

The Shortgrass Steppe Long Term Ecological Research (SGS LTER) project represents the continuing development of a research tradition that began with the US/IBP Grassland Biome project in the late 1960s. Much of this research has focused on the Central Plains Experimental Range (CPER), a 6,280 hectare research site owned by the Agricultural Research Service (ARS) that is adjacent to the 78,100 ha Pawnee National Grasslands (PNG). Research at the SGS LTER site over the past 20 years has had an influence on national and international grassland ecology; work from this site has generated 639 journal articles, 181 chapters, 141 theses, and 336 abstracts.

An important part of our mission is to support the broad scientific community conducting research in the shortgrass steppe. An integral part of that mission is the collection and curation of representative species collections. The Shortgrass Steppe LTER project currently maintains a fairly extensive collection of voucher specimens of native plants and a small but important collection of several animal groups. These collections are invaluable to the activities of the project, as described below. We are seeking supplemental funding from NSF to improve existing infrastructure of our collections, implement new plans for maintaining and curating these specimens, and to add and replace specimens of representative taxa in our collections.

Existing Collections at the SGS-LTER Field Station

Extensive plant and animal specimens were collected on the SGS-LTER site in north-central Colorado during the International Biological Program Grassland Biome, but nearly all of the animal specimens were transferred to neighboring institutions (e.g., academic departments within CSU) after the completion of the IBP studies in the mid- 1970s. Currently, the most important and useful collection on site is the herbarium, which contains approximately 300 dried, pressed and mounted plant specimens. Most locally common species are represented, but often only by a single specimen, and many rare species are not currently in the collection. However, because the shortgrass steppe flora is relatively small compared to other systems, we believe we have a good opportunity to have representatives of 95% of the resident species in a fairly short period, which would make the collection valuable for both research training and archival purposes.

Working reference-specimens and 35-mm slide collections of a variety of animal taxa have been made for training field staff over the course of the LTER project, but little of value remains of these collections. In 1997, a concerted effort was made to collect and prepare insect and small mammal specimens from ongoing studies on the research site and adjacent areas. At present, our

mammal collection consists of skin and skull material from small mammals of a dozen representative species. Our collection of terrestrial insects represents approximately 200 pinned specimens, and contains relatively complete collections of some locally common groups such as beetles in Tenebrionidae and Carabidae.

Current and anticipated use of site collections

Although our current collections are small, they are critical to many of our LTER project activities on the site:

- **Training and support of ongoing field research by SGS-LTER scientists.**

We use our collections extensively to train field technicians in species identification in the field and to verify unknown specimens brought in from field data collection. Advance familiarity with our reference specimens is particularly valuable for training technicians for studies involving live, mobile organisms such insects and small mammals, which are typically released after capture.

- **Training and support of ongoing field research by visiting scientists.**

The past several years has seen a significant increase in visitation of the site by researchers from other institutions and by school groups. Visiting researchers are often unfamiliar with resident flora and fauna and thus especially benefit from the presence of complete and representative voucher collections. During the past 3 years, non-LTER affiliated researchers from a variety of national universities (Wyoming, Northern Colorado, Colorado State, Nebraska, Kansas State, Texas-Austin, Texas A&M, Illinois-Chicago, Dayton, Miami-Ohio, Pennsylvania State), governmental agencies (USGS, USDA-NCRS, USDA-ARS, USDA Forest Service, Colorado Division of Wildlife, Boulder County Parks and Open Space) and international institutions (University of Buenos Aires, Argentina) have taken advantage of our current voucher collections.

- **Archiving and storing voucher specimens of local taxa.**

Currently there is not a mechanism for researchers to deposit voucher material from studies conducted on the Central Plains Experimental Range or Pawnee National Grasslands. Improvements to and increased recognition of the potential value of our collections will encourage researchers to collect and deposit voucher specimens from their work on the site. We will also

recommend and provide an avenue for duplicate herbarium specimens to be deposited in the CSU Herbarium, where they can be made more accessible for widespread research use.

- **Public outreach and extension.**

The field station is on a popular route for bird-watchers and other recreational users. These individuals occasionally stop by the station to ask for information and for identification of unknown plants and animals they have seen.

