



# Conservation Gap Analysis of Native U.S. Oaks

## Species profile: *Quercus chapmanii*

Emily Beckman, Patrick Griffith, Abby Meyer, Murphy Westwood

### 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 chapmanii Sarg.

Synonyms: N/A Common Names: Chapman oak

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## DISTRIBUTION AND ECOLOGY

*Quercus chapmanii*, or Chapman oak, occurs abundantly in Florida, U.S., especially along the western coast, and creeps up the coasts of Georgia, South Carolina, Alabama, and perhaps into Mississippi. Favorable habitat includes dry, xeric sandy ridges and coastal dunes that foster sandhill, scrub, and scrubby flatwood ecosystems. Pine-scrub forests are a favorite ecosystem for Chapman oak, which can thrive both inland and along the coast. Commonly associated species include *Quercus myrtifolia*, *Q. incana*, *Q. laevis*, *Q. geminata*, *Q. hemisphaerica*, *Q. laurifolia*, *Q. nigra*, *Q. minima*, *Ilex glabra*, *Serenoa repens*, *Sabal minor*, *Pinus clausa*, *Carya*, and *Vitis rotundifolia*. *Quercus chapmanii* is evergreen with a spreading crown and leaves that are shiny on top and somewhat hairy on the underside; the leaves are also occasionally slightly lobed. Its broad acorns are mostly enclosed in their cup and mature in one season. Chapman oak declines in areas with long-term flooding by salt water, but has a high drought tolerance. This species grows as a large shrub or small tree, reaching between three and 13 meters tall.<sup>1,2,3</sup>

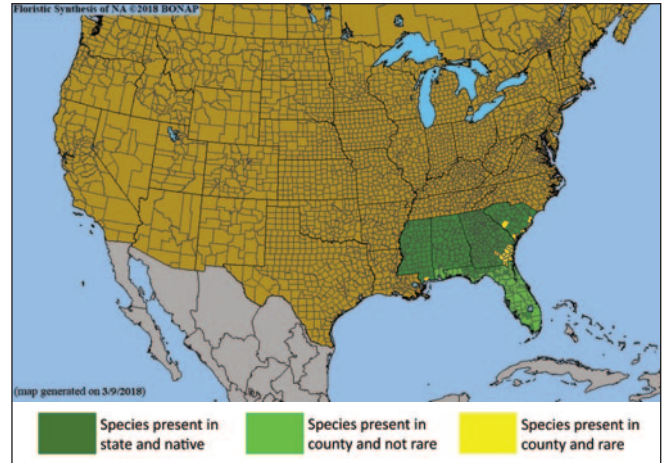


Figure 1. County-level distribution map for *Quercus chapmanii*. Source: Biota of North America Program (BONAP).<sup>4</sup>

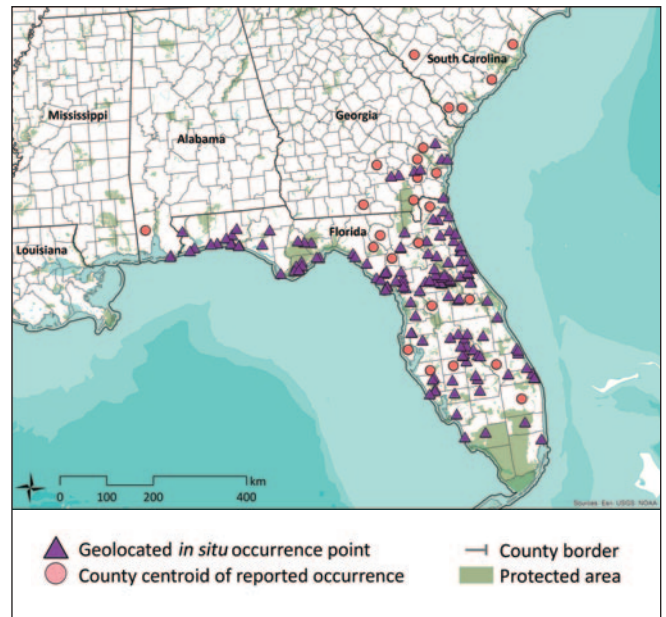


Figure 2. Documented *in situ* occurrence points for *Quercus chapmanii*. Protected areas layer from U.S. Geological Survey Gap Analysis Program (GAP) 2016 Protected Areas Database of the U.S. (PAD-US).<sup>5</sup>

## VULNERABILITY OF WILD POPULATIONS

**Table 1.** Scoring matrix identifying the most severe demographic issues affecting *Quercus chapmanii*. 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	5
Fragmentation	Severe fragmentation	Isolated populations	Somewhat isolated populations	Relatively connected populations	Connected populations	Unknown	10
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	0
Genetic variation/integrity	Extremely low	Low	Medium	High	Very high	Unknown	-
Average vulnerability score							3.0
Rank relative to all U.S. oak species of concern (out of 19)							19

