Intro To Geology In Lake and Mendocino Counties

Glenn McGourty,

Winegrowing and Plant Science Advisor

UCCE Mendocino and Lake Counties

We Are Stardust!

Most elements on this planet were not created in this solar system

The Periodic Table

Made in our Solar System

1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57-71	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89-103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Fl	115 Uup	116 Lv	117 Uus	118 Uuo
		57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	
		89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	

Requires Super nova to create anything >

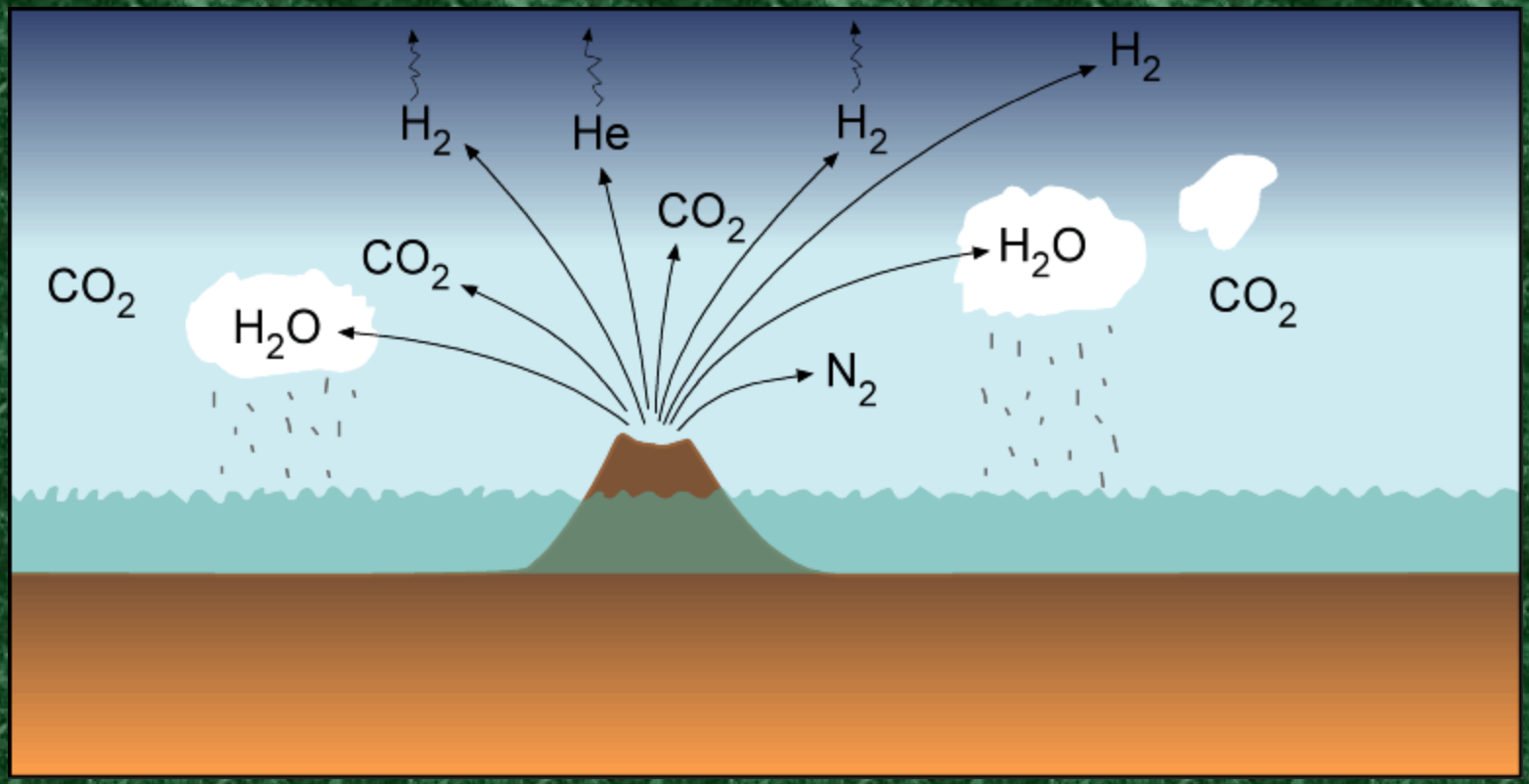
Big Bang (14 billion years ago)

Exploding Star (8 billion years ago)

