

**Final Recovery Planning Outline with Listing Status Review Triggers
for the Illinois Endangered Halberd Leaf Tearthumb (*Polygonum arifolium*)**

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Approved by the Illinois Endangered Species Protection Board at the February 20, 2014 Special Meeting.

Common Name: Halberd Leaf Tearthumb
Scientific Name: *Polygonum arifolium*
Family: Polygonaceae
Synonyms: Halberd-leaf Tearthumb

Status

Halberd Leaf Tearthumb (*Polygonum arifolium*) is endangered in Illinois (17 Ill. Adm. Code 1050). It was first listed in 1980 as an endangered species due to restricted habitats or low populations in Illinois (Mankowski 2012).

The species is not listed as federally endangered or threatened.

NatureServe gives the species a global rank of G5 (secure) and it is not ranked at a national scale. It is ranked as S1 (critically imperiled) in Illinois, Missouri, Tennessee, and Georgia. It is ranked as S2 (imperiled) in Nova Scotia and S3 (vulnerable) in two provinces of Canada and Maryland. For the remaining and majority of states in its range it is ranked as S4 (apparently secure), S5 (secure), or not ranked (NatureServe 2013; Figure 1).

Total Range

Halberd Leaf Tearthumb ranges across the eastern United States and adjacent Canada (Figure 1).

Illinois Distribution

In Illinois, the species is historically known from a few scattered and widely disjunct populations (Herkert and Ebinger 2002). There are historic museum and/or the Illinois Natural Heritage (Biotics 4) Database (Database) element occurrence records (EOs) from 4 counties (EOs have been established from 2 of the 4 counties) and possibly 7 Natural Division Sections (EOs have been established in 3 Sections and historic locations may have occupied up to 4 additional Sections) (Herkert and Ebinger 2002, INHD 2013; Tables 1 and 2, Figure 2).

Currently, there are a total of three EOs (across two counties) in the Database for *P. arifolium*. At the time of initial listing, no location information was brought forth to establish EOs. Later in the 1980s, two EOs were established (across two counties and two Natural Division Sections) and one more EO was added in the 1990s (adding one Natural Division Section). Not every EO is surveyed each year or regularly, so the number of EOs with observations in any given year or 5-year interval may not reflect the true status of the species (see Figure 3). There have been recent observations (since 2002) at two EOs in one county (across two Natural Division Sections) and the remaining EO has had multiple “surveyed with no observation” reports from 1997-2006. One EO occurs on property that is formally protected by dedication as an Illinois Nature Preserve or registration as an Illinois Land and Water Reserve (INHD 2013; Tables 1, 2, and 3, and Figure 2).

