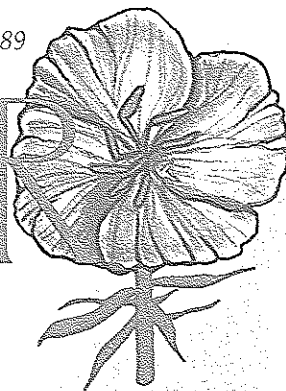


WILDFLOWER



A nonprofit organization dedicated to researching and promoting wildflowers to further their economic, environmental, and aesthetic use.

Poster Perfected

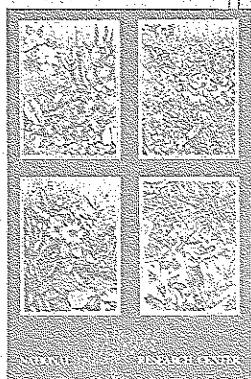
It is well worth the wait! Striking, full-color illustrations on the front of the Wildflower Center's new educational poster represent the four seasons, depicting a rich tapestry of plant and animal communities. The detail of plant and animal interaction represented is exceptional; each re-examination of the art reveals something new.

The poster back provides elementary schoolteachers with a variety of learning activities. (For a sampling, turn to page 5.) Word games, matching questions, and puzzles are arranged to facilitate photocopying them as handouts. Line drawings of the front's illustrations are accompanied by lists of the wildflowers, insects, and animals illustrated.

We are excited about the new educational poster that you, our members, made possible with your generous response to our appeal last summer. Preliminary evaluations by sample groups of classroom teachers have produced exceptionally positive feedback. Some comments: "Can be used in many subjects." "Fits well with curriculum." "Good color!"

Illustrator Anne Ducote, who blends impressionism with representational style, combined efforts on the poster with Patty Alvey, the Wildflower Center's graphic designer. Our multi-talented resource botanist, Beth Anderson, coordinated the entire project — compiling educational

(read on, back page)



Pass a Law; Protect a Tree

The saga of the poisoning of Treaty Oak, a venerable native live oak, or *Quercus virginiana*, in Austin, Texas, reached the national news arena recently. The outcry over the estimated 600-year-old oak is understandable. Imagine a city without trees: besides physical benefits like shade, air-filtering, and absorption of carbon dioxide (which helps counteract the greenhouse effect), trees also provide aesthetic and spiritual benefits.

*No town can fail of beauty,
though its walks were gutters
and its houses hovels,
if venerable trees make magnificent
colonnades along its streets.*

Henry Ward Beecher, 1887

Concern about the greenhouse effect and higher than average temperatures has inspired various tree-planting programs, but in the past few years many U.S. cities and counties have been revising or developing ordinances to preserve native trees and promote their use. Here's a look at an ordinance in Hilton Head Island, South Carolina:

Passed in 1986, the Hilton Head ordinance stipulates that developers "make reasonable efforts" to preserve and retain existing trees and shrubs, endangered species, and natural stands. No tree can be cut, altered, or destroyed without city approval. The ordinance also prohibits the proximity of waste materials or other substances potentially harmful to existing trees. Before altering a site, developers must survey existing trees.

The city divides trees into categories: broadleaf evergreen overstory, cone-bearing evergreen, and others. For every tree removed, a new tree from that category must be planted, so that percentages of trees in each category are the same before and after development. All trees planted must be native to the region.

In Austin, a city ordinance protects trees on construction sites, only, but state law protects large, valuable trees like Treaty Oak, and other trees. Not all U.S. cities have tree ordinances. For help in initiating legislation and booklet from the National Arbor Day Foundation, 100 Arbor Ave., Nebraska City, Nebr. 68410; telephone (402) 474-5655. The International Society of Arboriculture also provides a model tree ordinance. Send your request and \$5 to that organization at P.O. Box 908, Urbana, Ill. 68101.

Beth Anderson
Wildflower Center Resource Botanist



Grab a Rake! Fall is the time for planting. See page 4 for planting tips, and page 2 to find out about a Bluebonnet Blast at the Wildflower Center!

CATALOG INSIDE!

