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Schoenoplectus hallii and S. saximontanus 2000 Wichita Mountain Wildlife Refuge Survey

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A survey to determine locations of populations of Schoenoplectus hallii and S. saximontanus was conducted at Wichita Mountains Wildlife Refuge in August and September 2000. One or both species were found at 20 of the 134 locations surveyed. A distinctive terminal achene character was found specifically that the transverse ridges of *S. hallii* appeared to be rounded and *S. saximontanus* appeared to be rounded with a projecting narrow wing. Basal macroachenes have not yet been properly described but are borne singly at the base of each culm and are about 3-4 times larger than the terminal achenes. It is speculated that amphicarpy may be related to grazing pressure, the basal macroachene being produced even if the upper portion is consumed, as a response to grazing. Both species are grazed/disturbed by bison, elk, and longhorns on the Refuge.

Introduction

A survey to determine locations of populations of *Schoenoplectus hallii* (A. Gray) S.G. Smith (Hall's bulrush) and *S. saximontanus* (Fernald) J. Raynal (Rocky Mountain bulrush) was conducted on the Wichita Mountains Wildlife Refuge during late August through September 2000. The survey team members were myself, Sam Waldstein, Refuge Manager; Chip Kimball, Range Biologist; and Bob Timberman, Biology Technician. Sites selected for observation were areas similar to the Jed Johnson Dam habitat, which is the site of the original collection of S. hallii made in 1987. Selection of sites to be surveyed was done by WMWR team members. The three Sundays spent in the field were some of the hottest of the season with temperatures ranging from 100° to 110°F.

General Observations

The presence of *Schoenoplectus halllii* and *S. saximontanus* at the various sites sampled. represent, for the most part, a response to the drawdown of water levels in the various lakes and ponds. The plants seem to occur mainly on the drawdown mud, sand, or gravel flats. However in some places they occur in shallow water up to a depth of about a foot [30.5cm]. They seem to compete with perennial emergent plants and with most emergent annuals.

In addition to the 36 sites that I personally examined, WMWR staff examined an additional 98 sites with similar habitat and found no *Schoenoplectus* present. *Schoenoplectus* occurred in only 20 of the 134 sites (14.93%). Of those 134 sites, 4 had both species present (3%), 14 had *S. halllii* present (10.45%) and 10 had *S. saximontanus* present (7.46%) (see Table).

Based on the WMWR observations, it is strongly advised that the adjacent area of Fort Sill should be inventoried since these two species are, most likely, present there. However, Rahmona Thompson who has conducted plant surveys at Fort Sill has not found either species at this time (pers. comm. 2002).

At several of the sites plants had been uprooted as a result of trampling by bison and other animals in the mud flat areas. The number of uprooted plants ranged between 0.0% and 1.0% at those

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locations, but in general was less than .05%. While this obviously does cause some damage to populations in localized areas the damage appears to be negligible and it is even possible that it may be an important transport method of matured achenes to previously uncolonized areas. This could readily be accomplished by mud containing seeds or inflorescences with seeds adhering to the hooves, hair, or skin of the lower part of the animals' legs.

There appear to be three useful characters associated with the achenes that can be used to separate the two species: style branching, achene cross section, and transverse ridges.

	S. hallii	*S. saximontanus*
Style Branches	mostly bifid	trifid
Achene cross section	unequally biconvex (1 of 2 sides may be flat)	Trigonus (3-sided)
Transverse ridges	rounded	mostly rounded with narrow wing

To my knowledge, "Transverse ridges" has not been mentioned in the literature on these two taxa. McKenzie (1988) does not mention this character in his status assessment report on *S. hallii*, nor does Yatskievych (1999) in *Steyermark's Flora of Missouri*. Dr. Marian Smith at Southern Illinois University is working on both terminal achenes and basal macroachenes using Scanning Electron Microscopy and more precise measuring techniques (pers. comm. 2001). So this may be a new useful character to separate these two taxa. (see Figures).

