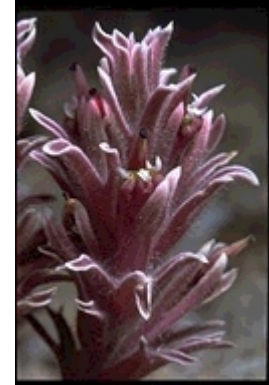




Lingua Botanica

A Journal for FS Botanists & Plant Ecologists



Welcome gentle readers, to the inaugural edition of *Lingua Botanica*, the Journal for Forest Service Botanists, Plant Ecologists, and friends. These pages are the fruit of efforts put forth by a group of people that are passionately dedicated to the grand botanical heritage of this nation’s public lands. Because LB is a new venture, we expect that there will be plenty of opportunities to grow and evolve (and maybe even mutate). With that in mind, the coming years should be both fun and interesting. Fun? Yes, but fun with a purpose. **The goals of LB** are threefold: 1). to foster communications among botanists and plant ecologists throughout the Forest Service, 2). to provide an organ through which we can communicate issues of importance to FS botanists and plant ecologists to our colleagues within and outside the agency, and 3). to serve as an educational tool. To that end, you can expect to see a wide range of topics in these pages. From news of national trends, to personal essays and profiles, LB is dedicated to enriching the culture of Forest Service botanists and plant ecologists. To achieve this goal, **LB invites its readers to submit materials for future editions. We are especially interested in material from the District botanists!** However, you don’t have to be a botanist to submit something, although contributions should be (more or less) plant-related. We are also interested in publishing images, to the extent that space and resolution limitations permit. So there you are, let the show begin! We hope that you and your friends enjoy *Lingua Botanica* today and in the future. **Your comments, contributions, chocolates, and suggestions can all be sent to your friendly editor, Wayne Owen (wowen/r8 or wowen/r8@fs.fed.us).**

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Useful URLs

Its midwinter for most of the nation, and while this means the witchhazel is blooming for some of us, for others it means something very different indeed. This month's list of URLs focuses on image galleries of tropical plants. If you can't be there, the next best thing is an imaginary journey. Visit one during your next ultra-tedious conference call.

Australian National Botanic Gardens Acacia Collection.

<http://www.anbg.gov.au/acacia/>

Images of Dry Tropical Habitats.

<http://hoya.mobot.org/gradstudents/olson/drytropics.html>

Tropical Flowers of Thailand.

<http://members.tripod.lycos.nl/gvo/>

The Tropical Botanical Garden, University of Malaya, Kuala Lumpur.

<http://rimba.botany.um.edu.my/>

After visiting the University of Malaya, you might want to try this link...

<http://agrolink.moa.my/comoditi/fruits.html>

And never let it be said that I'm not a realist...

<http://www.umich.edu/~newsinfo/Releases/1999/Dec99/r120899a.html>

Driven Up A Tree

Botanist Margaret D. Lowman opened up the tops of the rain forest for science.

by: Julie Lewis, Scientific American, December 1999.

Perched at the top of an oak tree, Margaret D. Lowman surveys the tips of tall palms and jungle plants and the fragment of Florida sea peeking through the foliage way below her. For her, the climb to the little platform wedged in the branches was effortless; despite the humidity, there's not a bead of sweat on her forehead. She inhales the early morning air and exudes contentment. The 45-year old botanist later confesses that she prefers coming down to clambering up. "Man was not made to live in the trees like monkeys," she declares. It's a strange observation for Lowman to make. She's come about as close to anyone to giving monkeys some real competition.

Lowman has made thousands of climbs in her quest to discover more about one of the earth's last frontiers" the rainforest canopy. The difficulty of getting up into the canopy had preserved its status as one of the world's most uncharted territories – until Lowman and a handful of other high-minded scientists devised various means of scaling those heights. When she's not using ropes to haul herself into the treetops, she might rely on a hot-air balloon to suspend herself over them or a crane to lower herself into them. When

she was pregnant, she squeezed into a cherry picker to continue her research. Her pioneering work on ways to get into the canopy has taken her to Cameroon, Peru, Belize, Samoa, Panama, and Australia and was recognized in 1997 when she was made a fellow of the venerable Explorers Club, one of 12 botanists among its 2,800 members.

Children's drawings and a poison dart blowgun from the Amazon share wall space in her office at the Marie Selby Botanical Gardens – a lush patch of tropical plants established on the grounds of what was once a Texaco oilman's Sarasota, Florida home – where she is director of research. On her desk is a copy of the New York Times Book Review, which warmly reviews her recently published autobiography, *Life in the Treetops*.

Although her work is physically demanding, the slender Lowman does not look particularly strong. But her small frame contains a dynamo of energy and enthusiasm, and she is constantly on the move, whether scrambling up a tree or making a quick dash to the supermarket for groceries to feed her family and a visiting journalist.

She seems most calm when we climb up to the viewing platform in the garden, where I observe as I reclip my safety harness that there must have been very few safety rules when she started climbing. “Oh, no, no rules,” she confirms brightly, then admits that it's still a largely unregulated business. She's only had one minor fall in her 20-year career, but several friends have had to “have their insides sewn back together” after accidents, she says.

Lowman began her arboreal career in Australia in the late 1970's. Born in upstate New York, she arrived at the University of Sydney in 1978 to pursue her doctorate in rain-forest research, only to discover that it was far from fashionable there. Not only was her supervisor not studying rain forests, no one else in the botany department was either. “I think he really just took me on as a kindness because he had met me on a sabbatical in England, and I had talked to him with this great enthusiasm about studying rain forests,” Lowman recalls. She also rather naively did not realize that the Australian tropics were 600 miles from Sydney.

Initially, Lowman set her heart on studying butterflies, but when her supervisor pointed out that they could be elusive, she changed her focus to leaves – a less mobile subject but with one significant drawback: it required her to climb. She struggled to think of alternatives to clambering up, even toying with the idea of training a monkey, but in the end it seemed unavoidable. Mountaineering shops and supplies were then not available in Sydney, so Lowman turned to university spelunkers for advice on climbing techniques and hardware. Following their instructions, she hand-sewed her harness out of car seat-belt straps. She made it up her first tree by using a slingshot to propel her ropes up into the branches.

