

Friends of Plant Conservation

Field Notes

NEWSLETTER OF THE FRIENDS OF PLANT CONSERVATION

VOL. II, ISSUE 4, DECEMBER 2010

SUPPORT GROUP OF THE
NC PLANT CONSERVATION PROGRAM
NC DEPARTMENT OF AGRICULTURE
AND CONSUMER SERVICES
RALEIGH, NC

THE ELUSIVE *SAGITTARIA FASCICULATA*, BUNCHED ARROWHEAD

Gently, steadily flow the waters where *Sagittaria fasciculata* (bunched arrowhead) grows—too fast and it is washed away, too slow and competing species move in. Too much canopy cover over the small, continuously flowing seepage areas favored by the species, and their populations decline; too little and water temperature changes enough to allow overgrowth of other species.(1)

This is North Carolina's most critically imperiled plant, with only two small populations remaining, likely so endangered because of habitat loss.

The seepage habitat in which bunched arrowhead occurs is extremely threatened by the activities of man. The Hendersonville/East Flat Rock area in North Carolina "once contained numerous bogs and seepages (Moore, 1982, personal communication) and had been known to contain many rare and widely disjunct plant species. Little remains of these habitats today...The expanding human population of Henderson and Buncombe Counties threatens the remaining bogs."(2)

Residential development, increase in land use for pasture, and changes in water flow levels increased the vulnerability of this species to such an extent that it was federally listed as endangered on July 25, 1979 (Federal Register 44:43700-43701), and was listed as endangered by the N.C. Plant Conservation Program in 1981. Development continues and required habitat is scarce.

Sagittaria fasciculata is a small plant that grows in moderately flowing seeps in deciduous

woodlands. Leaves grow to about $\frac{3}{4}$ inch wide and up to 12 inches long with a slightly spatulate shape, tapering downward into a long stalk which attaches to the base of the plant. This is the only *Sagittaria* species in North Carolina with non-sagittate (arrowhead shaped) leaves. Winter leaves are generally smaller (about 4 inches long) and linear in shape. Basal rosettes are submersed, as are much of the winter leaves. Flowers, each with 3 sepals and 3 white petals, grow in 2-4 whorls of three flowers each from late spring to mid-summer with fruits following a few weeks later.

Etymology

For those curious about how plants are named, exploring a bit of the word origins gives you clues to plant identification:

Sagittaria, taken from the Latin *sagitta* (arrow shaped) + Latin *aria*, is a genus of aquatic herbs in the Family Alismataceae having basal, mostly sagittate leaves with two basal lobes prolonged downwards.

Fasciculata is from the Latin *fascicularia*, to bundle—thus the common name bunched arrowhead.

One more word often encountered in this genus is phyllodia, the word given to expanded petioles which become leaf-like in appearance and function. It, too, is from Latin, *phyllodium*, in turn from Greek *phullōdēs* (leaflike). In *S. fasciculata*, the phyllodia are mostly flattened above the sheath.

Clifford Bogin, in his 1955 revision of the genus, placed this species as a variant of *S. macrocarpa*.

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From The President...

Brunswick County North Carolina is home to more imperiled and rare species of plants than any other county in North Carolina. Development, changing land use, and poaching are quickly depleting populations of Venus Flytraps, orchids, and a host of other species rare to North Carolina and the world. Enforcement of poaching laws is difficult but catching poachers in the act is much tougher. Brunswick County's Superior Court Judge Ola Lewis rocked our 3rd Annual meeting at the N.C. Aquarium-Ft. Fisher on November 3rd with her comments and suggestions to help reduce and tighten plant poaching regulations. Some of her suggestions included:



- Set replacement costs of poached plants, like the NC Wildlife Commission does for big game, for anyone caught removing native plants without the owners permission.
- Enforce existing regulations, develop new regulations, and stiffen fines for anyone selling imperiled plants or plant parts without proper documentation, licensing, and proof of origin.