Formation of a Planet: Earth, 4.5 Billion Years Ago

Formation of the Earth And Moon

Atmosphere Forms on Earth



Things Begin To Cool Down

CALIFORNIA:
A SPECIAL PLACE

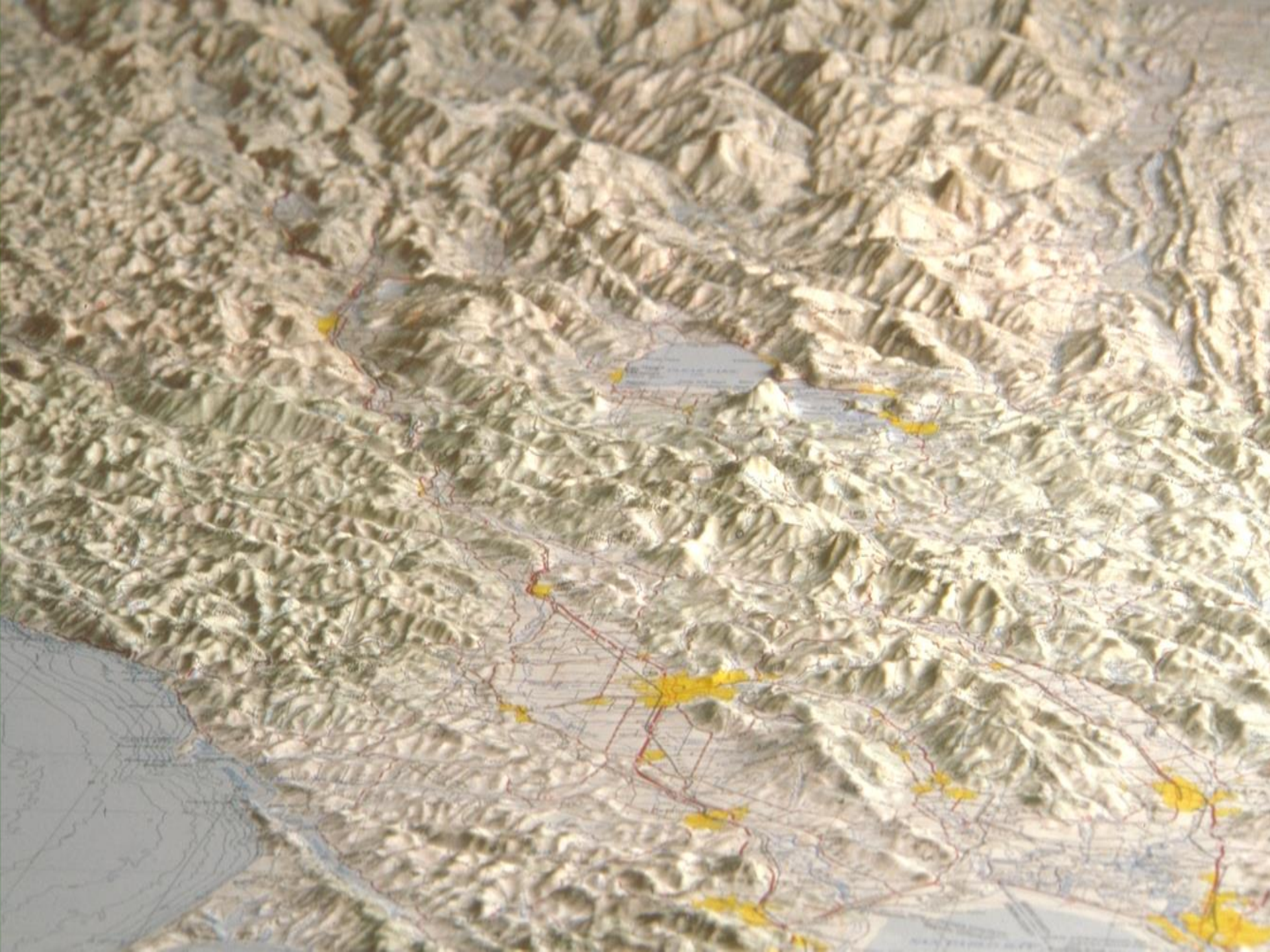
Unique Geology

Unique Climate

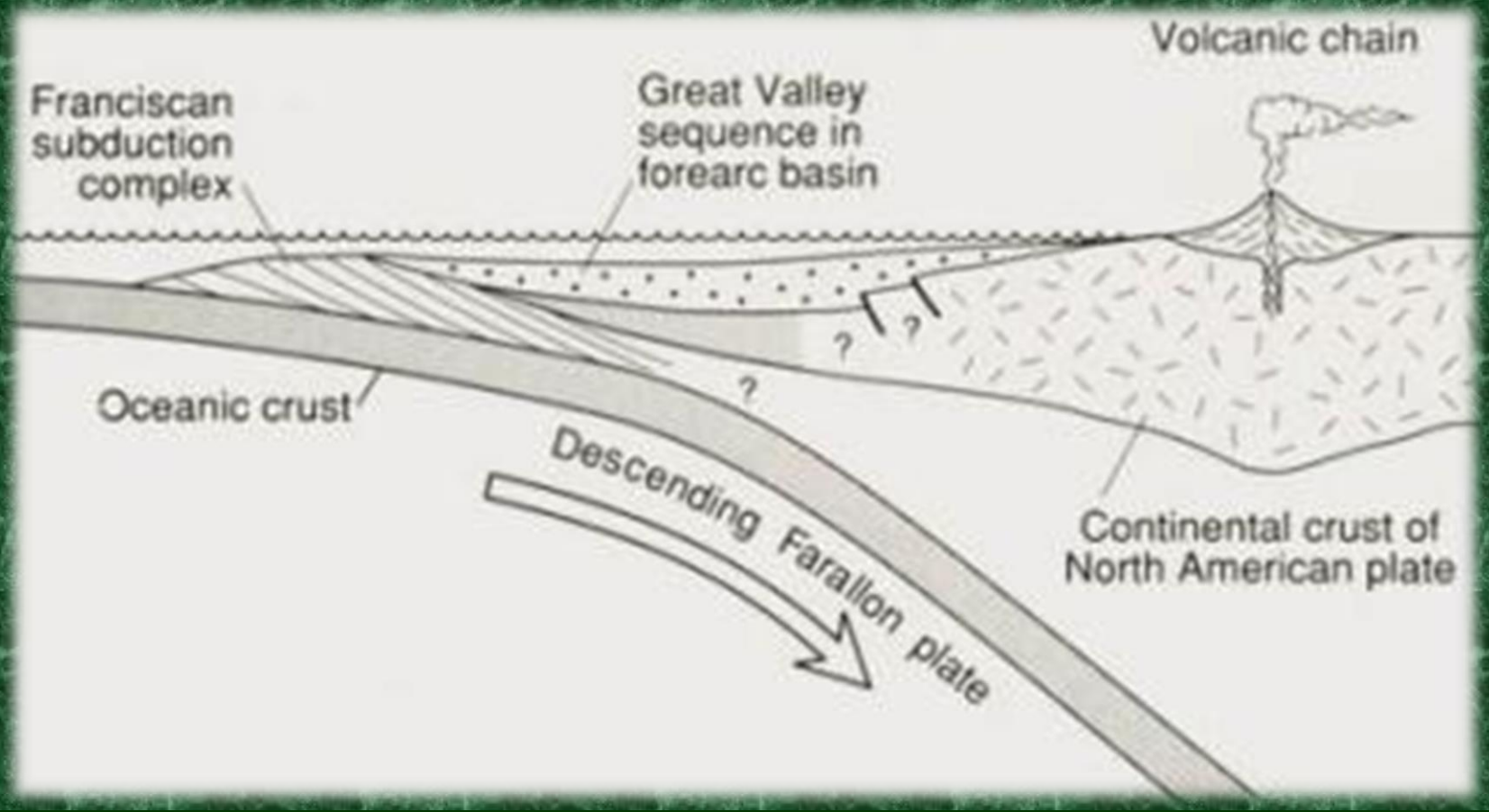
Unique Ecosystems

The Coast Range: A Wild and Crazy Place! (geologically speaking)

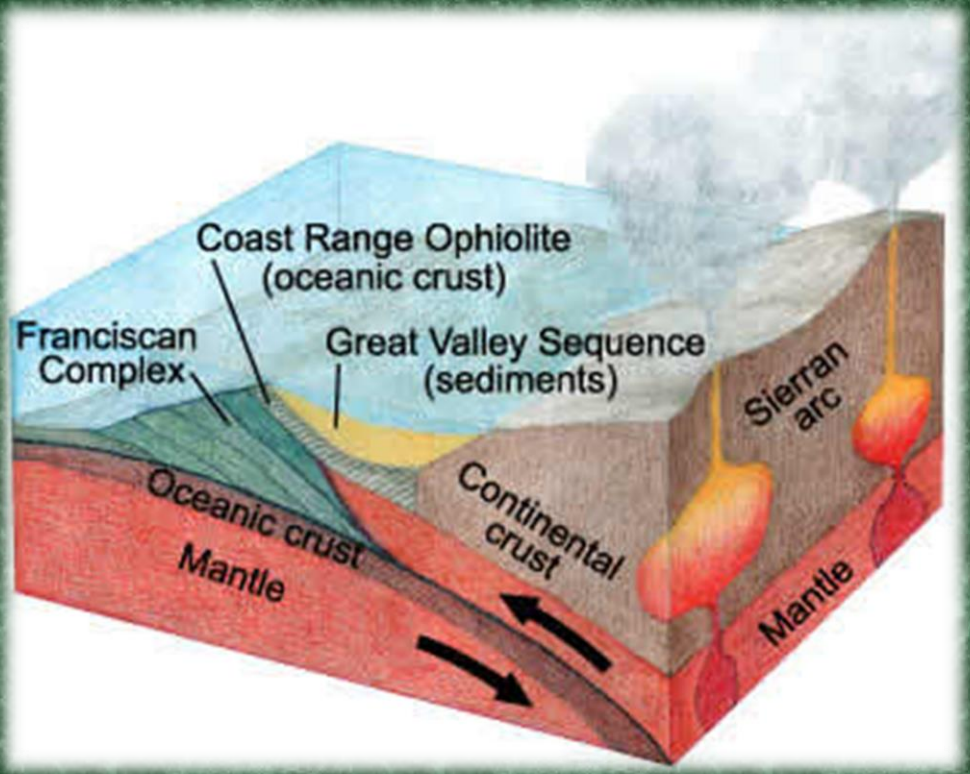
- Meeting of the Pacific and North American Plates
- Subduction zone in Lake County (one plate goes up, one plate goes down)
- Among the most unstable places on the planet

