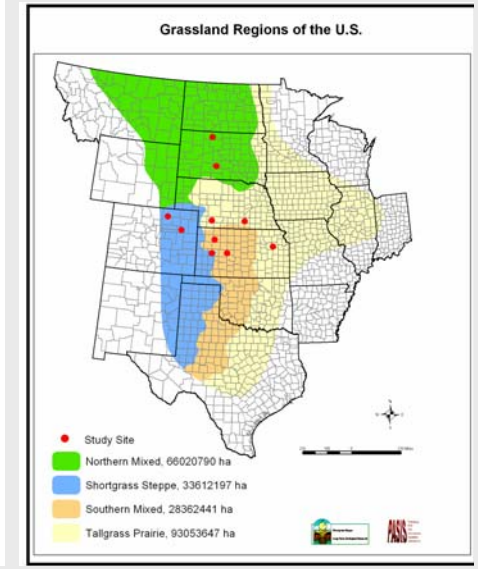
## Our Agenda for today

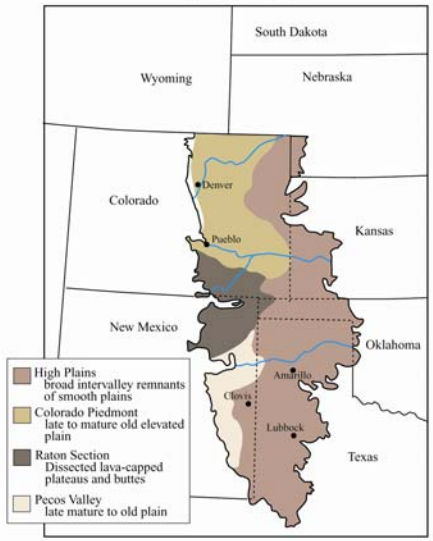
8:00 Introduction and Overview of SGS-LTER – Gene Kelly
8:30 Biogeochemistry Research Activities - Indy Burke
8:50 Plant-Grazing Dynamics Research Activities – Bill Lauenroth
9:10 Faunal Ecology Research Activities – Mike Antolin
9:30 Land Atmosphere Research Activities - Jack Morgan
10:20 Break
10:30 Vans depart from LSC for SGS-LTER Site
11:15 Stop 1 – *Land-Atmosphere Research*
12:30 Stop 2 - *Lunch in the cottonwoods (box lunches provided)*
1:30 Stop 3 – *Plant Ecosystem Dynamics Research*
2:45 Stop 4 - *Biogeochemistry Research*
4:00 Stop 5 - *Faunal Ecology Research*
5:15 Poster session/cocktail hour, followed by barbecue
7:30 Transport Site Review Team back to Armstrong Hotel

## Our goals for the site review are to:

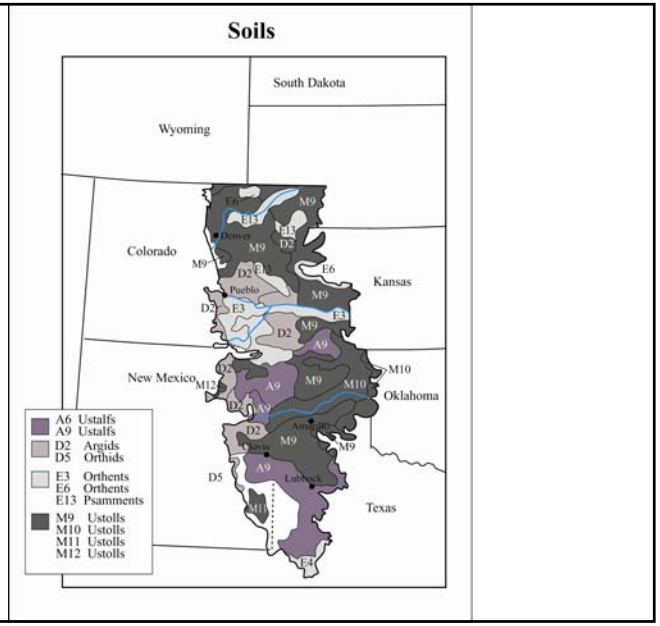
- Provide introduction and background to the Shortgrass Steppe LTER Program
- Highlight current research activities and accomplishments
- Tour SGS facilities and field research sites
- Provide updates on information management
- Overview and updates on educational and outreach activities
- Overview project management
- Present the central focus for the next three years, new initiatives and plans for the future

