

PLANT

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Recovery from Terrorism, Recovery for Rare Plants

Seattle's Center for Urban Horticulture recommits to conservation goals with a new building and labs more than two years after fire-bomb attack

In mid-May of 2001, things seemed to be going just peachy for Sarah Reichard and other Rare Care botanists at the University of Washington's Center for Urban Horticulture in Seattle. Reichard and staff had just celebrated the news that the Miller Foundation would fund a new state-of-the-art seed vault at CUH. Years of work with a captive population of Showy stickseed (*Hackelia venusta*) had finally yielded tissue culture protocols, and Reichard had just collected stem tissue specimens from the single remaining wild population of this extremely rare plant. Things were looking up.

And then it happened. At three in the morning, on May 21, 2001, the Center's Merrill Hall was fire-bombed by eco-terrorists claiming to be fighting genetic engineering. Everything went up in smoke – the building, labs, materials, data. Years of work. Even those showy stickseed specimens – burned beyond recognition. "The stem tissue has to be collected before the plants flowered, so after the fire it was too late," says Reichard. "It was just all so devastating."

Two and a half years later, Merrill Hall is getting a new lease on life, and Reichard and her group are finally getting a chance to fully operate their plant conservation programs once again. At a ground-breaking ceremony on Octo-

ber 1, university deans and private donors shoveled dirt to commemorate the start of work on what will be the new Merrill Hall, providing dedicated lab and office space once again, and utilizing sustainable building techniques to conserve energy, water and materials.

"I'm really excited about this," says Reichard. "When the first anniversary came around, our nerves were on edge, and we had an event reconfirm-



An artist's rendition of the planned rebuilding of Merrill Hall.

ing our values. I thought it was going to be painful, but I felt renewed; the

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Lions and Tigers and ... Plants!

CPC forges partnerships with natural allies: Zoos

Focus on Partnerships

Of the thousands of school children who know and love the Giant Panda, a good many probably also know a little bit about bamboo. Maybe they saw a panda in a zoo munching the leafy canes; maybe they learned about the mountainous bamboo habitat pandas need to survive in the wild. And so, learning about an adorable furry creature, kids also learn an important eco-

logical lesson: native plants and habitats may not be so cute and cuddly, but they're important, too.

The potential for public outreach in the link between plant and animal conservation is inspiring a new wave of partnerships between CPC and zoological organizations around the country. In October, CPC President Kathryn Kennedy spoke to the American Zoo-

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Director's Letter:

As Director of the Center for Plant Conservation, I think about the values that drive public service, and the elements of successful programs. Over the years at



Kathryn Kennedy

CPC we have come to value several core elements that are essential to our success in restoring vulnerable species.

One element is good science. Without inquiry and record keeping we cannot understand, interpret, and restore nature. Without good science we may unwittingly do harm instead of good. Good information supports success.

Good communication is also a core element. Knowledge that is not shared is of little value. We recognize the need to keep ourselves and others in the scientific and citizen community informed. With good communication we can inform, inspire, advise and advocate.

Another element is partnerships.

Clearly the job of restoring our vulnerable plant species is a big one, and while achievable, no entity in America today can achieve it on its own.

CPC as a network has many agency partners in projects large and small. We have agreements with the U.S. Fish and Wildlife Service, the Bureau of Land Management, the U.S. Dept. of Agriculture (Agricultural Research Service), and the U.S. Forest Service. Just last month we signed our newest agreement with the National Park Service. The power of these partnerships is remarkable. Working in partnership we can plan more strategically, and implement more efficiently. We extend precious conservation dollars by supplementing staff efforts and avoiding duplication of effort. Together, we are more effective.

We have worked to extend the power of partnerships to education, communication and advocacy as well. We have productive joint ventures with other organizations such as the American Horticultural Society, Plant Conservation Alliance, Garden Club of America, and Native Plant Societies. We recently

signed a Memorandum of Understanding with the American Association of Botanical Gardens and Arboreta, Botanic Gardens Conservation International, and the Canadian Botanical Conservation Network, to work cooperatively on communication and education projects. This Fall, we had opportunities to reach out to zoos and other plant-user groups to explore how we can work together.

In a very real sense, *everything* CPC does is accomplished with partnerships. The network itself is a partnership with institutions sharing our objectives and standards. Our donors are partners in our work, giving us stability and capacity to get real work done.

Our partnerships have never been stronger, or more promising. Thanks to each of you who are a part of our work. CPC looks forward to more partnerships and projects that help us grow, and make us even more effective for plant conservation.

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The Center for Plant Conservation is a national not-for-profit organization hosted by the Missouri Botanical Garden in St. Louis and governed by an independent board of trustees.

A network of more than 30 botanical gardens and arboreta, the Center's mission is to conserve and restore the rare native plants of the United States.



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Seed Banking: A Good Investment

By Megan Cotter, CPC intern

Do you ever wonder why your children look so much like you? Or wonder why you look more and more like your parents every year? You probably know that our families resemble each other because we have the same genetic information in our DNA, and this information has been passed from parent to child for many generations. Much like the children humans create, plants pass on their genetic information in their seeds. The seeds of endangered and imperiled plants are so valuable because there are no other plants in the world with that same genetic makeup, and we are at risk of losing these genetic resources forever. But preserving the genetic diversity of some species can be quite difficult.

When researchers and conservationists preserve a plant, one of their goals is to preserve genetic variety.

“By preserving the genes of these plants, we preserve the possibility for adaptations in the future,” explains Dr. Christina Walters, a plant physiologist at the USDA National Center for Genetic Resources Preservation and a member of the CPC Science Advisory Council.

After collecting the seeds, they must be stored for future use: planting or research. Since seeds begin to grow when it is warm and wet, scientists store seeds in places that are cold and dry. This is called freezing and desiccation of the seeds and is done in a seed bank. Many seeds naturally acquire the ability to survive drying and freezing, because this is what they must do to survive the winter. These types of seeds are easily put into storage by optimizing the humidity and then lowering the temperature. When cool and dry, seeds stop metabolizing and enter into a state of suspended animation. But not all seeds survive the drying and freezing treatments, and care must be taken so that they are not harmed during banking.

When researchers attempt to store a seed, they examine what is known about the growth habits of the plant, its habitat and geographical distribution,

and then classify the seeds by storage needs. Seeds are generally classified into two categories: orthodox (the majority of seeds) and recalcitrant; those that can survive the drying and those that cannot.

“The first step is to collect them and make sure they are mature,” says Walters. “Then you make sure you can germinate them. If you can, you know you have viable seed. This seems like an easy step, but it is actually quite hard to get some seeds with deep dormancy to germinate. If the seeds are dried on the plant, you have a good idea it is orthodox. If you can dry it down and get it to germinate, it is also probably orthodox. The rest is fine-tuning.”

Orthodox seeds can be stored at extremely cold temperatures and low humidity for long periods of time. These seeds are the easiest to place in liquid nitrogen storage, where temperatures are between -120°C to -150°C in the vapor above the liquid nitrogen, and at -196°C if seeds are immersed in the liquid.