Judge Ola commented that Venus Flytraps, along with other plants, can be found in many Flea Markets across eastern North Carolina. At present, the NC Wildlife Commission helps to enforce imperiled plant violations but this is not a high priority with any game warden. If you see native plants for sale, ask if the operator is a licensed nurseryman. All legitimate plant nurseries in North Carolina have to be inspected and have a license from the NCDA Plant Industry Division. A legitimate nurseryman will be glad to share this information with you whereas illegally harvested plants poachers may not. Ask where plants were grown or harvested; it creates all sorts of awareness and no harm is done. Help keep our imperiled plants in their native habitats.

One of the main responsibilities of membership is to elect members to the Board of Directors. This year, Jean Woods and Dale Batchelor, were elected to fill slots by vacated by outgoing directors Marsh Smith and Tom Harville. Special thanks to Tom Harville for his development of the "Plant Preserve Partners Volunteer" Program. Tom is very active in the North Carolina Native Plant Society but will continue to help Friends of Plant Conservation. Thanks Tom!

If you are a member, renew your membership. If you are not a member, sign up!
We have a great year ahead!

Bruce Williams
email: cbw.3@earthlink.net

NC Friends of Plant Conservation Officers for 2011

Bruce Williams- President
Paul Hosier- Vice President
Kathy Schlosser- Secretary
Kurt Schlimme- Treasurer

S. FASCICULATA CONTINUED...

Bogin...put the genus in its proper context of difficulty when he stated (page 182): This study illustrates the point that the number of proposed taxa of variable organisms may vary inversely with the frequency of collections. That is, there is a tendency for infrequently collected plants found in widely scattered areas to appear distinct until such times as collected intermediates show them to be no more than the extremes of a variable population. Even more recent investigations of complexes of *Sagittaria* by Beal (1960), Adams and Godfrey (1961), and particularly Wooten (1968, 1970, 1972, 1973) have shown what a taxonomic iceberg lies beneath the array of ecological variants presented within the genus. (3)

Sagittaria fasciculata was recognized as a distinct species in 1960 by Ernest O. Beal following a review of herbarium specimens collected beginning in 1894. Small (1909) and Bogin (1955) both used the name applied by J. G. Smith to the specimens appearing in the Biltmore herbarium. Smith himself doubted the validity of the name, addressing the subject in a letter to William Trelease in 1899:

'No. 897b, Biltmore Herbarium, which I (J. G. Smith) take to be *Sagittaria macrocarpa* [sic].' Smith explains further that "Curtiss's [sic] specimen [i.e., holotype of *S. macrocarpa*] was the only one in any of the collections at the time I worked on the genus (*Sagittaria*, Smith, 1894), and while the Biltmore specimens seem to agree, I can not be at all sure of their identity. If it does not agree with *macrocarpa*, it is a new species and ought to be separated as such." (4)

Beal, disagreeing with Bogin, declared "*S. fasciculata*, is described as a new species based upon the characteristic plants in southwestern North Carolina which are erroneously designated *S. graminea* var. *macrocarpa* by Bogin (p. 210) and *S. macrocarpa* by Small (1909, 1933)." (5)

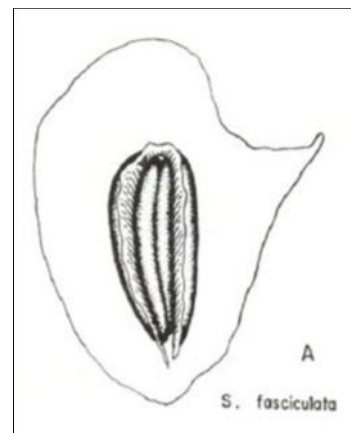
It is the small stamens, connate bracts, and broadly winged achenes (see Fig. A) that make these plants distinctive as *S. fasciculata*.

The N. C. Plant Conservation Program has watched and studied this rare species since 1981, finally acquiring parcels of land to protect the very small remaining populations in North Carolina. But even that cannot protect the plant from the destruction wrought by the activities of man and the vagaries of climate, which reach from inside and outside the Preserve to further threaten the existence of this small, fragile plant.

