

ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract

Element Code: PMORC0D010

Data Sensitivity: Yes

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Calypso bulbosa* (L.) Oakes

COMMON NAME: fairy slipper, Western fairy slipper, Calypso, fairy-slipper orchid, hider of the north, Venus' slipper, deer's head orchid

SYNONYMS: *Cypripedium bulbosum* L.; *Calypso borealis* (Swartz) Salisbury; *Cytherea borealis*; *C. bulbosa* (L.) House

FAMILY: Orchidaceae

AUTHOR, PLACE OF PUBLICATION: *Calypso bulbosa* (L.) Oakes, Catalogue of Vermont Plants 1: 200. 1842. *Cypripedium bulbosum* L., Species Plantarum 2: 951. 1753.

TYPE LOCALITY:

TYPE SPECIMEN:

TAXONOMIC UNIQUENESS: *Calypso* is a distinct genus, without any close relatives. It is 1 of 114 genera in the family Orchidaceae with only 1 species, *Calypso bulbosa*. Two varieties occur in North America, *americana* and *occidentalis*, which are very similar to each other. *C. b.* var. *americana* is the only variety of the species that occurs in Arizona.

DESCRIPTION: Perennial herb that arises from a bulbous corm, with flowers that hang at the tip of a single tall pink stem. Plants typically 10 – 14 cm tall but can be 7 – 21 cm (2.8 – 8.3 in) tall, stems are glabrous; plants 4.5-22 cm per Flora of North America (1993+). Single dark green plantain-like leaf is oval to egg-shaped, 1-6.5 x 1.2-5.2 cm, and at the base of the stalk; leaf withers soon after flowering. Short petiole is entirely separate from flower scape. Floral bracts are lanceolate, partially sheathing the stem, the same color as the sepals, and 0.7-1.7 cm long. The sepals and petals are nearly identical, rose-pink, purplish to pinkish white, lightly veined, lanceolate 5 cm (2 in) long, and 3.8 cm (1.5 in) wide; variety *Americana* is 1.4-2.0 cm long and 0.25-0.3 cm wide. The lip pendent is ovate-oblong in outline, 1.3-2.3 cm long, 0.4-1.3 cm wide; the sac is expanded in front and forming a whitish apron, and vividly marked on the inner surface with reddish spots and lines. The apron is bearded at the base with 3 longitudinal rows of white, yellow or brown spotted hairs. The column is inverted over the orifice of the lip. The capsule is erect, ellipsoid to lanceoloid, 2-3 x 1-1.5 cm long.

AIDS TO IDENTIFICATION: The lavender sepals look like a miniature hand drooping slightly towards the forest floor. The “slipper” is streaked, crimson-magenta with yellow “hairs” frontally. (NatureServe 2004). The lip, a complete slipper or pouch, gives rise to the common

name of fairy slipper, though *Calypso* is not closely related to the other genus of slipper orchids found in the Southwest, *Cypripedium*. The lip of *Calypso* is covered by a lamina (an apron-like blade over the pouch) whereas the lip of *Cypripedium* is not, and *Cypripedium* has two anthers while *Calypso* has a single anther. (Coleman 2002). According to Brian (2000), there are no look-alikes, however, it could be confused with *Epipactis gigantea*, but it differs by having only one leaf and one flower per flowering stem.

ILLUSTRATIONS: Color photos of plant and flower (Coleman 2002: Pl. 1)
Color photo of flower (Epple, 1995: plate 651).
Color photo of var. *americana* (N. Brain, in Brian 2000)
Line drawing (in Brian 2000).
Line drawing (Hickman, 1993: p. 1213).
Line drawing (Arnberger, 1982: p. 53).
Line drawing (Martin and Hutchins, 1980: p. 453).
Color photo of plants with flowers (Luer, 1975).
Color photo of flower (Rhein, in Rickett 1970: plate 20).
Color photos of flower and plants
(http://www.em.ca/garden/nat_calypso_bulbosa.html, 2002).
Color photo (Brother Alfred Brousseau, St. Mary's College of California, in http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=CABU)

TOTAL RANGE: Circumboreal species that is found from Labrador to Alaska, south into the western United States (except Nevada), through the northeast into South Dakota, Minnesota, Wisconsin, Michigan, New York, Vermont, New Hampshire and Maine. Also found in Europe.

RANGE WITHIN ARIZONA: North Rim of the Grand Canyon and the San Francisco Peaks, Coconino County; White Mountains, Apache and Greenlee counties. Possibly in the Chuska Mountains in Apache County.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Perennial bulbous herb, that grows by rhizomes.

