



**TRAFFIC**

BULLETIN

Excerpts, Vol. 17,  
No. 2 (June 1998)

## PUBLICATIONS:

### Examination of the US Pitcher-plant Trade With a focus on the White-topped Pitcher-plant

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*The unique appearance of carnivorous plants of the North American genera *Sarracenia*, their leaves modified to form pitcher-like organs that trap and digest insects, make them highly desirable to plant collectors and breeders. Whole plants artificially propagated in the USA are on sale worldwide and there is an emerging interest in the use of pitcher-plants for medicinal application. The cut pitchers of wild specimens, once exported from the USA, now appear to be mainly collected to supply the US domestic market in cut flowers. However, as the report below describes, the extent of the exploitation of wild-collected *Sarracenia* specimens for this trade is largely undocumented, as a consequence of which any damage such harvesting might be having on populations, many of which are already vulnerable to habitat loss, is unknown.*



White-topped Pitcher Plant  
*Sarracenia leucophylla*

Photo: Royal Botanic Gardens, Kew

#### Introduction

Carnivorous plants are an enigmatic group of plants that use specialized morphological adaptations, known as traps, to capture small animals, primarily insects, for supplementary nutrition. Globally, there are 15 genera of carnivorous plants, comprising more than 500 species. Their unique biology and unusual appearance make many of these species highly sought by collectors. Some taxa, particularly tropical pitcher-plants *Nepenthes* and the naturally occurring hybrids of the native North American pitcher-plants *Sarracenia*, are quite rare and under increasing pressure from habitat alteration, and the harvesting of cut pitchers and living plants for commercial trade and for personal collections. There is also a known yet poorly documented commercial medicinal market for carnivorous plants.

North America is home to five genera of carnivorous plants, including the ornamentally popular White-topped Pitcher-plant *Sarracenia leucophylla*, one of

eight generally recognized species in the genus. Pitcher-plants derive their name from their leaf structure, which consists of an erect funnel-shaped tube or "pitcher", on top of which sits a lid-like hood (Slack, 1979). These are designed to attract and passively trap insects, which upon capture fall to the pitcher's base and are slowly digested by acids and enzymes. Pitchers of *Sarracenia* are typically adorned with vertical red veins that encircle the leaf and are connected by smaller, web-like veins that guide insects to sources of nectar and the "pit-fall" trap.

Conservationists have been particularly concerned about the vulnerability of the White-topped Pitcher-plant because the species has a very restricted range, its habitat is diminishing, and specimens remain popular in the cut flower and horticultural trades. Although all *Sarracenia* species are listed in the CITES Appendices and a number of species in the genus are afforded national protection in the USA, allegations of illegal exports of whole plants from the USA in recent years have intensified concerns for the species.

The following report summarizes the findings of a study undertaken by TRAFFIC USA into the US trade of wild-collected pitchers of, in particular, White-topped Pitcher-plants, the extent of pitcher-plant cultivation in the USA and an analysis of exports of artificially propagated whole specimens.

### **Background**

At the CITES Plants Committee meeting in May 1994, TRAFFIC North America (formerly TRAFFIC USA) expressed concern about the possible illegal export of pitcher-plants, particularly of the White-topped Pitcher-plant, from southern US ports. Although a follow-up investigation by the US Animal and Plant Health Inspection Service (APHIS), the branch of US Government that implements and enforces CITES trade controls for plants in the USA, found no evidence of illegal exportation, TRAFFIC decided to conduct its own enquiry because of continuing concerns about levels of commercial exploitation of pitcher-plants and the species' worsening habitat loss. The White-topped Pitcher-plant was the focus of the study, but information on the trade in other pitcher-plants in the USA was obtained in order to gain a more complete understanding of the trade.

TRAFFIC's review served two ends: firstly, to synthesize information on the conservation status, management and trade of wild *Sarracenia* species and, secondly, to determine the extent to which species are artificially propagated in the USA and investigate the lack of transparency in export data for cultivated specimens.

Although trade, and the impact of trade on wild populations of these species, is at the centre of this review, it is important to note that the genus, and particularly the White-topped Pitcher-plant, is at far greater risk from wetland drainage for development and pine plantations, and the silvicultural practices of timber companies. Suburban development and tree farms can irreparably alter suitable

*Sarracenia* habitat, while the effects of fire suppression and the use of and runoff of herbicides can harm wild *Sarracenia* populations.