Recalcitrant seeds, however, require a unique balance of temperature and humidity for storage. They cannot tolerate dehydration or traditional storage methods. Most tropical rainforest plants fit into this category, as they do not experience cold, dry dormant periods in their natural habitat. Additional research must be completed on these seeds to determine their optimum storage conditions.

Base or Active?

Depending on the uses or needs for the seed, seed banks can be classified as base collections or active collections. Base collections usually store seed for the long-term, and seeds are used as voucher specimens, for backup or for needs in the distant future. These seeds are left undisturbed except for periodic viability tests. If seed viability reaches a dangerously low level, regeneration or recollection may need to be implemented.

“Even when stored under the best conditions possible, seeds will die slowly over decades,” says Walters.



Christina Walters prepares seed for cryostorage at the USDA seed bank.

photo courtesy of the National Center for Genetic Resources Preservation

“We don’t really know why these seeds age with time, but we test the seeds to insure the genetic integrity of these plants.”

The Center for Plant Conservation has a partnership program with the National Center for Genetic Resources Preservation (NCGRP) to store base collections of endangered and imperiled plants in their facility.

Active seed collections, on the other hand, also known as working collections, are stored in-house at CPC participating institutions. They are stored in medium-to-long-term conditions and can be sampled more frequently for research, plantings, and recovery efforts.

Factors in how the seeds were collected affect how easy it is to store them. If the seeds are collected too early, they may not be mature or able to withstand desiccation. If they are collected too late, there is a risk of infection within the seed, or even germination. An example of this is *Pritchardia*, a group of

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“Along the Road to Recovery” is a CPC series highlighting the steps to recovery for imperiled plant species. For an overview of the road to recovery, see the Winter 2003 issue of *Plant Conservation*, available on the CPC Web site at www.centerforplantconservation.org.

Meet the Network: David Orr, Waimea Valley Audubon Center

Last summer CPC heralded the opening of the Waimea Valley Audubon Center, which signaled a change in management at this Oahu botanical institution and re-established the conservation goals of a priceless collection of native Hawaiian flora. Previous management had focused on converting the stunning natural resources of the valley into an entertainment-focused tourist attraction, which was often not compatible with protecting both the unique site and the extensive collection it housed. Conservationists were thrilled that a long struggle to re-direct focus on Waimea's original mission, passive recreation and botanical study and education, had finally paid off.

But perhaps no one was as grateful as David Orr, longtime botanical curator at Waimea. For Orr, preserving the imperiled plants housed at Waimea has been a labor of love for many years, and he brought vital determination, energy, and passion to the fight to save Waimea's conservation program. Orr's hard work was joined by the efforts of conservationists and volunteers, and his commitment has been an inspiration for many.

Recipient of this year's CPC Star Award for his dedication to the plants of Waimea, Orr has a fascinating background. We thought we'd give you a peak at the long and twisty road he's taken to Waimea Valley Audubon Center:

How did you get your start in conservation botany?

My Dad taught me early about vegetable gardening, and I've never minded getting my hands dirty. But I was never really aware of the biodiversity crisis until my mid-thirties. I don't have any formal botanical training. I spent many years traveling the tropics, first as an exchange student in southern India, then a year backpacking in South America, as well as travels through Africa and China.

In the mid-80's I was teaching at a Montessori school in Honolulu and started attending courses at Lyon Arboretum. There were some great staffers

there who took me under their wing.

Then in 1987 the school lost its lease, so I decided to return to Southeast Asia. Before I left, Lyon and Waimea gave me \$100 each and a letter of introduction and said, "Send back any gingers you find." That was before 1992 Rio convention restricting international plant exchange, so I was just going around, with permission, digging up gingers in the forests and private collections, and sending them back to Hawaii to be lodged, at first, in Waimea's quarantine house. I didn't find anything remarkable, but I did visit lots of botanic gardens.

When I came back, I spent six months sleeping on friends' couches while I mapped the collections at Waimea in the hopes I would get a job here. I started as a research assistant in August 1989, and then in 1992 I was elevated to superintendent of collections. In 1993, I took an eight-week course in botanic garden management at Kew Gardens. Most of what I've learned has been on the job, especially from former director Keith Woolliams. I've had a lot of hands-on experience planting, mapping and label-making.

What happened to shift the focus away from conservation at Waimea?

In 1996 the management changed with a new owner. After two years, the propagation and botanical records staff were taken off salary. The Waimea Arboretum Foundation had been in existence since 1977 and they helped support us; plus we got two grants from the city. We were really on a shoestring, maintaining the plants on our own. It was an incredibly tense situation. During that lean period, the annual checks from CPC, for the nine sponsored taxa we maintain in the national collection, were very welcome.



photo by Kelly Perry

David Orr points out the hidden petals on Hidden-petaled Abutilon (Abutilon eremitopetalum), one of the rare Hawaiian plants he cares for at Waimea Valley Audubon Center.

What motivated your commitment through these tough times?

I started here when Waimea was at its prime: the perfect mix of botany and horticulture. The plant records were, and still are, excellent, and the gardens were immaculately maintained. There was a wonderful esprit des corps among the employees, a feeling that we were all serving a higher mission that benefited the future. So I had a memory of how good this place could be. I knew how special this sacred valley was and that we were sitting on a very well-documented plant collection of great value to the future. And we had an obligation to all the people who had given us plants over the years, expecting them to be preserved for future research.

Now that Audubon has taken over management, what changes do you see?

It's been a wonderful transition. The valley is peaceful and quiet with bird songs and flowing water replacing the loudspeakers and chugging trams. Plus, we're getting so much positive feedback from volunteers and visitors. We thought maybe the tour buses would stop coming, but the wonderful thing is that the drivers are happy to walk their passengers through the gardens,

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The Great Sneezweed Mystery

It was a dark and stormy night. As the rain beat down and the lightning flashed on Missouri's Ozark mountains, a shadowy form emerged from the darkness: elusive... intriguing... unexpected... it's a Virginia sneezweed plant, long thought endemic to the state of Virginia! Looks like another case for CPC detectives – otherwise known as conservation botanists.

Perhaps that's a slight exaggeration. But plant conservation often does require quite a bit of detective work—and the case of Virginia sneezweed (*Helenium virginicum*) is no exception.

This rare plant, called “sneezweed” by early settlers who used the plant as snuff by grinding up the yellow flowers, was thought to exist primarily in Virginia, growing along the edges of shallow limestone sinkhole ponds. These ponds are usually flooded half of the year, from January to July, and are filled with poorly drained, low-nutrient acidic soil.

The Virginia sneezweed is uniquely adapted to live in this flood-prone environment: Plants can survive for long periods completely submerged underwater, and seeds remain “stored” in the soil during high-water years. Population levels then spring back when the water levels retreat.

Field workers in Virginia have identified only about 25 populations of the sneezweed, and loss of habitat is a major threat to the species as a whole. Virginia sneezweed depends on the flood



photo by Kim McCue

Virginia sneezweed thrives when nearly submerged in water for parts of the year.

cycle of its habitat, and on the low-nutrient conditions that give it a competitive edge over other plants. Land uses like grazing, agriculture, industry, or development can hurt these plants by causing erosion, siltation, run-off of toxics or nutrients, permanent flooding, or draining. Little was known about the plant, and there were few resources to address the problem.