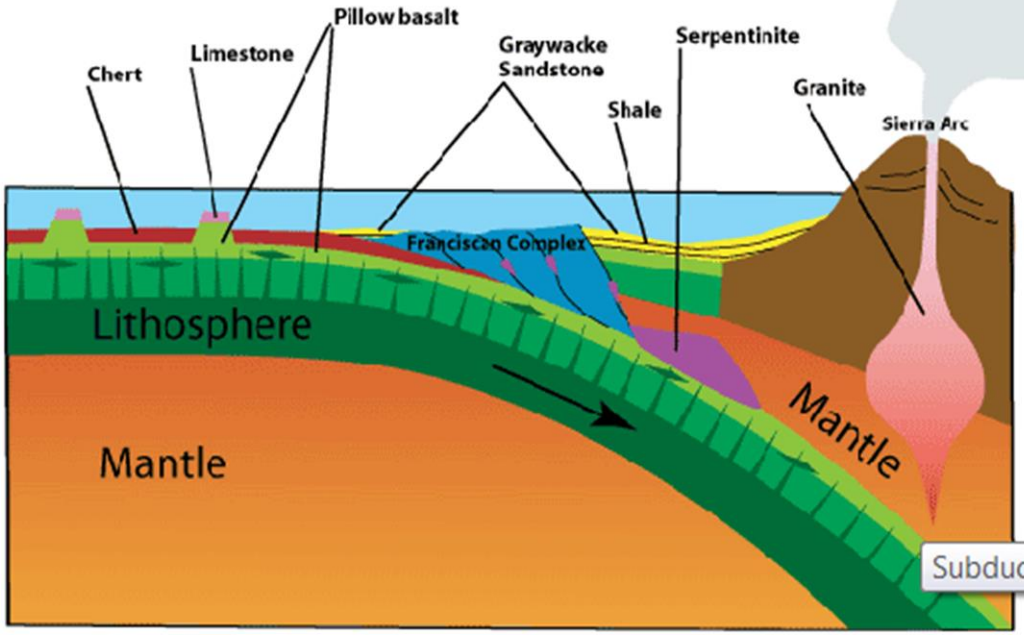


California Before The Coast Range



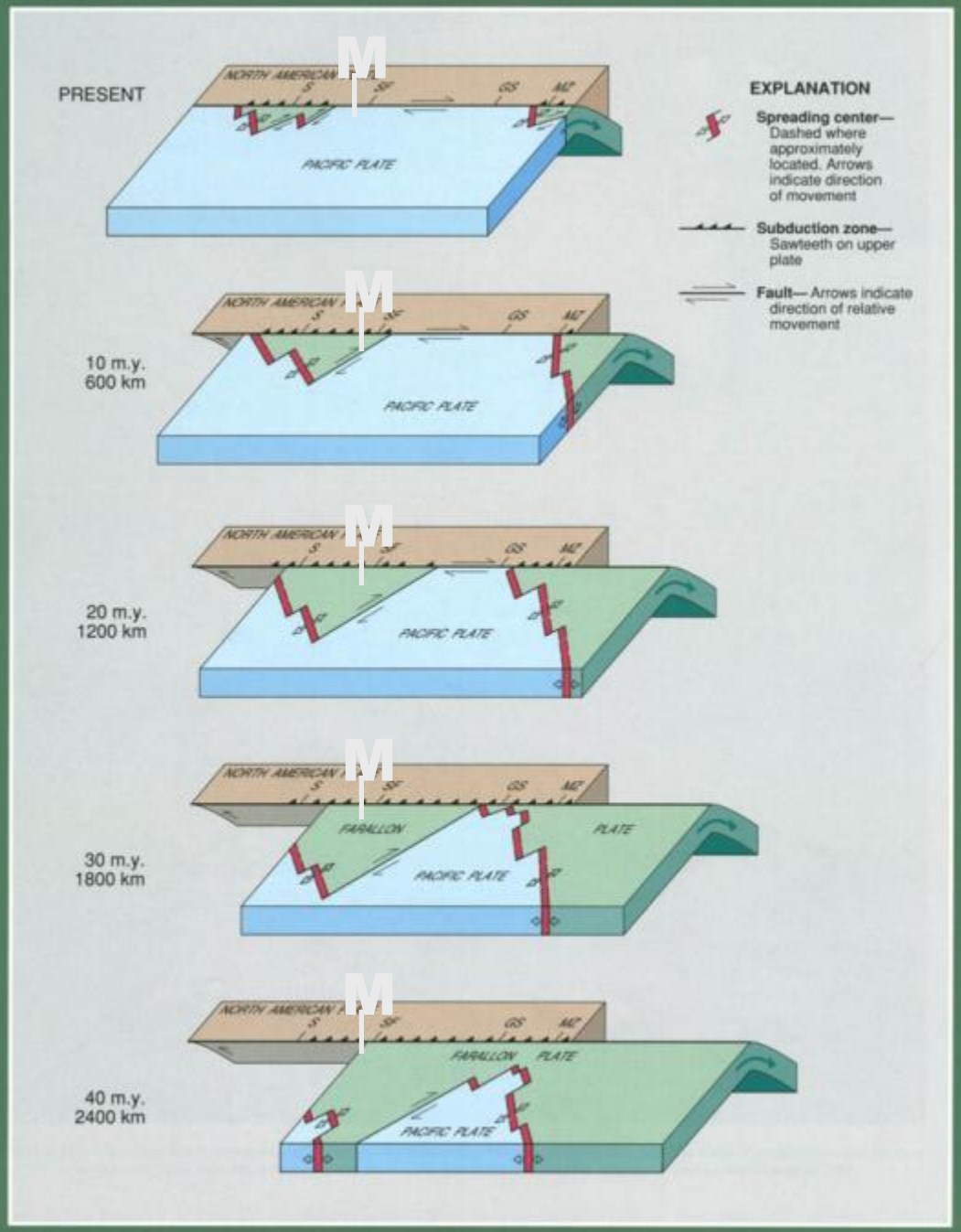
The Coast Range Forms





Subduction zone cross-section

Cross section of the West Coast of North America at about 100 million years ago, when the Franciscan complex was forming here. As the ocean crust was thrust under the continent, pillow basalts, chert, and limestone capped seamounts were scraped off and mixed with graywacke sandstone and shale shed from the continent, and sepentinite formed at the upper mantle, to