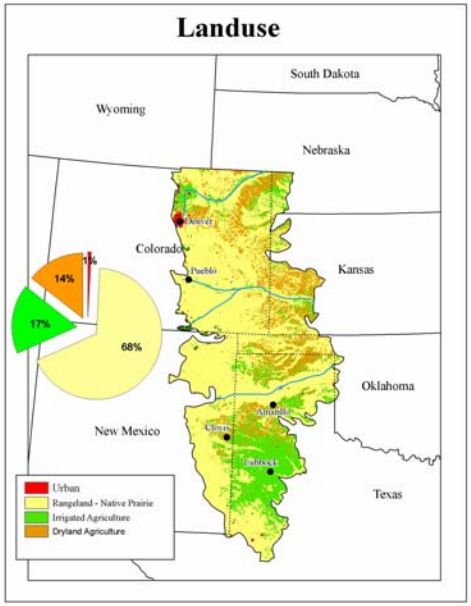


## Physiography




## Natural Vegetation


Soils
South Dakota
Wyoming
Colorado
Kansas
New Mexico
Oklahoma
Texas
Denver
Pueblo
Amarillo
Lubbock
A6 Ustalfs
A9 Ustalfs
D2 Argids
D5 Orthids
E3 Orthents
E6 Orthents
E13 Psamments
M9 Ustolls
M10 Ustolls
M11 Ustolls
M12 Ustolls


Landuse
South Dakota
Wyoming
Nebraska
Colorado
Kansas
New Mexico
Oklahoma
Texas
Denver
Pueblo
Amarillo
Clovis
Lubbock
1%
14%
17%
68%
Urban
Rangeland - Native Prairie
Irrigated Agriculture
Dryland Agriculture

The evolution of this grassland system was driven by ***grazing, periods of drought and landscape instability.***

These essential and interactive factors were responsible for the structure and function of this ecosystem

## High inter-annual variability in precipitation:

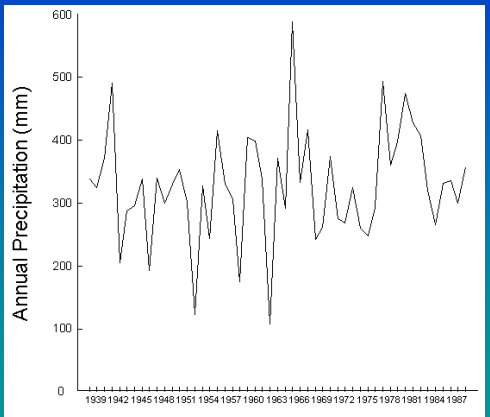



Fig. 2.22. Annual precipitation for the CPER from 1939 to 1990 (LTER unpubl. data).

# High seasonal variability in precipitation:

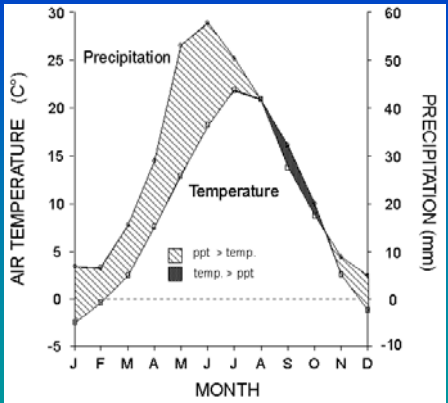
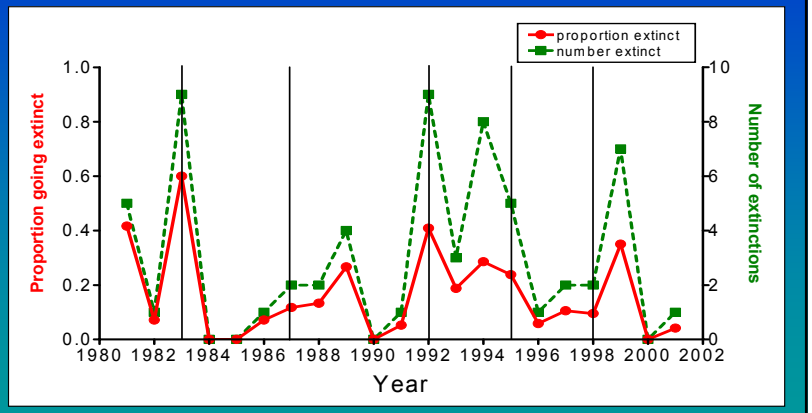


