



# Conservation Gap Analysis of Native U.S. Oaks

## Species profile: *Quercus similis*

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### SPECIES OF CONSERVATION CONCERN

#### CALIFORNIA

Channel Island endemics:  
*Quercus pacifica*, *Quercus tomentella*

Southern region:  
*Quercus cedrosensis*, *Quercus dumosa*,  
*Quercus engelmannii*

Northern region and /  
or broad distribution:  
*Quercus lobata*, *Quercus parvula*,  
*Quercus sadleriana*

#### SOUTHWESTERN U.S.

Texas limited-range endemics  
*Quercus carmenensis*,  
*Quercus graciliformis*, *Quercus hinckleyi*,  
*Quercus robusta*, *Quercus tardifolia*

Concentrated in Arizona:  
*Quercus ajoensis*, *Quercus palmeri*,  
*Quercus toumeyii*

Broad distribution:  
*Quercus havardii*, *Quercus laceyi*

#### SOUTHEASTERN U.S.

State endemics:  
*Quercus acerifolia*, *Quercus boyntonii*

Concentrated in Florida:  
*Quercus chapmanii*, *Quercus inopina*,  
*Quercus pumila*

Broad distribution:  
*Quercus arkansana*, *Quercus austrina*,  
*Quercus georgiana*,  
*Quercus oglethorpensis*, ***Quercus similis***



# Quercus similis Ashe

**Synonyms:** *Quercus ashei* Sterrett, *Q. mississippiensis* Ashe, *Q. margarettae* var. *paludosa* (Sarg.) Ashe, *Q. stellata* var. *Attenuata* Sarg., *Q. stellata* var. *mississippiensis* (Ashe) Little, *Q. stellata* subsp. *paludosa* (Sarg.) A.E.Murray, *Q. stellata* var. *paludosa* Sarg., *Q. stellata* var. *similis* (Ashe) Sudw. **Common Names:** Swamp post oak, Delta post oak

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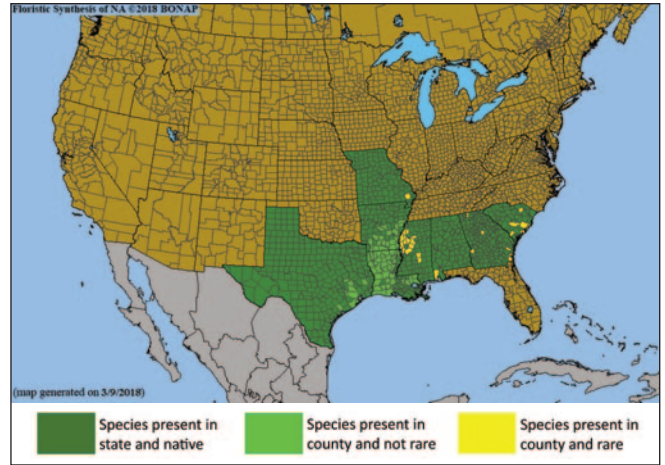
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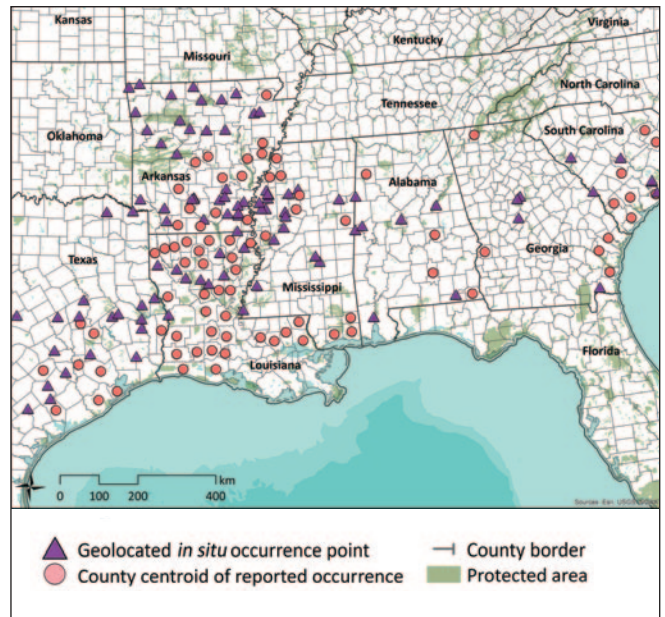