Nobody expected to find Virginia sneezweed in Missouri, but after careful investigation, researchers identified an unusual spiky-leaved plant sprouting at the edge of an Ozarks limestone pool as belonging to the rare species. CPC botanist Kim McCue at the Missouri Botanical Garden was called in to collect seed from these Missouri plants. McCue planned to build a seed bank and enter the species in the CPC National Collection, thus preserving our options for restoration.

Seed banks like this serve as insurance against un-foretold crises in the wild population, and in fact, the first year that McCue planned to collect seeds, she saw just why seed banking is so vital: the plants failed to set seed that year. Luckily, the following growing season saw better results, and seeds were collected for both a permanent seed bank and for use in propagating plants in the greenhouse.

Although the private land-owner had opened his property to researchers collecting seed, this federally listed species can not be considered safe until a wild population has been estab-

lished on land which offers long-term protection and addresses or removes the conditions that threaten the plant, like drainage alterations, industrial pollution, or urban development.

Last April, half of those greenhouse-propagated plants were planted on land owned by the Missouri Department of Conservation. The other half were planted this fall. “Nobody knows the optimum planting time, so we were hedging our bets,” explains McCue.

As it turns out, April planting seems to suit the sneezweed just fine. “So far they’ve done remarkably well,” reports McCue. “We saw very low mortality with the April plants. They’re big, robust, and stunning, with tons of flowers.”

Stalking the Sneezweed

But meanwhile, the big mystery remained: what was a Virginia endemic doing in Missouri? Was this an isolated, chance occurrence, perhaps a transplant that had hitchhiked on an animal or human? Or was it a remnant of a much larger population that had disappeared?

“It’s not that uncommon to discover populations of a plant where no one thought there were any,” McCue explains. “For a species that has not been thoroughly studied, it may be the case that simply no one had ever looked before.”

In the case of Virginia sneezweed, this was especially true because the plant, with its yellow composite flowers, can easily be mistaken for any of the many other yellow composites. But when the state conservation department went out looking, the results were stunning: at least twenty-nine previously unknown populations of Virginia sneezweed have been located in Missouri. Based on this research, the Fish and Wildlife Service has proposed downlisting the status of this rare plant from endangered to threatened. Land-owner cooperation has helped make this research a real success story.

“This is very exciting for a number of reasons,” says McCue. “Given the

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Virginia sneezweed (Helenium virginicum)



The Hidden Value of America's Vanishing Flora

CPC plants may yield food and medicinal benefits

What is the value of America's native flora? Here at CPC, we could talk your ears off about the role native plants play in maintaining balanced ecosystems for clean water, healthy air, and wildlife populations. Or we could lift your spirits with gorgeous photos of native wildflowers, proving that our imperiled flora brings a wealth of beauty to our lives. But in this Thanksgiving season, as we remember early settlers and Native Americans, let's consider the value of these natural resources as food and medicine.

It was native plants, and the agricultural knowledge and assistance of Native Americans, which made the first Thanksgiving possible. The pilgrims may not have enjoyed a hearty pie or filling stew cooked with any plants now endangered, but many endangered plants have a wealth of food and medicinal value that is part of our nation's natural bounty even to this day.

Over 50 percent of species in CPC's National Collection of Endangered Species are related to species that are cultivated for commercial use, according to a CPC report published in 1998 by Oliver Phillips and Brien Meilleur. Plus, of the nearly 3,000 U.S. plants of conservation concern, two-thirds are related to (found within the same genera as) economically important species. In fact, the yearly U.S. wholesale farm value of food crops related to rare plants

Etonia rosemary (*Conradina etonia*), a member of the mint family, may have been used by Native Americans.



photo courtesy of the Conservation Program of Historic Bok Sanctuary

Cheryl Peterson of Historic Bok Sanctuary tends to Okeechobee gourd (*Cucurbita okeechobeensis*) plants. Now found in the wild in only two locations in Florida, this wetlands plants could hold genetic secrets to grow better cucumbers.



photo courtesy of the Conservation Program of Historic Bok Sanctuary

was found to be \$9 billion in '98.

Having a wild-growing native relative can be a boon for a crop species. Agricultural plants are vulnerable to disease and insect attacks that wild plants may have developed adaptations to fight off. Using traditional plant breeding techniques, botanists can cross wild natives with developed crop species to grow a stronger, more resilient strain. As Phillips and Meilleur wrote, "Since many crops require periodic genetic infusions from close relatives to combat threats from climatic change and disease, or to supply features like improved nutritional value, we conclude that the threats to the rare wild plants of the U.S. also constitute threats to the future of many contemporary crops."

Within the national collection, thirteen plants have specific food-related properties. One such species is Price's ground nut (*Apios priceana*), which CPC botanist Kim McCue of the Missouri Botanical Garden has been working to restore. "Price's ground-nut has a potato-like tuber," she says. "Native Americans may have used it as a plant source, and a more common related species is being looked at as a crop species. If you develop one species as a crop species and then it gets a disease, if you've maintained the wild related species, that wild species may be harboring a genetic resource. That's happened with maize, and many of our crop species are very vulnerable."

Another plant that is being studied for its potential value in strengthening food production is Texas wild-rice (*Zizania texana*). Wild rice, the only cereal grain native to this country, may have been used as sustenance by native cultures living near the San Marcos River, where Texas wild rice once grew from bank to bank. We know for sure that this imperiled native is closely related to northern wild rice (*Z. palustris*), which is harvested for food. And what's more, new research shows that white rice, a hugely important source of food around the globe, shares many traits with its wild cousins.

At Historic Bok Sanctuary, conservation biologist Cheryl Peterson works with a number of imperiled plants that could have some tasty and healthy benefits. The Okeechobee gourd (*Cucurbita okeechobeensis*) remains in only two locations in Florida, and even there this wetlands plant suffers from alterations to the hydrologic cycle. The Bok Sanctuary maintains seeds from this at-risk plant in the CPC national collection, and if healthy populations are restored in the wild, it could help scientists in their quest for hardier cucumbers or squash. That's because the Okeechobee gourd, while not edible itself, is resistant to many of the diseases that affect these economically important crops.

Peterson also works with several rare, dwindling species of paw-paw, a

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CPC Welcomes New Staff

Join the CPC national office in welcoming two valuable colleagues to our team.

Maria Bradford is CPC's new development manager. A certified fund-raising executive, Maria had previously served as the managing director of the St. Louis Black Repertory Company, public information specialist of the Missouri Arts Council, resource development director of the Jackie Joyner-Kersey Boys and Girls Club, and director of Public Relations of Grand Center, Inc.

Maria also brings a long-standing conservation ethic. As a teenager, she worked for several years at the St. Louis Zoo, where she says she gained a deep appreciation for the natural world. "The idea of working for a conservation organization is very attractive to me because, especially as a parent, I see more and more the importance of preserving our natural resources for the future," Maria says.