“I remember the next day my legs were really sore, because I had obviously tightened all the wrong muscles thinking I could hug the tree and save my life,” she explains. “But I was really thrilled. It was really great, because when I knew I could do this project.” With her newly found access into the foliage, Lowman studied the growth of rain-forest

leaves and the impact of herbivores on them, her research is helping to question the assumption that such leaves live only for one to three years. In fact, although leaves in sunny treetops live just that long, leaves in the shady understory can live as long as 15 years. Such insights challenged scientific understanding of leaf growth, which had largely been based on observations made in temperate forests, and revealed the complexity of the rain forests, and revealed the complexity of the rain forest in comparison with other types of forests.

Then, in 1983, Lowman's unusual skills suddenly came into demand in rural Australia. Eucalyptus trees were dying in frightening numbers, in a phenomenon called dieback. First recorded in Australia in 1878, dieback had by the early 1980s reached epidemic proportions in the farming regions inland from Sydney, posing a severe economic and ecological threat to local communities. So Lowman moved to the outback and began climbing trees in a bid to find the cause. After three years of work, she and her coworker Harold F. Heatwole made a significant breakthrough, naming a common beetle as the immediate cause of a complex condition and thus clearing the native koalas of any culpability. The introduction of nonnative grasses and livestock had created a boom in beetle numbers. Trees weakened by drought and soil erosion were unable to withstand the insect onslaught.

By the time Lowman had identified the problem with the eucalypti, however, she had some problems of her own. She had married a local grazier, and after the birth of her two sons, she says, her husband and in-laws wanted her to devote herself entirely to traditional domestic duties on their 5,000-acre sheep station. At the same time, environmentalists were fighting to save Australia's rain forests, and there were increasing demands on Lowman's skills. "Rain forests were getting more important in Australia, not less," she recalls. In an effort to juggle motherhood and science, she took her then four-month-old first child, Eddie, on a trip to Queensland. She would go out into the rain forest to study tropical seedling growth and rush back from the field to feed him during the day. But after eight years in the bush, trying to work without family support, Lowman could no longer neglect her science. She moved back to the U.S. with her children, nearer her parents and brother, and later divorced her Australian husband.

Since then, she has been at the cutting edge of new canopy-access technology. In 1991, she worked with a French team that used a hot-air balloon to suspend an inflatable platform over the Cameroon jungle. It's Lowman's favorite way of getting into the canopy. "It's kind of like being on a trampoline," she says. She helped to build the first elevated walkway through the tropical treetops in Australia and constructed the first one in North America as well. Networks of these walkways now exist throughout the world, allowing scientists and members of the general public to climb into the canopy more safely.

When she could, Lowman has taken her boys on trips, schooling them in jungle etiquette (don't touch spiders) and using a system of hand-squeezing signals so they would know when not to disturb the working scientists. One gentle squeeze, for instance, meant "don't talk, just listen." My colleagues were totally impressed because the kids were so

good,” she says. “Now I get phone calls from my male colleagues saying, ‘I really want to take my child to Costa Rica, how can I do that?’”

In recent years Lowman has devoted her boundless energy to bringing together those working in the fledgling field of canopy research, organizing the first and second conferences on that subject. “She has been a great energizer of the community,” observes Terry Erwin, a research entomologist at the Smithsonian Institution. In 1995, with Nalini M. Nadkarni of Evergreen College, Lowman co-edited the first book to consolidate studies on the canopy and thus make the information more easily available. The numbers of people involved in canopy research have blossomed ever since. Erwin praises Lowman’s ability to inspire others” “She’s got to be one of the most enthusiastic persons I’ve ever met. She’s charming, and she makes you want to do the stuff.”

The stuff she is most keen on her colleagues doing right now is promoting their knowledge to help in rain-forest conservation. “I think a lot of it has to be translated into public education really quickly,” she states. “It’s not good enough just for scientists to learn about it and to share it in their scientific journals.” Uncovering the medicinal riches of rain forests could also help promote their conservation, Lowman believes. “I think we probably are missing the boat with some of those natural medicines and some of those ethnic uses that only the locals know,” she surmises. She hopes botanists will pursue funding partnerships with pharmaceutical companies to explore the medicinal potential of rain-forest plants.

Indigenous people, however, do have a claim to ownership of the products, she maintains. “They not only inhabit the forests, but they have also spent many generations developing the uses of these plants that are now learning about as medicines,” she says. “In future years, hopefully there will be beneficial partnerships between drug companies and local villagers, all of which will ultimately benefit rain-forest conservation.”

Having spent 20 years of her life exploring the treetops, Lowman has no intention of coming down just yet. “I hope I can last five or 10 more years,;” she says. For Lowman, it seems that a life lived only on the ground would be a life only half lived.

First Government Forest Reserve in the Hemisphere

by Terry West, in Centennial Mini-Histories of the Forest Service, 1992

Although 1991 marks the centennial of the creation of the forest reserves under the 1891 act, they were not the first government forest reserve in the New World. Fifteen years before President Benjamin Harrison (1833-1901) proclaimed the first Federal forest reserve (the Yellowstone Forest Reserve), the Spanish Crown had established reserves in Puerto Rico, then part of the Spanish Empire. The present Caribbean National Forest was formed from part of these lands.

Increased population pressure accelerated the rapid and widespread destruction of forest resources in Puerto Rico in the 19th century as forests were cleared for agricultural land, the economic base of the nation. The colonial wars of independence and illegal trade of timber led Governor Salvador Melendez Bruno to restrict the sale of wood considered important for naval use in 1816.

If military concerns led to the first consideration of forest depletion, it was the impact of farming that really led to conservation measures. Alarmed by the extent of deforestation resulting from government-sponsored farming, Governor Miguel de la Torre issued a decree in 1824 to stem harm to watersheds by planting trees – the first conservation law in Puerto Rico.

Puerto Rico remained under the dominion of Spain, which drafted the first comprehensive forest laws (1839) and set up forestry commissions that led to the first islandwide forest inventory in 1843. These were directed by *ingenieros de montes* (forest engineers) for the *cuero de montes* (forest corps), a department directed by the minister of public works and staffed by graduates of the Spanish forestry school.