## DISTRIBUTION AND ECOLOGY

*Quercus similis*, also known as Swamp post oak, occurs in the southeastern U.S. from South Carolina west to Texas. It is thought to have a very patchy distribution from South Carolina to Alabama and more significant populations in Louisiana, eastern Texas, southern Arkansas, and western Mississippi. This species' distribution is generally not well documented, and it is sometimes considered a variety of *Q. stellata*; therefore *Q. similis* could be significantly more prevalent or uncommon than currently thought. Swamp post oak thrives in the rich, moist bottom lands of eastern Texas pineywoods, as well as gulf prairies and marshes moving further east. It is a moderate to large tree that can reach a maximum height between 25 and 33 meters.<sup>1,2</sup> NatureServe rates the species as Apparently Secure in Texas, Critically Imperiled in Alabama, Georgia, and South Carolina, and has not yet ranked the species in Louisiana, Arkansas, or Mississippi. *Quercus similis* is also listed as a main component of eight different Ecological Associations, all of which have a confidence level of Low - Poorly Documented.<sup>3</sup>



**Figure 1.** County-level distribution map for *Quercus similis*. Source: Biota of North America Program (BONAP).<sup>4</sup>



**Figure 2.** Documented *in situ* occurrence points for *Quercus similis*. Protected areas layer from U.S. Geological Survey Gap Analysis Program (GAP) 2016 Protected Areas Database of the U.S. (PAD-US).<sup>5</sup>

## VULNERABILITY OF WILD POPULATIONS

**Table 1.** Scoring matrix identifying the most severe demographic issues affecting *Quercus similis*. Cells are highlighted when the species meets the respective vulnerability threshold for each demographic indicator. Average vulnerability score is calculated using only those demographic indicators with sufficient data (i.e., excluding unknown indicators).

Demographic indicators	Level of vulnerability						Score
	Emergency Score = 40	High Score = 20	Moderate Score = 10	Low Score = 5	None Score = 0	Unknown No score	
Population size	< 50	< 250	< 2,500	< 10,000	> 10,000	Unknown	0
Range/endemism	Extremely small range or 1 location	E00 < 100 km <sup>2</sup> or A00 < 10 km <sup>2</sup> or 2-4 locations	E00 < 5,000 km <sup>2</sup> or A00 < 500 km <sup>2</sup> or 5-9 locations	E00 < 20,000 km <sup>2</sup> or A00 < 2,000 km <sup>2</sup> or 10+ locations	E00 > 20,000 km <sup>2</sup> or A00 > 2,000 km <sup>2</sup>	Unknown	0
Population decline	Extreme	>= 80% decline	>= 50% decline	>= 30% decline	None	Unknown	10
Fragmentation	Severe fragmentation	Isolated populations	Somewhat isolated populations	Relatively connected populations	Connected populations	Unknown	5
Regeneration/recruitment	No regeneration or recruitment	Decline of >50% predicted in next generation	Insufficient to maintain current population size	Sufficient to maintain current population size	Sufficient to increase population size	Unknown	-
Genetic variation/integrity	Extremely low	Low	Medium	High	Very high	Unknown	-
Average vulnerability score							5.0
Rank relative to all U.S. oak species of concern (out of 19)							15

## THREATS TO WILD POPULATIONS

### High Impact Threats

**Human use of landscape — agriculture, silviculture, ranching, and/or grazing:** Specific threats to *Q. similis* are not well documented, but significant effects due to habitat use for agriculture, silviculture, and/or grazing are highly suspected based on reports regarding other similar oak species in the region.

### Moderate Impact Threats

**Human use of landscape — residential/commercial development, mining, and/or roads:** This threat is also not documented specifically for *Q. similis*, but for other well-documented oaks in its region, the most common and persistent threats are related to human use of the landscape.

**Climate change — habitat shifting, drought, temperature extremes, and/or flooding:** The 2016 ForeCAST Project climate change modeling predicts a 57% reduction in suitable habitat area for *Q. similis* by 2050.<sup>6</sup> In 2013 the same authors had predicted a 92% reduction in suitable habitat area by 2015.<sup>7</sup> A recent analysis of U.S. tree vulnerability to climate change gave *Q. similis* a moderate vulnerability ranking based on species-specific traits, predicting high threat exposure and low-to-moderate adaptive capacity, but low threat sensitivity.<sup>8</sup> Extreme flooding and fire have affected the species' main distribution, and these conditions are predicted to continue and perhaps increase in intensity and frequency moving forward.