Maria has already forged ahead to improve CPC's development program, and she reports she's enjoying every minute of it. "I look at the mission of CPC, and I realize, I can't grow those plants or go out and collect those



Megan Cotter, CPC Intern, and Maria Bradford, CPC Development Manager

seeds," she explains, "But I can go out and look for funding to support these wonderful programs. Fundraising is simply a matter of communicating the mission and the passion you feel. CPC really sells itself – it's so clearly important."

Also joining the staff is Megan Cotter, CPC's new national office intern. Megan graduated last Spring with a BS in Biology from Truman State University, and is now pursuing a non-thesis MS in Biology at St. Louis University, with a concentration in conservation botany. Her goal is to develop a career in conservation outreach and education.

"Plants are often overlooked in con-

Beattie Fellowship Open

The Garden Club of America and the Center for Plant Conservation are seeking applicants for the 2004 Catherine H. Beattie Fellowship for Conservation Horticulture. Each year, the grant enables a graduate student in biology, horticulture, or a related field to conduct research on a rare or endangered U.S. plant.

Preference is given to students focusing on the endangered flora of the Carolinas or the southeastern United States. Fellowships may vary from \$1,000 to \$4,000, and will serve as compensation for work done by a graduate student, often at a botanical garden, jointly serving CPC and that student's curricular studies.

Completed applications must be received by CPC no later than December 31, 2003. More information can be found on CPC's website at <http://www.centerforplantconservation.org/beattie.html>

servation efforts," she says, "But I have always had a passion for plants. Some people think they're really boring, but they're not. In fact, they're fascinating."

Megan is working hard to help coordinate many of CPC's data-collection and partnership programs.

CPC Annual Meeting, Small but Active, Builds on Partnerships

CPC Board Chairman Eliot Paine welcomed attendees to the CPC annual meeting on Thursday, October 16 in Cleveland, Ohio. As the former director of The Holden Arboretum, Paine noted it gave him special pleasure to host colleagues once again in Cleveland, nine years after CPC last met there. "This gives us the opportunity to show what we've done and to learn from you how we can continue to improve," he said.

Kathryn Kennedy, CPC Executive Director, thanked the meeting's Cleveland hosts, the board of directors, the network participants, and the Bureau of Land Management, a federal partner which sent a representative to the meeting. She reflected on the low turnout, an indication of tight budgets around the network. However,

Kennedy noted, as the first ever CPC annual report shows, the network is making significant progress on conservation, and the strength of network partnerships is growing.

Kayri Havens of the Chicago Botanic Garden presented the meeting's skill-building workshop on pollination biology, and the Holden education department hosted a workshop on conservation education. A panel discussion offered suggestions for managing natural areas, and conservation officers discussed upcoming projects including recovery on public lands partnerships.

A highlight of the meeting was the awards dinner, during which the CPC Star Award for 2003 was presented to David Orr of Waimea Valley Audubon Center. The Board of Trustees passed a resolution commending Orr for "a de-



Joan Seveers (left) of the BLM with Kayri Havens of Chicago Botanic Garden at the CPC 2003 annual meeting.

cade of commitment to preserving the priceless collections of imperiled native flora at Waimea valley... Due to his unswerving loyalty to these plants and a conservation vision for this unique site, he has provided a beacon of hope that has proved vital to the long-term survival of this conservation resource."



Working Together to Save Rare Natives of the Pacific Northwest

Focus on Partnerships

The Pacific Northwest offers a number of unique climate systems and habitats that many rare plants, adapted to these often-harsh conditions, call home. But growing suburban development and intensive agriculture often threatens these fragile places. At the Berry Botanic Garden, CPC botanists are working in partnership with public agencies to conserve several of these priceless resources.

The garden holds an annual contract with the U.S. Forest Service to collect seeds from rare plants on Forest Service land. Last summer, botanists focused on the Siskiyou and Umpqua National Forests, home of MacDonald's rock cress (*Arabis macdonaldiana*), one of the first plants to be listed as Endangered under the historic Endangered Species Act of 1978. MacDonald's rock cress is one of several CPC National Collection plants that botanists worked with this summer.

"The Forest Service wants to safeguard as many of their rare species as they can," explains Berry conservation biologist Andrea Raven. "Seed-bank-

Effect of grazing on Pale blue-eyed grass (Sisyrinchium sarmentosum).



photo by Linda McMahon

ing provides an insurance policy of sorts, so that if there is any accident to the plants in the wild, we have the genetic resources for restoration. The Forest Service wants special attention for their rare plants, so we work in collaboration."

Planning and conducting seed collection for this annual work often involves many partners. "Our work is done in conjunction with whomever else is working on that plant," explains Raven. "With the *Arabis*, for example, our team of seed collectors included Forest Service, U.S. Fish and Wildlife and Berry Garden botanists. Forest Service and Fish and Wildlife botanists will continue to monitor these plants."

Seed collection was completed during the summer months, when 120-degree weather made the work particularly challenging. The seeds are then prepared for frozen storage back at Berry, and also tested for germination rates in laboratory germination chambers. The exquisite Umpqua mariposa lily (*Calochortus umpquaensis*) and the Way-side aster (*Eucephalus vialis*; formerly *Aster vialis*), two other CPC plants, were also collected as part of this research project.

In another federal agency partnership, Berry Conservation Director Ed Guerrant is working with another imperiled plant, Koehler's rock cress (*Arabis koehleri* var. *koehleri*), a tough, tiny shrub, which grows only in the nooks and crannies of craggy rock faces overlooking the Umpqua River. Roads, quarries, agriculture and grazing practices have all diminished the natural habitat of these tufted plants, and so the Bureau of Land Management asked Guerrant and his colleagues to augment an existing population on BLM land.

"The basic question is, 'Is it better to use seeds or plants?'" Guerrant says. Seeds were collected from the wild



photo by Linda McMahon

Pale blue-eyed grass (Sisyrinchium sarmentosum)

population and used to propagate seedlings in the greenhouse. Garden staff and interns then outplanted seeds and small plants at the wild population and Berry Garden's rock garden. The success of seeds and plants planted directly in the wild is being compared to the success of garden-grown plants.

At the same time researchers are collecting a wealth of other data. "We are looking at a lot of habitat variables – basically, asking plants where they want to live. Since this population occurs on a rocky hillside, we measured how steep the slope was, what compass direction the plants are facing, and how high they are on the hill. Are they more likely to get grazed where deer could reach? We note other substrate variables, such as whether the plant is growing in cracks and whether soil or moss is present." These measurements will help botanists determine the best protocols for planning a full restoration.

Grading Grazing

Another project at Berry is just finishing – and the resulting research will be used by decision-makers facing an immediate conservation challenge. Pale blue-eyed grass (*Sisyrinchium sarmentosum*) is a beautiful, delicate member of the iris family and not really a grass at all. It grows in open, wet

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A Collaborative Approach to Conservation Planning in New England

Focus on Partnerships

“By doing conservation planning for one species, we’re in fact planning for all plants in a number of habitats,” says Elizabeth Farnsworth, senior research ecologist at the New England Wild Flower Society. She’s talking about the NEWFS Conservation and Research Plan project, an ambitious undertaking to publish 110 plans for the conservation of rare native flora throughout New England. Eighty of these plans have now been written, and the results could spell good news for a number of vulnerable CPC flora – and for wild places in general.