McKenzie (1998) reports that "heavy grazing has been noted at sites in Kansas, Missouri, and Wisconsin but it is not known whether this disturbance negatively impacts the species…"

It is my hypothesis that amphicarpy may well be a response to heavy grazing pressure disturbance by native grazing animals such as bison, elk, and deer prior to the introduction of exotic grazers such as cattle, horses and sheep by European settlers. It would be a way that the plant could insure seed production even if it is heavily grazed and the terminal achenes damaged or destroyed. The observation that the plant produces only a very limited number of basal macroachenes (one per culm) with significantly more food reserves per achene would seem to support this interpretation. The smaller, more numerous terminal achenes would offer a relatively easy method for seeds to be transported farther distances and to new sites while the macroachenes would provide an excellent way to persist in presently occupied sites.

The number and identification of the two species at sites where both occur could be somewhat problematic. S.G. Smith and A. E. Schuyler independently identified a hybrid from WMWR that was collected by M. Smith and McKenzie July 28, 2002 as the first documented, putative hybrid of the two species ever recorded. [USA Oklahoma: Comanche Co., WMWR, 28 July 02, P. McKenzie 2028 pers., WIS, MO] (pers. comm. McKenzie 2002; Smith 2002).

There obviously needs to be further research done to confirm or deny this hypothesis as well as possible hybridization between the two species at the Refuge.

Voucher Specimens of *Schoenoplectus hallii* and *S. saximontanus* resulting from this study are kept in the USAO Herbarium (OCLA) at the University of Science and arts of Oklahoma in Chickasha, Oklahoma.

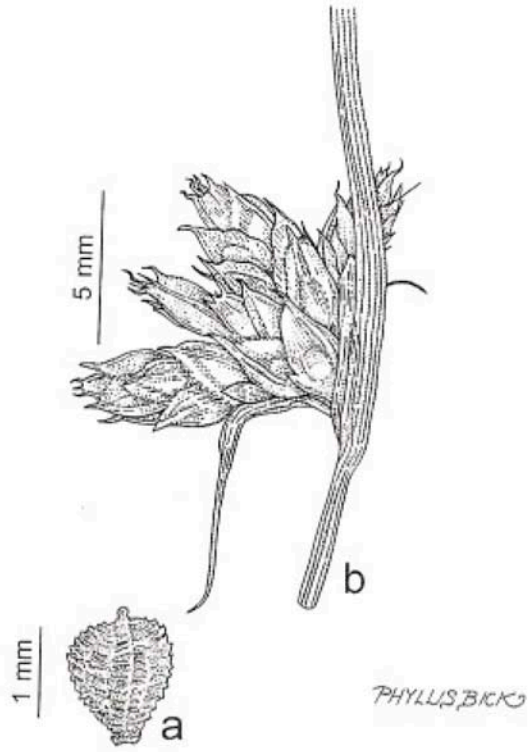

FIG. (a) and (b) Fruit and inflorescence of Schoenoplectus saximontanus (Steyermark's Flora of Missouri, 1999. Used by permission).

