

Vegetation Management Recommendations for Big Spring, Dallas, Texas

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Concept

The following report provides vegetation management and restoration plan recommendations for Big Spring's Historic and Environmental Conservation Easement, Dallas, Texas. The recommendations were developed by the University of North Texas (UNT) with technical advice from the U.S. Army Engineer Research and Development Center Environmental Lab's Lewisville Aquatic Ecosystem Research Facility (LAERF). Additionally, well-taken suggestions were implemented from naturalist stakeholders. The vegetation management plan is based upon an adaptive management approach through minimizing disturbances, invasive species removal, native species installation, and conservation management. The long-term goal is to both protect the area from disturbances and promote a diversity of habitat types to support a sustainable, healthy, and preserved ecosystem. Vegetation management was initiated in July 2014 (late summer mowing of adjacent grasslands) based upon early recommendations by UNT, with additional management and restorative measures to begin in late 2014 / early 2015. Although this general vegetation management plan, specific to the aforementioned area, may be applied broadly to other adjacent bottomlands in Dallas' Great Trinity Forest, those decisions should be made carefully on a case by case basis by knowledgeable personnel. The areas designated for vegetation management and restoration documented throughout this report are explicit to Big Spring's Historic and Environmental Conservation Easement.

Background

In 2013, after acquisition of properties within the Great Trinity Forest, the City of Dallas (COD) requested that the University of North Texas (UNT) develop, implement, and supervise a vegetation management plan for one of the only natural springs remaining in the urban footprint and located within acquired areas, Big Spring. The ecological and archeological or anthropological context of Big Spring and its surrounding areas is far-reaching, dating back 1,200 years to Native American inhabitants and to the eventual first European settlers of Dallas, thus highlighting the need for COD, with assistance from managers and conservationists, to preserve this unique ecosystem and historical site. Although several areas necessitate conservation management plans in the bottomland hardwoods of the Great Trinity Forest, this

scope of work and vegetation management plan focuses on the area encompassed by Big Spring's Historic and Environmental Conservation Easement (15.42 acres).

Stakeholders associated with the preservation of Big Spring include the Flora and Fauna (or Naturalist) Committee, represented by members of the Texas Master Naturalists, Texas Stream Team, Texas Parks and Wildlife, the Connemara Conservancy, and the Pemberton family, among others. In addition to interest in preservation and restoration of Big Spring, these groups possess preliminary baseline biotic and abiotic data valuable to decision-making on management approaches best suited for the site.

While the preservation plan for this distinctive ecosystem is extensive, the primary objective of UNT's participation is the ecological management and conservation of Big Spring's vegetation communities and associated biota. Many factors, especially in an urban setting, can detrimentally influence high-quality biodiversity, such as invasive species, erosion, sedimentation, eutrophication, development, human interactions, flooding, and vegetation control. All of these are central to Big Spring's ecosystem management plan.

To begin formulating a vegetation management plan for Big Spring, in 2014 UNT and technical advisors assessed available baseline biotic and abiotic data, conducted biological surveys (vegetation community structure, invertebrates, and fish) of the project area, as well as gathered and examined stakeholder opinions of applicable factors that could affect preservation and restoration of Big Spring. In addition, several meetings and discussions were held with stakeholders and COD personal to develop plan details.

Approach

The general approach to Big Spring's vegetation management recommendation specifics is one that is adaptive. This means that the timing of maintenance cycles, invasive species concerns, and restoration or plant establishment species selection may change through time as plant community structure changes / progresses, with the documentation of restoration results, disturbances and various human interactions, and other factors that may affect management outcomes. This concept is vital to the understanding and potential success of the plan as well as the eventual sustainable conservation of Big Spring.

To reach the long-term objective of promoting a diversity of habitat types to support a sustainable, healthy, and preserved Big Spring ecosystem, a set of specific management strategies must be accomplished in the short-term (2014 - plan development and implementation, 2015 - continued implementation, and 2016 and beyond – monitoring and management response). The remainder of this report highlights these specific strategies, supported through surveys and interviews, of Big Spring's vegetation management plan recommendations in order of priority and schedule, to maximize vegetative and associated biodiversity.

Vegetation Management

1. *Access (to prevent detriments to ecosystem)*

A. Human interaction

All access is to be cleared with trained personnel of COD.

No vehicular access, unless to assist in ecosystem management goals (mowing / hydrology or culvert removal).

No vegetation management / mowing / trail-mowing / disturbances by unauthorized personnel.