“In the case of New England Boneset (*Eupatorium leucolepis* var. *novae-angliae*), a coastal plain ponds plant, we’re doing planning for individual occurrences of the plant, but at the same time the plans point out the need for management of this specialized type of habitat. There needs to be integrated habitat management in areas like these; an increasing population of people in coastal areas demands more land and water; as a result water draw-down profiles are changing in the ponds, affecting plant species composition.

“By doing conservation planning for that one species, you’re in fact planning for many coastal plain pond species. In a way, the New England Boneset becomes emblematic for many species on the coastal plain ponds. They all need the same T.L.C.”

The conservation plans are being written by botanists across the New England region, coordinated by NEWFS, and reviewed by scientific committees that include botanists from Natural Heritage programs, academic scientists, and botanical consultants in all states involved. This high level of involvement engenders a collaborative approach that can greatly multiply efforts to save dwindling plants.

“Because these experts are integral to the review of these conservation

plans, they’re all reading the plans, using them, and talking to each other,” Farnsworth explains. “When it comes to a species that’s found in multiple states, now we can have more collaboration, and when research is being done, we can disseminate that to all the states and to the conservation and scientific community as a whole.”

One such species is Long’s bulrush (*Scirpus longii*), a wetlands bulrush in the CPC national collections that is endemic to the eastern United States, mainly along the coastal plain, from Nova Scotia to southern New Jersey. “In the course of writing the plan, the author, Tom Rawinski, who works with the Massachusetts Audubon Society, went out and found new populations, some of them fairly large,” reports Farnsworth. “He was able to give us some brighter news. That’s the kind of new information we get via the process. The authors are fabulous and they do a lot of fieldwork and herbarium research, to check on and verify historic occurrences.”

Another rare, vulnerable plant benefiting from the research generated by the NEWFS project is Parker’s Pipewort (*Eriocaulon parkeri*).

An undergraduate student supported by a National Science Foundation grant that grew out of the project has found several new sub-populations of this delicate aquatic wildflower in Maine at Merrymeeting Bay. Now, work will continue with this species to gather preliminary information on its basic life history and potential pollination mechanisms.

For other plants, even if the list of known occurrences does not grow through the plan-writing process, there are other benefits. For the Green Moun-



Christopher Matrick, plan author for *Rotala ramosior*, leads enthusiastic volunteers in management of purple loosestrife near a *Rotala* occurrence. Plan recommendations are being translated rapidly into action.

tain maidenhair fern (*Adiantum viridimontanum*), for example, the attention this project has brought means that a plant listed as globally endangered within the last ten years already has a conservation plan – whereas some species have had much longer waits. Endemic to rocky serpentine habitats, this bright, glossy fern is threatened by mining and roads and requires collaboration across borders, between U. S. and Canadian conservationists, to ensure its survival.

In fact, many of the conservation plans could help imperiled native plants outside of New England. “The planning addresses the New England populations, but the first part of each plan provides a regional and North American outlook,” Farnsworth says. “We ask authors to place the plant in its whole range context. This way, the plans can be a model for all the states that have populations of these plants.”

Some plan authors and volunteers really got into their work!



photo by NEWFS staff.

Plants and Zoos

Continued from page 1

logical Horticultural Society (AZH), promoting the possibility of high-synergy partnerships between zoos and conservation botanists. Some productive partnerships are already bearing fruit around the country.

“By working with zoos, we can reach a different audience,” Kennedy says. “It’s so appropriate for our organization to partner with zoos because they’re already working on many of the same issues that we are.”

In fact, some zoos may be so closely aligned with CPC goals that they could even become participating institutions, just like the current 32 participating institutions.

“Any zoo that can meet admittance criteria and is interested in developing a conservation program for U.S. plants is welcome to discuss preparing an application,” Kennedy told the AZH.

Many zoos have horticultural arms that are already engaged in researching, propagating, and interpreting native flora, and may work in conjunction with the zoo’s conservation efforts to restore native habitats. Partnerships with CPC botanists can enhance these goals and accelerate conservation efforts.

At the Cincinnati Zoo and Botanical Garden, The Plant Research Division of the Center for Conservation and Research of Endangered Wildlife (CREW) has already collaborated several times with CPC botanists to help propagate rare and difficult species in the CPC National Collection, such as Cumberland sandwort (*Arenaria cumberlandensis*) Roan Mountain bluet (*Hedyotis purpurea* var. *montana*), Four-petal pawpaw (*Asimina tetramera*), Todsens’s pennyroyal (*Hedeoma todsenii*), Mead’s milkweed (*Asclepias meadii*), Avon Park harebells (*Crotalaria avonensis*), and Ute’s ladies’ tresses (*Spiranthes diluvialis*). If an imperiled species is not setting seed, or if researchers cannot succeed in growing plants from seeds using traditional methods, CREW’s tissue culture lab can often help. CREW scientists place a small amount of tissue from an existing plant on culture media containing nutrients, hormones and water. The

results are often healthy plants that start their lives in test tubes.

As part of its Center for Conservation and Research, the Henry Doorly Zoo in Omaha has a lab for rare and endangered plants and is working on cryopreservation techniques for North American orchids of conservation concern such as the Western Prairie Fringed Orchid (*Platanthera praeclara*).

Other zoos help promote plant conservation by offering their visitors interpretive information about America’s vanishing flora. At the Cleveland Metroparks Zoo, horticulturalists have created the Endangered Plants of the Midwest Garden, highlighting three CPC National Collection plants and their companion plant species. The CPC plants, forking aster (*Aster furcatus*), Kankakee globe-mallow (*Iliamna rivularis*), and Royal Catchfly (*Silene regia*), are displayed with informative signs telling visitors a little bit about these unique natural treasures. The CPC logo is included on the signs.

In the Pacific Northwest, two zoos have forged partnerships with local CPC institutions to promote plant conservation in innovative ways. At the Oregon Zoo, senior gardener Rick

Four-petal pawpaw (Asimina tetramera), an endangered Florida tropical fruit, is grown in tissue culture at CREW.



photo courtesy of CREW



photo courtesy of CREW

At the Cincinnati Zoo and Botanical Garden, scientists bank genetic material in a “Frozen Garden” to preserve resources for vital restoration projects in the future.

Hanes is working with conservation botanists at Berry Botanic Garden to create upland prairie habitat featuring the threatened Kincaid’s Lupine (*Lupinus sulphureus* var. *kincaidii*) and other rare, imperiled plants of the Willamette Valley.

“The upland prairie of Willamette Valley has been encroached upon by agriculture and cities, and it’s now down to 1 percent of its original range,” explains Hanes. “It’s thought to be the most threatened habitat in the state. We got involved because the endangered Fender’s Blue Butterfly relies on the Kincaid’s Lupine, but developing the plant habitat turned out to be just a really perfect fit for us. We’re really excited about it.”

When the zoo’s prairie habitat exhibit is finished, visitors will be able to view conservation research underway right under their noses. Interpretive signage will introduce the plants and Berry Botanic Garden’s rare native plant conservation programs, and researchers will be able to monitor the growth and reproduction rates of the plant species, some of which have been difficult to grow outside of the greenhouse.