Research Director's Report: Wildflower Seed

This past summer, the National Wildflower Research Center hosted a conference on wildflower seed production. Thirty-two representatives of 17 firms or organizations took part, including seven Wildflower Center staff members. The meeting grew out of informal discussions during last January's American Seed Trade Association meetings in Dallas. There it was recognized that some aspects of wildflower seed production differ significantly from the production of horticultural varieties.

Discussion at the summer conference centered around marketing wildflower seed mixes. A variety of mixes is on the market, for needs ranging from home landscapes to large-scale reclamation projects. A point agreed upon is that a distinction should be made between mixes that are to be used for beautification and those to be used in reclamation.

Another topic addressed was reporting the composition of wildflower mixes to consumers. Seed sizes vary greatly among species. For example, a pound of seed for certain species of *Lupinus* (lupine)

has about 16,000 seeds, while there are about 4 million seeds per pound of *Castilleja* spp. (paintbrush). Species composition by weight, therefore, may not provide much insight into the proportion in which species will be represented when the plants start to grow. Paintbrush could be dominant in a mix of few species, even if by weight it accounted for only a small percentage of the mix.

Reporting germination percentages to consumers was also discussed. Some wildflower species have mechanisms that prevent simultaneous germination of all of each year's seed. In the wild, mechanisms for dormancy may be advantageous, preventing the germination of all of the seeds in a dry year, or a year in which a late freeze occurs. Germination percentages — determined under ideal conditions in a laboratory — may be irrelevant in planting wildflowers for long-term, environmental benefits.

Measures of Pure Live Seed (PLS) are based on germination and, therefore, may be no more informative. Tetrazolium (TZ) tests are, perhaps, a better method of predicting wildflower seed germination. Seeds are cut open, and tetrazolium, which

stains living tissue, is applied. The Wildflower Center maintains that any tests used should be standardized and the results included on seed labels.

No consensus was reached on most issues raised at the conference. The Wildflower Center continues to recommend that *wildflower* be used to label *only* indigenous native species and truly naturalized species in a mix. Varieties that are formally named and designated cultivars, or have patents or trademarks, should not be called wildflowers. Wildflower mixes marketed for a specific region should contain only species native to that region.

General agreement *was* reached that some issues related to consumers' use of wildflowers and the production of seed are complex, and that more dialog is needed among producers, and between consumers and producers.

John E. Averett, Ph.D., is Research Director of the National Wildflower Research Center.



Wildflower

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Wildflower Center News

Here's one way to maximize the rewards of fall planting! The Wildflower Center invites everyone to a wild, wonderful **Bluebonnet Blast** at the Center, on Saturday, September 16, from 10 a.m. to 4 p.m.

With bluegrass music by **Double Eagle Swing Band** in the air, there will be planting demos and talks by the Wildflower Center's botanists every hour. Talks will emphasize seed germination, how to use *Rhizobium* (bacteria beneficial to bluebonnets), and how to plant meadows and gardens.

Also, Tom Spencer, cohost of "Central Texas Gardener," broadcast on KLRU, Austin's PBS affiliate, will be on hand ready to answer questions about gardening. Bluebonnet seed, *Rhizobium*, and native plants donated by Lone Star Growers of San Antonio will be available for purchase. Refreshments will also be available. For more information about Bluebonnet Blast at the Wildflower Center, call the Center at (512) 929-3600.

The Wildflower Center helped gather ingredients for *Wild About Texas: A Bouquet of Recipes, Wildflowers, and Wine*, published by the Cypress Woodlands Junior Forum. The new cookbook includes wildflower notes and recipes for good food, such as Lady Bird Johnson's favorite spoon bread. Order it from the Center for \$17.95 plus \$3.50 for shipping (Texas residents also add 6% sales tax).

Executive Director David Northington travels to Birmingham in November to speak at the Central-South Native Plant Conference, then heads for Orlando to speak at the American Society of Landscape Architects' Annual Meeting. In July, Research Director John Averett addressed a meeting sponsored for highway administrators by Monsanto Chemical Co., in Tallahassee, Florida. He also presented a talk on "Native American Species Brought to Home Gardens" at the American Horticultural Society's annual meeting in Minneapolis/St. Paul.

