Final Recovery Planning Outline with Listing Status Review Triggers for the Illinois Endangered Tube Beard Tongue (*Penstemon tubaeflorus*)

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

Common Name: Tube Beardtongue
Scientific Name: Penstemon tubaeflorus
Alternate: Penstemon tubiflorus (Nutt.) *NatureServe*
Family: Scrophulariaceae
Synonyms: Tube Beardstongue, Beardtongue, Whitewand Beardtongue

Status

Tube beardtongue (*Penstemon tubaeflorus*) is endangered in Illinois (17 Ill. Adm. Code 1050). It was first listed in 2004 as an endangered species that was formerly widespread, but nearly extirpated from Illinois due to habitat destruction, collecting, or other development pressures (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 ranked as N5? (secure?) at a national scale. It is not ranked in Illinois. Other state rankings include an S1 rank (critically imperiled) for the species in Nebraska, Iowa, Indiana, and Tennessee; possibly extirpated (SH) in Ohio; apparently secure (S4) in Kentucky; and is not ranked or considered an exotic in the remaining states with distribution (NatureServe 2013; Figure 1).

Total Range

Tube beardtongue ranges from Nebraska to Texas, east to Mississippi, Tennessee, Indiana, and Wisconsin, and is considered introduced from Maine to Pennsylvania (Figure 1).

Illinois Distribution

In Illinois, the species is historically known from locations across the state (Nyboer et al. 2004). There are historic museum and/or the Illinois Natural Heritage (Biotics 4) Database (Database) element occurrence records (EOs) from 20 counties (EOs have been established from 7 of the 20 counties) and up to 12 Natural Division Sections (EOs have been established in 5 of the 13 Sections) (Nyboer et al. 2004, INHD 2013; Tables 1 and 2, Figure 2).

Currently, there are a total of 10 EOs (across 7 counties) in the Database for *P. tubaeflorus*. At the time of initial listing, location information was brought forth to establish 8 EOs (across 6 counties and within 4 Natural Division Sections) and since then 2 EOs have been added (across 2 counties, 1 of which was new, and 1 additional Natural Division Section). Not every EO is surveyed each year or regularly (4 EOs have no reports since at least 2002), 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 6 EOs across 4 counties; representing 4 of the 20 counties and 3 of the 12 Natural Division Sections with known historic distribution. Three EOs occur on properties that are 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).