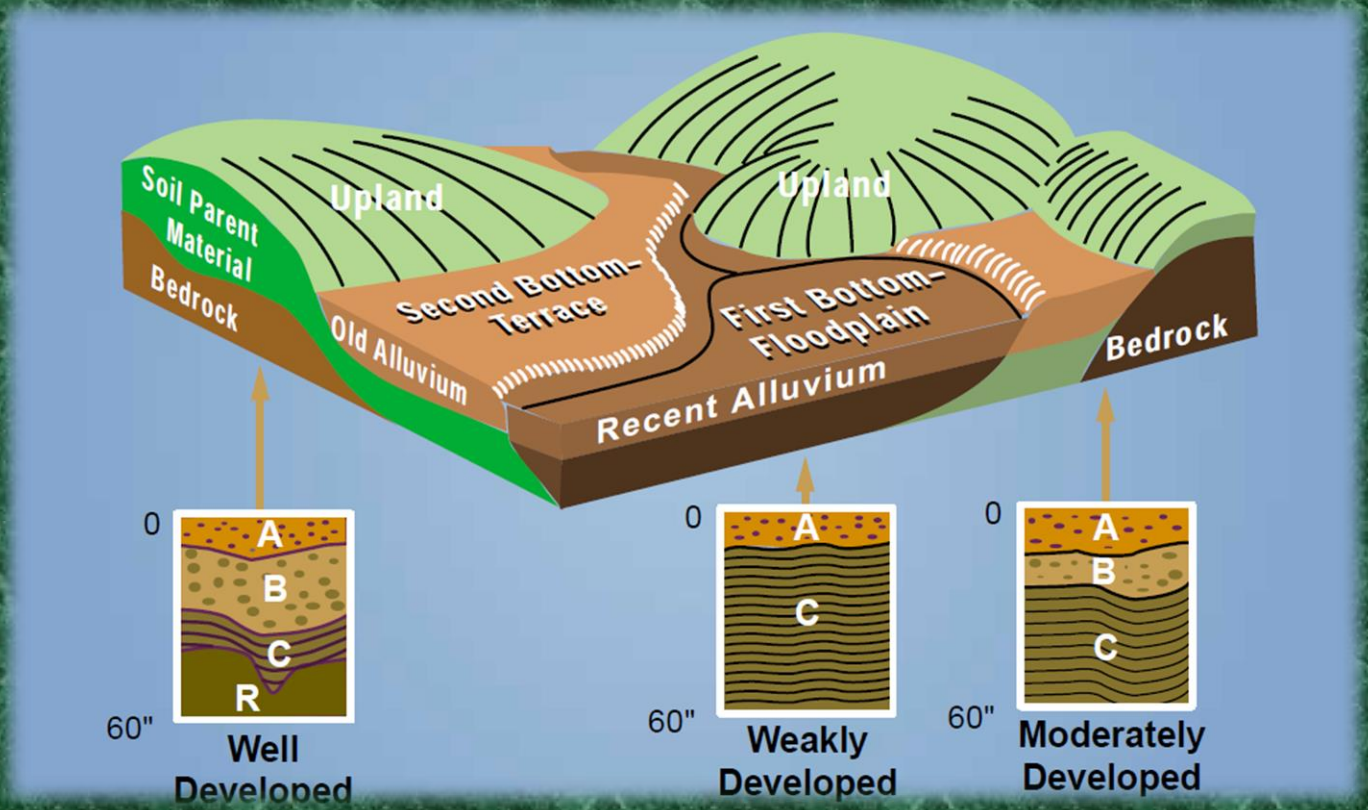

PRESENT
10 m.y.
600 km
20 m.y.
1200 km
30 m.y.
1800 km
40 m.y.
2400 km
PACIFIC PLATE
FARALLON
PLATE
EXPLANATION
Spreading center— Dashed where approximately located. Arrows indicate direction of movement
Subduction zone— Sawteeth on upper plate
Fault— Arrows indicate direction of relative movement


California's
San Andreas Fault
Crescent City
Eureka
Garberville
Point Delgada
Point Arena
Ukiah
Santa Rosa
Point Reyes
San Francisco
Daly City
San Jose
Santa Cruz
Hollister
San Juan Bautista
Monterey
Parkfield
San Luis Obispo
Simmler
Carrizo Plain
Soda Lake Rd
Frazier Park
Palmdale
Santa Barbara
San Bernardino
Desert Hot Springs
Los Angeles
Palm Springs
Brawley
San Diego
San Andreas Fault
Map copyright © 2006 David K. Lynch