“Here at the zoo, we had the ‘location, location, location,’ and Berry had the

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Hidden Value

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native tree that bears juicy fruit similar to custard apples. There's also the Florida ziziphus (*Ziziphus celata*), related to the Chinese ziziphus that is a powerful element in Chinese medicine. And Florida mints like the short-leaved rosemary (*Conradina brevifolia*) or the toothed savory (*Calamintha dentata*) make soothing, potentially therapeutic teas.

"There's a lot we don't know," Peterson points out. "Most of the information on ethno-botany has been lost, but I'd be surprised if Native Americans didn't use these mints. They haven't been tested for medicinal value, but they have unique chemistry in them that includes anti-fungal and perhaps anti-inflammatory elements."

Using gas chromatography and mass-spectrophotometry, Petersen identified essential oils in mint plants and found compounds that are known

Seed Banking

Continued from page 3

Hawaiian palms. Their seeds were thought to be recalcitrant, but researchers were harvesting them too early, when they looked healthy and mature. However, when researchers harvested them later, when they were dried up, the seeds responded much better to orthodox storage methods.

There are still many species whose optimum storage conditions are unknown. Recalcitrant species are a further problematic area. While problematic seeds are currently maintained by growing plants and tissue cultures, Dr. Walters reminds us that there is a risk of genetic erosion in using this method.

Once the seed category has been discovered and good quality seed are collected, it is not too difficult to manage seeds in seed banks. "It is really important for people to understand that banking the seeds of endangered plant species is a means to an end," Walters points out. "It is not a substitute for habitat restoration, but rather a way to preserve genetic diversity. [Seed banking] is a method of conserving a non-replenishable natural resource."

to be anti-fungal, anti-herbivore, and allelopathic. In the plant, these could function to deter rot, insects, and competitor species in the soil around the plant. "These plants potentially have very valuable roles in the chemical ecology of their habitats," she says, "and they may have filled medicinal roles for Native Americans."

But, of course, this does not mean we should head for the field in search of a rare mint when we come down with the sniffles. Remedies, even natural, are best prepared and prescribed by professionals, and proper identification and sustainable harvesting of native plants is extremely important. The case of the popular herbal remedy Echinacea provides a warning against uncontrolled collection.

Over-collection of a vulnerable plant because of possible medical value is extremely harmful to the plant's survival – and could prevent our ever knowing about the plant's beneficial effects.

McCue works with Tennessee purple coneflower, (*Echinacea tennesseensis*), a federally endangered wildflower with bright purple petals very similar in appearance to common Echinacea.



Okeechobee Gourd (*Cucurbita okeechobeensis*)

"Echinacea in general is very popular in the herbal trade," McCue says. "By and large the Echinacea that is processed is wild-collected. There's a perception that whatever benefit you could get is going to be stronger in a wild-collected plant, but there's no proof of that. Collectors dig out the roots, and they're not particular about which species they're digging.

"*Echinacea tennesseensis* gets hit because if you don't really pay attention, it looks like any other coneflower. I've seen it on glades: holes where the plants have been dug up. There's no incentive to harvest sustainably." Uncontrolled harvesting, along with habitat loss and development, threatens many rare plants.

For some plants, the stakes may be even higher. Virginia sneezeweed (*Helenium virginicum*), another CPC plant, may have anti-cancer properties. There are some indications that it may retard tumor growths, and if healthy populations can be restored, scientists could take advantage of these healing properties. Yet another reason to give thanks for our valuable, vanishing natural resources.



Tennessee purple coneflower (*Echinacea tennesseensis*)

Zoos

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expertise," says Hanes. "So it was a good opportunity to publicize their programs, and at the same time do something beneficial towards restoring these at-risk plants. Plus, it's an opportunity to educate the public. It's not just the old-growth forest we're going to lose—it's literally your backyard."

In, Seattle, the Washington Rare Plant Care and Conservation Program

at the Center for Urban Horticulture partners with the Woodland Park Zoo to present an annual wildflower celebration. The June event offers games, activities, and information about rare wildflowers, all free with zoo admission.

Nationwide, eight American zoos hosted events for international plant conservation day last year. As Kennedy told AZH members, "All zoos can help conservation of our U.S. flora!"

Merrill Hall

Continued from page 1

healing began. Now, we are taking the next step. Yes, we are going to rebuild, and yes, we will continue to exist.”

In the intervening years, Reichard and other CUH scientists have made do the best they could. Using temporary trailers as office space, they’ve borrowed lab facilities when possible from university researchers. “The people on campus have been very gracious,” says Reichard, “But you know what they say about the guest who stayed too long.”

Plus, workspace in the trailers was cramped – extremely so. Stacks of collections and field results pile up on the floor, and volunteers could only work one at a time preparing seeds for storage. The Miller seed vault was built as planned, and is now operational, but acquisitions have been slower than anticipated due to the shortage of workspace.

Reichard has also turned to private lab facilities to continue the tissue culture work so vital to saving some of the Pacific Northwest’s imperiled plants. Once again, colleagues have stepped up to lend a hand, and commercial scientists have volunteered to conduct some studies in their private labs.

“We’ve been very grateful for the private people who were doing it on a volunteer basis, because they’ve been really great,” Reichard says. “But there’s no substitute for doing it yourself.”



photo courtesy University of Washington

As firefighters doused the flames of an incendiary bomb in 2001, botanists mourned a major setback in conservation work.

Now, Reichard will be able to conduct her own tissue culture work – including further studies with Showy Stickseed.

This beautiful plant, the rarest in the state of Washington, currently only grows in the wild in one site, a sharply slanted embankment near a major highway. “We all agree that it’s essential for its survival that new populations are introduced in the wild, but the current population isn’t producing viable seed,” she says.

So, in 2002 Reichard and her colleagues were out on the slope once again collecting stem tissue, and what she found with the help of a private tissue lab may spell good news for this federally listed endangered plant.

*The new labs will allow botanists to finally return to full capacity restoring vulnerable plants like the Showy Stickseed (*Hackelia venusta*), which exists in the wild at only one site.*



photo by Ed Guerrant

Sneezeweed

Continued from page 5

number of sites being found, maybe the Missouri populations are not as disjunct as we had thought. We need to look between here and Virginia to see if there is actually a continuous range.”

Researchers are also learning more about the plant’s natural history. While most of the newly located plants have been found growing in the margins of

sinkholes, botanists have discovered that sinkhole habitat is not obligatory for Virginia sneezeweed. Some individual plants are able to survive in wet swales (low marshy areas) as well.

These new finds could spell a happy ending for Virginia sneezeweed. But since nearly all of the discovered populations are located on private land, crafting agreements for protection and study or reintroducing the plant to protected public land is still vital.

“For one thing, it gives us a chance to learn about this plant’s life history, seed setting success, seed dispersal, and more,” McCue says.

Since private land sites are not currently secured against future development, working on conservation agreements or creating secure sites on public land is vital to secure the long-term survival of this unique plant.