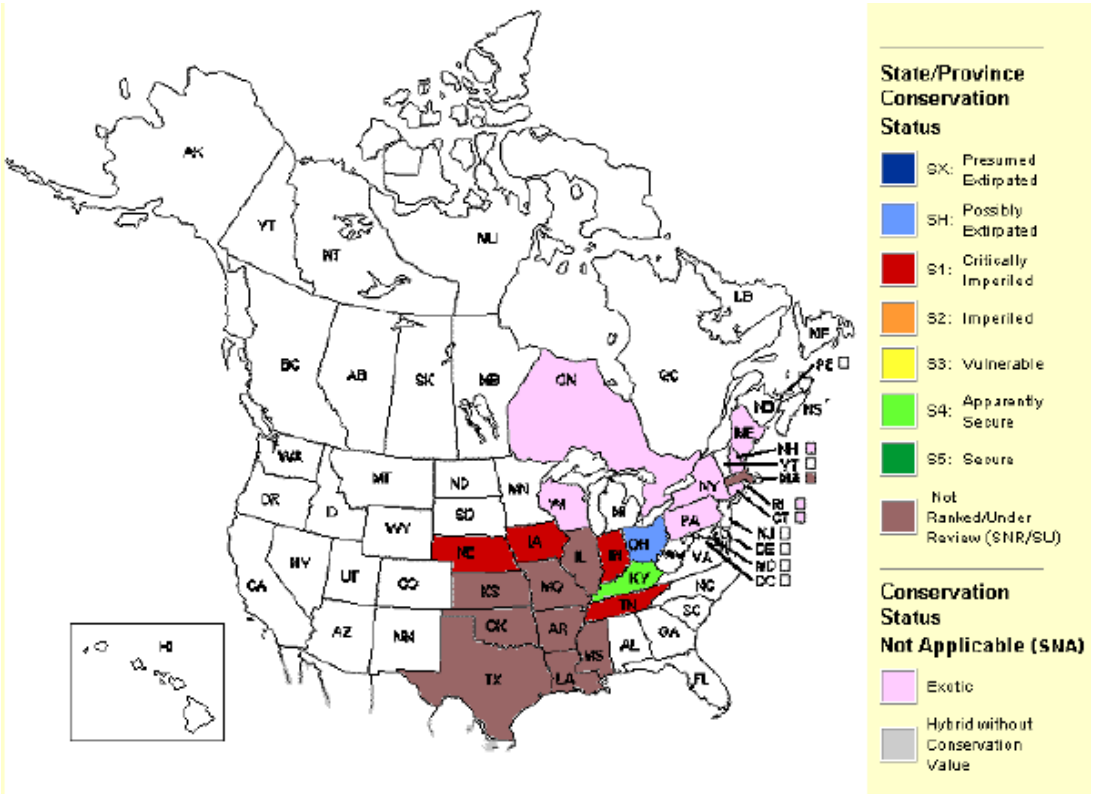

Figure 1. Distribution and NatureServe status of *Penstemon tubaeflorus*, by state and province (NatureServe 2013).

Table 1. Illinois county distribution of *Penstemon tubaeflorus*

	Historic (with no EO)	EO with historic obs	EO w/ recent (since 2002) obs
Alexander		x	x
Bureau	x		
Cumberland		x	
DuPage		x	x
Effingham	x		
Fayette			x
Jackson	x		
Jasper		x	x
Johnson	x		
Kankakee	x		
Lawrence		x	
Logan	x		
Madison	x		
Peoria	x		
Pope	x		
Randolph	x		
Richland	x		
St. Clair	x		
Saline	x		
Shelby		x	
Union	x		
Wabash	x		

Table 2. Illinois Natural Division and Section distribution of *Penstemon tubaeflorus*

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		2	3
	Lake Michigan Dunes			
	Chicago Lake Plain			
	Winnebago Drift			
Grand Prairie	Grand Prairie	?		
	Springfield	?		
	Western			
	Green River Lowland			
	Kankakee Sand Area	?		
Upper Mississippi River and Illinois River Bottomlands	Illinois River	?		
	Mississippi River			
Western Forest-Prairie	Galesburg			
	Carlinville			
Middle Mississippi Border	Glaciated			
	Driftless			
Southern Till Plain	Effingham Plain		4	2
	Mt. Vernon Hill Country			
Wabash Border	Bottomlands		1	
	Southern Uplands			
	Vermilion River			
Ozark Division	Northern	?		
	Central			
	Southern		1	
Lower Mississippi River Bottomlands	Northern	?		
	Southern			
Shawnee Hills	Greater Shawnee Hills	?		
	Lesser Shawnee Hills	?		
Coastal Plain	Cretaceous Hills			
	Bottomlands			1

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.