A Sand County for Every School

In a small corner of the Forsythe Junior High school grounds in Ann Arbor, Michigan, a short nature trail crosses a wildflower meadow outlined by native trees. This previously unused corner of land is being utilized as a nature study area, where students learn about biodiversity and the changes within an ecosystem. A 1987 state education act approves the idea of setting up nature study sites like this one at public schools across Michigan.

Public Act No. 147 has been described as a permissive rather than a mandatory bill. It does not *require* nature study areas, but it does *encourage* elementary, junior high, and high schools to set them aside for land ethic education, a discipline combining nature study, environmental education, and conservation practices.

Land ethic education has its roots in Aldo Leopold's *A Sand County Almanac*, published in 1949. The book, which came out of Leopold's experience of restoring a worn-out and over-exploited farm in Sand County, Wisconsin, explores humans' relationship with the land.

"Science education is strictly career or business-oriented and doesn't teach kids what they need to know about land stewardship and survival of species, valuing nature and the land," comments Eunice Hendrix, a former public schoolteacher in Ann Arbor, who campaigned 10 years to make this legislation a reality. "This is a more positive approach to teaching environmental issues than always talking about how bad things are," Hendrix says.

The bill recommends that students be involved in planning and preparing the sites. Hendrix says the outdoor classrooms demonstrate what terms like *biological desert*, *species diversity*, and *wildlife habitat* mean: "You just can't learn everything out of a book!"

Restoration work is usually part of developing a nature site. Teachers

can scale up or down for different age groups such questions as "What did the area look like before schools and houses were here?" "Are there any undisturbed areas nearby that we can imitate?" Learning that restoring habitats to pre-disturbance quality is difficult or impossible is a central concept of land ethic education.

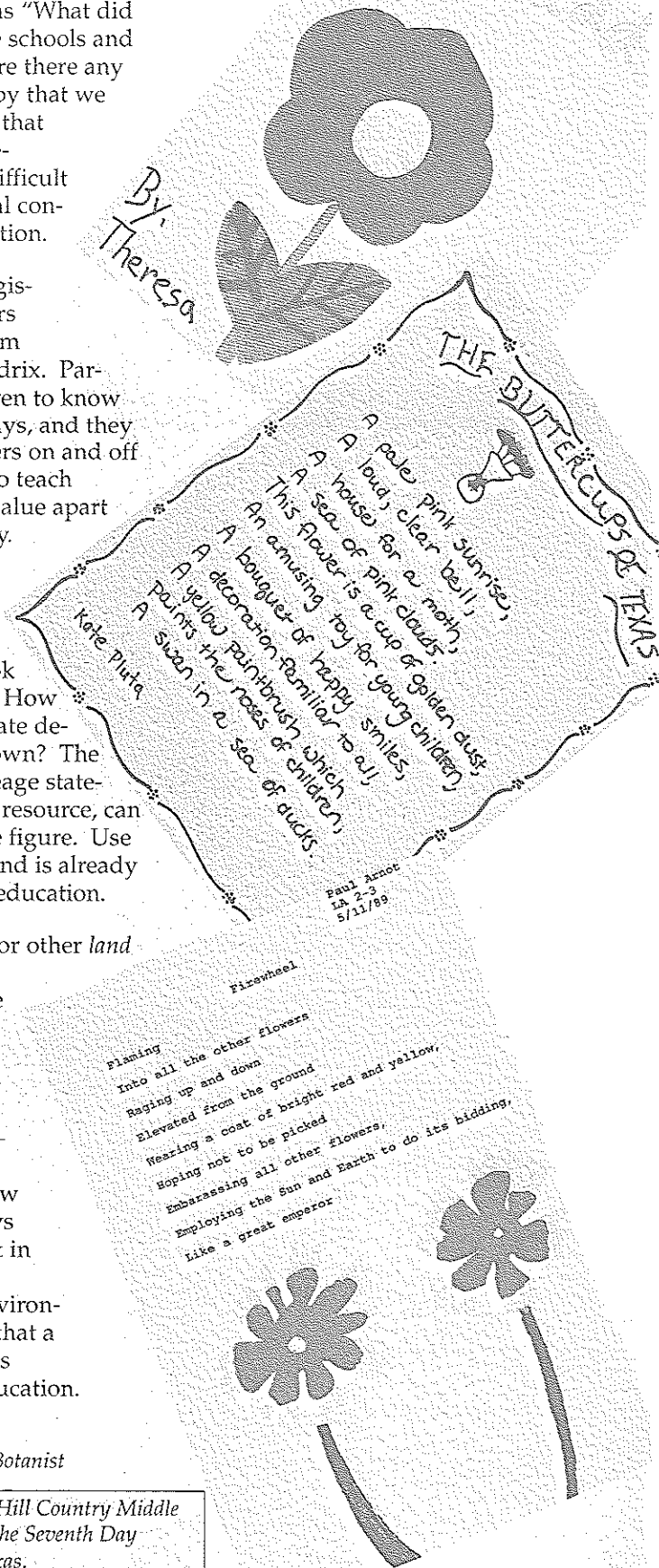
Behind the Michigan legislation lies nearly 30 years of neighborhood activism in Ann Arbor, says Hendrix. Parents wanted their children to know and value nature, she says, and they established nature centers on and off public school grounds to teach students that land has value apart from being a commodity.