## Methods

Although specimens, including pitchers, collected for export are subject to regulation under CITES and federal exporting requirements, the harvesting of White-topped Pitcher-plants for US domestic trade is generally not controlled or monitored at the State or federal level. As a consequence, the data on the number of plants collected and traded within the USA are incomplete, making it difficult to assess overall exploitation of the species and evaluate the impact of collection on native wild populations.

TRAFFIC's study was conducted during 1996 and 1997. In the absence of harvest data, investigators relied on other sources of information such as US mail-order catalogues and plant vendors for assessment of the availability of White-topped Pitcher-plants offered in the USA. US exports of pitcher-plants were examined by compiling CITES annual report data and comparing these with plant-health, or phytosanitary, certificates issued for the export of pitcher-plants. Overseas markets were also examined through interviews with pitcher-plant vendors in key importing countries such as the Netherlands and Japan. APHIS plant inspectors at the US ports of Mobile (Alabama), Gulfport (Mississippi) and New Orleans (Louisiana) - key ports for pitcher plant exports - were questioned about pitcher-plant shipments. Field botanists from US State natural heritage programmes and the US Fish and Wildlife Service (USFWS), and academic and botanical garden researchers were contacted for information on the conservation status, ecology, management and protection of the White-topped Pitcher-plant. Information from internal memoranda of the US CITES Scientific Authority that is used by the US Government to determine whether exports of pitcher-plants would be detrimental to wild populations was extracted and analysed.

## Distribution and Status

The White-topped Pitcher-plant, or swamp lily as it is sometimes known, favours moist habitats and soil that is usually acidic and lacking in nutrients. It occurs naturally in small discontinuous patches of bog, wet pine savannas and flatwoods (wooded areas growing on flat terrain) in the southeastern States of Alabama, Florida and Mississippi. Most of the suitable habitat is in Alabama, some of which is managed by State and federal governments but most is on private land owned by timber companies. The species is believed to be extinct in Georgia, where a single population has not been found in the last eight years.

The Nature Conservancy (TNC - a US-based international conservation organization), in co-operation with individual States, ranks the rarity of plants in North America on the estimated number of occurrences (locations) and individual plants reported by States (as well as other factors such as suitable habitat, habitat

loss and overexploitation). According to this system, the White-topped Pitcher-plant is considered critically imperilled in Georgia (five or fewer occurrences or fewer than 1000 individuals), imperilled in Mississippi (six to 20 occurrences or fewer than 3000 individuals), and vulnerable in Alabama and Florida (21 to 100 occurrences or fewer than 10 000 individuals) (TNC, 1997).

The level and intensity of management of the White-topped Pitcher-plant and information on the species' population varies from State to State. There are a reported 319 occurrences of White-topped Pitcher-plants in Florida, 70% of which have been documented on public land, and 30% on private land (Knight *in litt.*, 1995). Most populations on public land are located in the western panhandle of Florida, which is well-managed through growing-season fire (Knight *in litt.*, 1995). Conversely, private lands in Florida are not actively managed to preserve White-topped Pitcher-plant habitat (Knight *in litt.*, 1995). In Alabama, there are 98 known occurrences of White-topped Pitcher-plants, most of which are located in Baldwin, Washington, Mobile and Escambia Counties (Lewis *in litt.* to Kutchock, 1997). Eighteen extant populations of White-topped Pitcher-plants occur in Mississippi, eight of which occur on land owned by timber companies in the southeastern corner near the Alabama border. The remaining populations in that State have been documented on State lands in George, Jackson, Green and Wayne Counties. Mississippi does not actively manage White-topped Pitcher-plant habitat or populations.

### Protection

The entire *Sarracenia* genus is listed in the CITES Appendices: *Sarracenia jonesii*, the Green Pitcher-plant *S. oreophila* and two subspecies Alabama Canebrake Pitcher-plant *S. alabamensis alabamensis* and *S. rubra alabamensis* are listed in CITES Appendix I, while all other *Sarracenia* are listed in Appendix II. The *US Endangered Species Act* (ESA) prohibits interstate commerce and export of Green Pitcher-plants, Alabama Canebrake Pitcher-plants *S. rubra alabamensis* and Mountain Sweet Pitcher-plants *S.r. jonesii*. Although the White-topped Pitcher-plant is currently being evaluated for protection under the ESA, it receives no federal protection at the present time. The State legal designation of the White-topped Pitcher-plant in Florida is Endangered and permits regulate collection. While there is no legal protection for White-topped Pitcher-plants in Alabama, Mississippi and Georgia, trespass laws in the former two States require collectors to obtain permission from landowners prior to collection.