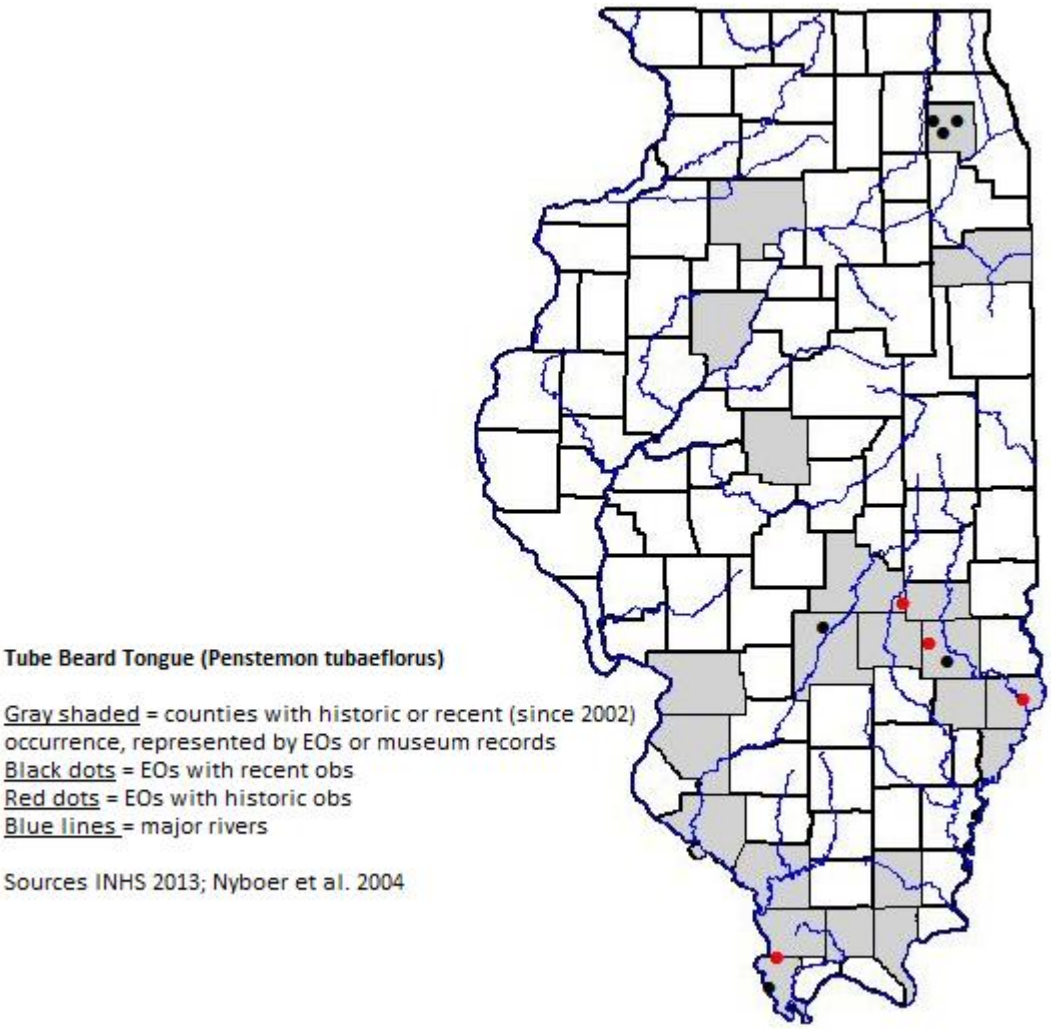

Figure 2. Historic and current distribution of *Penstemon tubaeflorus* in Illinois.

Table 3. Select Illinois Natural Heritage (Biotics 4) Database information for *Penstemon tubaeflorus*: 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
05/21/2012	10	6	3	10	7	4

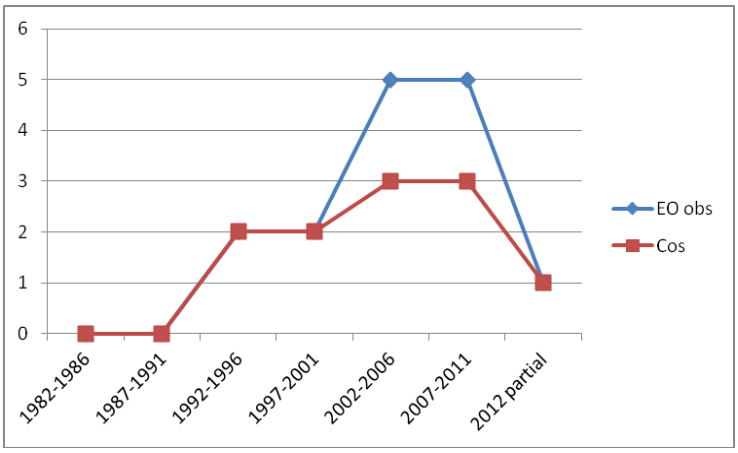

Figure 3. The number of *Penstemon tubaeflorus* EOs in Illinois with observation during respective 5-year intervals and for 2012 (partial).