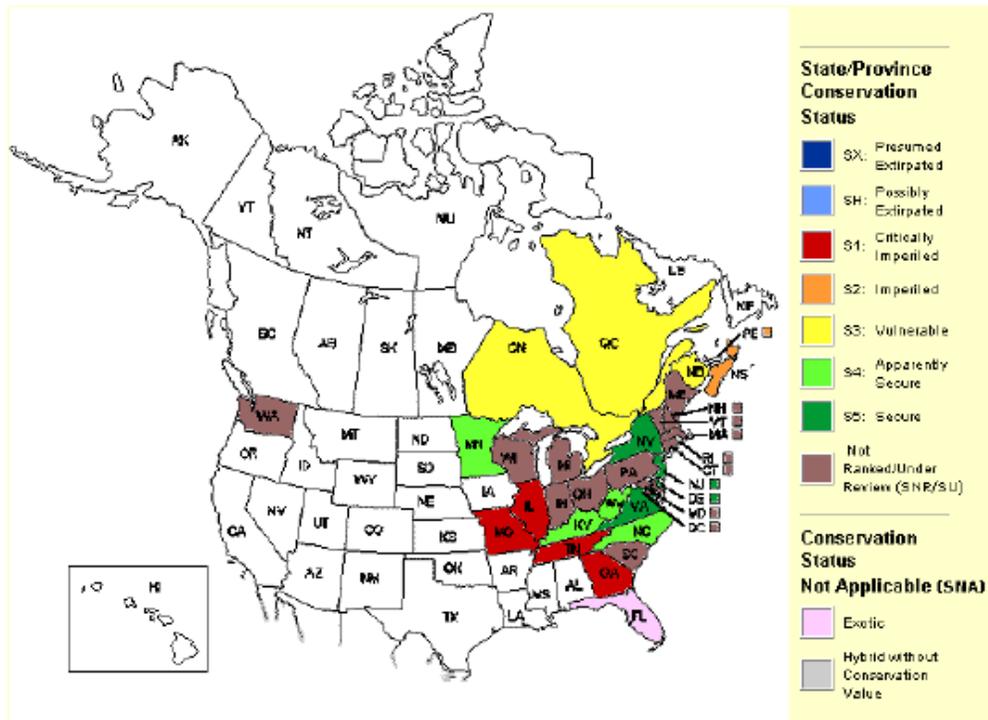


Figure 1. Distribution and NatureServe status of *Polygonum arifolium*, by state and province (NatureServe 2013).

Table 1. Illinois county distribution of *Polygonum arifolium*

	Historic (with no EO)	EO with historic obs	EO w/ recent (since 2002) obs
Jasper		X	X
Lawrence		X	X
Macon	X		
McHenry	X		

Table 2. Illinois Natural Division and Section distribution of *Polygonum arifolium*

DIVISION	SECTION	Historic (with no EO)	EOs with historic obs	EOs with recent (since 2002) obs
Wisconsin Driftless				
Rock River Hill Country	Freeport			
	Oregon			
Northeastern Morainal	Morainal	?		
	Lake Michigan Dunes			
	Chicago Lake Plain			
	Winnebago Drift	?		
Grand Prairie	Grand Prairie	?		
	Springfield	?		
	Western			
	Green River Lowland			
Upper Mississippi River and Illinois River Bottomlands	Kankakee Sand Area			
	Illinois River			
Western Forest-Prairie	Mississippi River			
	Galesburg			
Middle Mississippi Border	Carlville			
	Glaciated			
Southern Till Plain	Driftless			
	Effingham Plain		1	
Wabash Border	Mt. Vernon Hill Country			1
	Bottomlands			1
	Southern Uplands			

	Vermilion River			
Ozark Division	Northern			
	Central			
	Southern			
Lower Mississippi River Bottomlands	Northern			
	Southern			
Shawnee Hills	Greater Shawnee Hills			
	Lesser Shawnee Hills			
Coastal Plain	Cretaceous Hills			
	Bottomlands			

Note: "Historic with no EO" location information is not precise and assignment to Natural Division Section is based on a combination of known county occurrence, habitat association, and other Natural Division Section occurrences.