If you would like to learn more about *Sagittaria fasciculata*, contact Rob Evans (919-733-3610).

If you would like to do something to help protect the plant, send a donation to Friends of Plant Conservation, (Mail Service Center 1060, Raleigh North Carolina 27699-1060) designating the donation to the ***S. fasciculata* Effort**. Any amount is appreciated, and all donations are tax deductible.

Katherine Schlosser



- (1) Newberry, Gillian. "Factors Affecting the Survival of the Rare Plant, *Sagittaria fasciculata* E. O. Beal (Alismataceae)." *Castanea*, Vol. 56, No. 1 (Mar., 1991), pp. 59-64 (Southern Appalachian Botanical Society) <http://www.jstor.org/stable/4033422> Accessed: 07/11/2010 16:10
- (2) Sutter, Robert D. "Recovery Plan For the Bunched Arrowhead (*Sagittaria fasciculata*)," North Carolina Department of Agriculture, Plant Industry Division, Plant Protection Section. (Prepared for US Fish and Wildlife Service, Atlanta, Georgia), 1983. P.8.
- (3) Kral, Robert. "A New Phyllodial-Leaved *Sagittaria* (Alismaceae) from Alabama," *Brittonia*, Vol 34, No. 1 (Jan.-Mar. 1982), p.15. Published by: Springer on behalf of the New York Botanical Garden Press Stable URL: <http://www.jstor.org/stable/2806393> Accessed: 07/12/2010 19:42
- (4) Beal, Ernest O. "The Alismataceae of the Carolinas," *Journal of the Elisha Mitchell Society*, Vol. 76, May 1960. p76.
- (5) Ibid, Beal. p.70.

PRESERVE STEWARD NEWS—BAT FORK BOG

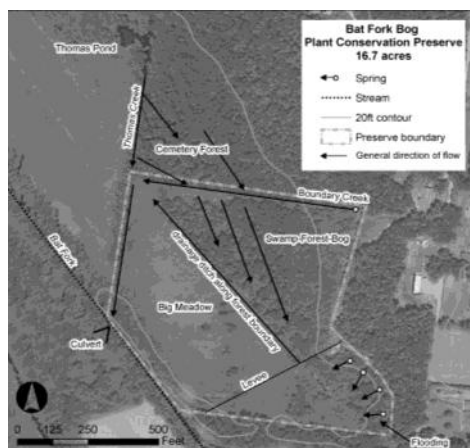
Over the past year, North Carolina Plant Conservation Program employees and a volunteer Steward have started to bring Bat Fork Bog Preserve in Henderson County under some degree of management. Initial efforts involved community outreach, posting the Preserve, and mapping of the more notable aspects of the Preserve (Figure 1).

In addition, about half of the Preserve was treated with an herbicide in order to control reed canary grass, other invasive species are being removed as they are discovered, and a hydrological description of the Preserve has been developed. The work at Bat Fork Bog has led to the development of two currently in press manuscripts as follows:

Baugh, T., R.E. Evans, C.J Stewart, and S. Artebane. In Press (March 2011). Restoration of a Southern

Appalachian Mountain Bog: Phase I. Phalaris arundinacea Removal. *Ecological Restoration* 9(1).

Baugh, T. R.E. Evans. In press (January 2011). Restoration of a Southern Appalachian Mountain Bog: Phase II: Hydrology. *Natural Areas Journal* 31(1).



Tom Baugh, top, and Rob Evans
at Bat Fork Bog

NEW BOARD MEMBERS

The 3rd Annual Meeting of the Friends of Plant conservation was a time to say good-bye and thanks to two of our board members:

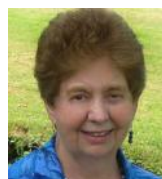
Tom Harville, who served faithfully on the Membership Committee, retires at the end of his two year term. He has been a strong advocate for the NCPCP, and an invaluable part of the organizing team for the Friends. We are grateful that he will continue as a volunteer, leading the Preserve Steward program.