No hydrological or faunal management by unauthorized personnel. This includes any prohibiting of natural hydrologic features to develop post Trinity River overbanking events and potential development of beaver dams / lodges.

Partial or limited foot-access in small groups, primarily for educational purposes.

No direct access to water, other than research personnel to continue ongoing research such as vegetation categorizing, biotic surveys, and water testing.

No equestrian trails or access.

Small 3 ft wide, marked walking access trail terminating on one side of spring, outside of buffer zone.

B. Signage / fencing

No immediate signage or fencing (although considered for future addition) until vegetation management has been completed or a factor necessitates them, such as unauthorized access.

2. *Hydrology*

A. Flow / pooling

Promote natural processes to restore hydrology to a more natural setting. Allow flood events from the overbanking of the Trinity River to restore spring to historic flow and permit beaver dams (if constructed) to remain in place to aid in habitat type development.

Maintain / manage nuisance vegetation that can significantly alter hydrology.

No spring or stream dredging.

B. Culverts

Consider removal of all concrete and PVC culverts to aid in hydrological restoration. These will be made on a case by case basis by UNT and COD after careful consideration in 2015, with additional input from stakeholders. The greatest impact of this removal would likely include loss of pools formed by culvert dams currently in place within the stream, of which ongoing research is being conducted.

3. Nuisance or invasive species (management and control)

**Table 1 includes, but is not limited or boundless to, invasive species to be addressed.*

A. Aquatic

Hand-removal of invasive aquatic vegetation, such as watercress, should be conducted within the spring and stream.

B. Herbaceous

Selective management of invasive grass, forb, and vine species (not controlled by periodic mowing) should be made by hand or in combination with EPA-registered aquatic herbicides, if deemed necessary (e.g., hand removal of nodding thistle and bastard cabbage).

C. Woody

Selective management of invasive woody and other vegetation should be made by hand or in combination with EPA- registered aquatic herbicides.

D. Fauna

Prevent disturbances to site by large animals. COD should strongly consider a feral hog trapping program if disturbances are observed. Alternatively, or in conjunction, fencing can be installed around the immediate area of the spring and creek to limit access by large fauna, although not preferred.

E. Mowing

Mowing requirements, necessity, and demarcations should be assessed annually by COD with technical advice from UNT and LAERF.

To be used only as a physical technique to remove or reduce the occurrence of nuisance or invasive vegetation, increase habitat diversity, or create small access paths for researchers and educational purposes. Not to be used as a tool to promote superficial aesthetic value, convenience of access, or recreate previous landowners land use types.

Aquatic and native woody vegetation areas are to be avoided and buffered (by a minimum of 100 ft and increasing annually) as to encourage succession, natural recruitment, and eventual restoration to the area's historic and native land type as a transition from prairie / post oak uplands to bottomland hardwood forest.

If mowing is thought to be required, timing and height is to-be-determined by target species' life history and phenology, typically (not always) late summer / early fall at 8 - 10" height. July 2014 mowing strategy is highlighted in figure 1.

A professional ecologist, botanist, vegetation restoration biologist, or conservation manager is recommended to be onsite during such mowing event (UNT or LAERF are sources).

Table 1. Nuisance or invasive aquatic, herbaceous, and woody plant species and candidates for management and control at Big Spring, Dallas, TX.

Scientific name	Common name
Ambrosia trifida	Giant ragweed
Bromus japonicus	Japanese brome
Carduus nutans	Nodding thistle
Convolvulus arvensis	Bindweed
Cynodon dactylon	Bermuda grass
Ligustrum sinense	Chinese privet
Lolium perenne ssp. multiflorum	Italian ryegrass
Lonicera japonica	Japanese honeysuckle
Melia azadarach	China berry
Nasturtium officinale	Watercress
Rapistrum rugosum	Bastard cabbage
Sorghum halepense	Johnsongrass
Torillia arvensis	Hedge parsley
Triadica sebifera	Chinese tallow
Typha sp.	Cattails
Vitex agnus-castus	Chaste tree

4. Native species (succession supplementation, establishment, and restoration)

**Table 2 includes, but is not limited or boundless to, native plant candidates to be supplemented or restored during management.*

A. Aquatic

Add suitable obligate and facultative native wetland plants to the spring and stream in order to increase biodiversity.

B. Herbaceous

Supplement grass dominated areas with additional species of native grasses, herbs, forbs, and wildflowers suitable for management strategies planned for those areas.

