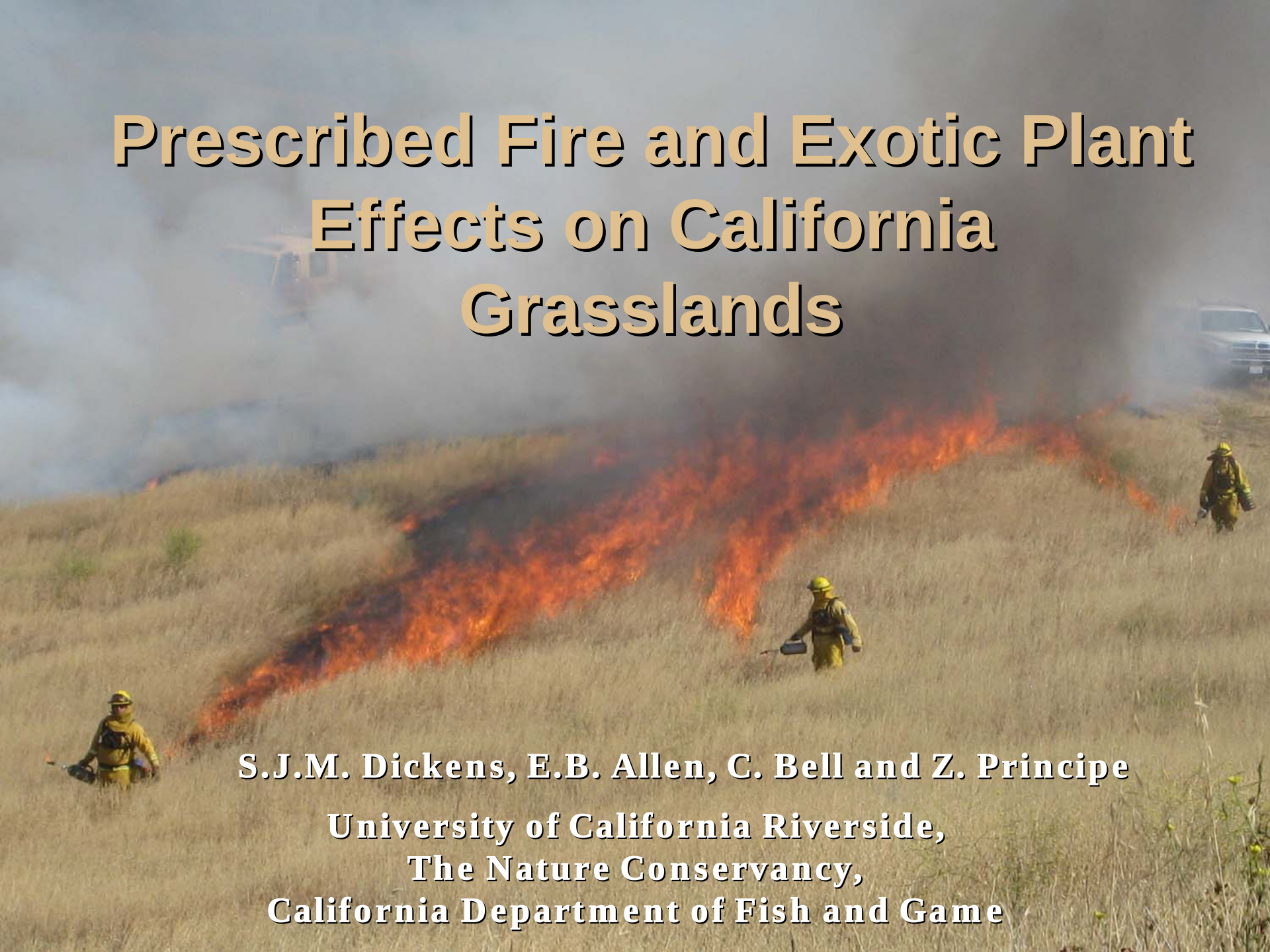
Prescribed Fire and Exotic Plant Effects on California Grasslands



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The Nature Conservancy,
California Department of Fish and Game

Santa Rosa Plateau Ecological Reserve

- Over 8000 acres
- 5 ecosystem types
- Many rare and endangered species
- Prescribed burning for 20 + years

Pictures: Cal Photos and Friends of Swainson's Hawk

Exotic Annual Grasses of Concern

Avena barbata and
A. fatua

Bromus diandrus, B. rubens,
B. hordeaceus

Vulpia myuros

Cal Photos

Prescribed Fire

Removal of exotic seed and thatch to release native plant species. Burns occur in the spring in Southern California to capture exotics with seed still on the standing biomass.