Also retiring after his first term is Marsh Smith, who has contributed his legal and organizational skills. He, too, will continue as a volunteer and advisor.

We are excited to welcome two new members to the board, knowing that they bring a wealth of experience and enthusiasm:

Jean Woods

Education Chair for the NC Native Plant Society Served 2 terms, Catawba Lands Conservancy board as Chair of the Stewardship Committee. Served on the Stewardship Advisory Council for Mecklenburg County. I have a BA in Mathematics and a Masters of Pastoral Studies.



Dale Batchelor

20-year career in communications and adult education. Second career as Gardener by Nature LLC, offering garden design and consultation services. Currently enrolled NC Botanical Garden Native Plant Certification program. Dale advocates for native plants as a member of the NCNPS Speakers Bureau, as a Habitat Steward for the National Wildlife Federation, and as a writer focusing on native plants for *Triangle Gardener Magazine*.



A more complete biography for Jean and Dale may be found on the website:

www.ncplantfriends.org

NCPCP: INTRODUCING...

It is with pleasure that we introduce the newest members of the NCPCP staff:

Lesley Starke is a recent graduate from Duke University where she studied Conservation and Ecosystems Management. She dedicates her research to modeling and understanding species distributions and preserve design. She is applying these analytical and field skills to the endangered plants of North Carolina in her new role as research specialist for the Plant Conservation Program. Lesley is a native of South-west Virginia and greatly enjoys knitting and swing dancing.



Charles Jefferson Stewart (Jeff) is a graduate from the University of North Carolina Asheville, where he got a BS in Environmental Studies with a concentration in Ecology and Environmental Biology. His post graduation experiences include working for the Southeast Exotic Plant Management Team, where he attempted to eradicate invasive plant species from nineteen national parks. Also, he worked for Native Trails, Inc, where he built mountain bike trails in the Triangle Area. He currently lives in his hometown of Pittsboro, NC and is dedicated to his work on the Plant Conservation Program preserves.

Now if we can just get him to turn around...

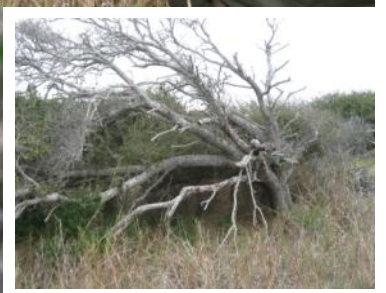
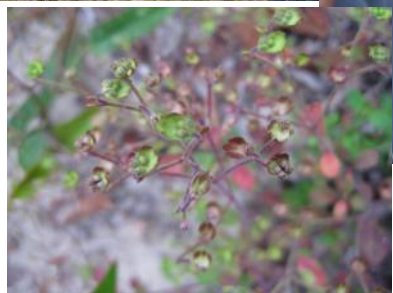
Also new to the team is **Nancy Stewart**, who is now serving at the Information Technician for Rob, Lesley, and Jeff. She is the person who will always be there to answer the phone and respond to emails, get information out, and assist in countless ways to the smooth functioning of the office.

We'll try to get Nancy's photo in the next newsletter...



3RD ANNUAL MEETING

WWW.NCPLANTFRIENDS.ORG



HOW LONG DOES IT TAKE TO CONSERVE A SPECIES?

THE 27 YEAR LONG, UNFINISHED ATTEMPT TO CONSERVE BUNCHED ARROWHEAD

ROB EVANS

Bunched arrowhead (*Sagittaria fasciculata*) was apparently first documented as part of the North Carolina by herbarium specimens from the East Flat Rock area, collected in the 1880's. However, it did not receive an official scientific name or recognition as a unique species until 1960. The species has the dubious honor to become one of the very first plants in our state to be listed under the federal Endangered Species Act (1979). At the time of listing, the plant was known from only 2 populations, both on private land in Henderson County, NC and an adjacent area of Greenville County, SC.