Until then, CPC plant detectives are on the case.

Pacific Northwest

Continued from page 8

meadows in eleven locations in Washington State, eight in Oregon, and possibly a few in Canada.

But many of these occurrences have shown significant decline in recent years, reaching sizes too small to be self-sustaining, and several have apparently disappeared. The two largest remaining populations are found on land owned by the U.S. Forest Service that is currently being grazed by cattle. Now, the allotment that allows for cattle grazing is being reconsidered, and the future of this beautiful, delicate wildflower hangs in the balance.

“The Forest Service is making a decision whether or not to renew a ten-year grazing permit on the land where blue-eyed grass occurs,” explains Raven. “We’re wrapping up a five-year project with this plant, and we’ve found there’s practically no fruit production when they’re being grazed by cattle. Reproduction is significantly reduced.”

Marked by bright flowers with periwinkle petals and a yellow center, the plant is capable of reproducing asexually by sending out underground rhizomes that grow into clones. Grazing forces plants to rely more heavily on this method. Cloning will make the population seem larger, but the genetic resources of the population will remain relatively constant since many individual plants are simply genetic copies of their parents. When there are fewer genetic variations in individual plants, populations are all the more vulnerable to disease, predation, and disturbances. As Raven’s report told the Forest Service, “Copying a lottery ticket does not increase the odds of winning.”

Researchers found that cows particularly like to eat the fruit of the pale blue-

Way-side Aster (Aster vialis)



photo by Ed Florance



Umpqua mariposa lily (Calochortus umpquaensis)

eyed grass, and grazing cattle have a much bigger impact on the plant than native wildlife like elk, deer, and rodents. Blue-eyed grass plants in a fenced cattle-exclusion plot produced twice as many new plants. Because the plant’s periods of emergence, flower production and seed development overlap with cattle grazing months, these plants are vulnerable throughout the season. Research found that just one month of grazing resulted in the removal of nearly half of all leaves and nearly all flowers and fruits from grazed plants.

Raven has presented these findings to the Forest Service, and now the decision rests in their hands. If all goes well, the pale blue-eyed grass could join the ranks of vulnerable Northwest natives being given a firmer footing by CPC botanists.

The Center for Urban Horticulture’s Rare Care team at the University of Washington also works with many native Pacific Northwest plants, including the Wenatchee Mountains checkermallow (*Sidalcea oregana* var. *calva*). CPC botanists at Rare Care have worked to establish seedlings of this bright pink wildflower, which got a boost two years ago when the U.S. Fish and Wildlife Service designated 6,135 acres of seasonal wetlands as “critical habitat” for the plant.

Another important and vulnerable Northwest species being researched at Rare Care is the Showy Stickseed (*Hackelia venusta*). For more information on challenges and achievements of research with this, one of the rarest plants in the state of Washington, see the front-page article of this newsletter.

David Orr

Continued from page 4

pointing out what’s in bloom.

The first day Audubon opened, we were expecting about 100 volunteers, but 300 showed up. I think everyone has wanted to help Waimea all along, but they didn’t want to work with previous management. Now the floodgates are open. One great thing about Audubon is they’ve hired a full-time volunteer coordinator, which takes a huge weight off my back.

So, take us on a tour of the vulnerable Hawaiian plants at Waimea.

On the tours, I explain CPC’s work, and then I take them through the Hawaiian plants – for example *Brighamia insignis*, which look like cabbage on a baseball stick. I show the old plants that are plants that we grew from even older ones that we hand-pollinated, but the younger are wild collected from the north shore of Kauai; so they can see that older ones are not really suitable for a conservation collection.

I show *Pritchardia munroi*, and explain there were not originally any coconuts on Hawaii, only one genus of palms. And I usually show the rare *Chamaesyce skottsbergii* var. *kalaeloana*, which was thought to be extinct, then rediscovered a few years ago. The only population is found on a US Naval Air Force property where they’re going to clear off the top six inches of soil because it used to be a shooting range.

I’d like to do more reintroductions of these rare plants, and once we get the staffing back, the sky’s the limit. But for right now, we’re holding our own.



photo by K. Wood

Pu aupaka (Brighamia insignis), on view at Waimea.

Give Thanks for a Natural Bounty Worth Preserving

The first Thanksgiving feast included many native foods that the Pilgrim Fathers and Mothers learned to grow and cook from Native Americans. In fact, our natural resources could still help America grow stronger, healthier foods, but many native flora are at risk of dying out unless we step in to save them.

The Center for Plant Conservation's National Collection of Endangered Plants includes several plants that are closely related to food species and could hold genetic secrets for longer plant life or more nutritional value.

Through traditional plant breeding techniques, botanists may be able to capture the economic value of these vulnerable native treasures--but only if we work now to preserve wild populations for the future.

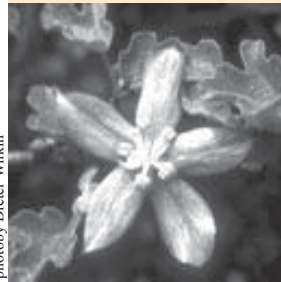
You can help by fully or partially sponsoring a species in the National Collection. The unsponsored species featured on this page all have food-related properties, and many other fascinating and valuable plants awaiting sponsorship can be found in online at www.centerforplantconservation.org.

Give us a call at (314) 577-9457 if you'd like to learn more about sponsoring a little piece of America's natural bounty.

For information on two more unsponsored plants with value to crop species (**Texas wild rice** and **Okeechobee gourd**), see our article on the hidden value of plants on page 6.

Unsponsored Plants in the National Collection

Pine Hill flannelbush (*Fremontodendron decumbens*)



photoby Dieter Wilkin

Pine Hill flannelbush is a member of the cacao family, which includes the tropical and subtropical

plants that are used to make cola and chocolate

Sand food (*Pholisma sonora*)

Stems of this mushroom-like plant were historically eaten raw or roasted by native American tribes.

Pecos sunflower (*Helianthus paradoxus*)

Because this wild sunflower is in the same genus as our domestic sunflowers, their genes are known to be invaluable in improving characteristics like yield, oil content, and disease resistance of cultivated sunflowers. The Pecos sunflower is found growing in brackish saline waters, which is proving useful in developing a cultivated sunflower



photoby Patite Leslie

which will grow under saline conditions.

Tumamoc globe-berry (*Tumamoca macdougalii*)

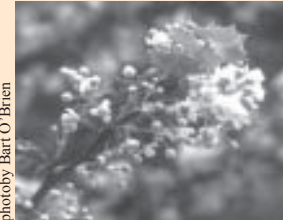
A member of the gourd family.



photoby Lynda Pritchett-Kozak

Nevin's barberry (*Berberis nevinii*)

This species is a federally-listed endangered species that is also popular in gardens and widely cultivated, in part for its bright red edible berries.



photoby Bart O'Brien

'Ala'alahua (*Alectryon macrococcus* var. *auwahiensis*) The mild, sweet seeds and scarlet-colored fruit of this tree provided food for the early Hawaiians.

Saiya (*Amoreuxia gonzalezii*) The starchy roots of this species were eaten by the Seri, Pima and Tohono O'odam people living in the American Southwest.