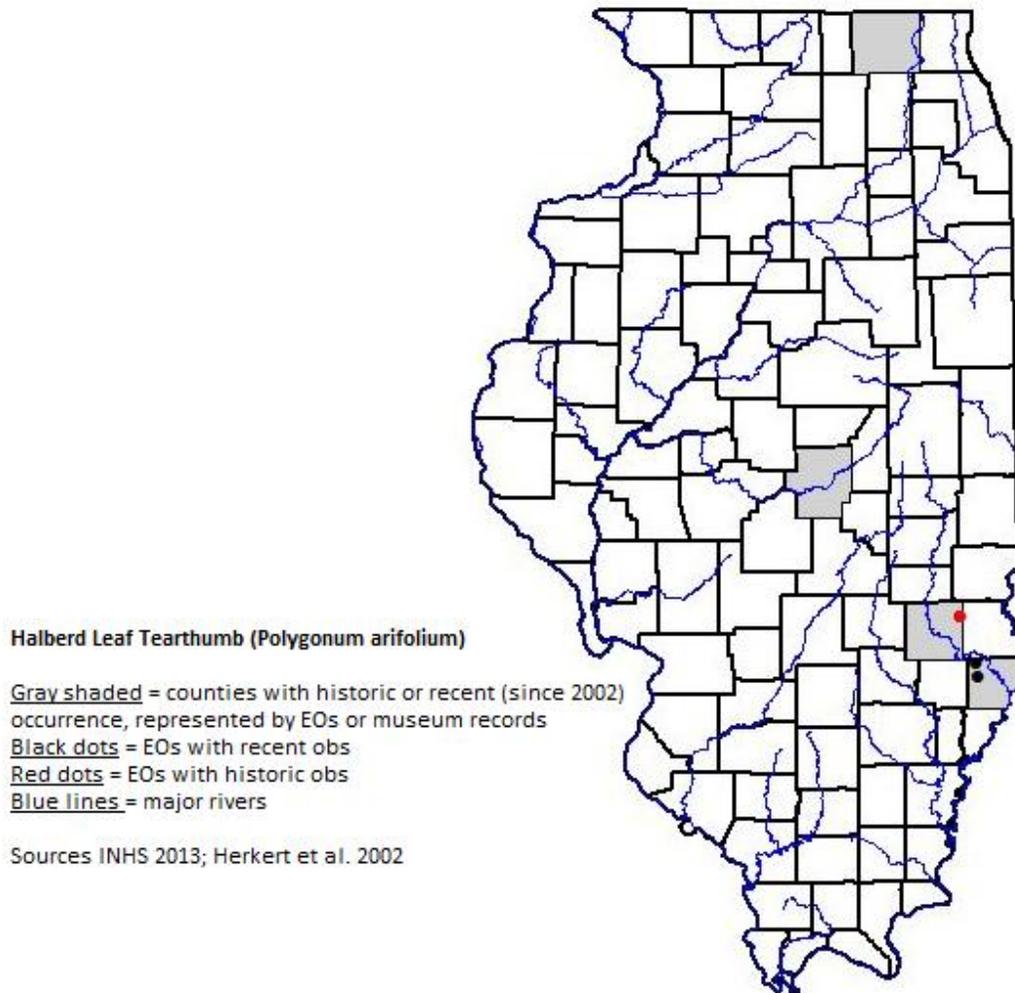


Figure 2. Historic and current distribution of *Polygonum arifolium* in Illinois.

Table 3. Select Illinois Natural Heritage (Biotics 4) Database information for *Polygonum arifolium*: Last observation date; total number of element occurrences (EOs); number of EOs observed since 2002; number of EOs protected as Illinois Nature Preserves or Illinois Land and Water Reserves; number of topographic quadrangles captured by total EOs; number of counties captured by total EOs; and, number of counties captured by EOs observed since 2002.

Last Observation	Total # EOs	# EOs observed since Jan 2002	# of EOs protected as NP/LWR	# topo quads	# Counties	# Counties since 2002
6/26/2007	3	2	1	3	2	1

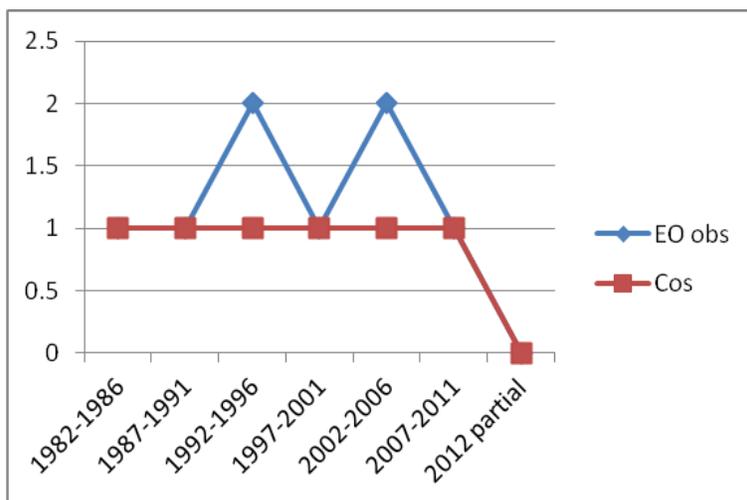


Figure 3. The number of *Polygonum arifolium* EOs in Illinois with observation during respective 5-year intervals and for 2012 (partial).

Description, Biology, and Habitat

Description

P. arifolium is an obligate wetland, vine-like annual herb that is decumbent and grows up to 2 m. in length often reclining on other vegetation (Herkert and Ebinger 2002). Stems are four-angled and reflexed prickly (Britton and Brown 1913). The leaves are 10-20 cm long and 7-15 cm wide, stellate-pubescent, at least below and prickly on the main veins below. They are hastate, acuminate to acute at the apex, truncate at the base, the two hastate lobes acute to acuminate (Gleason and Cronquist 1963). The lower leaves often have prickly petioles, the upper leaves are short-petiolate to sessile. The ocreae is oblique, fringed at the apex, bristly and arrowhead-shaped at base but the triangular-shaped basal lobes pointing outward rather than downward. The inflorescence is short terminal and/or axillary head or raceme, on long peduncles that are commonly glandular above. The perianth is 5-parted, 2-3 mm long, pink to greenish with six stamens and 2-parted style. Fruit is a lenticular achene, obovoid, dark brown, smooth, shiny, 3-4.5mm long (Silberhorn 1992). Flowering is from July-October in Illinois (Mohlenbrock 2002).