### Wild Harvest

Although the whole plant may sometimes be removed, typically, it is the funnel-shaped section of the White-topped Pitcher-plant, or pitcher, which is harvested from the wild for the US domestic trade. This occurs twice in each growing season - from late April to early July and again from early August to October/November - along the Gulf Coastal Plain of southeast USA (Groves, 1992). There are usually between four and seven pitchers per plant. Most White-topped Pitchers are collected in Alabama and may be collected illegally in western and northern Florida (Groves, 1992). The extent of collection in Mississippi is not known. Each cut pitcher fetches between seven and 10 cents (or less), or 30 to 40 cents per bunch of 10, and can potentially earn the harvester US\$150 to US\$200 a day (Groves *in litt.*, 1998).

Most harvesters (and growers) sell cut pitchers to brokers who serve as intermediaries between the harvester/grower and the florist.

State botanists have been concerned about heavy collection of White-topped Pitcher-plants in southern Alabama, particularly in northern Baldwin County near the town of Perdido, and in Washington County, where their collection from the wild for the domestic cut-flower trade is becoming a cottage industry (Hilton *in litt.*, 1995). Reportedly, White-topped Pitchers have been transported out of southern Alabama by the lorry-load (Hilton *in litt.*, 1995). A US timber company with large holdings in southern Alabama once leased its land to *Sarracenia* collectors, but this practice has now ceased (Folkerts pers. comm., 1997).

Owing to the absence of permit requirements in Alabama, there are no known public records of the number of pitchers collected in that State, and inventories maintained by local collectors and companies are not accessible to the public. The Alabama Division of Game and Fish has previously stated that there should be no harvest of pitcher-plants until a management plan has been established for them (Office of Scientific Authority *in litt.* to Office of Management Authority, 1992). However, based on the lack of protection plants receive in Alabama, and the lack of resources devoted to plant conservation in that State, the likelihood of a management plan for pitcher-plants in Alabama, at least in the foreseeable future, is low.



Photo: Madeleine Groves, Atlanta Botanical Garden

Cut pitchers of White-topped Pitcher-plants being harvested in Alabama. They are placed in buckets of water on all-terrain vehicles which are typically used during collection to get in and out of pitcher-plant bogs.

A permit is required to collect White-topped Pitcher-plants in Florida. According to State records, four permits have been issued for *Sarracenia* collection since January 1991: two permits issued in January 1991 and October 1993 authorized the collection of 2500 and 100 specimens of White-topped Pitcher-plants, respectively; two permits issued in May 1991 and November 1994, respectively authorized the collection of an unlimited number of *Sarracenia* specimens and White-topped Pitcher-plants (Anon., 1995). No collecting permits were issued in 1995 or 1996; no records for 1997 are yet available.

The quantity of pitcher-plants collected is not necessarily as harmful to populations or habitat as is the damage caused by repeated foot traffic and vehicle use which compact the soil and alter moisture levels (Hilton *in litt.*, 1995). However, over-harvesting can harm a local population over time because harvesters can potentially cut more than one pitcher per plant within a growing season year after year. It is considered by some scientists that removal of the plants' pitchers not only affects photosynthesis, but it also eliminates the mechanism from which supplemental nutrition is derived which may stress, or even kill the plant.

### US Market

Half or more of the White-topped Pitchers collected from the wild in 1989 are believed to have been purchased by US florists for domestic sale (Anon., 1989). Today, the US market for fresh and dried cut White-topped Pitchers may be even larger. By contrast, the US export market for cut specimens, once comprising tens of thousands, appears to have declined since 1989. Rhizomes and seeds of pitcher-plants can also be found in trade, but in insignificant quantities; these are believed to be mostly artificially propagated stock as they are recorded in the CITES annual reports to genus level, in common with other *Sarracenia* specimens that have been artificially propagated, whereas wild-collected plants are generally recorded to species level.

As part of the survey, TRAFFIC interviewed five major wholesalers/distributors in Alabama and Florida by telephone to obtain information on the species, volume,



Photo: Madeleine Groves, Atlanta Botanical Garden

Harvesters in Alabama. Bunches of ten pitchers are cut to size and then dipped in water to clean the stems and to offset wilting.