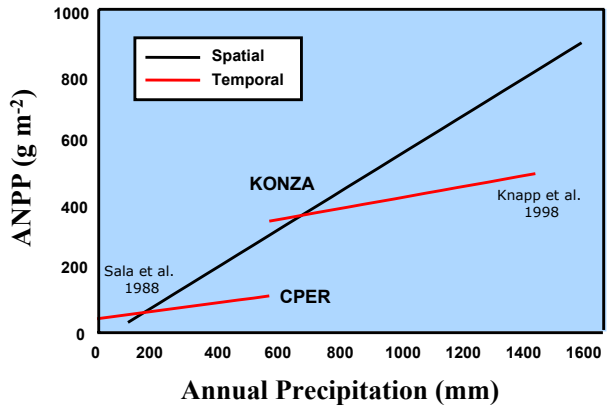

Fig. 2.23. Monthly precipitation and temperature for the CPER from 1939 to 1990 (Lauenroth and Milchunas 1991).

# Prairie dog populations linked to climatic variability:



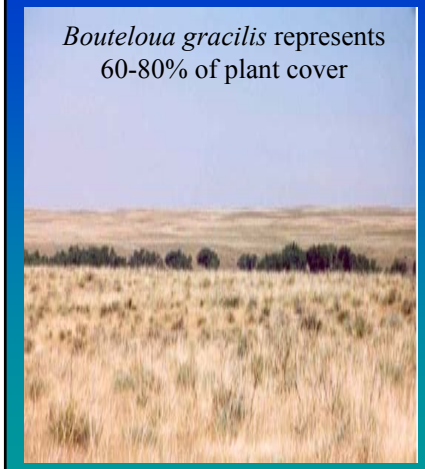

Vertical lines indicate El Niño years.

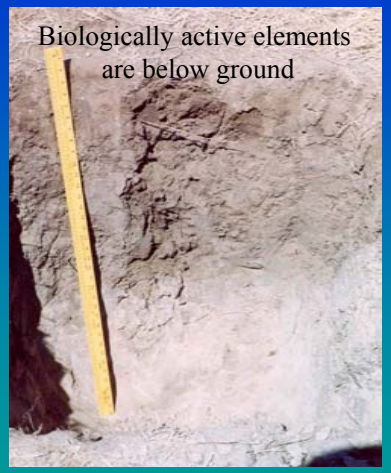
(Stapp, Antolin and Ball, 2004)