Hendrix has advice on how "to put a Sand County at every school site" in your state. "Look for numbers," she says. How much land does your state department of education own? The total school ground acreage statewide, a publicly owned resource, can add up to an impressive figure. Use it to demonstrate that land is already available for land ethic education.

Check state legislation for other *land use* laws, such as those dealing with open space preservation, erosion control, or roadside beautification. Use the information to demonstrate the need for *education* laws to ensure that young citizens know how to abide by land use laws the state has already put in effect. Finally, enlist the support of statewide environmental groups to show that a statewide constituency is calling for land ethic education.

Katy Kramer McKinney
Wildflower Center Research Botanist

Art is by students from the Hill Country Middle School, Austin, Texas, and the Seventh Day Adventist School, Elgin, Texas.



TIME TO PLANT: CULTIVATION GUIDES

Gardening with Native Plants of the Pacific Northwest, by A.R. Kruckeberg, University of Washington Press, 1982. \$27.95

Describing natural habitats of the Pacific Northwest, this manual elaborates on methods of propagating and cultivating the region's native plants. Trees, shrubs, and wildflowers are discussed, for backyard and professional landscapers.

Natural Landscaping, by J. Diekelmann et al, McGraw-Hill, 1982. \$44.95 (Not available from the Wildflower Center)

Natural Landscaping stresses diversity, helping home landscapers in the Northeast translate natural ecosystems into landscape designs. The book explores major woodland, savannah, and prairie communities and has detailed diagrams of native plant landscapes.

Southwestern Landscaping with Native Plants, by Judith Phillips, Museum of New Mexico Press, 1987. \$17.95

This work sets down planting guidelines for arid to subalpine regions of the Southwest. It covers in detail designing

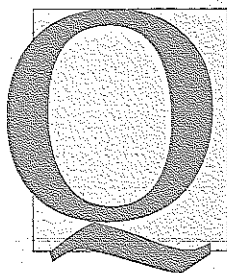


with native species, maintaining plantings, and propagating native plants.

National Wildflower Research Center's Wildflower Handbook, 1989. \$9.95

This resource book includes basic guidelines on planting wildflowers in large-scale areas, and those instructions apply to backyard plantings of any size, in any region. For all 50 states, the handbook lists native plant nurseries, seed companies, and native plant and conservation groups.

Books are available from the Wildflower Center unless otherwise noted. To order: Make check out to NWRC for book price plus \$3.50 for shipping (Texas residents also add 6% sales tax). Send to: Products, NWRC, 2600 FM 973 North, Austin, Texas 78725-4201. Or phone (512) 929-3600.