Photo: Madeleine Groves, Atlanta Botanical Garden

Harvesters at a shade house, Mississippi

source (i.e. wild or artificially propagated), prices and market availability of *Sarracenia*. Of these five, two (Companies A and B) indicated that they obtain cut pitchers from Alabama and sell them to domestic florists only. The remaining three companies did not respond to the survey.

According to Company A, an international cut-flower wholesaler located in Alabama, it purchases *Sarracenia* pitchers from local harvesters who allegedly collect wild specimens legally on leased land in Alabama. The company states that it does not buy specimens harvested from endangered populations, including those in Florida where the species is considered endangered (Mater Engineering, 1993). Company A states that it is unaware of any availability of cultivated supplies of White-topped Pitcher-plants in Alabama. It does not export White-topped Pitcher-plants because of the species' close resemblance to endangered species in the genus.

Company B, also based in Alabama, purchases White-topped Pitcher-plants from a source in Mobile, Alabama, and resells live plants at US\$4.95 each; it does not export any specimens. It is unable to confirm whether the plants are collected from the wild or cultivated.

A retail company in the State of Maine contacted by TRAFFIC offered dried wreaths decorated with *Sarracenia* in its 1995 Christmas catalogue (identified by TRAFFIC as being White-topped Pitchers). The company informed TRAFFIC that it has purchased wreaths from a local floral manufacturer which, in turn, claimed to have bought an unknown quantity of dried *Sarracenia* from Company A in Alabama; these specimens are all believed to have been wild-collected. Based on the number of pitchers used per wreath and the total number of wreaths produced, it is estimated that at least 45 000 dried *Sarracenia* pitchers were purchased for wreaths sold in 1995. This retail company no longer offers the wreaths for sale.

A review of US nursery price lists indicates that prices for White-topped Pitcher-plants range from US\$4.00-US\$5.25 for a whole plant; seeds and rhizomes are offered for US\$3.00 each.

### **Export Approval**

The US Fish and Wildlife Service (USFWS) is the designated US CITES Scientific and Management Authority and, as such, must ensure that any CITES-listed species, or specimens thereof, that are exported, have been legally acquired and that exports will not be detrimental to the species' survival.

Before recommending to the Office of Management Authority (OMA) whether a CITES permit for the export of *Sarracenia* should be issued, the Office of Scientific Authority (OSA) at USFWS usually requires and reviews the following information: (1) the *Sarracenia* species to be exported; (2) if applicable, the harvest frequency and total number of specimens harvested the previous year, the acreage and description (i.e. whether leased or exporter's own land) of site harvested the

previous year; (3) the estimated number of plants and indication of part of the plant to be harvested for the domestic market and export; (4) the acreage and brief description of site from where *Sarracenia* are to be extracted; (5) the estimated frequency and intensity of harvest at site; (6) the current and projected extent of *in situ* and *ex situ* artificial propagation; (7) signs of unauthorized collection; and (8) accessibility of site (OSA *in litt.* to OMA, 1992, 1993, 1994).

OSA has previously recommended the issuance of export permits for *Sarracenia* on the condition that the intensity of collection be limited to one mature pitcher per plant every two to three years. In addition to OSA's information requirements and recommendations, OMA must be reasonably assured that *Sarracenia* specimens being exported were not obtained in violation of State or federal law.

### US Exports and International Trade

According to US CITES annual report data, US exports of wild White-topped Pitcher-plants declined considerably from the mid-1980s and there have been no reported exports of any wild *Sarracenia* specimens since 1992, when 6300 live White-topped Pitcher-plants were exported to Taiwan (6000) and the Netherlands (300). The export trade in artificially propagated cut pitchers has declined owing to increased availability of *Sarracenia* from growers overseas, particularly in Europe. The reported number of artificially propagated *Sarracenia* whole plants exported from the USA, however, remains high, with the exception of a drop in exports in 1993 (1992: 83 900; 1993: 3600; 1994: 60 500; 1995: 48 740; 1996: 97 200) (USFWS, 1997). Since 1994, exports of artificially propagated Appendix II-listed *Sarracenia* have been entered into the US CITES annual report database at the genus level, which has impeded the monitoring and quantification of exports of propagated White-topped Pitcher-plants or any other *Sarracenia* species.