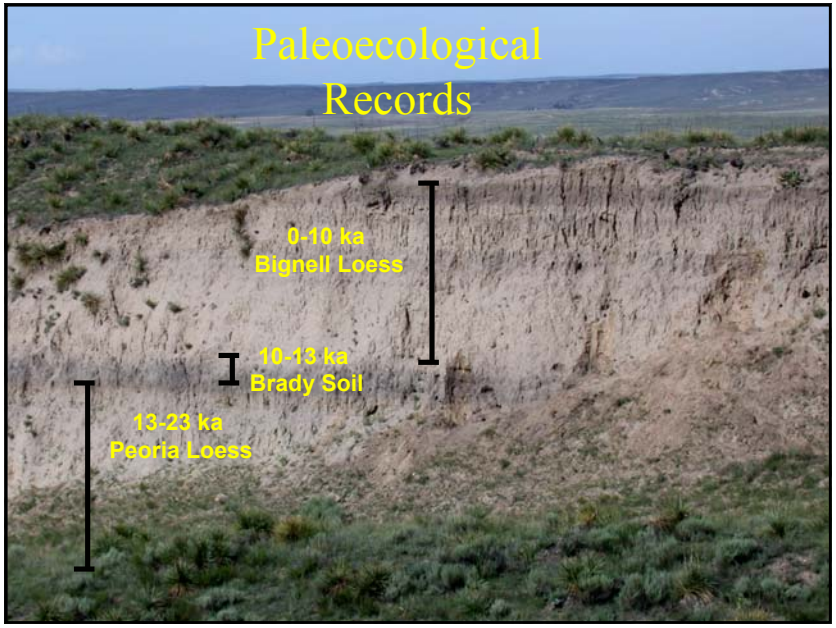



ANPP Increase with MAP

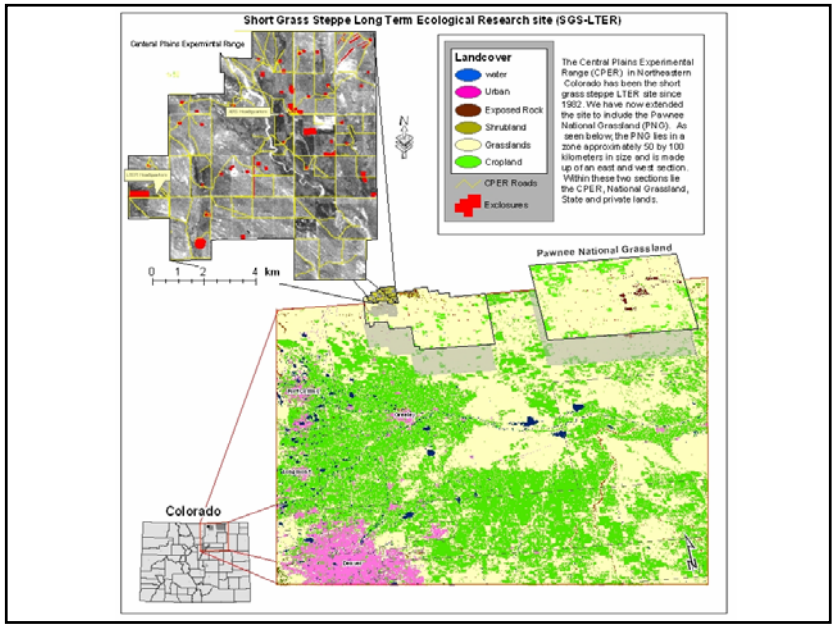
## What is unique about the shortgrass steppe ?