Conveying this information is greatly facilitated if we have specimens and photographs on hand for demonstration. Additionally, we have taken our insect and small mammal specimens to local and regional meetings to make the public and local agencies aware of our collections.

Improvements to Collection Infrastructure

At present, our herbarium and animal collections are housed in a small storage room adjacent to the laboratory in the LTER field station. We are requesting funds to purchase a second cabinet for plant specimens, which permits expansion and addition of replacement specimens to the herbarium. We are also requesting a separate insect-proof museum cabinet to house the insect and mammal collections. Existing cabinets will be used for storage of herpetological specimens in alcohol and for specimen preparation equipment.

Curation Plans

We anticipate that, because of relatively low species diversity of most taxa in the shortgrass steppe, and because of the existence of excellent research and teaching collections in the region at CSU and other institutions, our site collections will remain relatively small and thus will not require permanent curators. However, we recognize the importance of regular maintenance and organization of our collections, and we propose to implement curation plans in the following four ways.

- *Herbarium:* Recognizing the potential value of our current herbarium, we will coordinate with the Curator of the Colorado State University Herbarium to arrange for an initial assessment of the status and needs of the site herbarium. In addition, a staff member of the CSU Herbarium will make regular visits to the site for maintenance of the collection and to add and/or replace specimens during the growing season.
- *Invertebrate and Mammal Collections:* We are developing relationships with the Biology department to assist us with assessing the status and

future needs of our mammal and invertebrate collections. We plan to enlist the aid of members of the Biology department to maintain these collections as well.

- *Information Management of Species Collections:* We will hire a temporary student assistant knowledgeable with database entry and management to enter information from existing catalogs and tags into a computerized database accessible from computer stations on site. In addition, this student will help categorize and scan photographic images of species.
- *Curation Training:* We will provide additional training to the LTER Site Manager through a local research museum (or other training facility) to permit him to provide basic maintenance to the collections and to store, prepare, and catalog specimens as needed.

Additions to Current Specimen Collections

Except for support for a herbarium assistant from CSU, we are not requesting significant funds for collection of new specimens. Instead, we hope to take advantage of new equipment and supplies to make researchers conducting organismal research on the site aware of our plans to enhance existing voucher collections and to encourage them to deposit underrepresented specimens into our collections. For example, pitfall-trapping studies planned for 1998 will facilitate collection of representative amphibian and reptile specimens, and will allow us to continue to add to our collection of terrestrial arthropods. Additional sampling to document plant communities associated with prairie dog mounds and colonies may provide additional or new specimens of plant species that are typically rare on native shortgrass steppe.

Budget Request

Herbarium Supplies		
	Herbarium cabinet (2)	\$2400
	Herbarium paper	\$110
	Herbarium glue	\$40
	Herbarium tags	\$80
Vertebrate Collection		
	Specimen cabinet and drawers (share with Invertebrate Collection)	\$1500
	Taxidermy supplies (cotton, needles, wire, syringes)	\$80
	Specimen tags and string	\$60
	Sherman live traps	\$980
	Small boxes for skulls	\$40
	Glass jars with rubber gaskets	\$110
	Formalin and alcohol	\$130
Invertebrate Collection		
	Specimen cabinet and drawers (share with Vertebrate Collection)	
	Pinning trays	\$40
	Pins and specimen labels	\$50
	Collecting jars, sweep nets	\$70
	UV light trap	\$200

	Compound dissecting microscope and light source	\$1300
	Forceps and handling tools	\$60
Copies of field guides and plant identification books for field and lab use		
	Mammals of Colorado	\$50
	Peterson Field Guide to Western Reptiles and Amphibians	\$15
	Peterson Field Guide to Western Birds	\$15
	Rocky Mountain Flora (others?)	\$25
	North American Range Plants	\$35
	Grasshoppers of Colorado/ Wyoming	\$30
Film/developing costs for species photographs		\$500
Technical/ staff positions		
	Regular maintenance/collection by CSU herbarium staff	\$0
	Regular maintenance of mammal and invertebrate collections by CSU Biology personnel	\$0
	Student to enter specimen catalogs into database and scan photographic images	\$600
	Two days of curation training for site manager	\$1000
Total		\$9520