Government protection of the forest resources eroded in the next decades as Spain's ability to fund distant programs faded along with its economic status. Yet, in 1876 King Alfonso XII strove to ensure continued conservation of soils and water quality and flows in Puerto Rico by creating forest reserves. Because the forests were sources of roofing material, fuelwood, and sawtimber for people, extractive regulations needed to be enforced by the *servicio de monteros* (forest service).

As part of the settlement of the Spanish-American War of 1898, control of Puerto Rico passed to the United States of America, which has governed it since then as a "commonwealth." In 1903, the Luquillo Forest Reserve was declared and in 1907 it was named a national forest. It has the distinction of being the only forest reserve that was not established under authority of the 1891 act. Instead, the reserve was established under a 1902 act of Congress that gave the President one year to reserve "Crown lands" ceded to the United States by Spain in the Treaty of 1898. In 1935 it was renamed the Caribbean National Forest and additional land was purchased. In 1939, the Tropical Forest Experiment Station (now the Institute of Tropical Forestry) was established in Puerto Rico. Plans are underway to create an "international management model for tropical forest" in the only tropical ecosystem in the National Forest System – the Caribbean National Forest.

An Endangered Species Act Success Story

from Defenders of Wildlife <www.defenders.org>

MacFarlane's Four-O'Clock is a perennial herb with purple or rose colored flowers and heart-shaped leaves. The species experienced dramatic declines due to livestock overgrazing and the spread of exotic plants over its habitat. The species is only found in

northeast Oregon and in west-central Idaho. Under Section 6 of the ESA, the FWS and the U.S. Forest Service have given Oregon and Idaho funds and technical assistance to research and implement recovery options. As a result of a population increase, the FWS is considering reclassifying the species from endangered to threatened. The McFarlane's Four O'Clock's population grew from a low of 30 plants when it was listed in 1979 to over 2,300 today.

Invader Fuels a Fiery Cycle

By Tom Kenworthy, Washington Post Staff Writer

Monday, November 15, 1999

ELKO, Nev.—The wildfires began in early August with almost unimaginable speed and fury. On the night of Aug. 4, 8,275 lightning strikes were recorded in one 12-hour period in northern Nevada, and by the next day some 300,000 acres of rangeland were on fire or already burned. Within just five days, more than 1 million acres had been burned. By the end of the month, more than 1.5 million acres in Nevada had been charred—an area 40 times as large as the District.

Fire has always been a natural part of the Great Basin, the massive basin and range country between the Rockies and Sierras that includes most of Nevada, western Utah, southern Idaho and southeast Oregon and that appears to motorists hurtling between Salt Lake City and Reno as a desert wasteland. Of the major plant communities that exist here—sagebrush, salt desert shrub, and pinyon-juniper—all but the salt desert shrub have been shaped by the relatively infrequent, low-intensity fires that characterized this region.

But the massive fires in the Great Basin in the summer of 1999 were of a size and character fundamentally different from what occurred here naturally before white settlement began altering the landscape. To scientists who study and manage the land here, the fires that now occur far more frequently and burn far more of the landscape are a stark reminder of an ecological crisis affecting much of the Great Basin.

The big villain here is cheatgrass, *Bromus tectorum*, an annual brome grass native to Eurasia. Introduced into this country around the turn of the century, cheatgrass quickly found a niche in the West, where overgrazing by cattle and sheep in the late 1800s had weakened native perennial bunchgrasses. Today, cheatgrass occupies millions of acres of land in the West, and it has fundamentally altered the normal fire timetable.

"Before we had cheatgrass, the fuel that carries fire matured in August to mid-September," said Jim Young, a research scientist at the University of Nevada campus in Reno. "Cheatgrass matures in June, and extends the fire season. It's a very fine-textured, abundant fuel."

As an early maturing annual, cheatgrass typically outcompetes perennial grasses for the sparse rains that usually come during the winter in the Great Basin. The perennial natives it displaces—the blue bunch wheat grass, great basin wild rye, bottle brush squirrel tail,

indian rice grass and idaho fescue--"are all pretty well adapted to fire," said Bob Means, a fire ecologist with the federal Bureau of Land Management (BLM), which oversees 75 million acres in the Great Basin.

In the low-precipitation areas where cheatgrass thrives, the invasion has dramatically shortened the intervals between fires and opened up the landscape for opportunistic noxious weeds such as knapweed and rush skeletonweed. "Cheatgrass has totally changed the fire regime, from 50- to 100-year intervals to 5- to 10-year intervals," said Means. "It burns, and each time it burns it pushes farther into the remnant native vegetation and encourages an increase in the cheatgrass monoculture."

Helen Hankins, who heads up the Elko district of the BLM, saw a half-million acres of her territory burn this summer. "The more fires you have, the more cheatgrass you have," she said. "The more cheatgrass you have, the more fires you have. If we don't break the cycle pretty soon, we won't have a 200,000-acre fire, we'll have a 500,000-acre fire and we don't want to go there."

The dominance of cheatgrass, and the shortening of fire return intervals, has a cascading effect on the Great Basin ecosystem. With more vegetation burned, there are fewer roots to hold the soil, and erosion increases. Increased silt in the streams that are this arid region's lifeblood, and less vegetative cover along riparian areas, spell trouble for the Lahontan cutthroat trout, a threatened species that is hanging on in just 10 percent of its historic range.

Because most sagebrush species take 10 to 15 years to recover after fire, the fact that fire is returning to many areas in five years or less is having a dramatic impact not just on those plant communities but on the wildlife that depends on them, from mule deer and wild horses to sage grouse, which could be listed soon under the Endangered Species Act.

"It's going to affect the birds, no question, because you've lost a lot of the sagebrush," said BLM wildlife biologist Ken Wilkinson during a recent tour of the Sadler fire, a 209,000-acre blaze south of Elko.

The surge in fires--this year's burned acreage was more than 10 times the annual average in Nevada for the past decade--also affects the human inhabitants in the Great Basin, particularly the cattle ranchers who almost all must rely on federal grazing land. Because the BLM insists that burned range be rested for two years, cattlemen have to find alternatives, either renting private land or getting government permission to use federal grazing allotments that have been previously designated for non-use. "A lot of people don't have many options," said Tom Warren, a range conservationist with the BLM's Elko office.

"We've been touched by fires for as long as I can remember," said rancher Rita Stitzel, who runs 500 head of cattle about 10 miles south of Carlin, Nev. "But now it seems like it's burning on an annual basis."