There appears to be a discrepancy between the number of phytosanitary certificates issued and the quantity of *Sarracenia* exports recorded in the US CITES annual reports for 1995 and 1996. In theory, these should be the same or similar. However, US CITES annual reports show fewer *Sarracenia* exports than phytosanitary certificates issued for exports during those years. The US Department of Agriculture (USDA) at the port of New Orleans, Louisiana, issued phytosanitary certificates for the export of 59 000 Purple Pitcher-plants *Sarracenia purpurea* and 11 000 Parrot Pitcher-plants *S. psittacina* to the Netherlands in 1995. By comparison, US CITES annual report data show that only 44 000 *Sarracenia* plants were exported to the Netherlands in 1995 (live, artificially propagated). Similarly, in 1996, USDA issued phytosanitary certificates for the export of 90 980 *Sarracenia* specimens to the Netherlands: 44 600 Purple Pitcher-plants, 32 400 Parrot Pitcher-plants, 1500 Sweet Pitcher-plants *Sarracenia rubra*, 10 500 *S. wherryi* (= *S.r. wherryi*) and 1980 *Sarracenia* hybrid pitcher-plants. Surprisingly, US CITES annual report data record only 13 400 *Sarracenia* (live, artificially propagated) exported to the Netherlands in 1996, a discrepancy of 78 580 specimens.

The only recent documented case of illegal *Sarracenia* trade in the USA involved a shipment of carnivorous plants which was destined for the Netherlands but intercepted by authorities at Baltimore International Airport in January 1996. The shipment consisted of 8190 Venus Flytraps *Dionaea muscipula*, 130 Purple Pitcher-plants and one Sweet Pitcher-plant, all of which had clearly been removed from the wild in North Carolina and intended for commercial resale and artificial propagation (Lieberman, *in litt.*, 1996). The shipment was not declared to the appropriate US authorities prior to export and false documentation accompanied the plants (Lieberman, *in litt.*, 1996).

There appears to be a horticultural market in the Netherlands for whole *Sarracenia* plants that have been artificially propagated in and exported from the USA. Historically a major importer and re-exporter of wild *Sarracenia* from the USA, the Netherlands has achieved success in propagating *Sarracenia* spp. by seed and tissue culture that has resulted in more desirable, smaller and uniformly sized plants for the trade in cut flowers (Determann pers. comm., 1995). A Dutch grower informed TRAFFIC that improved propagation techniques such as tissue culture had enabled his nursery to produce twice as many *Sarracenia* in 1995 as in 1994. The same grower imported approximately 44 000 artificially propagated *Sarracenia* specimens from the USA in 1995 and more than 130 000 in 1996. This figure points up another discrepancy in the trade figures, which record a total of 97 200 specimens exported from the USA in 1996, 13 400 going to the Netherlands, although phytosanitary certificates were issued for the export of 90 980 *Sarracenia* specimens to the Netherlands in that year. Nearly two-thirds of 1995 imports and half of 1996 imports were Purple Pitcher-plants.

According to CITES annual report data, other European countries importing *Sarracenia* specimens from Europe include the Czech Republic, Italy and Austria. Japan imports large quantities from the USA and may be supplying its domestic market with plants cultivated from those originally imported from the USA.

### **US Imports**

Prior to 1993, there were very few reported imports of *Sarracenia* to the USA. Since that time, an annual average of 700 live *Sarracenia* have been imported. As the trade figures do not discriminate among individual species identified by the exporter as artificially propagated, these specimens were likely to have been artificially propagated. Canada has been the largest supplier of *Sarracenia* to the USA, exporting 614 live specimens in 1993, 783 in 1994, 663 in 1995 and 716 in 1996. From 1993 to 1996, live imports were also received from the UK (271), the Netherlands (204) and Australia (11).



Photo: Royal Botanic Gardens, Kew

In recent years, Yellow Pitcher-plants *Sarracenia flava* have been exported from the USA to Canada for medicinal purposes.

## Medicinal Trade

Carnivorous plants have traditionally been collected, cultivated and traded for decorative purposes, but there appears to be a limited albeit little-documented medicinal market for some species, including *Sarracenia*. According to Grieve, 1980, the root and leaves of the Purple Pitcher-plant are taken as a tincture, or in fluid or powder form as a tonic, laxative,