PHENOLOGY: Grows primarily in the fall and early spring, flowering from late May to late June (July); June to August in New Mexico. The evergreen, solitary leaf, emerges in late August, overwinters, and shrivels soon after blooming. Few plants set fruit, however, they produce thousands of seeds per capsule, which gives them the potential of good spread by seed.

BIOLOGY: *Calypso bulbosa* is intolerant of soil temperatures in excess of 15° C, and a canopy of less than 60% (Caljouw 1981, in TNC 1991). It can grow in full shade (deep woodland) or semi-shade (light woodland). This species is superficially nestled in loose moss or in the rotting humus of the forest floor, where its slender, brittle roots seek out their nutrients.

The small ivory-colored corm, produces in late summer to early fall a single dark green, satiny leaf, the previous leaf having died shortly after the spring flowering. In the spring, the thawing of snow exposes the leaf lying flat on the ground. (Luer, 1975). Flowers are hermaphrodite (have both male and female organs) and are pollinated by insects. Bees commonly pollinate the flower, although nectar is not produced. Predation may occur from rodents, slugs and fungi. Plants have a distinct, pleasant aroma, which is highly variable in intensity.

HABITAT: In Arizona, *Calypso bulbosa* can be found in the cool understory of moist mixed conifer and subalpine forests with ponderosa pine, aspen, or spruce-fir, bogs, and along streams, in rich organic soil. Within those areas it grows in densely forested spots, in open areas within the forest, and on the edges of meadows. It is usually rooted shallowly in deep duff and mosses. (Coleman 2002).

Range wide, most often found in cool, mature cedar swamps or on slopes of mixed coniferous growth underlain by some type of calcareous bedrock (NatureServe 2004). This coincides with CalFlora's (2002) description of being usually found in swampy wetlands in the eastern U.S., while in the Rocky Mountains of the west, it occurs in Redwood, Mixed Evergreen and Yellow Pine forests. Per Arnberger (1982), "...in moist pine and spruce woods and along cool, shady streams." Per Welsh et al. (1993), *Calypso bulbosa* most commonly occurs in thick stands of lodge-pole pine where it grows with arnica, pyrola, ribes, and sedge. It is less common in the duff of ponderosa pine.

ELEVATION: 8,000 – 10,000 ft (2440-3050 m) in Arizona; 7,000-10,000 ft (2135-3050 m) in New Mexico.

EXPOSURE: In Arizona, have been reported on West, Northwest, and North slopes.

SUBSTRATE: Rich humus soils in Arizona. For its range, the plant prefers sandy, loamy and clay soils. They prefer acid and neutral soils that are moist or wet.

PLANT COMMUNITY: Mixed conifer and subalpine forests. Several other orchids occur in the same habitat as *C. bulbosa* and include *Corallorhiza maculata* (spotted coralroot), *C. striata* (striped coralroot), *C. wisteriana* (spring coralroot), and *Schiedeella arizonica* (fallen ladies'-tresses). Less often, and only above 9,000 feet (2743 meters), *Coeloglossum viride* (long-bract green orchis) and *Listera cordata* (heartleaf twayblade) may co-occur with calypso. Later in the season *Platanthera purpurascens* (= *P. stricta*, slender bog orchid) and *Malaxis soulei* (= *M. macrostachya*, Chiricahua adder's-mouth orchid) may bloom nearby. (Coleman 2002).

POPULATION HISTORY AND TRENDS: Plants are widespread and locally common throughout its range. According to NatureServe (2004), "Population fluctuations in the absence of human activities are probably caused by periodic openings in the canopy allowing light to penetrate to the forest floor and thus increasing competition and substrate temperature." In Arizona, it is considered demonstrably secure across its entire range and has more than 100

occurrences in the state. Though not considered rare in Arizona and New Mexico, it is not as common in other areas of its range. (Coleman 2002).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: None
STATE STATUS: Salvage Restricted (ARS, ANPL 1999)
OTHER STATUS:

MANAGEMENT FACTORS: Threats include collecting for cultivation in gardens (poor candidate for cultivation as transplanting is seldom successful), and loss of forest canopy due to insect infestation. Enough of a buffer zone should be maintained for the protection of the canopy. Also may be vulnerable to local reduction due to herbivory from overly abundant deer. Frost damage to the tubers may occur during some winters. In general, harvesting of timber and therefore loss of habitat is the worst threat (NatureServe 2004). In Arizona, most of the localities are on Forest Service land. With this in mind, the effects of grazing, logging and fires, should be evaluated on National Forest lands.

PROTECTIVE MEASURES TAKEN:

SUGGESTED PROJECTS: Fruitition is rare, thus hand pollination should be studied as a possible management tool. Information on abundance and population dynamics is needed. Any life history studies would aid in management and conservation, specifically the species' breeding systems such as biology, and studies leading to a better understanding of the requirements for germination and establishment. Long term demographic studies would provide information regarding the longevity of this species, as well as providing information on Calypso's specific adaptations to competition and habitat changes.