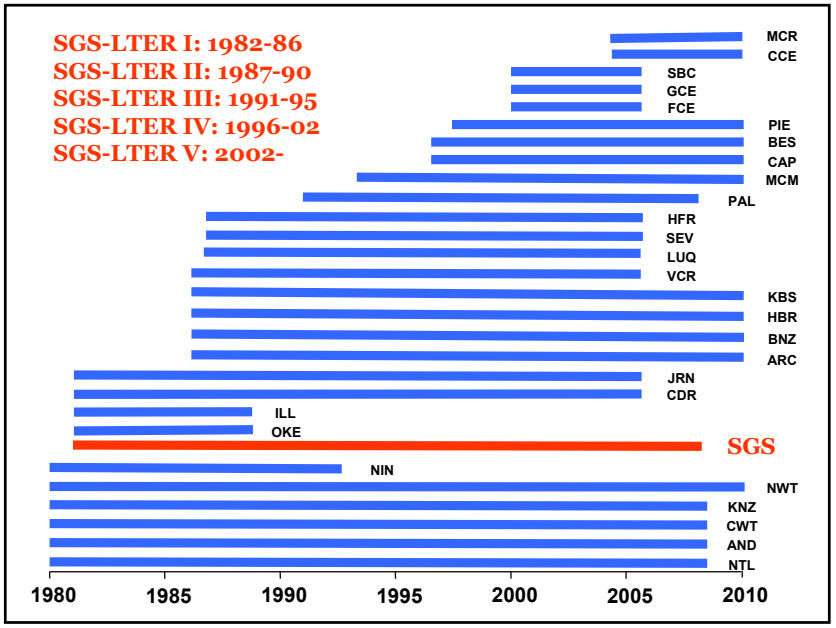




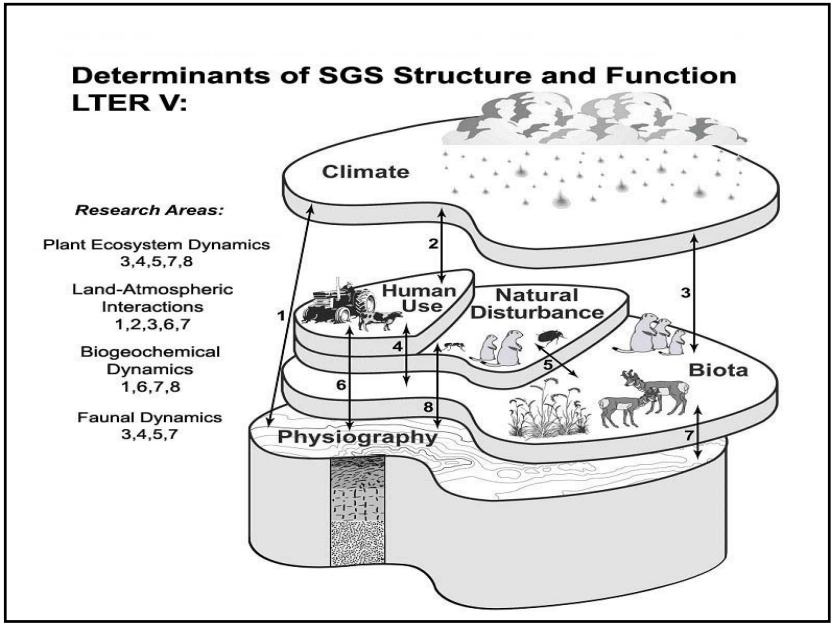

*"The nature of the vegetation and the distribution of resources belowground promotes resistance of this system to disturbance and is unmatched elsewhere".*


Short Grass Steppe Long Term Ecological Research site (SGS-LTER)
Central Plains Experimental Range
Landcover
water
Urban
Exposed Rock
Shrubland
Grasslands
Cropland
CPER Roads
Exclosures
The Central Plains Experimental Range (CPER) in Northeastern Colorado has been the short grass steppe LTER site since 1982. We have now extended the site to include the Pawnee National Grassland (PNG). As seen below, the PNG lies in a zone approximately 50 by 100 kilometers in size and is made up of an east and west section. Within these two sections lie the CPER, National Grassland, State and private lands.
N
0 1 2 4 km
Pawnee National Grassland
Colorado


SGS-LTER I: 1982-86
SGS-LTER II: 1987-90
SGS-LTER III: 1991-95
SGS-LTER IV: 1996-02
SGS-LTER V: 2002-
MCR
CCE
SBC
GCE
FCE
PIE
BES
CAP
MCM
PAL
HFR
SEV
LUQ
VCR
KBS
HBR
BNZ
ARC
JRN
CDR
ILL
OKE
SGS
NIN
NWT
KNZ
CWT
AND
NTL
1980
1985
1990
1995
2000
2005
2010

# SGS-LTER conceptual framework:

- **LTER I (1982-86):** Landscape structure and catena concept
- **LTER II (1987-90)**: Origin and persistence of spatial patterns.
- **LTER III (1990-96)**: Nested hierarchy of spatial/ temporal patterns & scales
- **LTER IV (1997-02)**: Determinants of ecosystem structure & function