Species Biology

P. arifolium is identified as an annual, which can root from proximal nodes (Flora of North America). In freshwater marshes of Delaware, it seems to exhibit a high probability of germination and/or dispersal and appeared to depend on seed input and possibly a persistent seed bank for persistence (Leck and Simpson 1994). Seed germination occurs in March or April in response to warming temperatures and increasing photoperiod in the high light environments (Leck et al. 2009).

Habitat

P. arifolium is a species associated with wet areas such as wet marshes, meadows, pond margins, borders of swamps and has been found in seep springs and open areas of floodplain forests where it occurs in Illinois and acid seep springs in central Indiana (Homoya 1983, Herkert and Ebinger 2002). Associated species include black willow (*Salix nigra*), buttonbush (*Cephalanthus* spp.), other smartweeds (*Polygonum* spp.), swamp dock (*Rumex verticillatus*), rice cut grass (*Leersia oryzoides*), white turtlehead (*Chelone glabra*), swamp milkweed (*Asclepias incarnata*) and great blue lobelia (*Lobelia silphilitica*) (INHD 2013, Silberhorn 1992).

Reasons for Status and Threats

Halberd leaf tearthumb is known from only a few scattered and disjunct locations in Illinois. Threats include conversion of habitat, alteration of hydrology (including draining or inundation), and woody encroachment. It should be communicated to local land managers that local hydrology should not be altered or subjected to extreme fluctuation and that saturated soils should also not be drained in areas where *P. arifolium* occurs.

Low population numbers is also a threat to *Polygonum arifolium* in Illinois. There are only three EOs for this species, with one EO not having an observation reported since 1985. Most recent observation reports at the remaining 2 EOs were “observed” and 11 plants, none flowering.

Recovery Objectives and Criteria

The Illinois Endangered Species Protection Board is required by law to review, and revise as necessary, the Illinois List of Endangered and Threatened Species at least every five years. We propose that measures of population size and distribution, as documented in the Illinois Department of Natural Resources (Biotics 4) Database, be used to trigger a detailed review of the species’ status by the Illinois Endangered Species Protection Board. The measures were developed relative to the status and distribution of the species at the time of original listing and the definitions of “endangered” and “threatened”. Achieving the levels of population size and distribution proposed in this outline shall not prompt an “automatic” change in the status of the species in Illinois, and the Endangered Species Protection Board may review the status or status review criteria of the species at any time. Other factors, including known threats, productivity, and extent and condition of protected habitat, should be considered with population size and distribution data to judge whether a change in status is warranted.

Definitions of “endangered” and “threatened” under the Illinois Endangered Species Protection Act.

Endangered in Illinois – in danger of extinction in the wild in Illinois due to one or more causes including but not limited to, the destruction, diminution or disturbance of habitat, overexploitation, predation, pollution, disease, or other natural or manmade factors affecting its prospects of survival.

Threatened in Illinois – likely to become endangered in the wild in Illinois within the foreseeable future.

Listing Status Review Triggers

Endangered – Over the last 5-years, the Natural Heritage (Biotics 4) Database has element occurrence reports for the species that fall below the levels identified in the “Threatened” Listing Status Review Trigger.

Threatened – Over the last 5 years, the Natural Heritage (Biotics 4) Database has element occurrence reports for the species of at least 5 EOs with observations that demonstrate natural recruitment across 2 counties and within 2 Natural Division Sections known for historic distribution and at least 3 of the 5 EOs should have observations in more than one year during the last 10 years. At least 3 EOs must be protected. For EOs that have undergone population manipulation, they must have been liberated from population interventions for at least 3 years and meet the above criteria.

Secure – Remove from the IL List – Over the last 5 years, the Natural Heritage (Biotics 4) Database has element occurrence reports for the species of at least 12 EOs with observations that demonstrate natural recruitment across 3 counties and within 4 Natural Division Sections known for historic distribution and at least 5 of the 12 EOs should have observations in more than one year during the last 10 years. At least 7 EOs must be protected. For EOs that have undergone population manipulation, they must have been liberated from population interventions for at least 3 years and meet the above criteria.