C. Woody

Supplement natural recruitment and succession with native riparian and bottomland, understory and overstory vegetation to ensure increased habitat types and resulting biodiversity.

D. Erosion Control

Implement erosion control measures through native vegetative soft armoring.

Table 2. Aquatic, herbaceous, and woody plant species native to North Texas and candidates for vegetation community establishment, succession supplements, restoration, or erosion control at Big Spring, Dallas, TX.

Scientific name	Common name
Aquatic	
<i>Acmella oppositifolia</i>	Oppositeleaf spottflower
<i>Bacopa monnieri</i>	Water hyssop
<i>Carex cherokeensis</i>	Cherokee sedge
<i>Carex emoryi</i>	Emory's sedge
<i>Echinodorus berteroi</i>	Tall burhead
<i>Eleocharis acicularis</i>	Slender spikerush
<i>Eleocharis macrostachya</i>	Flatstem spikerush
<i>Eleocharis quadrangulata</i>	Squarestem spikerush
<i>Equisetum hyemale</i>	American scouring-rush
<i>Potamogeton nodosus</i>	American pondweed
<i>Sagittaria latifolia</i>	Arrowhead
<i>Sagittaria platyphylla</i>	Delta arrowhead
<i>Schoenoplectus pungens</i>	Common threesquare bulrush
Herbaceous	
<i>Amsonia tabernaemontana</i>	Eastern bluestar
<i>Andropogon gerardii</i>	Big bluestem
<i>Andropogon glomeratus</i>	Bushy bluestem
<i>Bouteloua curtipendula</i>	Side-oats grama
<i>Bouteloua gracilis</i>	Blue grama
<i>Chasmanthium latifolium</i>	Inland sea oats
<i>Helianthus grosseserratus</i>	Sawtooth sunflower
<i>Helianthus maximiliani</i>	Maximilian sunflower
<i>Panicum virgatum</i>	Switchgrass
<i>Passiflora incarnata</i>	Passion flower
<i>Phyla lanceolata</i>	Lanceleaf frogfruit
<i>Phyla nodiflora</i>	Texas frogfruit
<i>Salvia coccinea</i>	Scarlet sage
<i>Schizachyrium scoparium</i>	Little bluestem
<i>Sorghastrum nutans</i>	Indiangrass
<i>Tridens albescens</i>	White tridens
<i>Tripsacum dactyloides</i>	Eastern gamagrass
Woody	
<i>Ampelopsis arborea</i>	Peppervine
<i>Ampelopsis cordata</i>	Heartleaf peppervine
<i>Callicarpa americana</i>	American beautyberry
<i>Campsis radicans</i>	Trumpet creeper
<i>Carya illinoensis</i>	Pecan
<i>Celtis laevigata</i>	Sugarberry

<i>Cercis canadensis</i>	Eastern redbud
<i>Cornus drummondii</i>	Roughleaf dogwood
<i>Crataegus spathulata</i>	Hawthorn
<i>Diospyros virginiana</i>	Common persimmon
<i>Juglans nigra</i>	Black walnut
<i>Lonicera sempervirens</i>	Coral honeysuckle
<i>Morus rubra</i>	Red Mulberry
<i>Prunus angustifolia</i>	Chickasaw plum
<i>Prunus mexicana</i>	Mexican plum
<i>Prunus rivularis</i>	River plum
<i>Quercus macrocarpa</i>	Bur oak
<i>Quercus muehlenbergii</i>	Chinquapin oak
<i>Quercus shumardii</i>	Shumard oak
<i>Quercus stellata</i>	Post oak
<i>Rhus lanceolata</i>	Flameleaf sumac
<i>Sambucus nigra</i>	Elderberry
<i>Sapindus saponaria</i>	Western soapberry
<i>Sophora affinis</i>	Eve's necklace
<i>Symphoricarpos orbiculatus</i>	Coral berry
<i>Viburnum rufidulum</i>	Rusty blackhaw
<i>Vitis mustangensis</i>	Mustang grape

5. Other considerations

Management of archaeological site within Big Spring's Historic & Environmental Conservation Easement or 41DL72 (as recommended by stakeholders) should be maintained by COD by clearing of silo, fencing, debris, limbs, logs, and other materials for its preservation. A trained archeologist should be consulted prior to removal of any in-ground materials.

Water testing is to be continued by Texas Stream Team and other responsible parties for research / monitoring purposes.