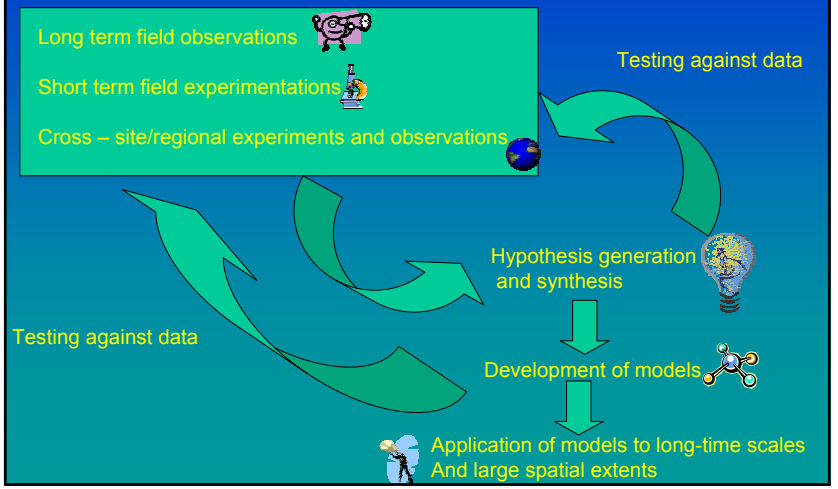
# LTER V

What factors regulate the ecological structure and function of the SGS over space and time ?

How do the factors that regulate the ecological structure and function and the coupling of biotic and abiotic components vary spatially and temporally within the SGS?

What are the biotic and abiotic thresholds that determine the vulnerability of the SGS to changes in the factors influencing ecological structure and function?

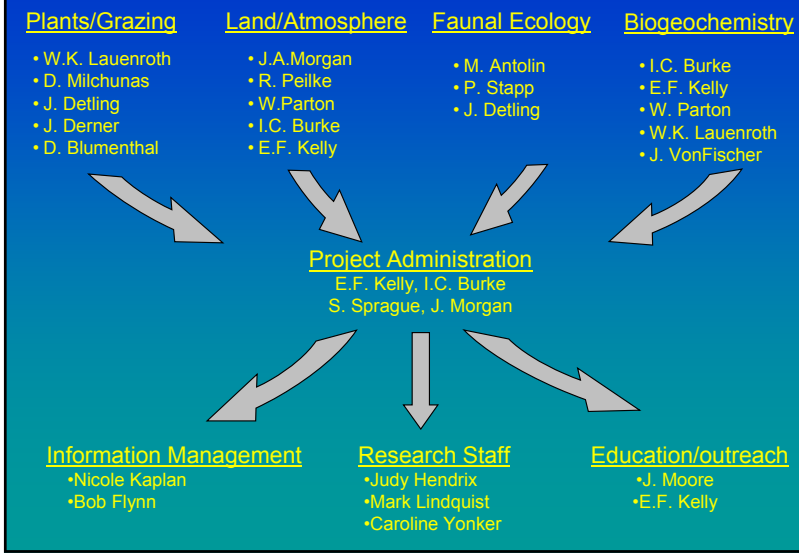
# How we do our science:



## SGS-LTER Leadership:

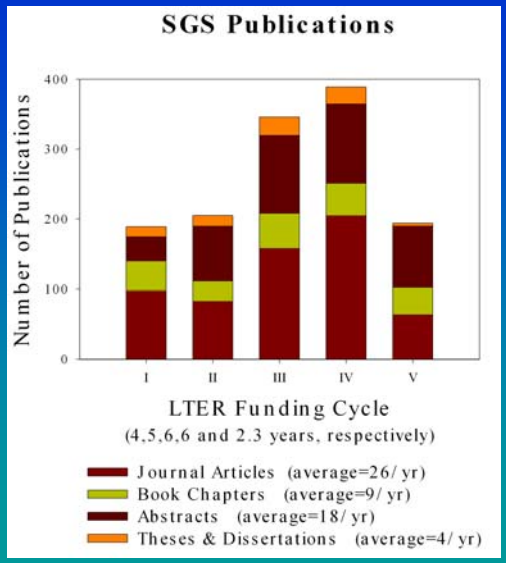
- LTER I : Lauenroth/Woodmansee
- LTER II: Lauenroth
- LTER II/III: Lauenroth/Burke
- LTER III: Burke/Lauenroth
- LTER IV: Burke/Lauenroth/Kelly
- LTER V: Kelly/Burke/Antolin

