

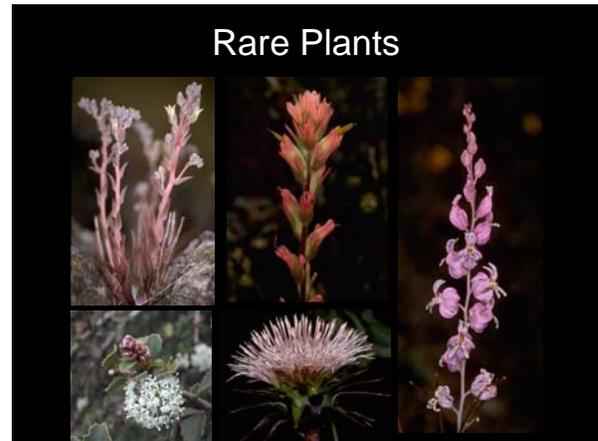
Serpentine soil has unique chemical properties

- Low nitrogen
- Often low in phosphorus and potassium
- High magnesium to calcium ratio
- Toxic metals (nickel, chromium, cobalt)
- California state rock

Serpentine
#R 027

Serpentine is a refuge for many plants

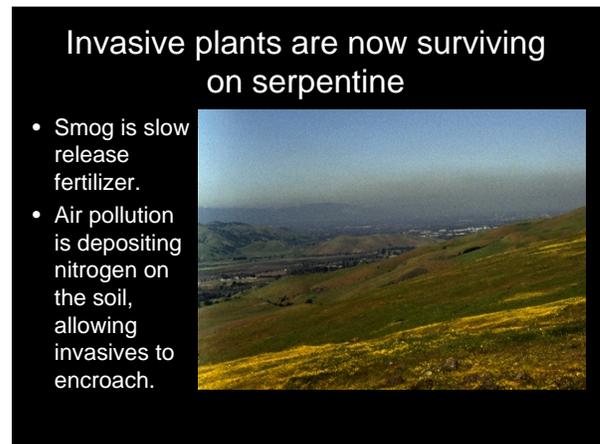
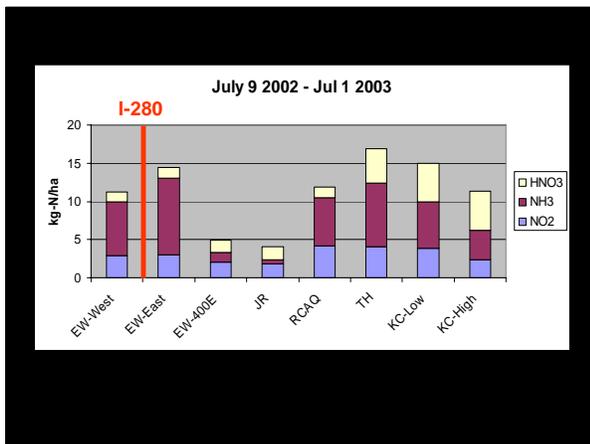
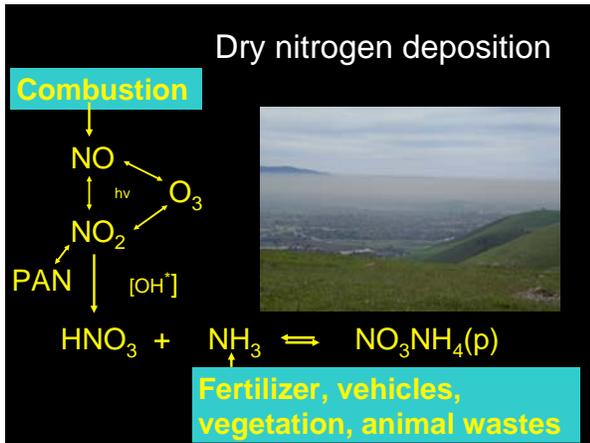
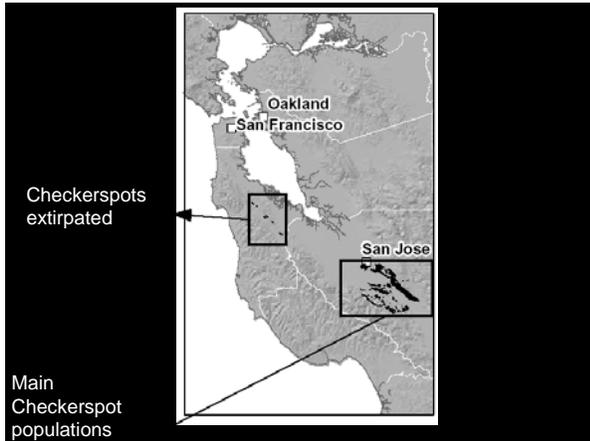
- High endemism
- Invasive plants historically haven't tolerated serpentine soil.
- Many natives have been pushed by invasives onto serpentine.



Bay checkerspot butterflies are a threatened species

- Larvae are dependent on *Plantago erecta* for food.
- *Plantago erecta* is mostly restricted to serpentine soils.

Plantago erecta California plantain

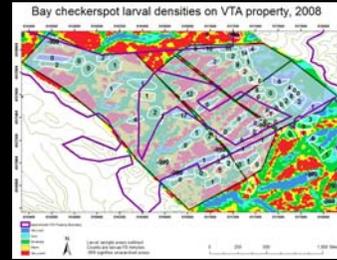


Projects that increase nitrogen deposition require mitigation

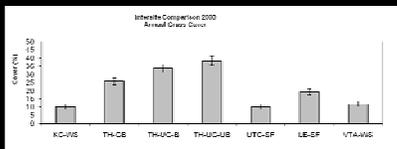
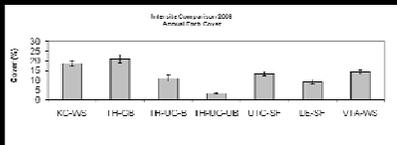
- Negative impacts on serpentine grasslands that support rare species must be mitigated.
- Power plants, highway widening, HCP, etc.
- Land purchases, management, and monitoring



Larval monitoring



Vegetation monitoring



Serpentine grasslands must now be managed to reduce nonnatives

- Different grazing regimes support robust populations of checkerspot butterflies and other rare plants.
- ~1 cow-calf pair per ten acres, grazing about 6 months/year
- Unmanaged areas do not support checkerspots.



Cattle graze on the right side of the fence. The left side of the fence has lots of invasive grass and few wildflowers.

Grazing and rare species

- On our sites, grazing has been critical to maintaining rare species habitat.
- Monitoring data has been key to educating regulators and getting additional funding for purchasing and managing rare species habitat.
- Be proactive with regulators.



Questions?