LAND MANAGEMENT/OWNERSHIP: BIA – Fort Apache Reservation; NPS – Grand Canyon National Park; USFS – Coconino and Apache-Sitgreaves National Forests; Private. Possibly on BIA – Navajo Nation.

SOURCES OF FURTHER INFORMATION

REFERENCES:

- Arizona Revised Statutes, Chapter 7. 1999. Arizona Native Plant Law. Appendix A.
Arnberger, L.P. 1982. Flowers of the Southwest Mountains. Southwest Parks and Monuments Association. p. 53.
Brian, N. 2000. A field guide to the Special Status Plants of Grand Canyon National Park. Science Center, Grand Canyon National Park. Grand Canyon, Arizona.

- CalFlora: Information on California plants for education, research and conservation. [web application]. 2002. Berkeley, California: The CalFlora Database [a non-profit organization]. Available: <http://www.calflora.org/>. (Accessed: Jul 31, 2002).
- Coleman, R.A. 2002. The Wild Orchids of Arizona and New Mexico. Comstock Publishing Associates, a division of Cornell University Press. Ithaca and London. Pp. 19-26.
- Epple, A.O. 1995. A field guide to the Plants of Arizona. Falcon. Helena, Montana. Pp. 32-33.
- Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 7+ vols. New York and Oxford.
- Hickman, J.C., editor. 1993. The Jepson Manual, Higher Plants of California. University of California Press. Berkeley, California. Pp. 1212-1213.
- Integrated Taxonomic Information System (ITIS). Retrieved 9/1/2004 from ITIS, <http://www.itis.usda.gov>.
- Kearney, T.H., and R.H. Peebles with collaborators. 1951. Arizona flora. Second edition with supplement by J.T. Howell, E. McClintock and collaborators. 1960. University of California Press. Berkeley, California. Pp. 203.
- Luer, C.A. 1975. The Native Orchids of the United States and Canada excluding Florida. The New York Botanical Garden. New York. Pp. 334-336.
- Martin, W.C., and C.R. Hutchins. 1980. A Flora of New Mexico. Volume 1. J. Cramer, Germany. P. 453.
- Michigan Natural Features Inventory. 1996. Special abstract for *Calypso bulbosa* (calypso orchid). Lansing, MI. 2 pp.
- Missouri Botanical Garden – Tropicos, Nomenclatural Data Base. *Calypso bulbosa* (L.) Oakes. <http://mobot.mobot.org>. Accessed: 31 Jul 2002.
- NatureServe Explorer: An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, Virginia, USA: NatureServe. Available: <http://www.natureserve.org/explorer>. (Accessed: July 31, 2002).
- NatureServe. 2004. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.0. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: September 1, 2004).
- Rickett, H.W. 1970. Wild Flowers of the United States, the Southwestern States, Southern California, Arizona and New Mexico. Volume Four, Part One of Three Parts. W.C. Steere, general editor. The New York Botanical Garden, McGraw-Hill Book Company. New York. P. 71.
- SEINet. Collections Search Result. Accessed 9/1/2004 at <http://seinet.asu.edu/collections/list.jsp>.
- USDA, NRCS. 2002. The PLANTS Database, Version 2.0 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
- USDA, NRCS. 2004. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
- Welsh, S.L. et al., editors. 1993. A Utah Flora. Second Edition, revised. Print Services, Brigham Young University. Provo, Utah. P. 908.

MAJOR KNOWLEDGEABLE INDIVIDUALS:

Ronald Coleman – Tucson, Arizona.

ADDITIONAL INFORMATION:

Indians of the northwestern States and Alaska are reported to have eaten the small bulbs either raw or cooked (Arnberger, 1982).

The genus name *Calypso*, was proposed and named by Salisbury. It was named for the Greek sea nymph, *Kalypso*, of Homer's *Odyssey*, the word meaning covered or hidden from view. Salisbury introduced it into cultivation in England in 1805 from Canada. The species name *bulbosa*, comes from the Latin *bulbosus*, "bulbous," referring to the bulb-like corm of the species.

Revised: 2002-08-08 (SMS)
2004-09-23 (SMS)

To the user of this abstract: you may use the entire abstract or any part of it. We do request, however, that if you make use of this abstract in plans, reports, publications, etc. that you credit the Arizona Game and Fish Department. Please use the following citation:

Arizona Game and Fish Department. 20XX (= **year of last revision as indicated at end of abstract**). X...X (= **taxon of animal or plant**). Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. X pp.