## SGS-LTER Project Structure:

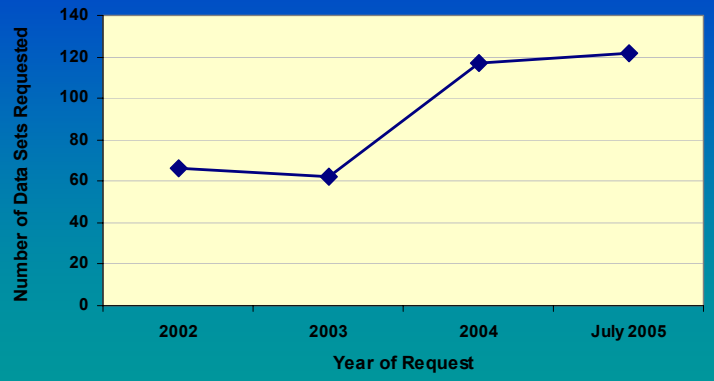


# Key aspects of SGS-LTER program management:

- Distributed leadership (day-to-day)
- Working groups (L/A, BGC, P/G, FE, IM, E/O)
- Workshop every other year
- Brown Bag Seminars and PI meetings (2x month)
- E-mail, listserv and web page communications with all collaborators
- Subcontracts to support non-CSU collaborators
- Administrative and Scientific support for Grant Writing/Submission



## Data: Usage Summary by Year from 2002 – April 2005




### LTER K-12 Initiatives

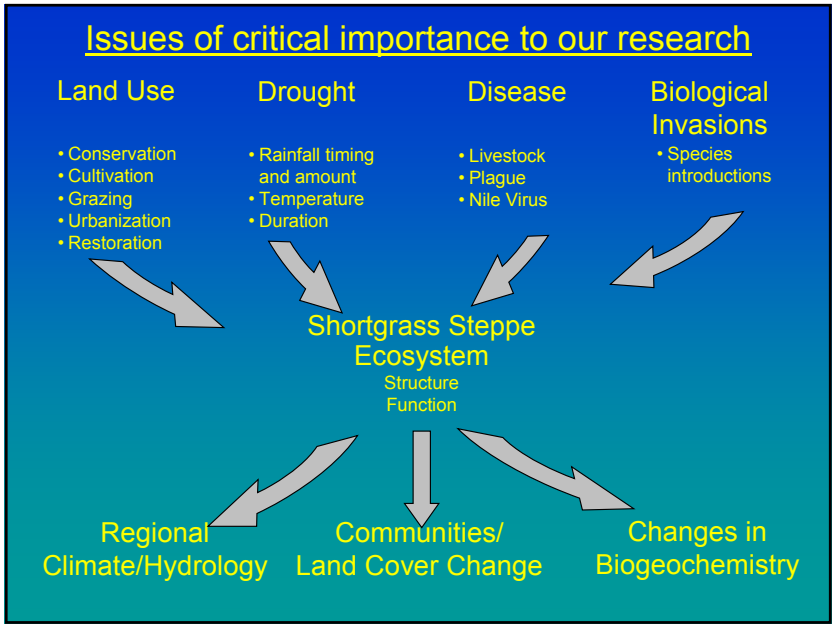
| | | |
|---|---|---|
| DOE UBMS | 1996-2008 | $ 3.2M |
| FSI | 1958-pres | $100K $yr^{-1}$ |
| NSF RAMHSS | Supplements | $10K $yr^{-1}$ |
| NSF Schoolyard | Supplements | $15K $yr^{-1}$ |
| NSF EdEn | 2004-2006 | $ 68K |

### LTER Undergraduate Initiatives

| | | |
|---|---|---|
| NSF REU | Supplements | $10K |
| NSF UBM | March 2005 | $ 1.2M |
| NSF UMEB | October 2005 | $ 500K |

### LTER Graduate Initiatives

| | | |
|---|---|---|
| NSF GK-12 | 2001-2010 | $ 2.9M |
| NSF CLT-W | 2001-2006 | $ 10M |
| CDE MSP | 2003-2006 | $ 750K |


Issues of critical importance to our research
Land Use
• Conservation
• Cultivation
• Grazing
• Urbanization
• Restoration
Drought
• Rainfall timing and amount
• Temperature
• Duration
Disease
• Livestock
• Plague
• Nile Virus
Biological Invasions
• Species introductions
Shortgrass Steppe Ecosystem
Structure
Function
Regional Climate/Hydrology
Communities/ Land Cover Change
Changes in Biogeochemistry