In this issue's *Clearinghouse Q & A*, the focus is on planting wildflowers. The *Clearinghouse at the National Wildflower Research Center* answers thousands

of questions a year on wildflowers and how to grow them. Books reviewed on this page can be a source of more detailed information on how to plant wildflowers, native grasses, or other native plants in your region.

Q. When is the best time to plant wildflower seed?

A. Fall is the best time. Some species may be planted in some areas in the spring, but for most species, fall has proven to be best.

Q. How do I know what to plant?

A. First, learn what species are native to your area, then match them to your site, e.g., sun-loving plants to sunny sites. Next, find out what species are available from seed catalogs and local nurseries.

Q. Can I really just throw seeds out and get the results nature does?

A. No. First, you need to prepare the ground. Eliminate weeds by repeated tilling or applications of herbicide. Covering the site with black plastic for several months during the summer prior to planting will also work. If you are overseeding into a grassy area, mow the grass as short as possible and rake out the thatch. The objective is seed/soil contact, so in grassy areas the soil must be exposed. If the site is already free of vegetation, simply rake over it to break the hard soil surface and make it receptive to seeds.

Then, seed by hand or use a drill seeder. If you seed by hand, rake lightly over the site after seeding to cover seeds. Water is essential for germination. If rainfall is lower than average in your area, water the seeded areas, if possible.

If you have a question about native plants, write to the Clearinghouse at the Wildflower Center (address on back page). Free wildflower information is a benefit of membership in the Center. Nonmembers need to enclose \$1 and a self-addressed label or 3-by-5-inch card.

From the Field

National Roadside Vegetation Management Association Conference Oct. 3-5, Nashville
Program focuses on such key topics as "Pesticides and the Nineties." Contact: (302) 655-9993.

Ecological Landscaping Symposium — "Water-Wise Gardens: California Style" Oct. 14, Claremont, Calif.
Hosted by Rancho Santa Ana Botanic Garden for homeowners, landscape professionals, contractors, and others. Preregister. Contact: (714) 625-8767.

New Mexico Xeriscape Conference Oct. 27-28, Albuquerque
Registration cut-off is Oct. 1. Contact: Lynn Daxon, Cooperative Extension Office, 9301 Indian School Rd., NE, Albuquerque, N.M. 87112.

Mid-South Native Plant Conference Oct. 27-29, Memphis
Program is "Using Native Plants in the Landscape." Contact: Jennifer Smith, (901) 685-1566.

American Society of Landscape Architects Annual Meeting (ASLA) and Educational Exhibit Nov. 18-21, Orlando, Fla.
Two major pre-meeting events are also planned. Contact: ASLA Meetings Department, (202) 686-2752.

Coming Up!

Watch *Wildflower* newsletter and other publications for details about the following events: **Central-South Conference on the Use of Native Plants in the Landscape**, Birmingham, Ala., Nov. 10-11... **Xeriscape Tour** in Austin, Texas... **Wildflower Days** at the National Wildflower Research Center in Austin, Nov. 11-12.

Autumn Autumn Autumn

Just for Kids!

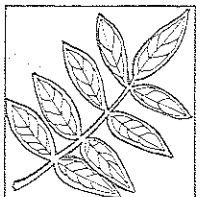
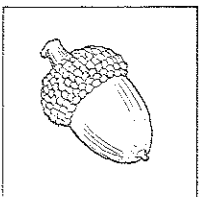
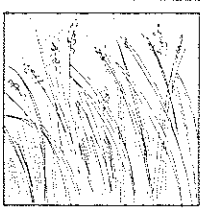
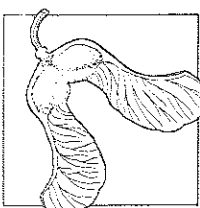
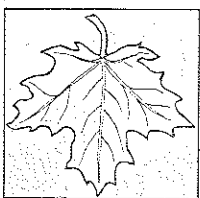
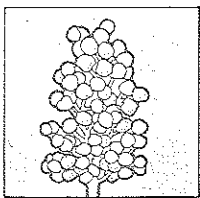
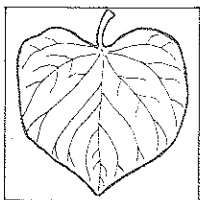
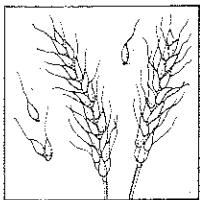
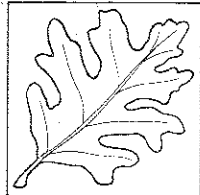
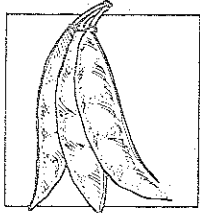
Have you ever noticed how different seeds are? The word lists below give some types of seeds and leaves. Fill in the blank below each picture with the correct seed or leaf type. Then draw lines to connect each leaf on the right with the correct seed on the left.