Stitzel, like many ranchers, believes the answer is for the federal government to allow more intensive grazing so the fuel load is reduced. But to many federal land managers and range scientists, more intensive grazing would just put more stress on remnant native grass populations, the very communities that need to be nurtured back to health.

The BLM is proposing an ambitious recovery plan, the Great Basin Restoration Initiative, that would likely cost tens of millions of dollars over the next decade. Priorities would include restoring areas that have lost perennial grasses and protecting those that have not yet been invaded by annual grasses and noxious weeds.

Treatments could include planting fuel breaks with species more resistant to fire than cheatgrass, using controlled fire, mechanical thinning of shrubs, and herbicides.

Ironically, says the University of Nevada's Young, the battle must begin by introducing other grasses from Asia that can compete with cheatgrass, such as crested wheatgrass and forage kochia. "We have never found native perennial grasses that can compete with cheatgrass," said Young. "The only way to combat it is to introduce grasses from Asia. You have to biologically suppress the cheatgrass with those perennial grasses and then build the native community back up from there."

As difficult and expensive as the process might be, said Young, the alternative is "a large-scale disaster" in which the Great Basin continues to degrade into a weed-dominated landscape that "will look like Turkey or Lebanon with nothing but spiny weeds that won't support livestock or people."

Sagebrush Rebels would rather fight than win

by Jon Christensen

As long as there are public lands in the West and Westerners who chafe under government restrictions -- in other words, as long as the West survives -- there will be a Sagebrush Rebellion.

The name may change. These days, some rebels rally round a County Supremacy flag, while others see themselves as foot soldiers in a grand, if somewhat amorphous, War for the West.

Whatever name it goes by the Sagebrush Rebellion is grounded in the unchanging reality of Western communities surrounded by public land. Nowhere is this reality more apparent than in Nevada. Around 87 percent of the state is owned by the federal government. It is no coincidence that the Sagebrush Rebellion has found a natural base of support here over the years.

So it is interesting to watch the latest flare-up in the Sagebrush State -- a battle over a dead-end dirt road leading to a wilderness area in Jarbidge, Nev. -- to see where the rebellion is going.

The short answer is nowhere fast. But there is more to the story.

The Jarbidge road will be the subject of a special congressional hearing in Elko, Nev., in mid-November. The hearing is being held by Rep. Helen Chenoweth-Hage, R-Idaho, chairman of the House Resources subcommittee on forests and forest health. Chenoweth recently married Wayne Hage, a Nevada rancher and long-time Sagebrush Rebel who has filed a multimillion-dollar lawsuit accusing the U.S. Forest Service of regulating him out of business. Chenoweth plans to call Forest Service employees on the carpet and give the Sagebrush Rebels an opportunity to vent their fiery anti-government rhetoric.

Even before the hearing began, Chenoweth succeeded in intimidating the Forest Service supervisor in Nevada. Gloria Flora resigned in protest rather than face what she called a public inquisition. Her resignation added drama to the Jarbidge story and made the Sagebrush Rebellion appear stronger than ever.

But the real story here is not to be found in the high dudgeon of political rhetoric. It is in the tiny old mining town of Jarbidge in the northernmost reaches of Nevada near the Idaho border. Home to about 30 year-round residents, the town sits in a narrow canyon alongside the Jarbidge River. A dirt road runs up the canyon through a national forest to the Jarbidge wilderness area. Four years ago, the uppermost mile and a half of the dirt road was washed out in a flood.

And that is where things got messy, because the river is also home to bull trout, a fish listed as threatened under the Endangered Species Act. The Forest Service wanted to rebuild the road to keep local residents happy and avoid a skirmish with the Sagebrush Rebels who control the Elko County government and are always looking for a fight with the feds. But environmentalists sued to protect the fish and the Forest Service desisted. So the county sent in its own road graders and then the Forest Service had to repair the damage.

At that point, U.S. Sen. Harry Reid, D-Nev., asked his staff to try to resolve the conflict. The various parties -- local citizens, environmentalists, and the Forest Service -- got together and came up with a compromise: Instead of rebuilding the road, which could damage trout spawning habitat and inevitably get washed away again, they recommended building a narrower trail that could be used by hikers and off-road vehicles.

But no sooner was the compromise announced than the Sagebrush Rebels in Elko County, including State Assemblyman John Carpenter, called for a volunteer work party to reconstruct the road in October. Before the work could begin, however, U.S. District Court Judge David W. Hagen issued a temporary restraining order to stop the rebellion. The judge ordered all of the parties involved -- the citizens, the Elko County government,

and the U.S. Forest Service -- to enter mediation talks supervised by the U.S. Institute for Environmental Conflict Resolution, which Congress created last year.

That's not a bad idea. When I visited Jarbidge in October, and watched the promised rebellion end with a few diehards chucking rocks in the river in defiance of the court order, I also found a strong undercurrent of support for a compromise. The town of Jarbidge is completely dependent on wilderness tourism. An extra mile and a half of hiking or horseback riding will not deter people who come to Jarbidge to get away from roads. Restoring the river fits this picture.

There are more and more people in Jarbidge, and around the West, who see the need to cooperate with the federal government. But the Sagebrush Rebels prefer the fight they can't win, to the resolution they can. That's why the Sagebrush Rebellion will never succeed. But it is also why the Sagebrush Rebellion will always be with us.

Jon Christensen is a contributor to Writers on the Range, a service of High Country News, based in Paonia, Colo (www.hcn.org). He lives in Carson City, Nevada.

Open Letter to Employees of the Humboldt-Toiyabe National Forest

Gloria Flora, Former Forest Supervisor

There is no easy way to say good-bye to a group of hard-working, dedicated employees and friends. But the time has come when I must do just that. The best part of working on this Forest is watching each of you perform your work so well. The results speak for themselves in the outstanding land stewardship and exemplary business practices found on this Forest.

I have become increasingly troubled by the difficult conditions that so many of us face in the state of Nevada. We now accept as commonplace unwarranted criticisms of and verbal attacks on federal employees. Officials at all levels of government in Nevada participate in this irresponsible fed-bashing. The public is largely silent, watching as if this were a spectator sport. This level of anti-federal fervor is simply not acceptable.