Five soil-forming factors

- Parent material
- Climate
- Living organisms
- Landscape position
- Time

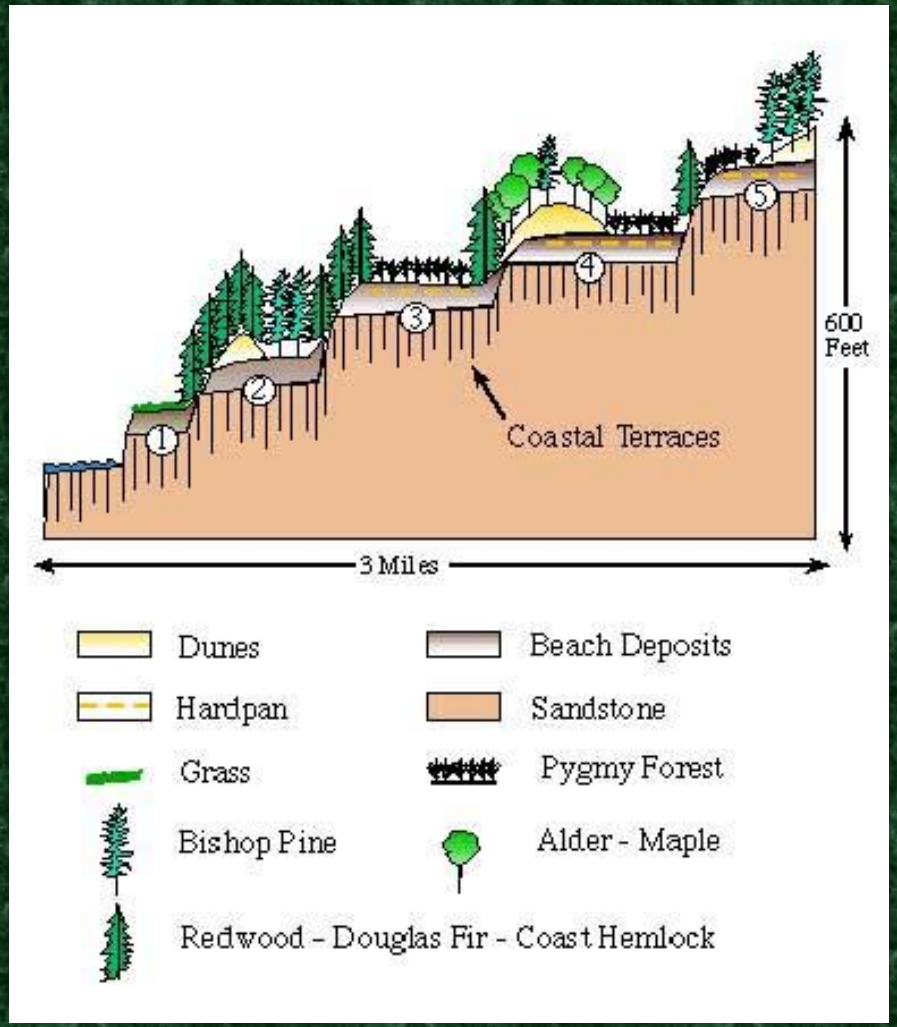
Soil Formation

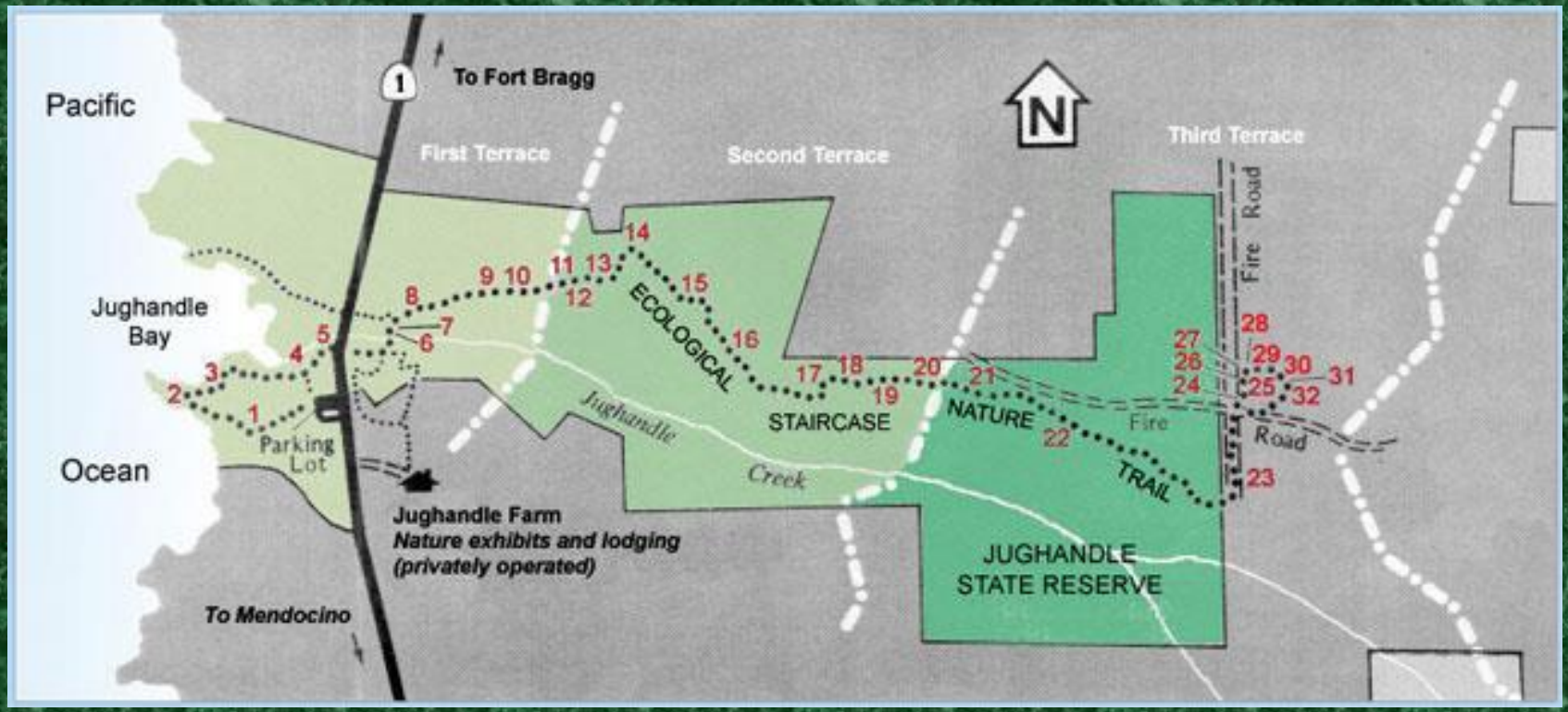


Anderson Valley

The Power of The Sea

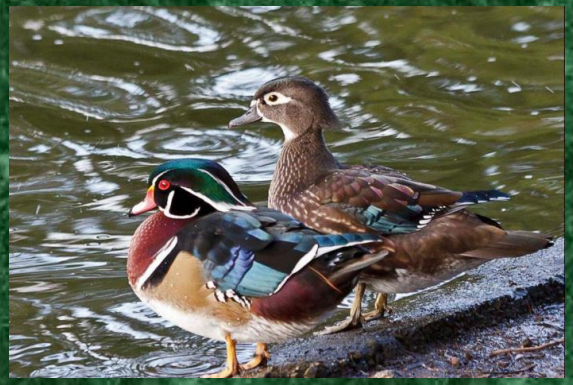
Coastal Terraces



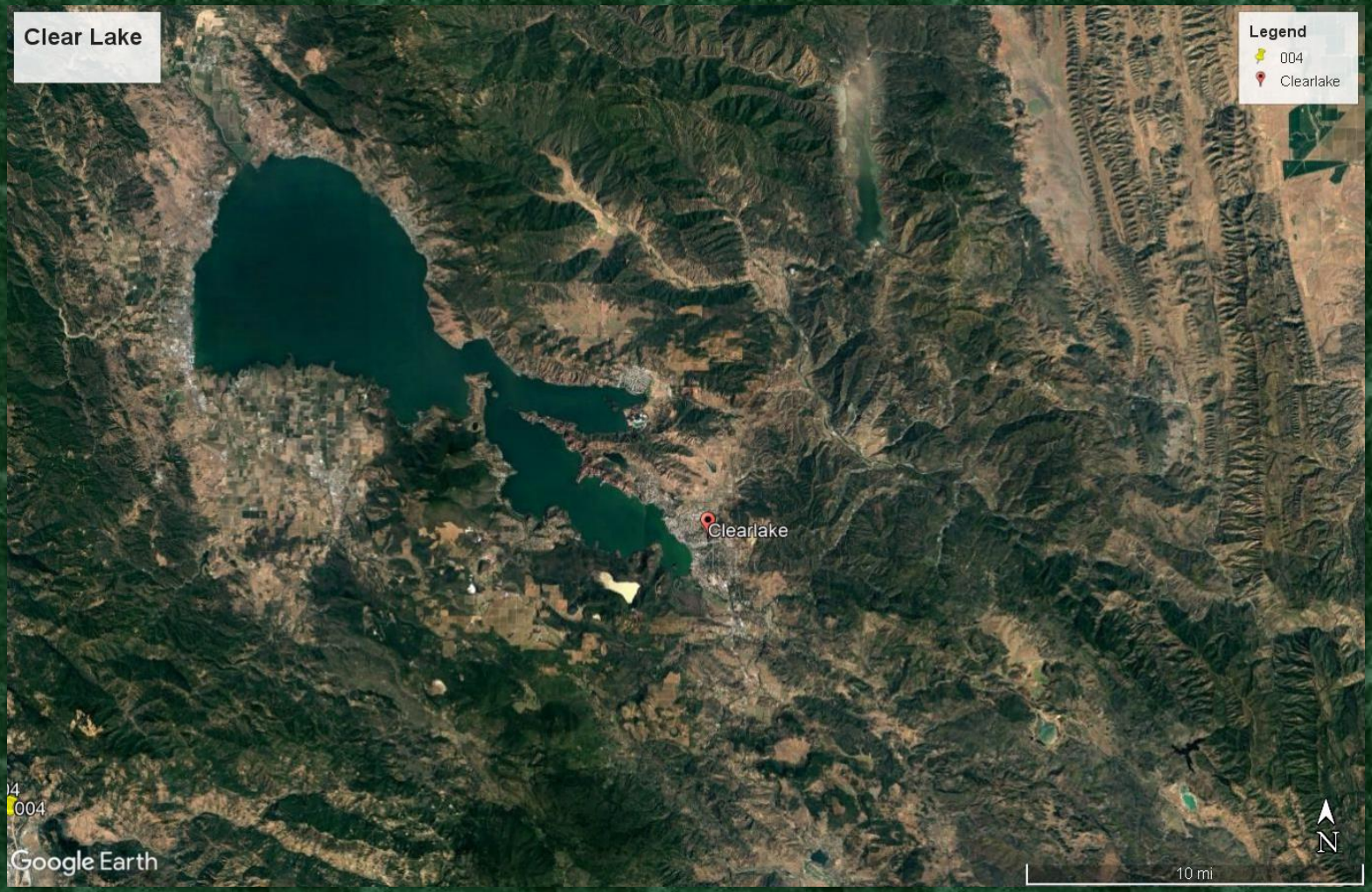

Pacific
Ocean
1
To Fort Bragg
N
First Terrace
Second Terrace
Third Terrace
Fire Road
Jughandle Bay
Parking Lot
ECOLOGICAL
STAIRCASE
NATURE TRAIL
Jughandle Creek
Fire Road
Jughandle Farm
Nature exhibits and lodging
(privately operated)
To Mendocino
JUGHANDLE STATE RESERVE
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