stomachic, and diuretic. In the southern USA the plant is used in the treatment of dyspepsia. The plant's principal value appears to be in torpid liver, stomach, kidney and uterus complaints (Grieve, 1980). It is also taken to alleviate pain (Sheldon *et al.*, 1997). Native Americans have used the Purple Pitcher-plant as a diuretic and to treat smallpox, lung and liver ailments, and the species is listed in the Physicians' Desk Reference, a reference list on available pharmaceuticals (Foster and Duke, 1990). Owing to the increased scarcity of this species, US botanical companies in the last several years have reportedly offered prices as high as US\$30/lb (454 g) (Sheldon *et al.*, 1997). The USFWS regional field office in North Carolina and botanists working for that State have reported an increase in the number of queries from natural product companies regarding the availability of Purple Pitcher-plants. In one instance, a company wished to know where it could secure 1000 lbs (400 kg) (dry weight) per year of Purple Pitcher-plants for the production of an extract known as *Sarapine*, a muscle relaxant used primarily on horses. Apparently, the company's previous supplier, which harvested Purple Pitcher-plants from the New Jersey pine barrens – a biologically rich area in southern and central New Jersey comprising over one million acres of sandy and peaty soil wooded with Pitch Pine *Pinus rigida* – was no longer supplying it with material. In 1994 and 1996, 1000 wild Yellow Pitcher-plants *Sarracenia flava* and 1500 specimens of *Sarracenia*, respectively, were reportedly exported from the USA to Canada for medicinal use (USFWS, 1997). Purple Pitcher-plants have also been documented on the German medicinal market (Lange and Schippmann, 1997). TRAFFIC, in co-operation with relevant experts, intends to examine the demand for and trade in *Sarracenia* offered on the US, Canadian and European medicinal markets, including a study of the plant's uses.

## Conclusions

Conservation of the White-topped Pitcher-plant is largely a US issue for which US solutions should be identified and implemented, particularly at the State and consumer levels. Four conclusions can be drawn from this review:

- the greatest long-term threat to White-topped Pitcher-plants is loss of habitat, which is widespread and possibly accelerating in areas prone to suburban sprawl and pine plantation development. Approximately 98% of the habitat

suitable for *Sarracenia* has been eliminated across its range in the lower Gulf Coastal Plain (Folkerts, pers. comm., 1995);

- the international market for cut pitcher-plants harvested from the wild and exported from the USA has shrunk from tens of thousands to no reported wild specimens today. All cut pitcher-plants exported in recent years appear to have been artificially propagated. By contrast, US demand for the domestic trade in cut pitchers for floral arrangements remains high and is the greatest factor driving wild harvest;
- there is insufficient information on the location of, and levels of, wild *Sarracenia* harvests, or on the extent of *Sarracenia* artificial propagation in the USA; and
- the quantity of White-topped Pitcher-plants collected may not be as harmful to populations and habitat as the damage caused by foot traffic and vehicles during collection of pitcher-plants.

### Recommendations

In order to address the long-term conservation and exploitation of White-topped Pitcher-plants, further research is needed to study the level and potential and known impacts of trade and habitat loss on wild populations of the species. The author recommends that, to improve management of White-topped Pitcher-plants, and the monitoring of harvesting and trade, the following steps should be taken:

- individual US State governments should design and implement a management plan that provides harvesters of wild White-topped Pitcher-plants with information on less harmful harvesting techniques and that improves the monitoring of harvest on public land, particularly in Alabama. The latter could be achieved through a permitting system, whereby in-State plant vendors and nurseries would apply for and obtain collecting permits prior to harvest. Further, if land is going to be converted to use that is inconsistent with the habitat requirements of *Sarracenia*, private landowners should be encouraged to donate *Sarracenia* plants to plant rescue operations, thus allowing specimens to be propagated and distributed to other institutions, to reputable outlets of the horticultural trade and to selected individuals, for restocking other wild populations;
- State governments, in co-operation with regional botanical gardens and research institutions, should produce and distribute literature to *Sarracenia* wholesale vendors and retail florists in the USA, particularly in Alabama and Mississippi, on the status of the White-topped Pitcher-plant and the long-term effects of poor harvesting methods on wild plants;
- garden clubs should encourage their members to determine the source of cut pitcher-plants (i.e. whether wild or artificially propagated) by examining catalogues and querying vendors, and to make every effort to determine the origin of cut pitcher-plants, whole plants and rhizomes, before making a purchase;
- federal and State officials should monitor the US domestic market for

evidence of fresh and dried White-topped Pitchers, as well as whole plants and rhizomes, to determine whether protection or regulation is required at the State or federal level;

- APHIS and the USFWS should identify and account for gaps in trade data through the exchange of information on *Sarracenia* exports: this could be achieved by the provision by APHIS of copies of relevant phytosanitary certificates to the USFWS who, in turn, could supply APHIS with copies of approved export permits for *Sarracenia* and pertinent CITES annual report data for comparison.

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