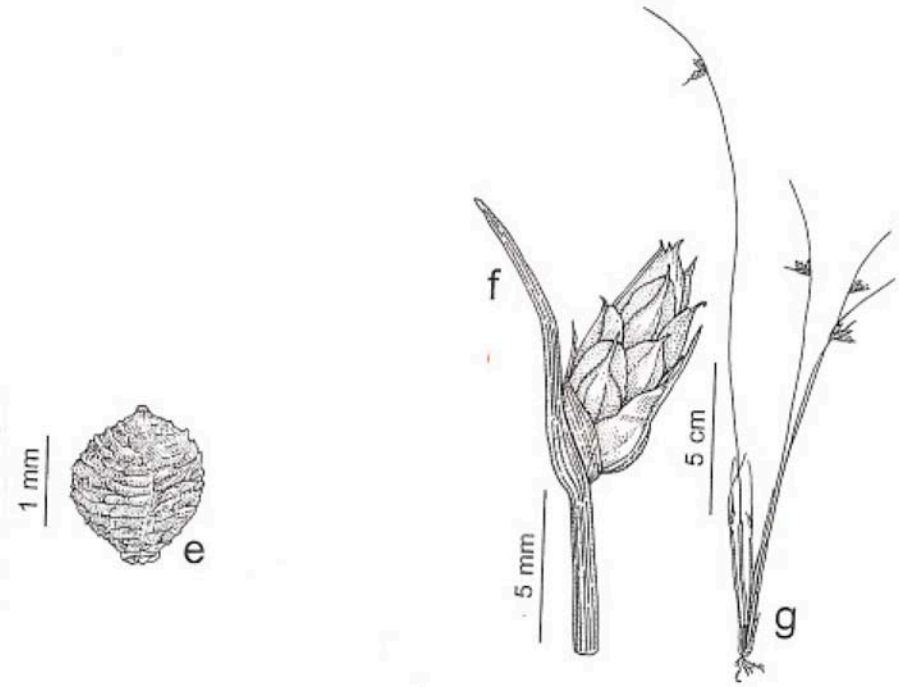

FIG. (e), (f), and (g) Fruit, inflorescence, and habit of Schoenoplectus hallii (Steyermark's Flora of Missouri, 1999. Used by permission).

TABLE
***Schoenoplectus* occurrence in thirty-six survey sites**
August and September 2000
(based on achene characteristics of the two species)

Site # Description & Date	**abundance/# collected/voucher#**	
	S. hallii	*S. saximontanu*
1-Pond		
27-Aug Draw-down mudflat around pond Some plants grazed, some uprooted Some dried out on shore Few floating in water still alive	0	**scat/8/21254**
2-Pond		
27-Aug Draw-down mudflat	0	0
3-Pond		
27 Aug Draw-down mudflat	0	0
4-Corral area		
27 Aug Stream with draw-down mudflat Utricularia observered	0	0
5-Kiowa Lake		
27 Aug Draw-down mud flat around pond Some plants grazed, some uprooted Some dried out on shore Few floating in water still alive	0	**scattered/4/21259**
6-Wing Pasture west of creek		
27 Aug Draw-down mud flat around pond Some plants grazed	0	**rare/12/21261**
7-Buford Lake		
27 Aug Draw-down mud flats *Utricularia* and *Nelumbo* abundant	0	0

8-Quanah Parker Lake		
27 Aug Near Nature Center Draw-down mud flat around pond	**scat/6/21263**	0
9-New Pond by Crater Lake		
27 Aug South of Visitor Center Draw-down mud flat	0	0
10-Pond at Sulphur Trap Corrals		
27 Aug East of Visitor Center Draw-down mud flat	0	0
11-Pond in Sulphur Trap		
27 Aug North of Visitor Center Draw-down mud flat around pond	0	0
12-Jed Johnson Lake		
18 Aug 8 identifiable plants. Not collected Plants just coming into bloom Original site for the original Collections for WMWR	**rare/0/-**	0
27 Aug 8 identifiable plants No collections made	**rare/0/-**	0
13-Crater Lake		
27 Aug Draw-down mud flat Apparently too much perennial vegetation present	0	0
14-West Gate Pond		
3 Sep Draw-down mud flat Apparently too much perennial vegetation present	0	0
15-Comanche Lake		
18 Aug Draw-down mud flat	**scat/2/21237**	0

3 Sep Draw-down mud flat Mixed populations	**scat-loc com/24/21272**	**scat-locom/83/27271**
16-Grama Lake near dam & Gram Flat		
18 Aug Draw-down mud flat Several hundred plants Numerous basal rosettes in shallow water (20-30 cm)	0	**scat/3/21236**
3 Sep Mixed populations on draw-down Several hundred plants Numerous submerged basal rosettes in shallow water (20-30 cm)	**scat-loc com/48/21274**	**scat-loc com/15/21273**
10 Sep Revisit & complete walk-around Both present on draw-down mud flat Several thousand plants Dominant plant in a few places Numerous basal rosettes present in shallows in several areas	**scat-loc abd/211/21216**	**scat/99/21322**
17-Hollis Lake		
3 Sep Apparently too much perennial vegetation in draw-down zone	0	0
18-Pond 0.5 mile west of Hollis		
3 Sep	**com-loc abd/300+/21278**	0
19-Pond		
3 Sep Draw-down mudflat	0	0
20-Pond		
3 Sep Draw-down mudflat	0	0
21-Boggy Flats		
18 August 2000 Draw-down mudflat around pond Some plants grazed or uprooted Some dried out on shore Few floating in water still alive First located by Sam Waldenstein on Aug 17, 2000.	0	**loc abd/x/21231**