The Unique Geology Of Lake County

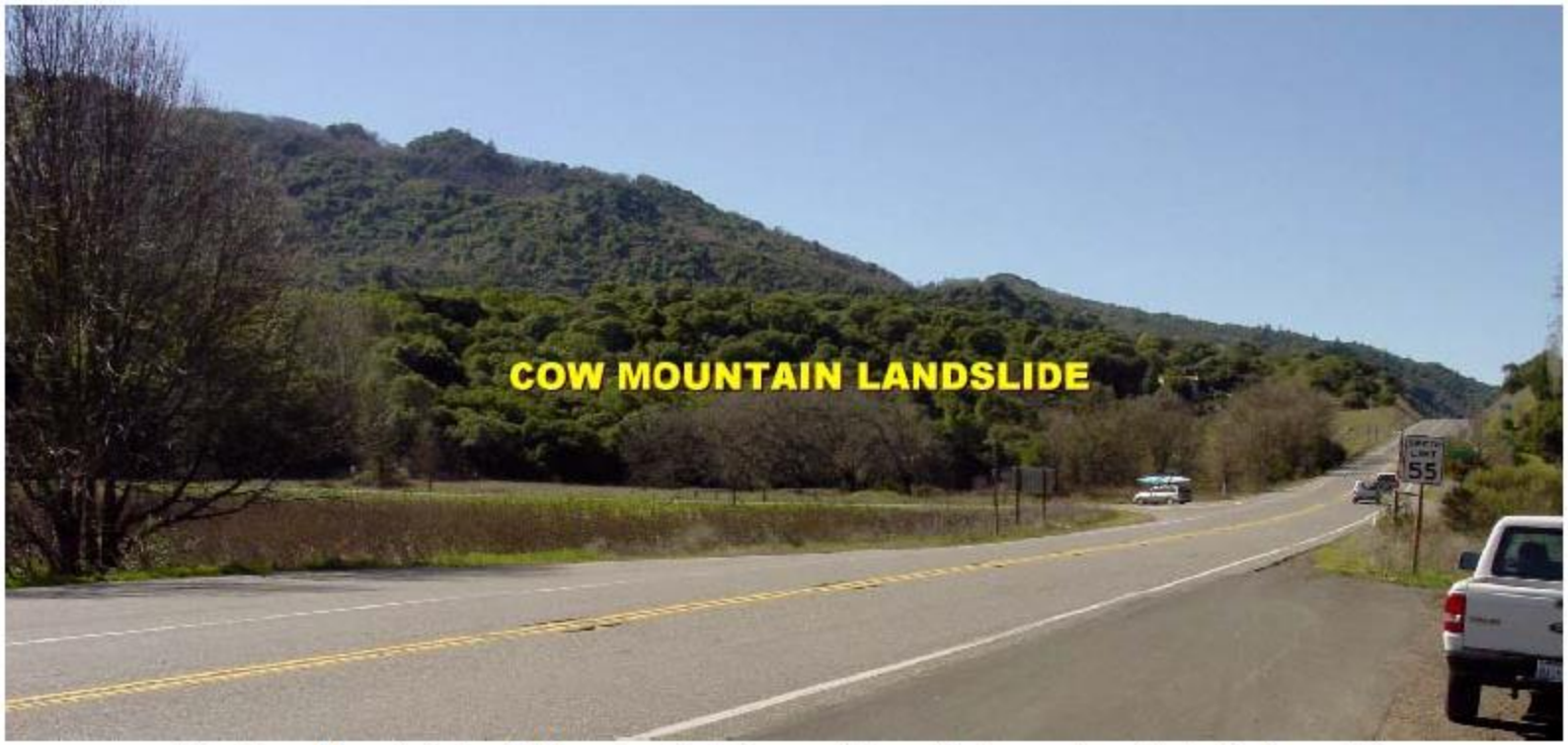
Clear Lake, an Old Lake



Pacific Plate, North American Plate

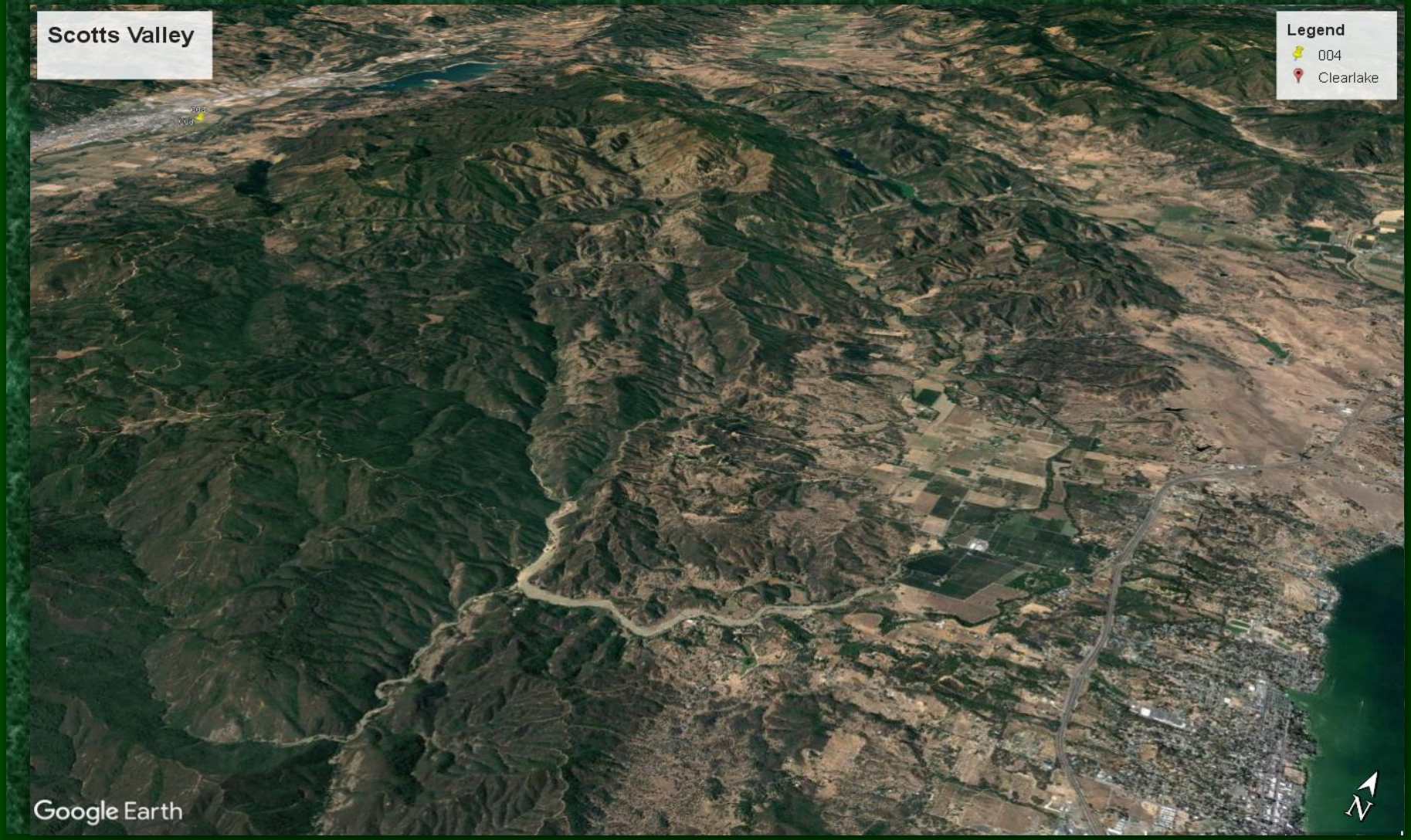


Change in Direction



The Cow Mountain landslide, view looking west from the turnout on State Highway 20.

Drainage to Russian River



