

the Smooth Purple Coneflower

on the SRS

about coneflowers....

The smooth purple coneflower (*Echinacea laevigata*) is a perennial herb that grows up to 1.5 meters tall. Each plant produces one or more clusters of basal leaves from a stout rootstock. These leaves may reach 20 cm in length, although those on young plants are smaller. Leaves generally emerge in March and die in the fall. Flowering plants produce a smooth stem with a few smaller leaves and a single flower in May or June. In sunny habitats, plants may produce a second flower in late summer. The petal-like rays of the flower are light pink to purplish, usually drooping, and 5-8 cm long.

Typical coneflower habitat is open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way, usually on magnesium- and calcium-rich soils. Optimal sites have abundant sunlight and little competition in the herbaceous layer. Natural fires, as well as large herbivores, are part of the history of the vegetation in this species' range; coneflowers are dependent upon periodic disturbances to reduce the shade and competition from woody plants.

The reported historical range of the smooth purple coneflower included Pennsylvania, Maryland, Virginia, North and South Carolina, Georgia, Alabama, and Arkansas. The

species now is known to survive only in Virginia, North and South Carolina, and Georgia. Of the seven populations known from South Carolina, two are located on the Department of Energy's Savannah River Site (SRS), one on Burma Road and the other in a power line right-of-way along Road B-9. *Echinacea laevigata* was listed as federally endangered on October 8, 1992 and also is listed as a sensitive species by the U.S. Forest Service; it is the only known federally endangered plant on the SRS. These designations require that DOE avoid actions with deleterious impacts to the populations.

The Savannah River Ecology Laboratory (SREL) and the USFS Savannah River Institute (SRI) have been collaborating for several years to develop methods to maintain population viability of the smooth purple coneflower on the SRS. Both populations are exposed to threats such as power line maintenance activities and accidental herbicide application. Collaborative research also tests management activities, including forest thinning and burning, that might improve coneflower habitat.

management of the smooth purple coneflower on the SRS...

The objectives of endangered species management go beyond protection of existing populations. Management can improve habitat quality and encourage population expansion, with the ultimate goal of achieving a natural, self-sustaining coneflower population. Future management of SRS coneflower populations is guided by these goals. Past management of the two SRS smooth purple coneflower populations focused on protection of the immediate area surrounding each population. Over time, complete protection of these areas from most management activities has led to slight degradation of habitat quality and no obvious increase in population size at one site.



SRI now will take a more proactive approach to smooth purple coneflower management on the SRS. A management plan has been drafted and is pending approval by site managers and the U.S. Fish and Wildlife Service. If approved, future management will include expanding both of the areas being managed for coneflower habitat to allow populations to expand without impacts from other land uses. These areas will become open, fire-maintained woodland savanna settings with enhanced plant diversity and fewer, but larger trees. Such habitat, thought to have once been commonplace throughout the Coastal Plain, is highly suited for the smooth purple coneflower. Smaller trees will be hand-removed to create sunny-to-partially sunny conditions on the forest floor. Controlled fires will be set at regular intervals to reduce the establishment of competing plants and encourage smooth purple coneflower flowering and seedling establishment. Changes in habitat quality and coneflower population size will be studied to determine response to the management strategies.

Future management may also include the establishment of a research coneflower population from SRS seed sources. This research population will further improve the status of the smooth purple coneflower on the SRS and provide opportunities for study of the species' biology and its habitat. Such opportunities will include manipulative studies and activities that could not be performed on naturally existing federally protected populations.

research...

SREL has been studying the two SRS populations of smooth coneflower since 1988 (Burma Road) and 1994 (Road B-9). Management goals are to prevent population decline, including loss of genetic diversity. Research on coneflower population biology, including pollination biology and genetics, and response to experimental burning and overstory thinning has provided a basis for evaluating the effects of current management efforts and developing future management plans. In collaboration with the Coneflower



Management Plan being prepared by SRI, SREL will study the effects of alternative management practices on the research coneflower population.

population status and research results...

- *Echinacea* seedlings and small plants were observed in early summer 1998 at the Burma Road location. This was the first time in recent years that new individuals were documented.
- The Burma Road coneflower population fluctuates, with the number of individuals varying from 146 plants in 1995, to 150 in 1996, 137 in 1997, and 156 plants in 1998. All of these recent counts indicate fewer plants are now present than the approximately 250 plants documented in this population in the late 1980's.
- The Burma Road population has declined because plants are dying, but very few new plants are establishing. Recruitment varied from no new plants in most years, to 1 new plant in 1991 and 1993, 4 new plants in 1989, and 5 new plants in 1992. Mortality of established plants varied between 7 and 38 plants per year.
- The Road B-9 coneflower population, when first discovered in 1994, was documented to contain 600 plants and 740 stems. The 1995 census of this population included 609 plants and 851 stems; the 1998 census included 655 plants and 1,492 stems.
- In the Road B-9 population, *Echinacea* flowers in the open received more visits from potential pollinators, including butterflies, honeybees, and bumblebees, than did plants in the shade. Management strategies that maintain a more open canopy may promote cross pollination and help maintain genetic diversity.
- Along the geographical range from Georgia to Virginia, nearby *Echinacea* populations are more similar genetically to one another than they are to more distant populations. The Burma Road population on the SRS is slightly different genetically from all other populations.
- Past management treatments (limited to minimal experimental burning and overstory thinning) have had little effect on the population dynamics of the Burma Road population. Treatments proposed in the new management plan will provide further information on whether such treatments result in cumulative beneficial effects.