6. Monitoring management response

Monitoring is critical in determining whether management actions are achieving preservation goals, and is necessary to formulate adaptive management strategies that may be required to meet those goals. UNT will conduct and supervise monitoring of the biological and physical attributes of the spring footprint before, during, and following all management actions (2014 - 2015); COD will be responsible for monitoring thereafter. Information from monitoring through 2015 will be provided periodically to COD and other stakeholders for their review, with changes in management strategies made as needed to ensure the conservation and ecosystem sustainability of Big Spring.

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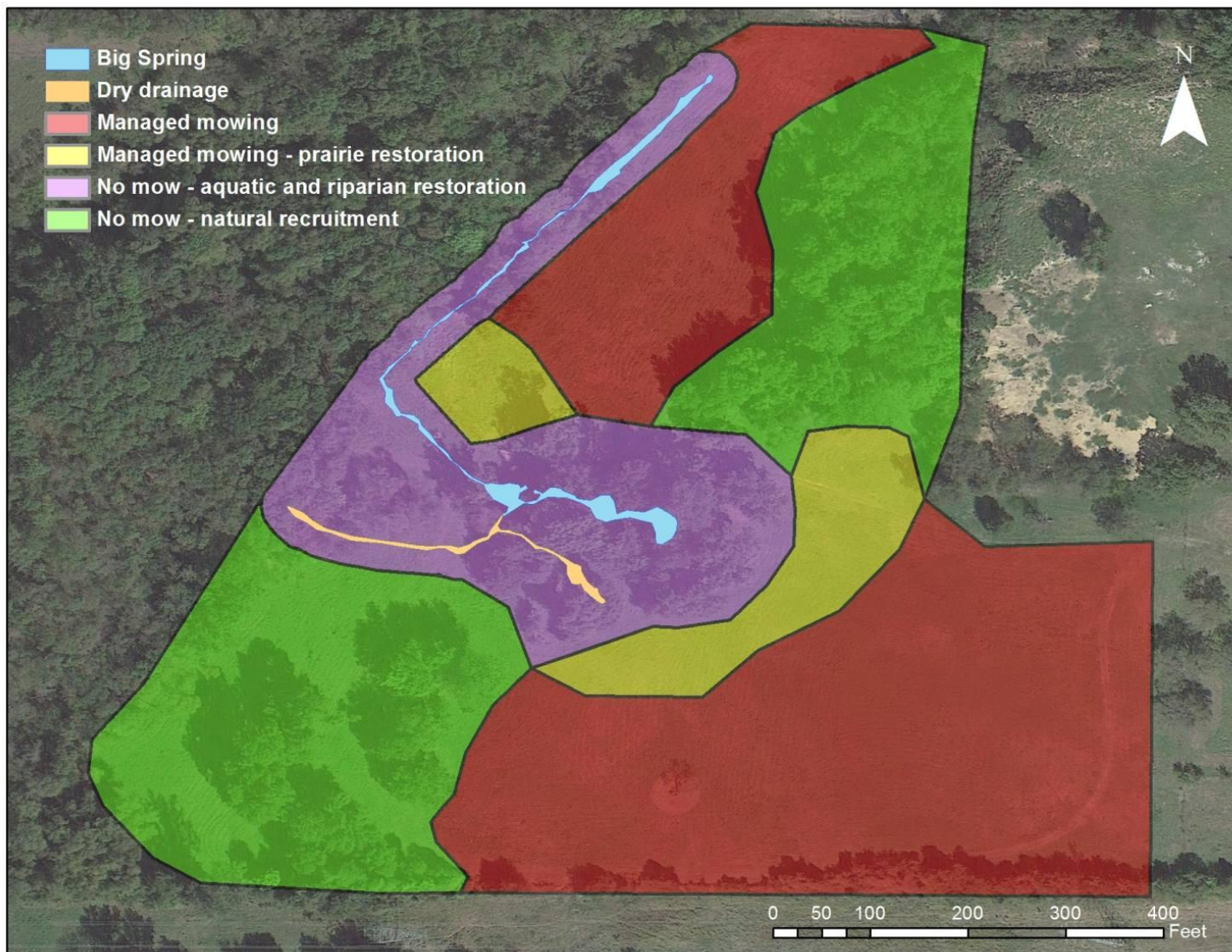


Figure 1. Example of late July 2014's mowing / vegetation management strategy ("no mow - aquatic and riparian restoration, natural recruitment" and "managed mowing") within Big Spring's Historic & Environmental Conservation Easement.