Sun 3 September 2000 Draw-down mud flats on ponds	0	**loc abd/5/21280**
22-Pond southwest of Grace Mountain		
3 Sep Draw-down mud flat Water-clover fern present	0	0
23-Cut Throat Lake		
3 Sep Draw-down mud flat Water-clover fern present Beautiful clear water and bass	0	0
24-Northwest Corner of Pinchot Loop		
3 Sep Draw-down mud flat around pond	0	0
25-Barow Pit east side of Pinchot Loop		
3 Sep Draw-down mud flat around pond	0	0
26-Straight east of site 25		
3 Sep Draw-down mud flat around pond *Bacopa* present	**scat/8/21287**	0
27-Medicine Tank		
3 Sep Draw-down mud flat around pond Colonial Bryozoan *Pectinatella magnifica* Leidy in shallow water by dam Identification by Dr. Mike Mather, USAO	**common/12/21290**	**scat/3/21289**
28-West Gate Road, Buffalo Gap		
10 sep Draw-down mud flat around pond *Bacopa* present	0	**scat/11/21303**
29-Winter Valley at end of Wing Fence at Hot Trap		
10 Sep Draw-down mud flat around pond Mixed collection not discovered until laboratory observations were made.	**rare/3/21304** in part*	**rare/6/21304** in part*

30-Winter Valley southeast fo Road		
10 Sep Draw-down mudflat around pond *Bacopa* present	**scat/2/21305**	0
31-North end of Research		
10 Sep Draw-down mud flat around pond *Bacopa* present	0	**scat/14/21306**
32-Pond in Exhibition Pasture		
10 Sep Pond in Exhibition Pasture Draw-down mud flat	**one plant/0/0**	0
33 Ingram House Pond		
10 Sep Draw-down mud flat Several hundred plants *Bacopa* present	**scat-loc com/19/21309**	0
34-Quanah Parker		
10 Sep Near dam Draw-down mud flat Several thousand? plants	**scat-loc com/54/21210**	0
35-Quanah Parker		
10 Sep SE of Environmental Center Draw-down mud flat Several hundred plants	**scat-loc com/7/21313**	**scat-loc com/25/21311**
36-Elmer Thomas Lake		
10 Sep Draw-down mud flat along north shore	**scat-loc abd/46/21314**	0

Key to abundance descriptors

rare = fewer than 10 plants at site
scat = scattered, a few plants occurring over several square meters
common = many plants occurring over several square meters
abundant = large numbers of plants (often the local dominant plant)
loc com = many plants in a small area, but may be scattered over a large area
loc abd = large numbers of plants in small area, but may be scattered over a large area

References

McKenzie, Paul M. 1998. Hall's Bulrush (*Schoenoplectus hallii*) Status Assessment. U.S. Fish and Wildlife Service. Columbia, MO.

Yatskievych, George. 1999. Steyermark's Flora of Missouri, Vol 1, rev. ed. Missouri Dept. of Conservation in cooperation with the Missouri Botanical Garden Press. St. Louis, MO.

Editor's Note: Exact locations of individual sites were determined by GPS and are recorded in the WMWR database. However, that information and access to the sites is strictly limited and permission must be requested from the refuge manager.

Wichita Mountains Wildlife Refuge,
Comanche County

***Echinocerus baileyi* on Elk Mountain Trail**
(photos by Sheila Strawn)

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