Seeds

- pod - shell with seeds inside (such as a pea pod)
- grain - seeds along a stalk
- acorn - nut with a cap on
- samara - seed with wings
- berry - fleshy fruit

Leaves

- oak
- maple
- grass
- sumac
- redbud



What makes leaves change color?

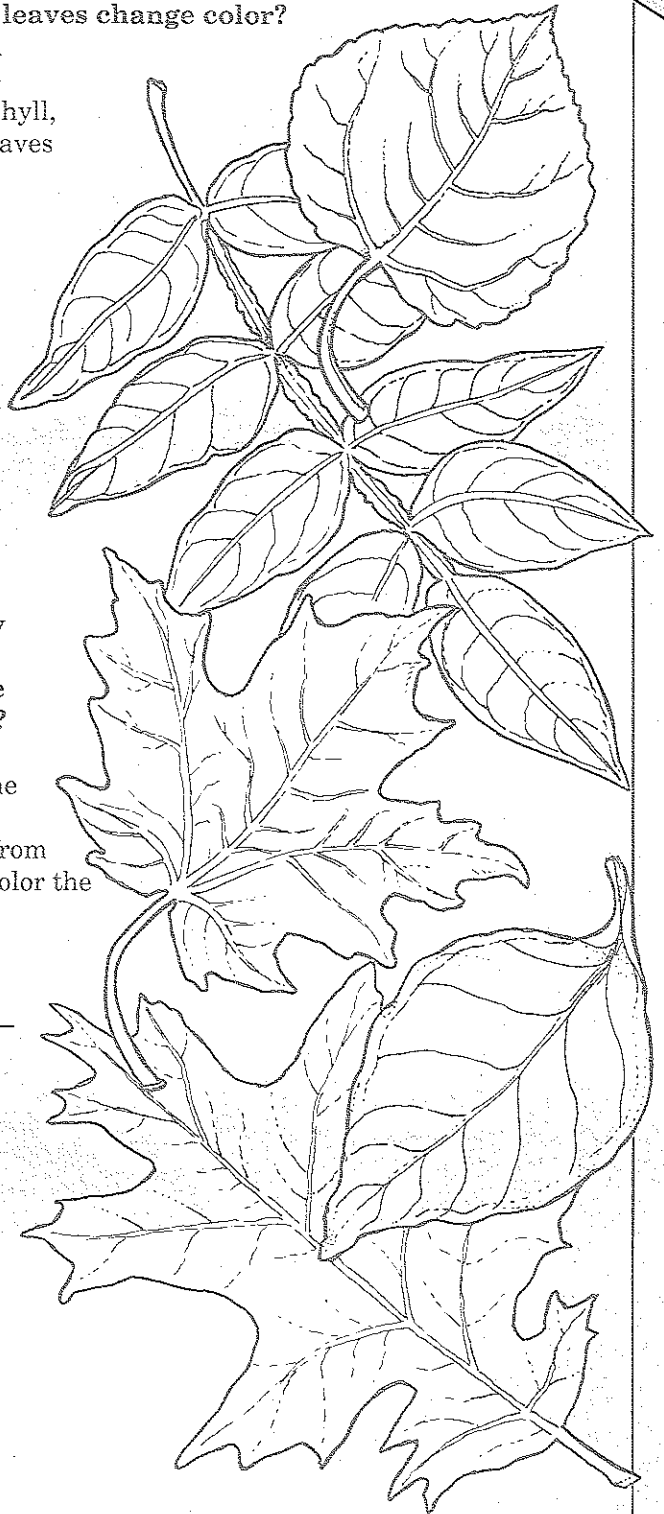
When autumn nights become cooler, chlorophyll, which gives leaves their green color, begins to break down. This allows other pigments (colors) to show through. Some trees and shrubs become very colorful.