One Day, Blue Lakes Will Fill In

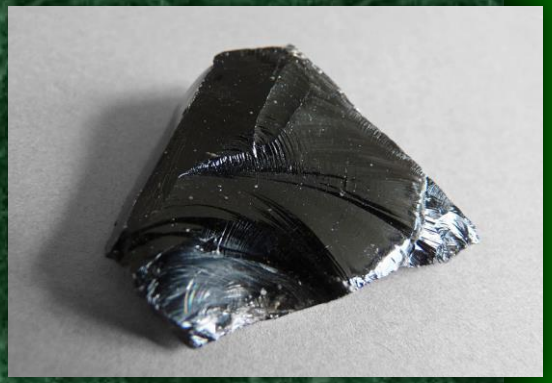
Blue Lakes, with Clear Lake in the distance.

Clear Lake Drainage Today

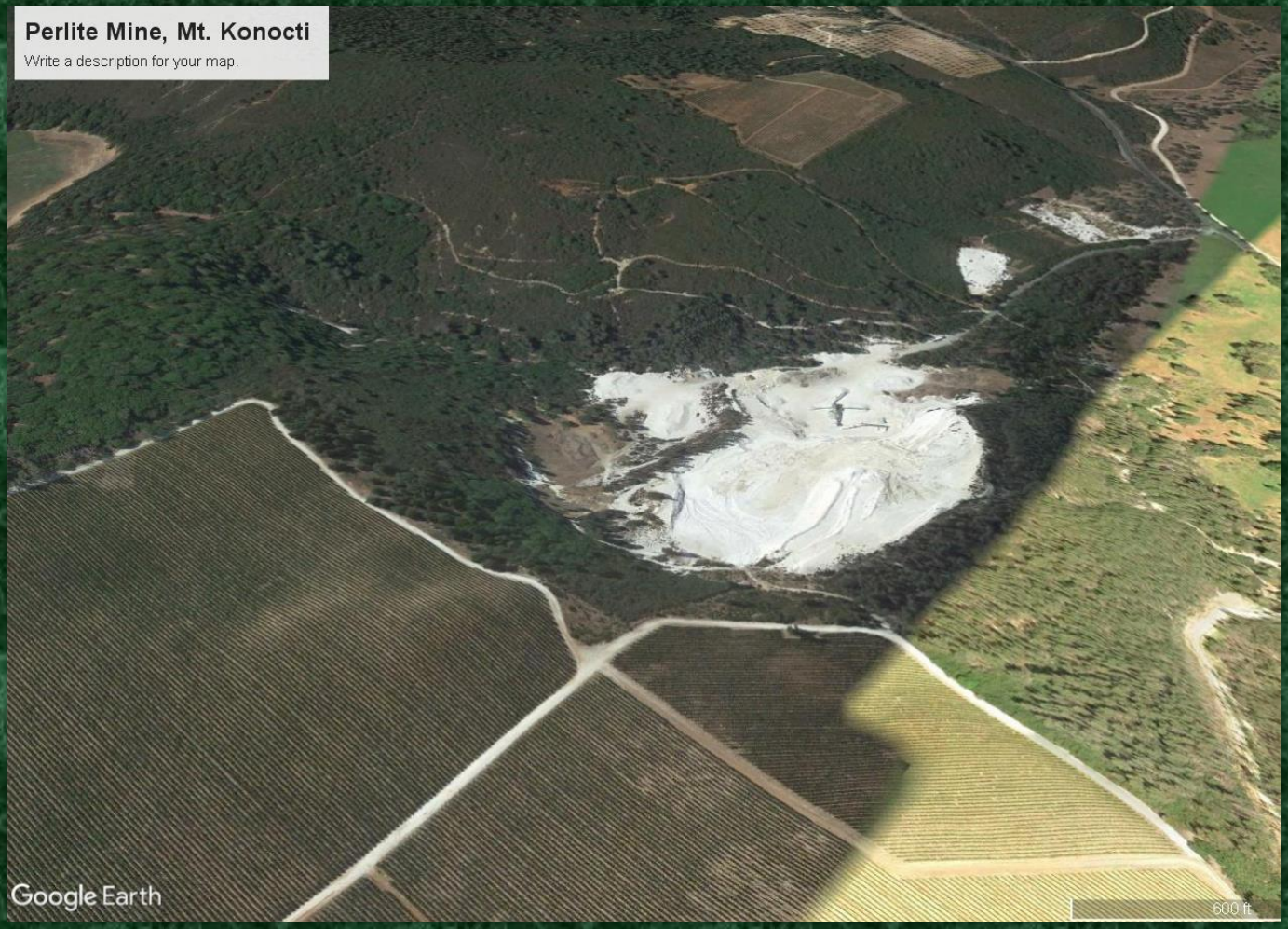
Mysterious Mt. Konocti

- About 500,000 years old
- Last erupted 13,000 years ago
- May have a large cavern inside
- People can hear the mountain “breath”