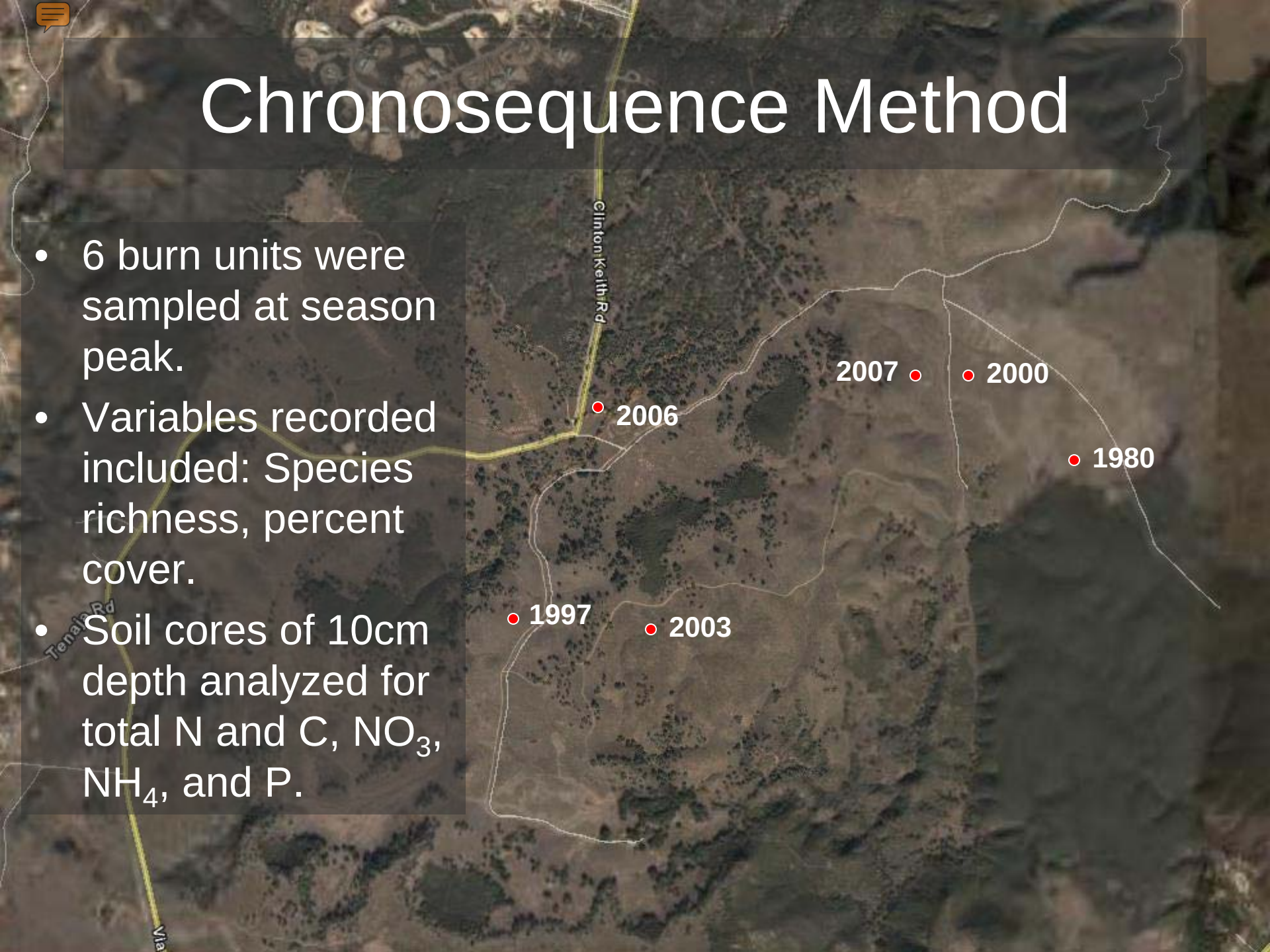
(Hervey 1949; Gillespie & Allen 2004; Moyes et al. 2005; White et al. 2006)