### Low Impact Threats

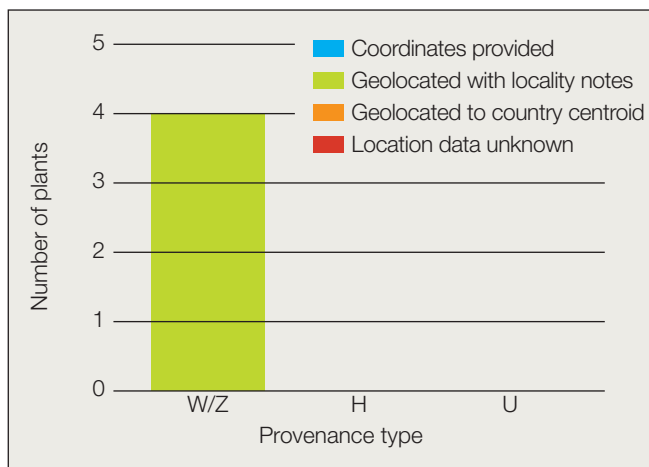
**Human use of species — wild harvesting:** Swamp post oak has broad utility as timber and is known as a mast producer used for low-grade lumber, but no unsustainable harvesting is currently known.<sup>9</sup> Its yellow-tan cast restricts its use as veneer.<sup>10</sup>

## CONSERVATION ACTIVITIES

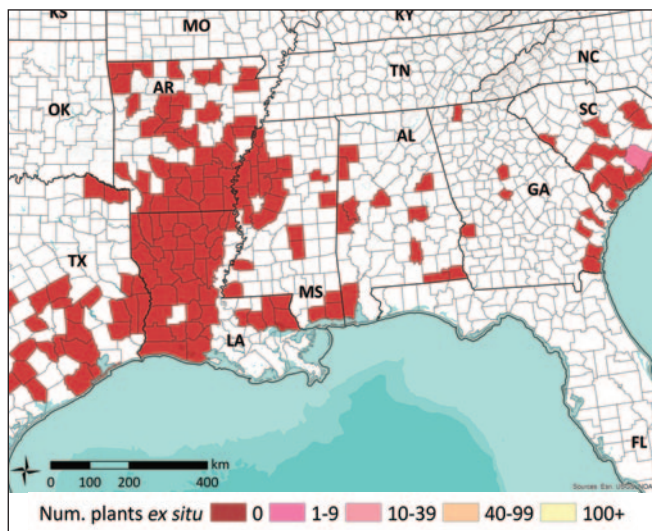
In 2017 *Quercus* accessions data were requested from *ex situ* collections. A total of 162 institutions from 26 countries submitted data for native U.S. oaks (Figures 3 and 4). Past, present, and planned conservation activities for U.S. oak species of concern were also examined through literature review, expert consultation, and conduction of a questionnaire. Questionnaire respondents totaled 328 individuals from 252 organizations, including 78 institutions reporting on species of concern (Figure 6).

### Results of 2017 *ex situ* survey

Number of <i>ex situ</i> collections reporting this species:	2
Number of plants in <i>ex situ</i> collections:	4
Average number of plants per institution:	2
Percent of <i>ex situ</i> plants of wild origin:	100%
Percent of wild origin plants with known locality:	100%



**Figure 3.** Number and origin of *Quercus similis* plants in *ex situ* collections. Provenance types: W = wild; Z = indirect wild; H = horticultural; U = unknown.

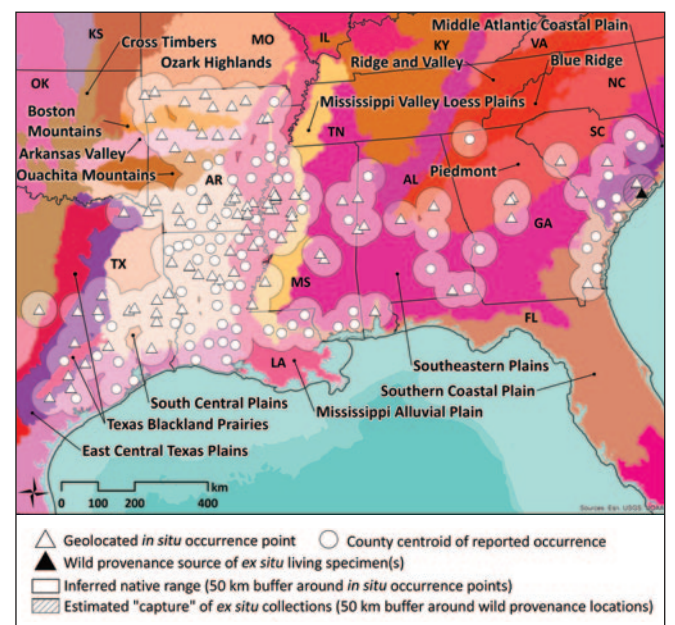


**Figure 4.** *Quercus similis* counties of *in situ* occurrence, reflecting the number of plants from each county in *ex situ* collections.