It is not like this in other places! As you know, I've worked throughout the Intermountain West: Montana, Idaho, Utah and Wyoming. Yes, there are arguments and strong disagreements over land use policy, but they usually stay within the bounds of reason. As tensions escalate, others weigh in with their opinions and the media does in-depth investigative reporting. There is a sense of balance. Outlandish words and acts, regardless of the origin, are repudiated openly by reasonable community members. Constructive collaboration and discourse are recognized as the methods to resolve complex natural resource issues. Yes, things may get heated but all people have a voice.

The attitude towards federal employees and federal laws in Nevada is pitiful. People in rural communities who do respect the law and accept responsibility for complying with it are often rebuked or ridiculed. They are compared to collaborators with the Vichy

government in Nazi-controlled France! People who support the federal government or conservation of natural resources ask that they not be identified for fear of retaliation. When I speak against the diatribes and half-truths of the Sagebrush Rebellion, I am labeled a liar and personally vilified in an attempt to silence me. When I express concerns for Forest Service employees' safety, I am accused of inciting violence.

This is the United States of America. All people have a right to speak and all people have a right to protection from discrimination. However, I learned that in Nevada, as a federal employee, you have no right to speak, no right to do your job and certainly no right to be treated with respect. I could go on and on with examples of those of you who have been castigated in public, shunned in your communities, refused service in restaurants, kicked out of motels... just because of who you work for. And we cannot forget those who have been harassed, called before kangaroo courts, or had their very lives threatened.

It disturbs me to think that two million people in this state watch silently, or worse, in amusement, as a small percent of their number break laws and trounce the rights of others with impunity. Worse yet, there are elected officials who actively support these offenders. Those whose responsibility it is to help us enforce the laws passed by Congress and do our mandated jobs, always seem to have a reason why action must be postponed.

The Jarbidge situation is just another example of how certain elements would rather fight and excoriate the federal government than work towards a solution. These people need an "evil empire" to attack. When a member of the United States Congress joins forces with them, using the power of the office to stage a public inquisition of federal employees followed by a political fundraiser, I must protest. This member and others continue to do this, and we, as an agency, believe that it is best to keep turning the other cheek. Enough is enough. I am not promoting conflict; I'm simply advocating that our agency demands fairness and common decency. It's time to speak up.

But speaking up and continuing to work here are not compatible. By speaking out, I cannot provide you, my employees, with a safe working environment. And to date, I have not been able to convince others that the current atmosphere is unacceptable and requires a proactive response. I refuse to continue to participate in this charade of normalcy.

Equally troubling is our limited ability to perform the mission of the Forest Service under these conditions. As stewards for public lands, entrusted with protecting and restoring natural resources for present and future generations, we must be able to perform those functions in a collaborative and cooperative manner. The health of the land is paramount.

I am choosing to leave for my principles, for my personal well-being, and so I can actualize my commitment to natural resource management in a setting where respect and civil discourse is the norm. I have no definite plans and I am not seeking special

treatment from the agency. I will stay at least until the end of the year to help ensure a smoother transition to new leadership.

I leave you with my fondest wishes for continuing your excellent work and gaining the fulfillment and respect that you all deserve. As I told you when I first arrived, simply demonstrate honesty, integrity and ethical behavior and you will succeed. Thank you for the tremendous support you have given me, I couldn't have asked for more from you.

Sincerely,

Gloria E. Flora
Forest Supervisor

Plant Smuggler Trapped in the Act

American: Environment News Service

BALTIMORE, Maryland, November 29, 1999 - A North Carolina man has pleaded guilty to illegal trafficking in carnivorous plants. Ted Allan Minton sold Venus flytraps illegally taken from the wild to international plant dealers in Holland. The Venus flytrap, native to the coastal bogs of North and South Carolina, is protected by the state of North Carolina and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The U.S. is one of 146 nations party to CITES, which monitors global trade in wild animals and plants and the products that contain these species. "People are fascinated by this unusual plant, which has been popularized in literature and cinema," said Sam Hamilton, Southeast regional director of the USFWS. "A victim of its own popularity, the Venus flytrap is prized by collectors worldwide. Consumer demand fuels the marketplace and contributes to the depletion of wild populations."

In 1996, Minton, a plant nursery owner, sold about 9,000 flytraps collected in eastern North Carolina to Hendrikus Lommerse of Holland. Minton gave Lommerse a false U.S. Department of Agriculture certificate stating that the shipment contained Christmas ferns. Later the same year, Minton tried to send another 5,000 illegal Venus flytraps to Holland with false permits stating that the shipment contained nursery raised flytraps. Minton faces up to five years incarceration and/or a fine of \$250,000. Lommerse pleaded guilty to a felony act and has been sentenced to jail time served, a \$2,000 fine, and 18 months of federal probation.

(editorial comment: What he got was a minor slap on the wrist and a wink of approval from the courts. \$2,000 is about a day's work for fly-trap poachers. While it is good to see criminals caught, as long as there are no consequences, there will be no behavior changes.)

How Economists See the Environment.

Don Fullerton and Robert Stavins
Nature, vol. 395, 1 October 1998.

On a topic such as the environment, communications among those from different disciplines in the natural and social sciences is both important and difficult. Economists themselves may have contributed to some misunderstandings about how they think about the environment, perhaps through enthusiasm for market solutions, perhaps by neglecting to make explicit all the necessary qualifications, and perhaps simply by the use of jargon.

There are several prevalent myths about how economists think about the environment. By examining them here, we hope to explain how economists really do think about the natural environment.

Myth of the universal market

The first myth is that economists believe that the market solves all problems. The “first theorem of welfare economics”, as taught to generations of economics students, is that private markets are perfectly efficient on their own, with no interference from government, provided certain conditions are met.

This theorem, easily proved, is exceptionally powerful, because it means that no one needs to tell producers of goods and services what to sell to which consumers. Instead, self-interested producers and consumers meet in the market-place, engage in trade, and thereby achieve the greatest good for the greatest number, as if “guided by an invisible hand”.¹ This maximum general welfare is what economists mean by “efficiency” of competitive markets. Economists in business schools are particularly fond of identifying markets where the necessary conditions are met, such as the stock market, where many buyers and sellers operate with good information and low transaction costs to trade well-defined commodities with enforced rights of ownership.