Project Objectives

1. Examine the effectiveness of spring, prescribed burns in controlling exotic grasses.
2. Determine an optimal burn regime to reduce exotic grasses and release native plant species .
3. Determine if soil chemistry is responding to reduced exotic grass caused by burning.

Chronosequence Method

- 6 burn units were sampled at season peak.
- Variables recorded included: Species richness, percent cover.
- Soil cores of 10cm depth analyzed for total N and C, NO_3, NH_4, and P.

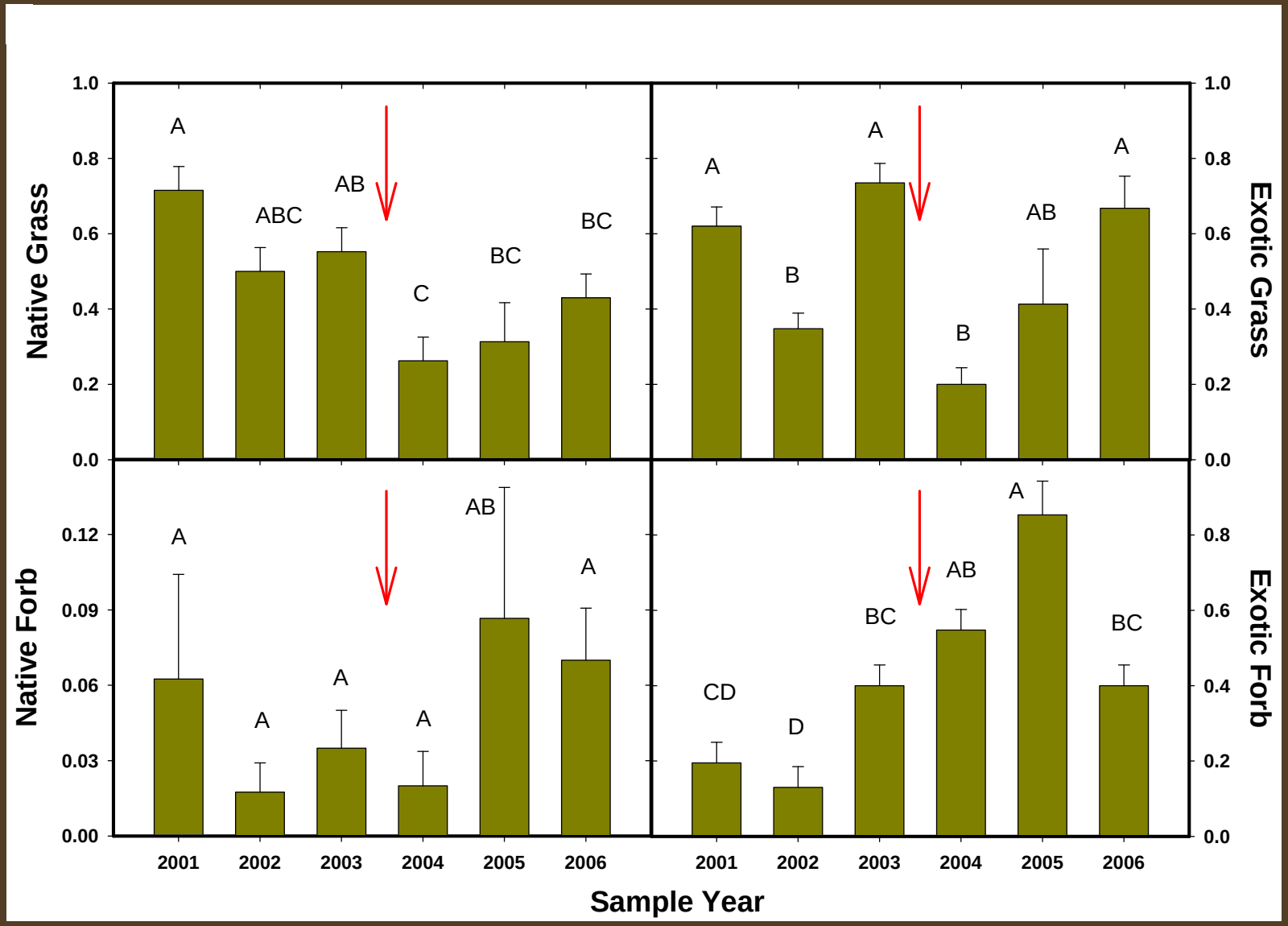


Long-term Data Collection Method

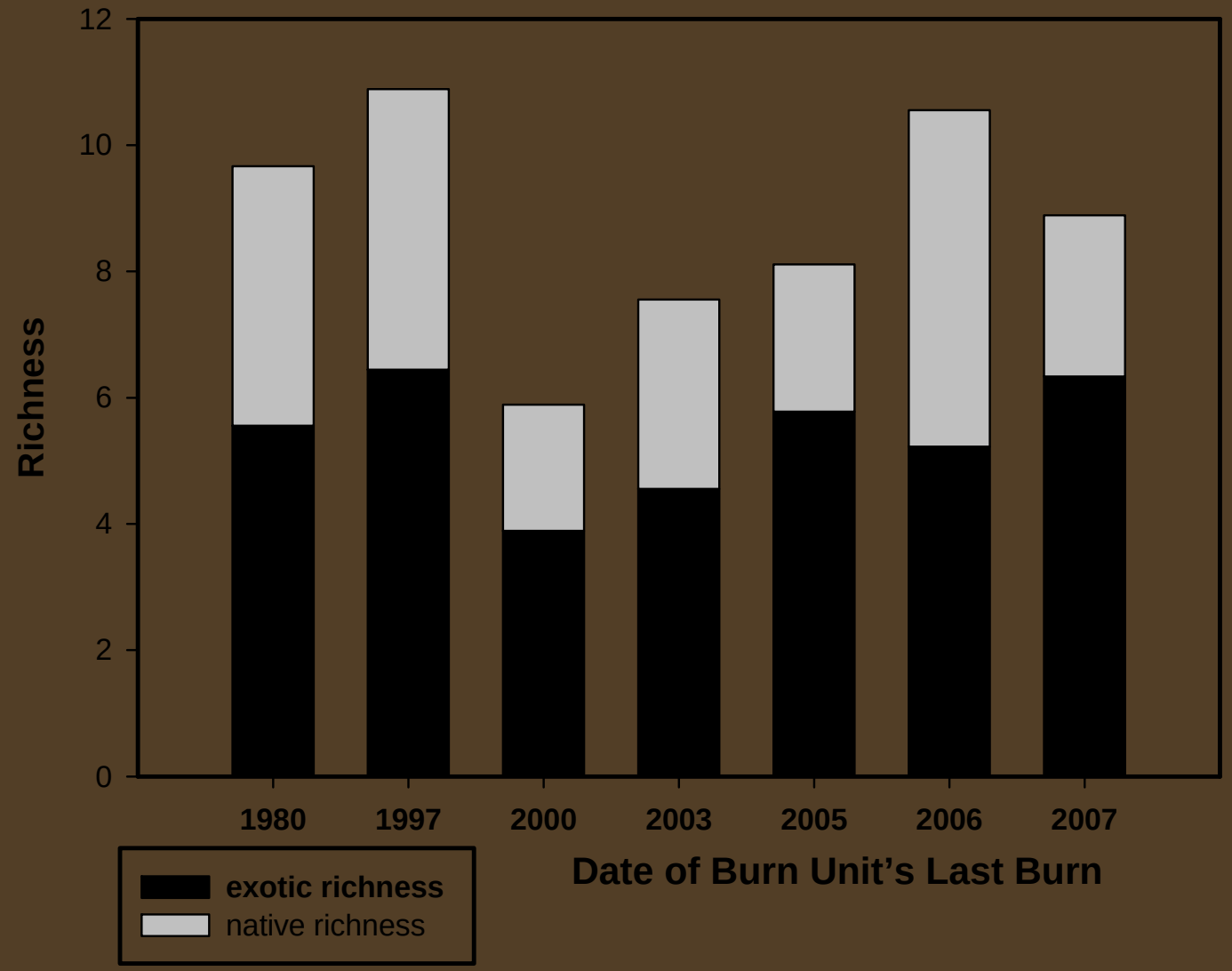
- Transects were permanently set up in 10 burn units throughout preserve.
- Transect location was determined by randomly locating 2 points, connecting them with a transect and sampling along 50 m of the transect.
- Line-point intercept sampling was conducted at 1 meter intervals during springs of 2001-2006.
- Plant species frequency (F) was determined:

$$F = \frac{\text{\# of intercepts at which a species is found}}{\text{Total \# of intercepts on the transect}}$$

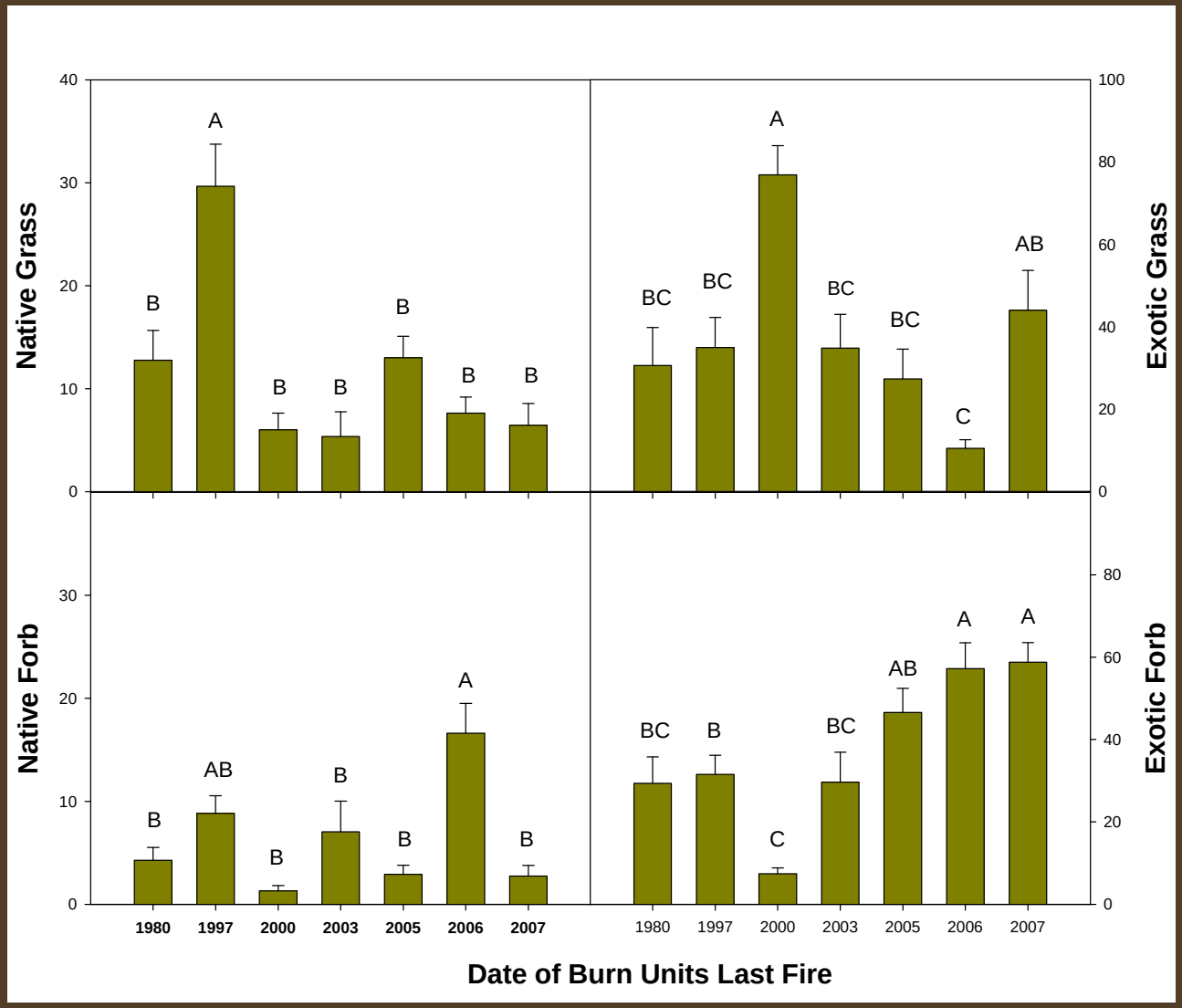
Long-term Data Plant Frequency



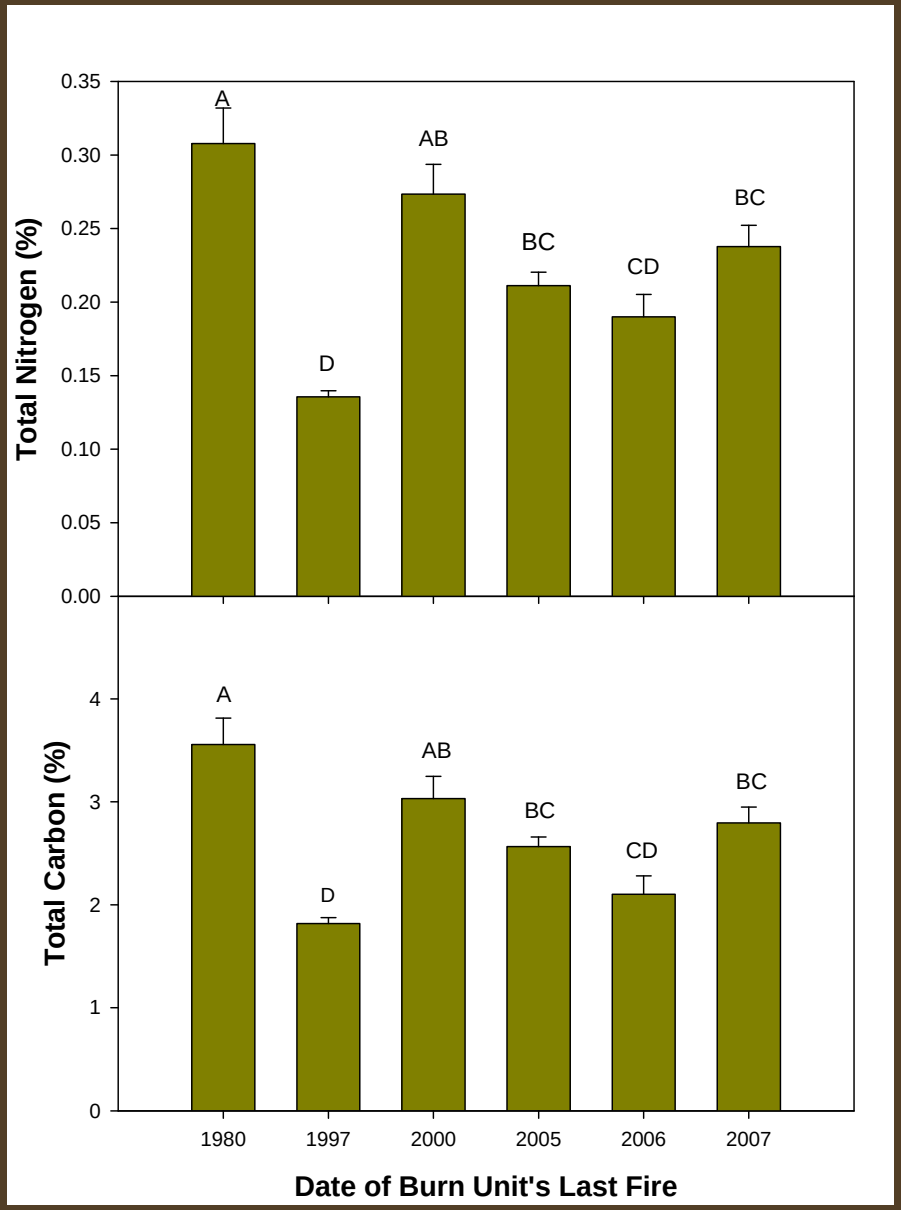
Chronosequence Species Richness Data



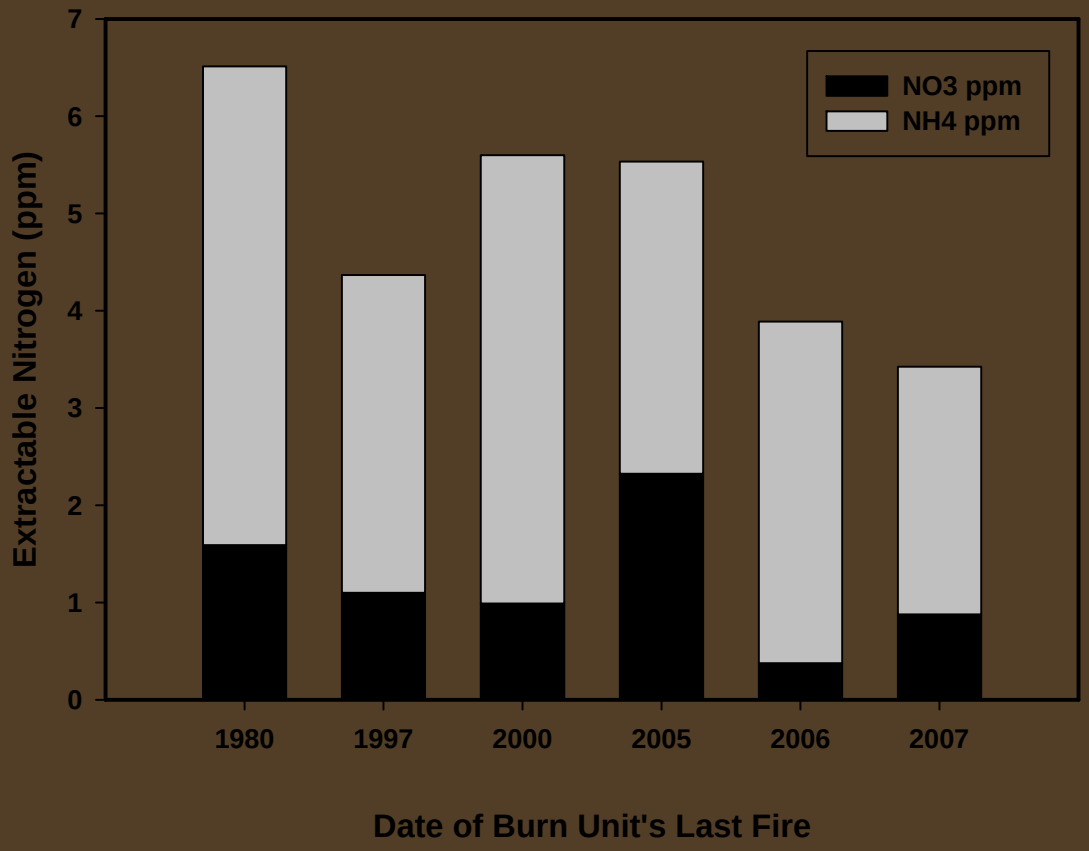
Chronosequence Plant Percent Cover Data



Chronosequence Total Nitrogen and Carbon



Chronosequence Extractable Nitrogen



Conclusions

- Prescribed burns reduce exotic grass frequency and allow for increased native and exotic forb frequency.
- Exotic grass frequency returns to initial levels within 4 years.
- Increases in forb cover declines with increased recovery of exotic grasses.
- Soil chemical pools are not being altered by fire or different exotic grass invasion levels.

Management Implications

- Since pre-fire exotic grass frequencies return within 3-4 years of the burn, burning every 4 years might reduce exotic grasses while allowing for the natives to persist.
- Chronosequence method is not as effective as long-term monitoring of burn units.
- Coarse scale measurements such as plant frequency from line intercept methods are effective methods for measuring changes in plant community, and are less costly.
- To understand the long-term effects on natives, native species seedling counts are necessary to test for recruitment.

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