Do you know what color each of these leaves turns?

Fill in the blanks with the number of the right color(s) from below. Then color the leaves.

- sumac _____
- dogwood _____
- maple _____
- aspen _____
- oak _____

1. yellow, orange, or red
2. gold
3. burgundy
4. rust or red
5. cherry red



Learning activities for schoolchildren are reprinted from an educational poster conceived, designed, and produced by the National Wildflower Research Center. (See related story, page 1.) © 1989 by the National Wildflower Research Center. This material may be reproduced for educational purposes.

Poster (con inued from page 1)

activities, writing text, and overseeing all phases. Many staff members, trustees, and friends offered suggestions, as well.

The poster will be mailed early this fall to sample schools around the country, supporters of this project, and potential sponsors. We hope to attract corporate or organizational sponsorship, regionally and nationally, and to distribute a poster to every elementary classroom in the country! Please contact Mae Daniller, Development Director of the Center, for information on printing costs.

Thank you for making this poster possible. It is a piece that is truly useful nationwide, and the Wildflower Center is proud to have produced it.

David K. Northington, Ph.D.
Wildflower Center Executive Director

Wildflower Outlook

The Board of the Virginia Department of Agriculture and Consumer Services has listed a dozen plant species as endangered in the Commonwealth, and they are now protected by state law. Four species were already listed under the U.S. Endangered Species Act — *Arabis serotina* (rock cress), *Helonias bullata* (swamp pink), *Iliamna corei* (mallow), and *Spiraea virginiana* (spirea).

of landscapers have household incomes below \$30,000 a year. An estimated 38 million households had flower gardens in 1988, down a million from 1987. (Statistics do not distinguish between wildflowers and horticultural varieties.) Sales for flower gardening were down 6 percent. The association attributes that to widespread drought, reporting that average temperatures in many parts of the country last year were the hottest in 50 years.

Some demographic information from the National Gardening Association: 20 million U.S. households did some landscaping in 1988, about the same as in 1987. As a rule, the higher your income, the more likely you are to landscape your property, but over half

Carol Davidge of the Connecticut State Museum of Natural History reports that the museum's summer wildflower festival drew an "extremely high" turnout of 2,000 people.

Harvesttime: Join the Wildflower Center and harvest these benefits!

Members of the National Wildflower Research Center support wildflower work across the nation. Benefits include *Wildflower*, the newsletter and *Wildflower*, the journal; 10% discount on unique Center products such as wildflower books, calendars, and T-shirts; special advance notice of and discounts to Center seminars; free wildflower information from the Center's Clearinghouse; a membership card signed by Lady Bird Johnson; and other benefits.

- \$25 Supporting Member. All benefits listed above.
- \$50 Sustaining Member. All the above plus a set of specially commissioned wildflower note cards.
- \$100 Key Member. All the above plus wildflower garden apron and invitations to special events.
- \$250 Center Sponsor. All the above plus annual limited edition wildflower poster.
- \$500 Trust Member and \$1000 Benefactor. All the above plus special privileges.

* Thank you! Your contribution is tax deductible to the extent permitted by applicable law.

Please enter a membership in the category checked at left:

Name: _____

Address: _____

City/St./ZIP: _____

Phone: _____

Gift Membership: If you are giving this membership as a gift, please enter your name and address below.

Donor Name: _____

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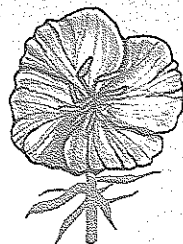
• Make your check payable to: NWRC
• Mail to: Membership, National Wildflower Research Center, 2600 FM 973 NORTH, AUSTIN, TX 78725-4201 6/5

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