Recommended Recovery Strategies

Recommended recovery strategies include a combination of monitoring, management, and protection for known populations and a prescription for testing a translocation program for the species to establish new populations. Translocations will be compliant with the INPC/IESPB/IDNR Plant Translocation and Restoration Policy (current version) and will be conducted according to site-specific prescriptions that will include a schedule of review to evaluate the success or failure of individual translocations, the need for prescription adjustments, and whether they should be continued. Translocations will need to be successful and liberated from population manipulation as described above in the Listing Status Review Triggers before they will be considered “wild” occurrences in the statewide population.

Recovery Strategy 1: Assess current status and distribution

- a. Conduct surveys at 1/5 of known EOs annually to confirm presence/absence and population numbers of all EOs, within each 5-year cycle. Surveys should cover information necessary to complete an Element Occurrence Reporting form and include the following specific information: the total number of individuals at a location (indicate count or estimate); the number or percent of individuals from younger age classes that demonstrate natural recruitment (indicate count or estimate); the area surveyed and what % of proximate suitable habitat the survey area represents (include a map); and, search effort (person hours).
- b. Conduct surveys at two historic locales with no EOs to confirm presence/absence and population numbers (if present), within a 5-year period.
- c. Survey for additional suitable habitat and new occurrences in counties/Natural Division Sections known for historic and current populations where EOs have been established.
- d. Report results annually to the Illinois Natural Heritage (Biotics 4) Database.
- e. At the end of the initial 5-year period, assess whether additional surveys are warranted for areas identified in (b) and (c) or if these locales should be considered low priority areas in allocating future resources.

Recovery Strategy 2: Promote management and protection of known populations.

- a. Work with landowners to gain commitment for developing management plans to promote compatible land uses and minimize threats for properties with extant populations.
- b. Work with landowners to promote enrollment of properties with extant populations into land protection programs such as dedication as an Illinois Nature Preserve, registration as an Illinois Land and Water Reserve, or a similar conservation easement program.

Recovery Strategy 3: Assess need and potential for augmenting existing populations and/or establishing reintroduced/introduced populations within appropriate habitat.

- a. Review status and distribution against Listing Status Review Triggers to determine if augmenting existing populations and/or reestablishing/establishing new populations is necessary.
- b. Determine whether local ecotype stock is available for collection of seed and either direct dispersal to receiving sites or for propagation and later planting of propagules to receiving sites. If local ecotype stock is not available, conduct genetic analysis of proposed translocation stock to determine genetic health and compatibility. If propagation of stock is prescribed, methods with demonstrated success should be used – at this time, methods should follow those used for propagation and planting of *Silene regia* by Edgin (Edgin 2012).
- c. Perform an assessment of potential translocation areas based on results from Recovery Strategy 1 and relative to Recovery Strategy 3a and assess for potential impacts to other listed species in the proposed receiving sites.

- d. Relative to determinations about origin of proposed translocation stock from 3b, and consistent with the INPC/IESPB/IDNR Plant Translocation and Restoration Policy, conduct translocations at sites that have formal protection agreements in place.
- e. Translocated occurrences will be monitored annually for at least the first 3 years. Results of the first 3 years monitoring will be reviewed to determine survivorship at the receiving site and success of translocation methods and whether translocation efforts should be continued, ceased, or otherwise adjusted.
- f. Report results annually to the Illinois Natural Heritage (Biotics 4) Database.

Recovery Outline Review & Revision

This outline will be reviewed annually by the authors and staff involved with implementation. The need for revisions may be identified at any time. All substantive revisions to this outline, including but not limited to recovery objectives and recovery strategies, should be considered a new recovery plan and follow the protocol described in “The Illinois Department of Natural Resources’ Recovery Planning in the Office of Resource Conservation” (current version). As such, recovery planning may be initiated by any staff and follows an established process to ensure proper review and potential conflicts are identified. Updated information – such as new data on distribution and abundance, research results relevant to recovery considerations, changes in taxonomy or nomenclature, and corrections to factual errors in this document – may be posted as addendums to the recovery outline without changing the original document.

Estimated Timing of Strategies

Implementation is expected to take 10 or more years: Strategies will be somewhat implemented in phases and results from the first 5-year interval will greatly inform the overall estimate. Many activities such as landowner contacts, site-specific habitat management plan development, contract administration, etc., will be ongoing throughout the year. A basic schedule of some key implementation activities is presented below.