The original listing as "endangered" helped draw attention to the plight of the species and encourage field survey. The NC Plant Conservation Program has been involved in such efforts since at least the 1980's. In fact, the 1st PCP coordinator authored the species recovery plan on behalf of the US Fish and Wildlife Service.

Slowly but surely information on the species has grown over time, and there has been conservation progress for the benefit of the species in both states. However, the species is still in precarious condition in North Carolina. We can document 5 separate clusters of plants in locations presumed to represent true natural remnants, but each has a host of problems facing them. We also know of a couple other places where the plants have been extirpated, including a third "historic" report consisting of 1896 herbarium specimen reportedly from Buncombe County that has never been relocated and for which there is some doubt as to the original county location.

The accompanying timeline will provide outline bits of the ongoing saga of the Program's multi-decade efforts to understand and conserve this rare part of our flora.

Preserve History & Timeline
Ochlawaha Bog and Bat Fork Bog Plant
Conservation Preserves

1983: PCP staff complete species recovery plan for Bunched Arrowhead

1986: Acquisition funds (\$28,600) were first granted for the bogs (by USFWS to NCDA)

1986-1992: USFWS granted numerous extensions of the funding through at least 1992, and presumably through 1996 largely because property hung up in bankruptcy and unavailable for purchase

~ 1990: the Plant Conservation Program (PCP), with the financial support of the US Fish and Wildlife Service, began focusing some of its limited resources on Bunched Arrowhead (*Sagittaria fasciculata*).

1990: notes documenting that Bat Fork Bog ditch was established around 1986 when area was reportedly "all woods." The ditch came to within 25 feet of the bunched arrowhead and was later extended. This was labeled "new ditch" on the 1990 Bat Fork map. This population was later marked "missing" in 1996. This leads me to believe the plants in the current ditch were re-introduced (see 1998).

1992-96: PCP monitoring efforts documented population declines and extirpations from NC sites causing the Program to conclude that this was the most endangered species in North Carolina. The status of the 2 best remaining sites in North Carolina was evaluated as follows:

Bat Fork: "This was a small *Sagittaria* population in 1990, barely holding on in the man-made ditch that cut through it's original habitat. To reestablish the species a variety of restoration activities will be needed."

Ochlawaha: the original natural population known in a seepage area had disappeared by the mid-1980's while remnant plants at the site diminished from an estimated 2,000 plants in 1995 to "only scattered plants" in 1996, with the majority apparently having been destroyed when the artificial ditch they occupied was deeply dug out.

1996: Program report stated, "hope for the species in North Carolina now lies with the current effort to acquire Ochlawaha Bog and Bat Fork Bog". At that time, the concept of the Department of Agriculture and the Plant Conservation Program acquiring sites for endangered species was completely novel. The report also outlined acquisition and management goals for these sites (both sites were already highly fragmented by development and consisted of numerous small tracts in private ownership).

Continued on page 8...



HOW LONG DOES IT TAKE *CONTINUED...*

tracts meaning that many of the management needs could not be addressed because the activities hinged on acquisitions that never occurred.

Unknown date: The North Carolina Botanical Garden and Atlanta Botanical Garden obtained Bunched Arrowhead plants to form the nucleus of a proposed "captive population" to eventually be used for reintroduction.

1998: Bunched arrowhead (and mountain sweet pitcher plant) re-introduced to Ochlawaha and Bat Fork from specimens propagated at Atlanta Botanical Garden

1998: NCDA pays contractor to fill ~ 2700 feet of ditch and remove culverts at Bat Fork (the contractor is the grandson of Duncan, the man who cut the ditches in the first place)

1997-2006: PCP and partners plug tributary streams at Ochlawaha Bog to slow stream degradation and continued loss of seepage habitat. Atlanta Botanical Garden attempts failed reintroduction of *Sagittaria* and other species at both sites. PCP staff plug artificial ditch at Bat Fork

2007: PCP staff request the help of the Carolina Mountain Land Conservancy (CMLC) to re-invigorate acquisition efforts. A few priority tracts were found to be available at Ochlawaha Bog and PCP obtained a land acquisition grant from the Natural Heritage Trust Fund to acquire them.