A spatial analysis was conducted to estimate the geographic and ecological coverage of *ex situ* collections (Figure 5). Fifty-kilometer buffers were placed around each *in situ* occurrence point and the source locality of each plant living in *ex situ* collections. Collectively, the *in situ* buffer area serves as the inferred native range of the species, or “combined area *in situ*” (CAI50). The *ex situ* buffer area represents the native range “captured” in *ex situ* collections, or “combined area *ex situ*” (CAE50). Geographic coverage of *ex situ* collections was estimated by dividing CAI50 by CAE50. Ecological coverage was estimated by dividing the number of EPA Level IV Ecoregions present in CAE50 by the number of ecoregions in CAI50.

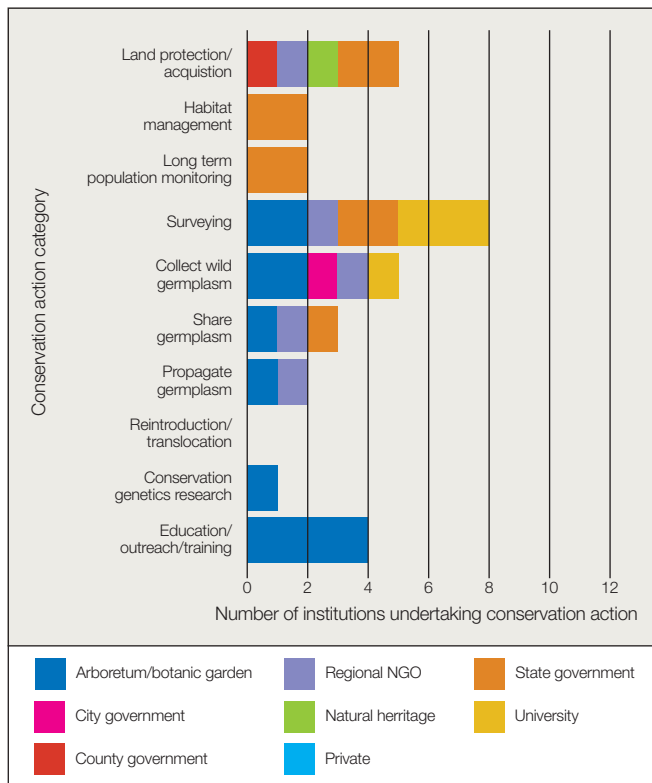
### Estimated *ex situ* representation

Geographic coverage:	1%
Ecological coverage:	3%



**Figure 5.** *Quercus similis* *in situ* occurrence points and *ex situ* collection source localities. U.S. EPA Level III Ecoregions are colored and labeled.<sup>11</sup> County centroid is shown if no precise locality data exist for that county of occurrence. Email [treeconservation@mortonarb.org](mailto:treeconservation@mortonarb.org) for information regarding specific coordinates.





**Figure 6.** Number of institutions reporting conservation activities for *Quercus similis* grouped by organization type. Fifteen of 252 institutions reported activities focused on *Q. similis* (see Appendix D for a list of all responding institutions).

**Land protection:** Within the inferred native range of *Q. similis*, only 10% of the land is covered by protected areas (Figure 7). There is little information available regarding the size and health of *Q. similis* populations within protected areas, or the management of such populations. It is assumed the vast majority of Swamp post oak individuals are unprotected, though the use and condition of private lands housing the species are also largely unknown.

Land where a Swamp post oak herbarium record was taken in Bibb County, Alabama, has recently been purchased by The Nature Conservancy. The Conservancy was not aware of the record, but work is being done to confirm its presence (P. Thompson pers. comm., 2017). The White River National Wildlife Refuge has been reported to contain *Q. similis*.<sup>12</sup> The Little Sandy National Wildlife Refuge: Draft Comprehensive Conservation Plan and Environmental Assessment also reports the species.<sup>13</sup>

**Sustainable management of land:** A project focusing on the reclamation of a remnant Post Oak Savannah within Northwest Arkansas Community College’s Outdoor Living Laboratory located a previously-unknown stand of what seems to be *Q. similis*. Project participants are working to scientifically prove the trees to be *Q. similis*, which would make the stand the northernmost recorded population of the species.<sup>14</sup>