Mann's gardenia (*Gardenia mannii*)

This member of the coffee family is a tree that grows to a height of up to fifty feet with creamy, fragrant blossoms that open in the late afternoon and last for about two days.

How you can help the Center for Plant Conservation recover native plants

There are many ways to help the Center for Plant Conservation continue to recover America's vanishing flora. Every gift counts and is important to us.

Unrestricted Giving: These gifts are not designated for a particular program or project. Funds are used where there is the greatest need.

Honorary and Memorial Opportunities: You can choose to make your gift in honor or memory of a friend or loved one.

Stock Gifts: As your financial advisor can confirm, there are advantages

to giving appreciated stock directly.

Gift Friendships: CPC Friendships make great gifts! A way to say you care, a gift Friendship can be sent for any occasion.

Plant Sponsorships: Plant sponsorships provide the funding to get the "hands on" work done for plants in the National Collection.

Our Friends and Donors are the backbone of our native plant conservation efforts, providing the help we need to run a national plant conservation organization. CPC could not exist with-

out their help. The Center for Plant Conservation accepts gifts in the form of cash, check, credit card, or transfer of securities.

If you would like to know more about donating to CPC, please contact:

Maria Bradford
Development Manager
Center for Plant Conservation
P.O. Box 299
St. Louis, MO 63166-0299
(314) 577-9457
or e-mail cpc@mobot.org

With iGive, You Give More than Holiday Gifts

We wanted to let you know about an opportunity that will help raise funds for the Center for Plant Conservation, while providing you with a convenient way to shop for holiday gifts (or anything else, for that matter). When you shop at iGive.com a percentage of your purchases are donated to a charity of your choice.

So you can send your Aunt Tilly a gift pack from Hickory Farms and CPC will receive a donation of six percent of the value of the purchase. You can buy that adorable outfit from Baby Gap for your grandson and CPC will receive two percent of the value of the purchase. Or, you can pamper yourself with some luxurious bath oil from Bath-and-Body and CPC will receive six percent of the value of the purchase.

More than 450 stores participate in the iGive.com program, so you won't have any trouble finding the perfect gift for everyone on your list. You don't have to fight the crowds at the mall. You don't have to stand in line at the post office to mail your gifts to people in far off places. And, best of all, you are supporting the Center for Plant Conservation with every purchase -- a win-win situation.

When you log on to igive.com, you must register to ensure that funds will go to the charity of your choice. There is no cost or obligation to you when you register, and the process is simple. Just be sure to use the keyword "plant" to help you find and designate the Center for Plant Conservation as the recipient of any funds generated by your purchases. You can get more information by visiting the web site www.iGive.com.

And, while we are on the subject of the holidays, there are other ways to honor your loved ones while supporting CPC's efforts to restore imperiled native plant species.

You can give a CPC gift membership to a friend or family member. The person you designate will receive all the benefits of CPC membership, including a one-year subscription to *Plant Conservation*. So if you know someone who cares about plants, what better gift than membership in the first national organization dedicated solely to preventing the extinction of America's most vulnerable plants?

You can also make a year-end contribution to support CPC. Your tax-deductible contribution can be designated to



photo by Greg Wieland

You could help sponsor Clay's Hibiscus (Hibiscus clayi), a Hawaiian endemic in the CPC National Collection.

help sponsor a plant in the CPC National Collection of Endangered Plants, or it can be used to help offset the costs of coordinating our national program of species preservation and research. Your gift can be made by check, credit card or through a gift of securities. (Check with your financial advisor about the advantages of giving appreciated securities.)

You might be able to increase the value of your gift through an employee matching gift program. Many employers will match employee gifts dollar for dollar (and some even more). Check with your human resource department to see if your company will match your gift to CPC.

Thank you for your past support and best wishes during the coming season!

Give the gift that keeps on growing!

The Center for Plant Conservation's efforts are made possible by the **Friends of CPC**. All Friends receive a complimentary subscription to *Plant Conservation*, the CPC newsletter. Plus, Friends will receive our new **Friends benefits**, with distinctive botanical illustrations of the imperiled plants that your gifts support. The

benefits feature artwork by botanical illustrator Bobbi Angell.

Please use the form below either to renew your support or enroll as a new Friend. **Your gift will contribute in an important way to the vital work of saving America's most imperiled plants.**

- \$35 Friends 4 notecards
- \$75 Family Friends above and 3 magnets
- \$150 Sustaining Friends ..above and canvas lunch bag
- \$250 Benefactorsabove and 15" boat bag
- \$500 Preserving Donors*
- \$1,000 Conserving Donors*
- \$5,000 President's Circle Donors*

**These Donors will receive periodic informational updates about the progress of the Center.*

- This is a gift membership for a new Friend. (Please list name, address and phone number of recipient on the form at right.)

Please send this completed form and payment in enclosed envelope, or mail this form to: Center for Plant Conservation, P.O. Box 299, St. Louis, MO 63166

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Please print your name as you wish it to appear in the newsletter Honor Roll.

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Plant Profile: Vine Hill Clarkia

By Megan Cotter, CPC intern

Many people associate the Vine Hill area of Sonoma County, California with fields of grapes and fantastic wines. To one little plant, however, it is a last refuge in a losing battle. Vine Hill clarkia (*Clarkia imbricata*) belongs to the evening primrose family, and is listed as endangered by the U.S Fish and Wildlife Service.

Clarkia is an annual plant that produces white or pink flowers late in the season. Historically, there have only been two known populations of this species in the Vine Hill area of California. However, one of these populations has been recently destroyed, leaving a lone population. A few hundred plants have been rescued and transplanted at the California Native Plant

Society's Vine-Hill Preserve, but a significant effort needs to be made to save the surviving native population.

To compound the problem, the clarkia seeds require a special kind of soil to germinate and grow, decreasing the probability that these plants will be able to come back after a significant disturbance. The soil must be an acidic loamy soil with an undisturbed crust. The single native population is on privately owned land. However, the California Department of Fish and Game is seeking cooperation to acquire this land in the hope of preserving this highly endangered plant.

The University of California Botanical Garden, a participating institution at Berkeley, is the primary custodian for the clarkia in the National Collection of Endangered Plants.

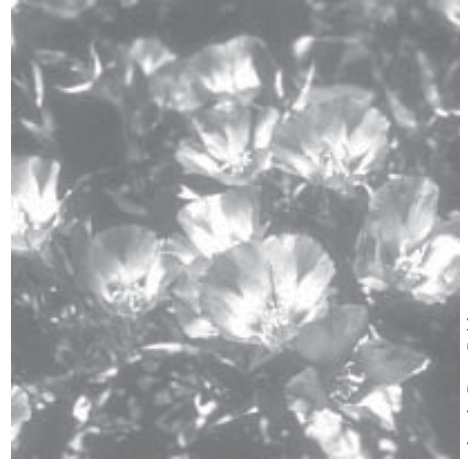


photo by Roger Raiche

Vine Hill clarkia is currently not sponsored. To sponsor or partially sponsor this plant, please contact CPC at (314) 577-9540, or cpc@mobot.org.

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