January	Conduct annual review of recovery outline strategies to confirm priority activities for calendar year. Recovery activities of INPC and IDNR staff are included in respective annual plan of work processes.
February	
March	Confirm information and resources are in place to conduct annual field work.
April	Primary window for spring plantings for translocations.
May	
June	Primary window for surveys of element occurrence and potential habitat (flowering is in July-October). If fall plantings are prescribed for translocations, September/October is the target window.
July	
August	
September	
October	Ensure element occurrence survey reports have been submitted to the Biotics 4 Database. Compile information on annual surveys, translocation activities, and habitat protection.
November	
December	Complete and post biennial progress reports on <i>Polygonum arifolium</i> recovery.

Estimated Costs of Strategies

Estimated total cost for establishing 300 plants on 7 protected sites (what is currently estimated as necessary to achieve the population threshold for the Listing Status Review Trigger for “Secure – Remove from the IL List”) is between \$7,000 and \$10,500 plus labor for transplanting. The estimate for staff time for monitoring, habitat searches, and reporting is approximately 0.75 day/occurrence.

References:

520 ILCS 10/ Illinois Endangered Species Protection Act (1972 et seq.).

Edgin, R. 2012. Recovery of *Silene regia* Sims (Royal Catchfly) in the Prairie Ridge Conservation Opportunity Area – Report 2010-2012. Unpublished report. Illinois Nature Preserves Commission. Springfield, Illinois. 26 pp.

Gleason and Cronquist. 1963. Manual of the Vascular Plants of Northeastern United States and Adjacent Canada. Van Nostrand, Princeton NJ. 910 pp.

Herkert, J.R, and J.E. Ebinger, editors. 2002. Endangered and Threatened Species of Illinois: Status and Distribution, Volume 1 – Plants. Illinois Endangered Species Protection Board, Springfield, Illinois. 161 pp.

Homoya, M. A. 1983. A floristic survey of acid seep springs in Martin and Dubois Counties, Indiana. Proceedings of the Indiana Academy of Science 93: 323-331.

ILL. ADM. CODE. Conservation § 1050: Illinois List of Endangered and Threatened Flora (1980 et seq.).

Illinois Natural Heritage Biotics 4 Database (INHD). 2013. Illinois Natural Heritage Biotics 4 Database, Illinois Department of Natural Resources, Springfield, Illinois. (Accessed January, 2013).

Illinois Nature Preserves Commission (INPC), Illinois Endangered Species Protection Board (IESPB), and Illinois Department of Natural Resources (IDNR). 1992. Illinois Plant Translocation and Restoration Policy. INPC, IESPB, IDNR, Springfield, Illinois. 8 pp.

Leck, M. A. and R. L. Simpson. 1994. Tidal freshwater wetland zonation: seed and seedling dynamics. Aquatic Botany 47: 61-75.

Leck, M.A., A.H. Baldwin, V. T. Parker, L. Schile and D.F. Whigham. 2009. Plant communities of tidal freshwater wetlands of the continental USA and Canada (Chapter 5) *In*: Barendregt, A., D. Whigham and A. Baldwin, (eds), Tidal Freshwater Wetlands. Backhuys Publishers.

Mankowski, A. 2012. The Illinois Endangered Species Protection Act at Forty: a Review of the Act's Provisions and the Illinois List of Endangered and Threatened Species. Illinois Endangered Species Protection Board, Springfield, Illinois. 152 pp. Published online at <http://www.dnr.illinois.gov/ESPB/Pages/default.aspx>.

Mohlenbrock, R.H. 2002. Vascular Flora of Illinois. Southern Illinois University Press, Carbondale. 490 pp.

NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life (web application). Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed June 8, 2013).

Schwegman, J.E. 1973. Comprehensive Plan for the Illinois Nature Preserves System, Part 2. The Natural Divisions of Illinois. Illinois Nature Preserves Commission, Rockford. 32pp.

Silberhorn, G. 1992. Technical Report Wetland Flora – Halbred-leaved tearthumb. Wetlands Program School of Marine Science, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia. Available at: http://ccrm.vims.edu/publications/wetlands_technical_reports/92-3-tearthumb.pdf

Britton, N.L. and A. Brown. 1913. An Illustrated Flora of the Northern United States, Canada and the British Possessions: From Newfoundland to the Parallel of the Southern Boundary of Virginia, and from the Atlantic Ocean Westward to the 102d Meridian, Volume 1. Charles Scribner's Sons, New York.