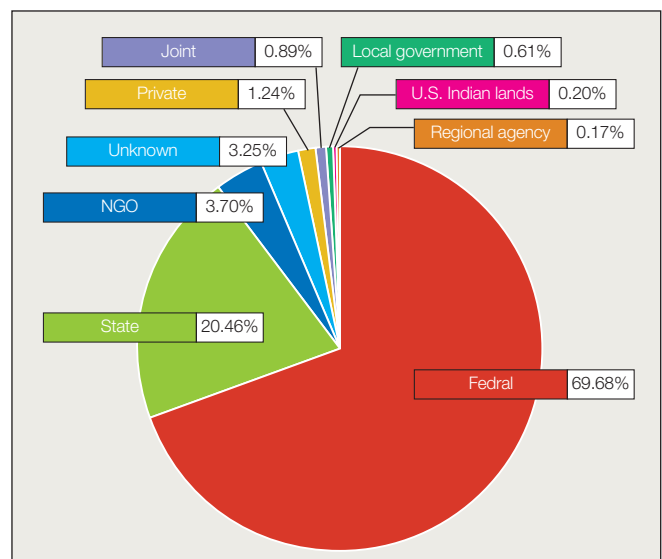
**Population monitoring and/or occurrence surveys:** A Forest Inventory and Analysis (FIA) inventory of Louisiana’s forests revealed that Loblolly pine was the most common species, with over 25,000 observations, Sweetgum was the next most commonly observed, with 6,440 observations, and Swamp post oak was observed four times.<sup>15</sup> Auburn University’s Davis Arboretum is planning to create a vetted occurrence point dataset as they find verifiable specimens of *Q. similis* in Alabama (T. Boland pers. comm., 2017).

**Wild collecting and/or ex situ curation:** The Polly Hill Arboretum will be embarking on a seed collecting trip in the fall of 2019, including sites in Georgia, South Carolina, and Alabama. The Arboretum is interested in locating *Q. similis* if possible, for collection. This trip will also be used to geolocate populations with limited location data, and to share seed with collaborating public garden institutions (T. Boland pers. comm., 2018).

**Propagation and/or breeding programs:** Two institutions reported this activity in the conservation action questionnaire, but no other details are currently known.

**Reintroduction, reinforcement, and/or translocation:** No known initiatives at the time of publication.

**Research:** Within the Little Sandy Wildlife Refuge, *Q. nigra*, *Q. similis*, *Q. phellos*, and *Q. lyrata* cumulatively “comprise a scant 10% of the small stems, despite canopy dominance of the latter two species.” *Quercus similis* is noted as majority “very large trees (> 75 cm dbh),” rather than presence as “small stems.”<sup>13</sup> The Coastal Georgia Land Conservation Initiative--a collaboration among the Georgia Department of Natural Resources, Georgia Conservancy, and Association County Commissioners of Georgia--confirmed *Q. similis* to be present in the state, which had previously been arguable.<sup>16</sup>



**Figure 7.** Management type of protected areas within the inferred native range of *Quercus similis*. Protected areas data from the U.S. Geological Survey Gap Analysis Program (GAP) 2016 Protected Areas Database of the U.S. (PAD-US).<sup>5</sup>



**Education, outreach, and/or training:** Four institutions reported this activity in the conservation action questionnaire, but no other details are currently known.

**Species protection policies:** NatureServe ranks *Q. similis* as Critically Imperiled in South Carolina, Georgia, and Alabama, but it is unknown if specific protection policies accompany these rankings.<sup>3</sup>

## PRIORITY CONSERVATION ACTIONS

It is clear from current and past efforts that Swamp post oak offers opportunities for more detailed study in several areas. Populations in South Carolina, Georgia, and Alabama should be placed under protection where possible, and monitored for changes in population size, health, and existing threats to their livelihood. Given its current known distribution, exploration into the Florida panhandle may find additional populations based on habitat preference. More extensive distribution studies are recommended based on existing documentation.

There is also significant room for improvement of genetic diversity representation in *ex situ* collections, which will provide adequate germplasm backup if the severe impacts of climate change predicted for this species decimate valuable subpopulations. This species has poor representation in *ex situ* collections at this time, with limited population sampling from its current known distribution. Opportunities exist to determine successful protocols for propagation of Swamp post oak, and its requirements for reintroduction into the wild. In addition, taxonomic examination of this species and its relationship to its two dry land relatives, *Q. stellata* Wangenh and *Q. margarettae* (Ashe) Small, should be undertaken to determine their shared evolutionary past and current relationships.

### Conservation recommendations for *Quercus similis*

#### Highest Priority

- Land protection
- Population monitoring and/or occurrence surveys
- Research (demographic studies/ecological niche modeling; restoration protocols/guidelines; taxonomy/phylogenetics)

#### Recommended

- Wild collecting and/or *ex situ* curation

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