Other economists, especially those in public policy schools, have a different approach to this theorem. By clarifying the conditions under which markets are efficient, the theorem also identifies the conditions which they are not. Private markets are perfectly efficient only if there are no public goods, no externalities, no monopoly buyers or sellers, no increasing returns to scale, no information problems, no transaction costs, no taxes, no common property, and no other “distortions” between the costs paid by buyers and the benefits received by sellers. Those conditions are obviously very restrictive, and they are usually not all satisfied simultaneously in the real world.

When a market thus fails, this same theorem offers guidance. For any particular market, it asks whether the number of sellers is sufficiently small to warrant antitrust action, whether the returns to scale are great enough to justify tolerating a single producer in a regulated market, or whether the benefits from the good are public in a way that might justify outright government provision of it. A public good, like the light from a lighthouse, benefits additional users at no cost to society.

Environmental economists are interested in pollution and other externalities, where some consequences of producing or consuming a good or service are external to the market (not considered by producers or consumers). With a negative externality, such as environmental pollution, the total social cost of production may exceed the value to consumers. If the market is left to itself, too many pollution-generating products are made.

Similarly, natural resource economists are interested in common property, or open access resources, where anyone can extract or harvest the resource freely and no one recognizes the full cost of using the resource. Extractors consider only their own direct and immediate costs, not the costs to others of increased scarcity (“user cost” or “scarcity rent”). The result is that the resource is depleted too quickly.

So, the market by itself demonstrably does not solve all problems. Indeed, in the environmental domain, perfectly functioning markets are the exception rather than the rule. Governments can try to correct those market failures, for example by restricting pollutant emissions or limiting access to open-access resources, which can improve welfare and lead to greater efficiency.

Myth of market solutions

A second common myth is that economists always recommend a market solution to a market problem. Economists tend to search for instruments of public policy that can fix one market essentially by introducing another, allowing each to operate efficiently on its own. If pollution imposes large external costs, for example, the government can establish a market for rights to emit a limited amount of that pollutant. Such a market for tradable emission permits will work if there are many buyers and sellers, all are well informed, and the other conditions of the “first theorem” are met. In this case, the government’s role is to enforce the rights and responsibilities of permit ownership, so that each unit of emissions is matched by the ownership of one emission permit. Then the market for the output will also work, as the producer has to pay a price for each permit that reflects the social cost of the associated pollution. Equivalently, producers can be required to pay a tax on their emissions that reflects the external social cost. Either way, the result in theory will be efficient amount of pollution abatement, undertaken at minimum aggregate abatement cost.

This tradable-permit approach has much to recommend it, and can be just the right solution in some cases, but it is still a “market.” Therefore the outcome will be efficient only if certain conditions are met. But these conditions are not always met.² Could the sale of permits be monopolized by a small number of buyers or sellers? Do problems arise from inadequate information or significant transaction costs? Will the government find it too costly to measure emissions? If the answer to any such question is yes, the permit market may work less than optimally. The environmental goal may still be met, but at more than the minimum cost.

As an example, to reduce acid rain in the United States, amendments to the Clean Air Act of 1990 require electricity generators to hold a permit for each tonne of SO₂ they emit. A

robust market for the permits emerged, in which well-defined prices are broadly known to many potential buyers and sellers. Through continuous emissions monitoring, the government can track SO₂ emissions from each plant. Equally important, penalties are significantly greater than incremental abatement costs and hence are sufficient to ensure compliance. Overall, this market works: acid rain deposition is being reduced by 50 percent in a cost-effective manner.

A permit market achieves this efficiency through trades because any company that has high abatement costs can buy permits from another that has low costs, so reducing the total cost of abating pollution. These trades also switch the source of the pollution from one company to another, which is unimportant when any emissions equally affect the whole trading area. This “perfect mixing” assumption is certainly valid for global problems such as greenhouse gases or the effects of chlorofluorocarbons on the stratospheric ozone layer. It may also work reasonably well for a regional problem such as acid rain, because acid deposition in downwind states of New England is about equally affected by SO₂ emissions that were traded among upwind sources in Ohio, Indiana, or Illinois. But it does not work perfectly, as acid rain in New England may increase if a plant there sells permits to a plant in the mid-west.

At the other extreme, many environmental problems might not be addressed appropriately by tradable-permit systems or other market-based policy instruments.⁴ One example is a hazardous air pollutant such as benzene that does not mix in the airshed and so can cause localized “hotspots.” Because a company can buy permits and increase local emissions, permit trading does not ensure that each location will meet a specific standard. Moreover, the damages caused by local concentrations may increase nonlinearly. If so, then even a permit system that reduces total emissions might allow trades that move those emissions to a high-impact location and thus increase total damages.

The bottom line is that no specific policy instrument, or even set of instruments, is a panacea. Market instruments do not always provide the best solutions, and sometimes not even satisfactory solutions.

Myth of market prices.

The next myth is that, when non-market solutions are considered, economists still use only market prices to evaluate them. No matter what policy instrument is chosen, the environmental goal of that policy must be identified. For example, should vehicle emissions be reduced by 10, 20, or 50 percent? Economists frequently try to identify the most efficient degree of control that provides the greatest net benefit. This means, of course, that both the benefits and costs need to be evaluated. True enough, economists typically favour using market prices, whenever possible, to carry out such evaluations, because these prices reveal how members of society actually value the scarce amenities and resources under consideration.

Economists are wary of asking people how much they value something, as respondents may not provide honest assessments of their own valuations. Instead, actions may reveal

their preferences, as when individuals pay more for a house in a neighborhood with cleaner air, all else being equal.⁵

This is not to suggest that economists are concerned only with the financial value of things. Far from it. The financial flows that make up the gross national product represent only a fraction of all economic flows. The scope of economics encompasses the allocation and use of all scarce resources. For example, the economic value of the human-health damages of environmental pollution is greater than the sum of health-care costs and lost wages (or lost productivity), as it includes what lawyers would call “pain and suffering.” Economists might use a market price indirectly to measure revealed rather than stated preferences, but the goal is to measure the total value of the loss that individuals incur.