Volcanic Areas



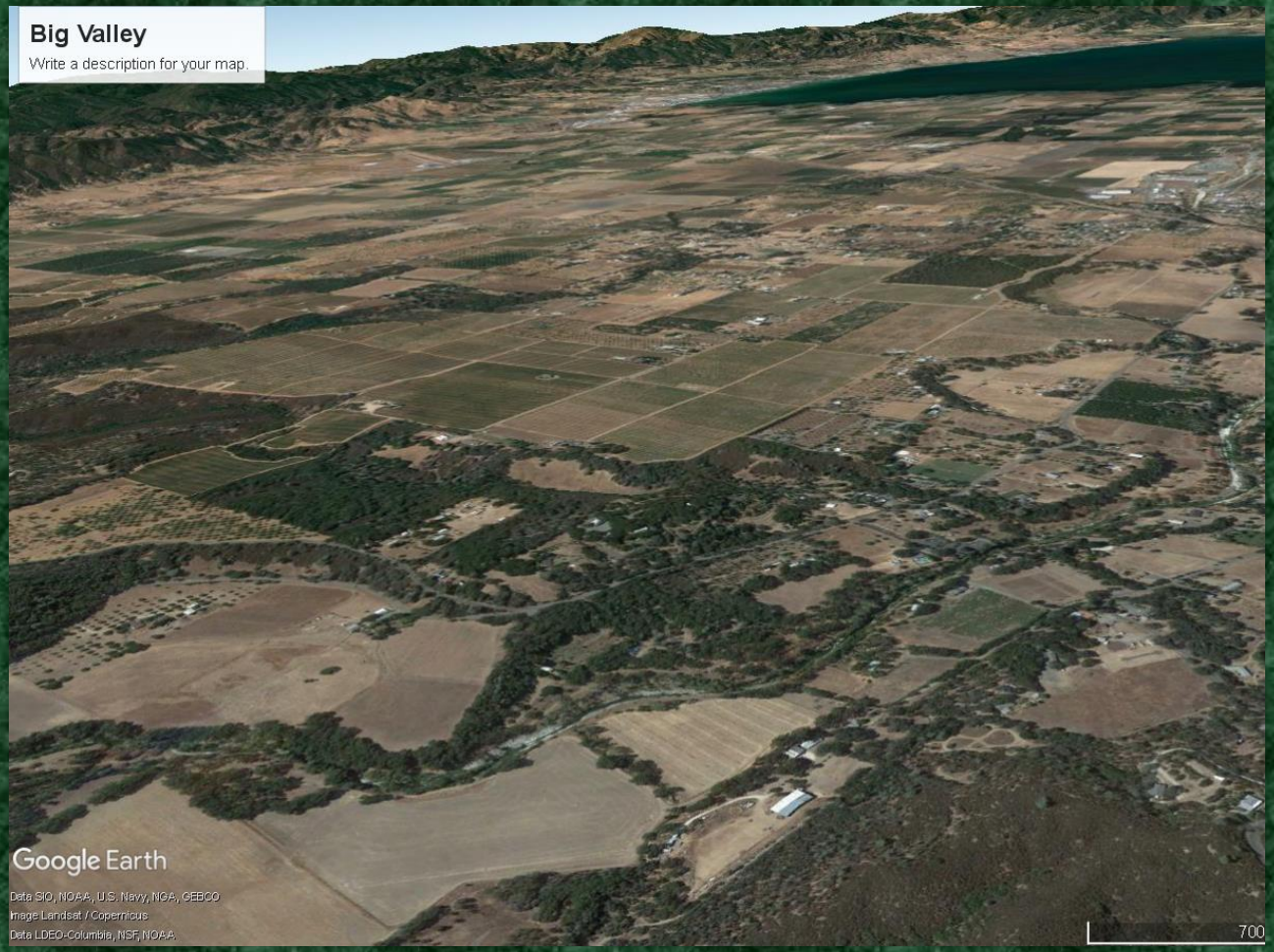
Volcanic Vent



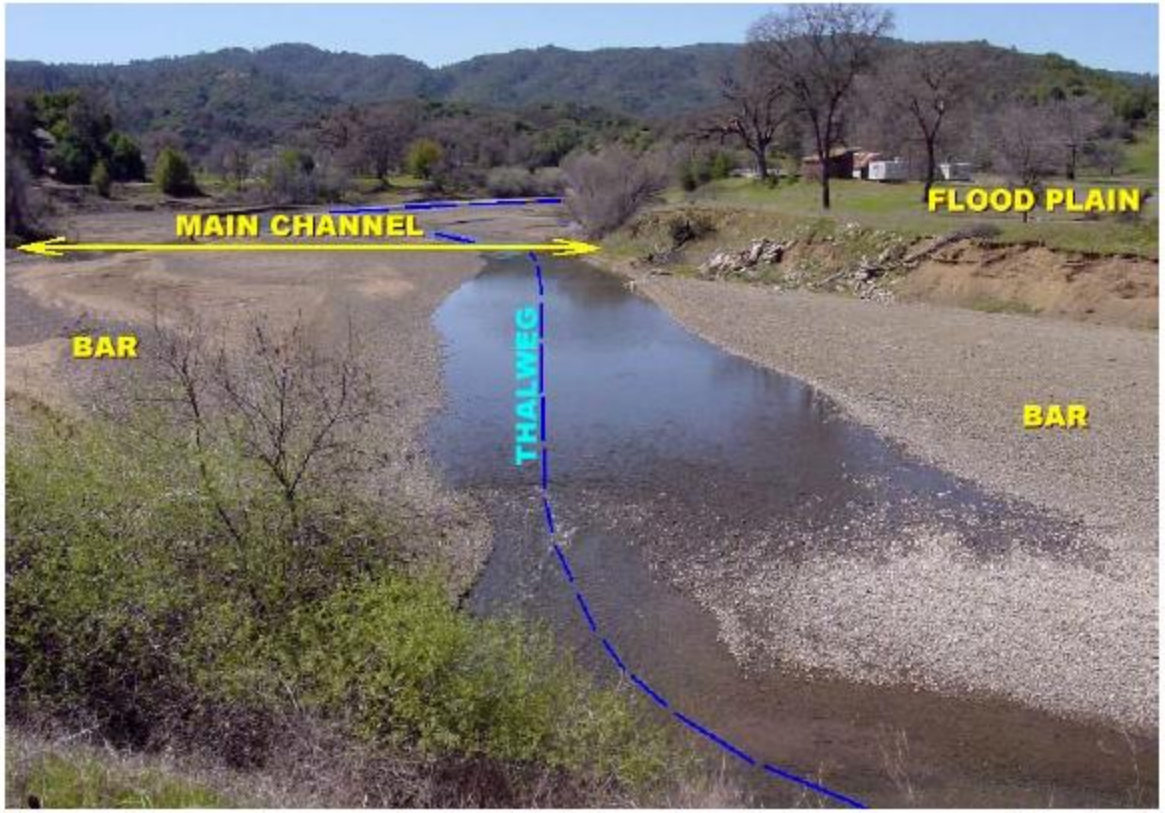
Highway 29, Red Hills. Caldera

Erosion from the South

Big Valley, Lake Deposits



Upper Lake



View looking upstream on Scotts Creek from Stop 2, showing some of the basic components of the stream channel and flood plain. The photograph was taken in March 2007.

A groundwater well along Scotts Valley Road, showing subsidence around the well collar.

Little Borax Lake: Maar

Aerial photo of Little Borax Lake and Buckingham Peak, showing the location of Stop 6. Notice the nearly circular form of Little Borax Lake, which is situated in the crater of a maar. (Air photo courtesy Lake County GIS).

Franciscan Rock Association

- Uplifted marine sandstones, weakly stratified, always tumbled (shaken, not stirred…)
- Intrusions of ultramafic rock: magma boiling up from the sea bottom through fissures into salt water=serpentine rock

Serpentine Rock as a Parent Material

- High in magnesium
- Not hard
- Weathers easily

Serpentinite: Blue Soil Blues

- High magnesium in general
- Very problematic when Magnesium base saturation> 60%
- May also have high levels of Manganese and Nickel
- Asbestos potential air quality problem
- Unstable—prone to slippage

Plant Growth Problems

- Soils poorly aerated when wet (basic glop), hard when dry, poor root development
- Soils low in potassium
- Potential toxic elements

More Problems

- Subsoils don't drain well, salts will accumulate unless drainage provided
- Subsurface unstable, prone to slippage, especially when saturated and no drains are provided

December 31, 2005 7:58 a.m.