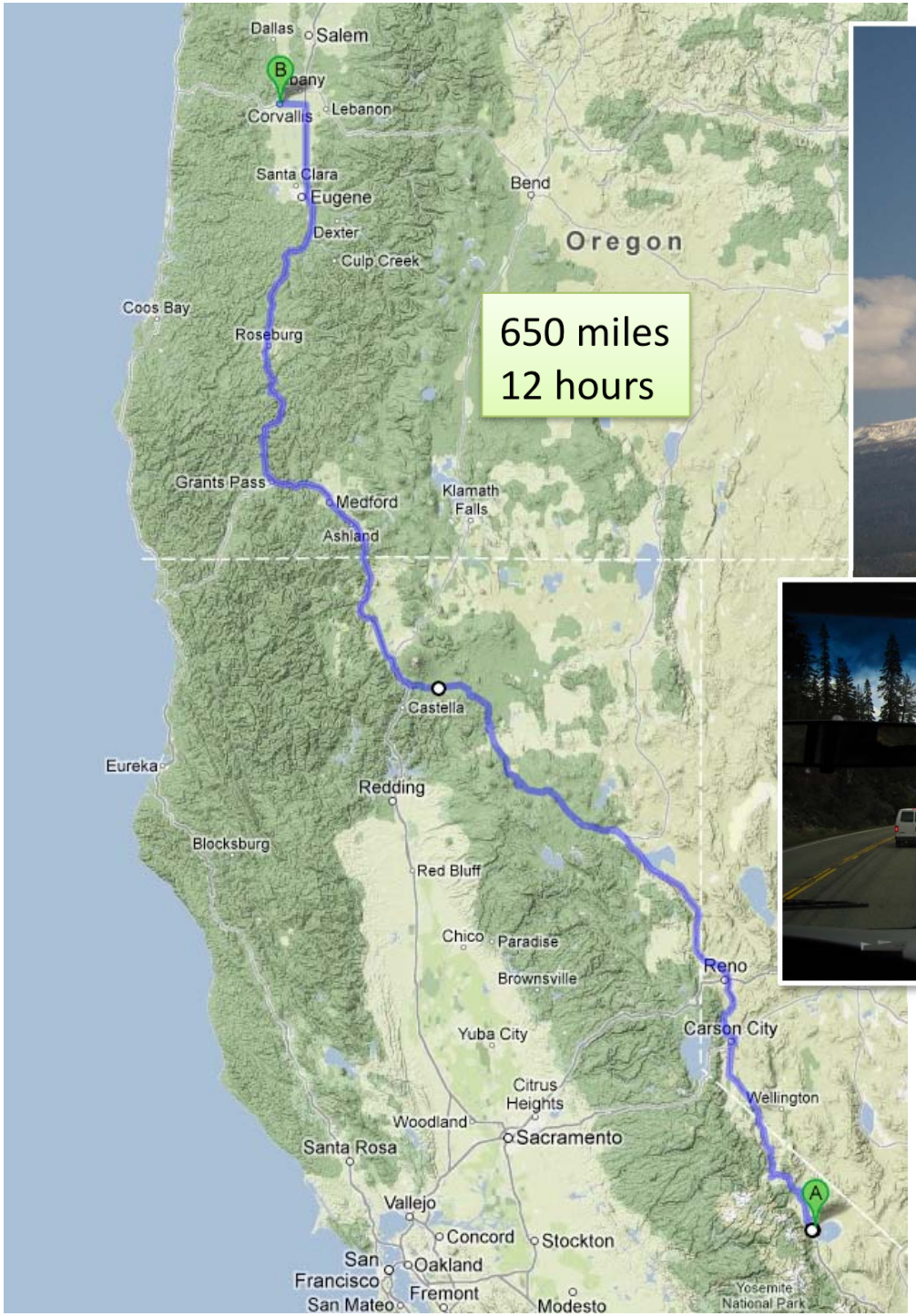
McConnell et al. (1997)



Jessey (2007)

Camp site, 3rd night


1
2
Day 4 Drive home
1) N. Mono Lake Campground
2) Liquefaction



Mt. Shasta

Lassen

the end