To take another example, the economic value of part of the Amazon rainforest is not limited to its financial value as a repository of future pharmaceutical products or as a location for ecotourism. That “use” value may only be a small part of the properly defined economic valuation. For decades, economists have recognized the importance of “non-use” value of environmental amenities such as wilderness areas or endangered species. The public nature of these goods make it particularly difficult to quantify these values empirically, as we cannot use market prices! The important fact is that benefit-cost analysis of environmental policies, virtually by definition cannot rely exclusively on market prices.⁶

Economists insist on trying to convert all these disparate values into monetary terms because a common unit of measure is needed to be able to add them up. How else can we combine the benefits of ten extra miles of visibility plus some amount of reduced morbidity, and then compare these total benefits with the total cost of installing scrubbers to clean stack gases at coal-fired power plants? Money, after all, is simply a medium of exchange, a convenient way to add together or compare disparate goods and services.

Myth of efficiency.

The last myth we address here is that these economic analyses are concerned only with efficiency rather than distribution. Many economists do give more attention to measures of aggregate social welfare than to measures of the distribution of the benefits and costs of policies among members of society. The reason is that an improvement in economic efficiency can be determined by a simple and unambiguous criterion – an increase in the total net benefits. What constitutes an improvement in distributional equity, on the other hand, is inevitably the subject of considerable dispute. Nevertheless, many economists do analyse distributional issues thoroughly. The more difficult problem, not yet solved in a satisfactory manner, is how to combine efficiency and distributional issues in a unified analysis.

Available data often permit reliable estimates of the impacts of environmental policies on important subgroups of the population.⁷ On the other hand, environmental regulations are neither effective nor efficient tools for achieving redistributive goals. The best

economic analyses recognize the contributions and limitations of efficiency and distributional measures.

Where does this leave us?

To summarize, economists do not necessarily believe that the market solves all problems. Indeed, many economists, ourselves included, make a living out of analyzing market failures such as environmental pollution in which laissez-faire policy leads not to social efficiency. When economists identify market problems, their tendency is first to consider the feasibility of market solutions because of their potential cost-effectiveness, but market-based approaches to environmental protection are no panacea. When market or no-market solutions to environmental problems are being assessed, economists do not limit their analysis to financial considerations but use money as a unit of measurement in the absence of a more convenient unit. And although the efficiency criterion is by definition aggregate in nature, economic analysis can reveal much about the distribution of the benefits and costs of environmental policy.

Having identified and sought to dispel four prevalent myths about how economists think about the natural environment, we acknowledge that our profession bears some responsibility for the existence of such misunderstandings. Like their colleagues in other social and natural sciences, academic economists focus their greatest energies on communicating to their peers within their own discipline. Greater effort can certainly be made to improve communications across disciplinary boundaries.

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Biodiversity yields dividends, finds pan-European research

Research News Release, Max Planck Society

The loss of biodiversity in European grasslands will make them less productive, reducing the amount of energy available to the rest of the food chain and threatening the overall health of the ecosystem, say results from one of the world's most extensive ecological studies (*Science* 5 November 1999).

BIODEPTH (Biodiversity and Ecological Processes in Terrestrial Herbaceous Ecosystems) is an EU-funded programme as part of the Terrestrial Ecosystem Research Initiative (TERI). A team of 34 scientists from 8 European countries participated in this study, establishing a network of European field sites in natural and semi-natural plant communities along a North-West to South-East (Ireland to Greece) and a North-East to South-West (Sweden to Portugal) gradient through Europe. The German measuring site near Bayreuth was co-ordinated by Prof. Dr. E.-D. Schulze, Max Planck Institute for

Biogeochemistry, Jena, and his team from the Max Planck Institute and the University of Bayreuth.

Within BIODDEPTH - a multinational collaboration to perform the same standardised experiment at a continental scale - experimental grassland communities were established that mimicked the gradual loss of biodiversity seen throughout Europe by creating replicate plant communities with reduced species richness. On each site, effects of reduced biodiversity on key ecosystem processes and structural characteristics were determined and quantified. The German site at Bayreuth focused on effects on productivity, nutrient cycling, soil nitrate leaching, decomposition, canopy architecture, competition and population biology of species involved.

The experimental manipulation of plant species diversity significantly changed the dynamics of those ecosystem processes. It affects ecosystem functioning and population dynamics. The productivity decreased linearly with decreasing species richness – plant communities grow better in species-rich teams. Harvest yields were found to increase when there was a range of plants with different characteristics growing together. Similar patterns occurred in a broad range of European grasslands, making the findings applicable on a continental scale. Concentrations of soil water nitrate were higher than the European official limit for drinking water under situations of low diversity. Functional characteristics of plant species - especially the ability to fix nitrogen - play a major role for several ecosystem processes and are at least as important as their number per se. Resource-use complementarity in more diverse systems could explain the higher productivity and lower nitrogen losses.

These findings represent the latest development in the scientific debate about how the loss of biodiversity affects the way in which ecosystems function - recently a major focus of ecological research. The BIODDEPTH evidence provides a vital contribution to the debate by demonstrating that both numbers of species and the types of plant play important roles in ecosystems.

The authors claim that their experimental evidence should send a clear message to European policy makers: that preserving and restoring biodiversity is beneficial to maintaining grassland productivity - particularly if reductions in fertiliser and pesticide usage are to be achieved. About half of Europe's farmland is grassland (60 million hectares), used as grazing pastures, hay meadows, and as set-aside land. The loss of species is playing a key role in the gradual erosion of the quality of our environment. "In addition to moral and aesthetic reasons to conserve biodiversity, our results now provide strong scientific reasons, too," says Dr Andy Hector of Imperial College, lead author of the group's report in *Science*. "These results provide the type of general ecological principles needed for European conservation and agricultural policies". This project signals the beginning of a new era by demonstrating the power of "big ecology" to underpin environmental policymaking.

Arboretum Helps Preserve Cherry Tree Genetic Heritage

From Friends of the National Arboretum's Arbor Friends Newsletter, Summer 1999

Future visitors to Washington, D.C. will have the National Arboretum to thank for helping to restore one of Washington D.C.'s most cherished historic garden landscapes, the cherry trees along the Tidal Basin. Arboretum horticulturalist Ruth Dix propagated 500 cherry trees from the Yoshino trees presented by Japan to First Lady Helen Herron Taft in 1912. The new trees will be planted at the Tidal Basin to reinfuse the area with true replicas of the original trees. Cherry trees were first planted in the area where the Lincoln Memorial stands during the spring of 1909, by President Taft's wife. To help the First Lady in her beautification of the mudflat area which could be seen from the White House, the mayor of Tokyo, Yukio Ozaki, presented Mrs. Taft with additional cherry trees as a gift of friendship. He wanted to express his gratitude to President Taft for support during the Russian-Japanese War.