2008: Ochlawaha Bog Special Session was held for the benefit of the Plant Conservation Board. Board insists on partnership effort to restore the site.

2009: Several tracts approved for addition to the Ochlawaha Bog Plant Conservation Preserve. CMLC secures restoration dollars to help reverse years of damage caused by agricultural ditching.

2010: Ochlawaha Bog Preserve expansion by 30.4 acres in 3 new parcels, restoration planning completed. 1st Plant Conservation Preserve Steward (Tom Baugh) began service at Bat Fork Bog; he and PCP staff remove major invasive species infestations, develop hydrology model for the site, and steward contacts adjacent neighbors and post Preserve boundari

2011: It is expected that major earthwork and restoration will be completed at Ochlawaha Bog with the goal

of restoring seepage hydrology and re-creating habitat for Bunched Arrowhead.

Prepared by:

Rob Evans, Coordinator
NC Plant Conservation Program



Beaver dam (at bottom of photo) on ditch at Ochlawaha Bog



S. fasciculata at Bat Fork Bog

THINGS TO WATCH FOR, AND THINGS ACCOMPLISHED...

FoPC Accomplishments 2010

Bruce Williams, President, read a list of accomplishments of the organization at the Annual Meeting, including:

- Establishing Preserve Stewards program and identifying first stewards.
- Revising and expanding Website www.ncplantfriends.org
- Numerous recruiting and educational talks (Charlotte, Fayetteville, Wilmington, Raleigh, Greensboro)
- New promotional flyers and postcards for recruiting
- Creating informational brochure
- Participating in the Eno River Festival in Durham
- Participating in the "Fire in the Lakes" Festival, Boiling Springs Lakes
- Publishing 4 newsletters
- Providing support for NC Plant Conservation efforts
- Developing a powerpoint slide program for presentation
- Organizing the 3rd annual meeting

What comes next??

- Preserve walks and picnics
- Preserve Photography Workshops
- Workdays
- Educational programs



Join a growing group of Preserve Stewards

Do you have some time to spare? Are you willing to donate some of that time?

- Are you a biologist, environmental scientist, trained in a related field, or willing learn a few new skills ?
- Are you interested in...
 - exotic vegetation control?
 - plant inventories
 - community outreach
 - land acquisition
 - site maintenance
 - and a number of things necessary to protect and maintain North Carolina's Plant Conservation Preserves
- Would you like to hone or develop the above skills , or simply gain a better understanding of day to day Preserve management issues ?
- Training provided!

**If so, contact Tom Harville at
tomhar@bellsouth.net**

Watch your newsletters and emails

For dates

And details

For the special events planned for

Friends of Plant Conservation

Members.

Friends of Plant Conservation

Membership Renewal and Application

☐ New Membership, ☐ Renewal

Name(s): _____

Address: _____

City: _____

State: _____ Zip: _____

Phone: _____

Email: _____

Send completed form and check to:

Friends of Plant Conservation
Mail Service Center 1060
Raleigh, NC 27699-1060

☐ I am willing to receive the newsletter via email to conserve resources.

☐ I am interested in a FoPCP license plate when available.

Memberships/Gifts:

- ☐ Student Member \$5
- ☐ Individual Member \$15
- ☐ Family Member \$25
- ☐ Affiliate Member \$25

Please include the number of members in your organization

- ☐ Sustaining Member \$50
- ☐ Life Member \$500
(Five (5), \$100 yearly installments)
- ☐ Gift _____

Indicate activities of interest:

- ☐ Volunteer to assist PCP staff
- ☐ Policy Committee
- ☐ Education Committee
- ☐ Membership Committee
- ☐ Financial Stewardship Committee
- ☐ Strategic Planning Committee
- ☐ Program Committee
- ☐ Communications Committee
- ☐ Preserve Stewards