Description, Biology, and Habitat

Description

Tube beardtongue is a smooth stemmed perennial herb with stems up to one meter tall (Nyboer and Ebinger 2004). Stems are erect, simple, herbaceous, glabrous and develop from a thick caudex. Leaves are opposite, sessile, to partially clasping, entire or with few shallow teeth, glabrous, typically ovate below and lanceolate to oblong above, to 13cm long, +/-3cm broad and acute to obtuse at the apex (Mohlenbrock 1985, Gleason and Croinquist 1963). Most leaves are on the lower half of the stem, those by the inflorescence are much reduced and may resemble bracts. The inflorescence is a long terminal thryse (indeterminate panicle) to -40cm long (tall). Flowers occur in +/-6 whorled clusters each with +/-6 flowers. Each cluster is erect, remaining mostly parallel to axis of panicle subtended by pair of foliaceous bracts. Peduncles and pedicels are up to 1cm long with gland tipped pubescence which is typically not dense. The corolla is pure white, weakly funnelform with the tube staying fairly narrow, 2cm long, -2cm broad at apex, glandular pubescent internally and externally, radially symmetrical and 5-lobed. Corolla lobes are obtuse to rounded. Stamens are 4 in number, adnate to and included within the lower half of corolla tube. Filaments are up to to 1.5cm long, white, glabrous. Anthers are blackish, 1.7mm long. Staminodes have sparse glandular pubescence with compressed yellow-brown pubescence. The style is 1cm long, glabrous, white. Ovary is glabrous, green, 3mm long, 2mm in diameter, 2-locular. Sepals are five, 5mm long, 2.2mm broad, glandular pubescent externally, glabrous internally, lance-ovate, acute to acuminate, with slightly scarious margins. Capsules to 1cm long, many seeded. Flowering is from May-June in Illinois (Mohlenbrock 2002).

Species Biology

The nectar and pollen of tube beardtongue flowers attract long-tongued bees primarily bumblebees (Bombus spp.), miner bees (*Anthophora abrupta, A. ursina*), a mason bee (*Osmia distincta*), and a wasp (*Pseudomasaris occidentalis*) (Clinebell and Bernhardt 1998). The last two insects are oligoleges of *Penstemon* species with larvae consuming the pollen but not pollinating the flowers. Other floral visitors include green metallic bees that collect pollen and *Pterourus troilus* (spicebush swallowtail butterfly) and the ruby-throated hummingbird that consume nectar. Moth caterpillars that feed on *Penstemons* include *Elaphria chalcedonia* (chalcedony midget), *Oncocnemis saudersiana* (Saunder's Oncocnemis), and *Pyrrhia exprimens* (purple-lined sallow) (Hilty 2010). Mammalian herbivores apparently make little use of the foliage as a food source. Natural reproduction is from seed. If plants are needed to augment existing populations or establish new populations, plants may also be grown from seed and/or herbaceous stem cuttings or root cuttings. Seed should be collected when the capsules are brown and dried. Seed may be direct sown outdoors in fall, winter sown in vented containers, coldframe or unheated greenhouse, or in a heated greenhouse. If sowing indoors, sow under thin cover for eight weeks @ 40ºF (4ºC). Exposure to smoke enhances germination.

Habitat

Tube Beard Tongue is a species of rich prairies and moist, open woods in Illinois (Nyboer and Ebinger 2004).

Reasons for Decline and Threats

Tube beardtongue historically occurred in 20 counties across the majority of the state, occupying habitats (rich prairie and moist, open woods) that have been subject to considerable conversion. Threats include conversion and/or degradation of habitat, woody encroachment, collecting, or other development pressures. It should be communicated to local land managers that habitat should be protected from conversion to other uses and managed to control woody encroachment where *P. tubaeflorus* occurs.

Low population numbers is also a threat to *Penstemon tubaeflorus* in Illinois. There are 10 EOs for this species, however 4 EOs have not had observations since at least 1997. Most recent observation reports at the remaining 6 EOs were "plant collected", 484 plants, 1,218 stems in 7 locations, >500 plants in 3 locations, 5 plants, and 68 flowering plants.

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 8 EOs with observations that demonstrate natural recruitment across 6 counties and within 4 Natural Division Sections known for historic distribution and at least 4 of the 8 EOs should have observations in more than one year during the last 10 years. At least 4 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 15 EOs with observations that demonstrate natural recruitment across 12 counties and within 7 Natural Division Sections known for historic distribution and at least 7 of the 15 EOs should have observations in more than one year during the last 10 years. At least 8 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 three 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 may 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 February	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.
March	Confirm information and resources are in place to conduct annual field work.
April May June July August September	Primary window for spring plantings for translocations (April-May). Primary window for surveys of element occurrence and potential habitat (flowering is in May-June). If fall plantings are prescribed for translocations, September/October is the target window.
October November	Ensure element occurrence survey reports have been submitted to the Biotics 4 Database. Compile information on annual surveys, translocation activities, and habitat protection.
December	Complete and post biennial progress reports on *Penstemon tubaeflorus* recovery.

Estimated Costs of Actions

Estimated total cost for establishing 300 plants on 8 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 $5,000 and $7,500 plus labor for transplanting. The estimate for staff time for monitoring, habitat searches, and reporting is approximately 0.75 day/occurrence.

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