In the mid 1990s, Roland Jefferson, a retired National Arboretum botanist, was among the first to point out that the original cherry trees along the Tidal Basin were dying out. Jefferson argued that it was important to preserve the genetic heritage of the original trees, which over the years had been replaced with nursery cuttings. Yoshino cherry trees have an average life span of 40 years. Only a few of the original trees around the Tidal Basin remain. Dr. Tom Elias, Director of the Arboretum, offered the Arboretum's help to the U.S. Park Service to propagate these original trees. Arboretum staff took cuttings from two trees planted commemoratively on March 27, 1912 by Mrs. Taft and the Japanese Ambassador's wife, Countess Iwa Chinda. Cuttings also were taken from other trees known to be original.

Songbird toll linked to exotic shrubs

By Margot Higgins, Environmental News Network *Sunday, December 26, 1999*

The decline of songbirds may be related to the proliferation of non-native shrubs, a recent study suggests. Birds that nest in non-native plants, most of which lack the height or physical deterrents of native plants, may sacrifice more eggs to predators such as raccoons and possums, the report notes. "Here is an ecological trap if there ever was one," said Chris Whelan, a researcher at the Illinois Natural History Survey who conducted the study.

Introduced from Europe and Asia mostly for their aesthetic qualities, non-native shrubs are prevalent throughout the United States. Exotic honeysuckle and buckhorn sometimes dominate the lower levels of forests, particularly small, fragmented preserves surrounded by urban sprawl.

For six years Whelan studied nest predation of American robins and wood thrushes in a 500-acre deciduous woodland preserve near Chicago. There, non-native shrubs have largely replaced traditional nesting shrubs, including arrowwood and hawthorne.

"Our study focused on what makes predators click," said Whelan. Thinking like a predator, Whelan discovered that non-native shrubs generally aren't as high as their native counterparts. He also found that exotic shrubs have heavier branches with less physical deterrents such as thorns. "These factors are good for nest-building, but also provide a good physical structure for predators to move around in," Whelan said. Scientists have blamed nest predation for recent declines in wood thrush populations. During the study, researchers found that the number of robins nesting in non-native honeysuckle has increased six-fold, from five percent to more than 30 percent. They believe honeysuckle offers an attractive nesting site because it often blooms before native shrubs do.

Whelan plans to research the extent of this predation trend by examining other locations throughout the United States. His study is published in the December Issue of *Conservation Biology*.

Elizabeth Patterson Trumpeted Conservation

Celia Sibley, *Atlanta Journal-Constitution*, 11 January 2000

When Elizabeth Mason Patterson, 90, left Atlanta in the 1950's to advance her career with the U.S. Forest Service in Washington, newspaper columnist Celestine Sibley wrote, "The pine trees are weeping today because Elizabeth is leaving Georgia."

It was at Mrs. Patterson's suggestion that the Forest Service enlist garden clubs to help spread the conservation message, said her niece, Gene Waller Owens of Atlanta.

Mrs. Patterson, an Atlanta native, died of pneumonia Sunday at Lenbrook Square [in Atlanta]... "She taught us all about conservation," said her niece.

Mrs. Patterson retired in the 1970's as the Forest Service's national conservation chairwoman and head of women's activities for the United States and its provinces. She was the second woman to attain that rank, which was the highest a woman could achieve then, said her great-niece, Vivian Brust of Anniston, Alabama. "With what she accomplished in her day in a man's world, it's fascinating," she said. Mrs. Patterson was nicknamed "The Petticoat Forester" and "Smokey Bear's Mother." She worked in the state and regional offices before being beckoned to Washington.

After retiring from the Forest Service, Mrs. Patterson returned to Atlanta and worked as a consultant on special projects for Shell Oil Co., the Girl Scouts of America, and the National Wildlife Federation. She was a member and the conservation chairwoman of the National Garden Club and the Georgia Garden Club and belonged to the Moon Flower Garden Club, the Atlanta Business and Professional Woman's Club and the Atlanta Symphony Associate Concerto Group.

Banner Plant: *Castilleja nana*

Each month, a different plant will grace the banner of *Lingua Botanica*.

Castilleja nana is a low-growing species (to 25 cm, but usually smaller) of Indian paintbrush that is common in subalpine and alpine areas (to 14,250 feet) in the Sierra Nevada of California, and the Intermountain ranges of Nevada and Utah. It blooms from mid to late summer into the fall. While conducting my doctoral research in the White Mountains of eastern California, I found that *C. nana* plants that occurred in mats of *Astragalus kentrophyta* var. *implexus* (= *A. k.* var. *tegetarius*) had a higher tissue nitrogen content (derived from the *Astragalus* as determined by nitrogen isotope ratios) and produced significantly more seeds than *C. nana* plants that occurred alone or with other, non-legume species. The banner image was copied from UC Berkeley's CalPhoto, Botanical Photo Database. -the editor

AfterWord

Clean and Silly Jokes About Plants

Q: What vegetable do you get when King Kong walks through your garden?

A: Squash.

Q: Why did the tomato blush?

A: It saw the salad dressing.

Q: How do you fix a broken tomato?

A: With tomato paste.

Q: How do you fix a cracked pumpkin?

A: With a pumpkin patch.

Q: Why did the cholla cross the road?

A: Because it was stuck to the back of a dumb chicken.

Q: What did the grape do when it got stepped on?

A: It let out a little whine.

Q: When do you stop at green and go at red?

A: When you are eating a watermelon.

The opinions expressed in *Lingua Botanica* are not necessarily those of the USDA Forest Service or the editors. Do not use *Lingua Botanica* on an empty stomach. Do not tease *Lingua Botanica*.

Contributing submissions (text and graphics) are always welcome. Contact the editor for details.

To subscribe to the *Lingua Botanica*, send an email to Wayne Owen at wowen/r8 (wowen/r8@fs.fed.us).