## THREATS TO WILD POPULATIONS

### High Impact Threats

**Human modification of natural systems — disturbance regime modification, pollution, and/or eradication:** In Florida, natural, lightning-caused fires once occurred at an average rate of more than 1,000 fires per year, and burned through the landscape until fuel decreased or wetlands created a firebreak.<sup>6,7</sup> These fires provided room for *Q. chapmanii* to reproduce, but have been suppressed by human settlement. The disappearance of *Q. chapmanii* subpopulations has been witnessed due to infrequent or a complete lack of prescribed burns, which leads to intense competition with aggressive colonizers (A. Black pers. comm., 2017).

### Moderate Impact Threats

**Human use of landscape — residential/commercial development, mining, and/or roads:** Though there are few recorded land development threats specific to Chapman oak itself, its habitat is known to face many threats. Scrub communities in the southeastern U.S. have been widely destroyed, fragmented, and degraded due to developed or disturbed lands. The U.S. Fish and Wildlife Service estimates that “virtually all remaining significant scrub tracts that are not currently protected are proposed for development, or are for sale.”<sup>7</sup>

**Human use of landscape — tourism and/or recreation:** Scrub habitat is readily damaged by off-road vehicle traffic or even foot traffic, which destroys the delicate ground cover and causes the loose sand to erode.<sup>8</sup>

### Low Impact Threats

**Climate change — habitat shifting, drought, temperature extremes, and/or flooding:** Scrub communities are known to be sensitive to disturbance regime changes, which are altered by a changing climate. Further research is necessary regarding the effects of climate change on the fluctuation of fire regimes.<sup>9</sup> No climate change projections are known for *Q. chapmanii* specifically.

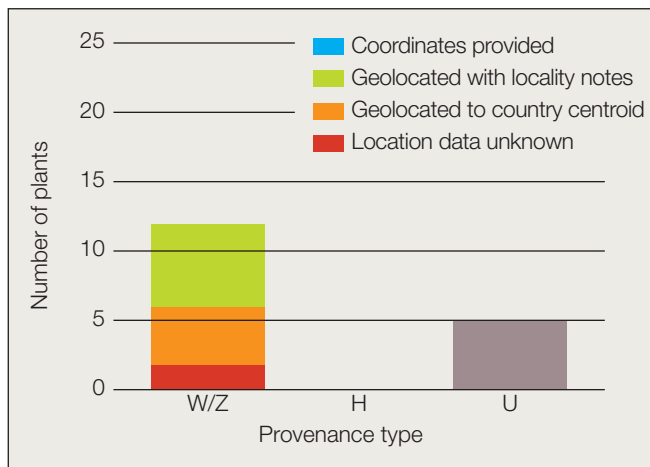


## CONSERVATION ACTIVITIES

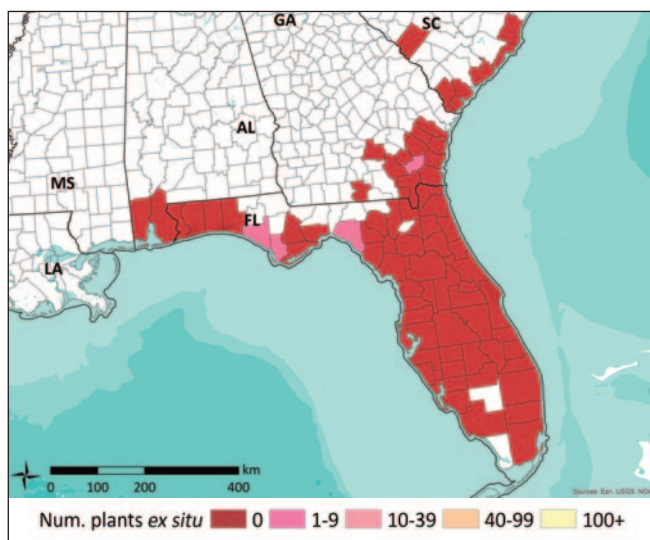
In 2017 *Quercus* accessions data were requested from *ex situ* collections. A total of 162 institutions from 26 countries submitted data for native U.S. oaks (Figures 3 and 4). Past, present, and planned conservation activities for U.S. oak species of concern were also examined through literature review, 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:	9
Number of plants in <i>ex situ</i> collections:	17
Average number of plants per institution:	2
Percent of <i>ex situ</i> plants of wild origin:	71%
Percent of wild origin plants with known locality:	83%



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

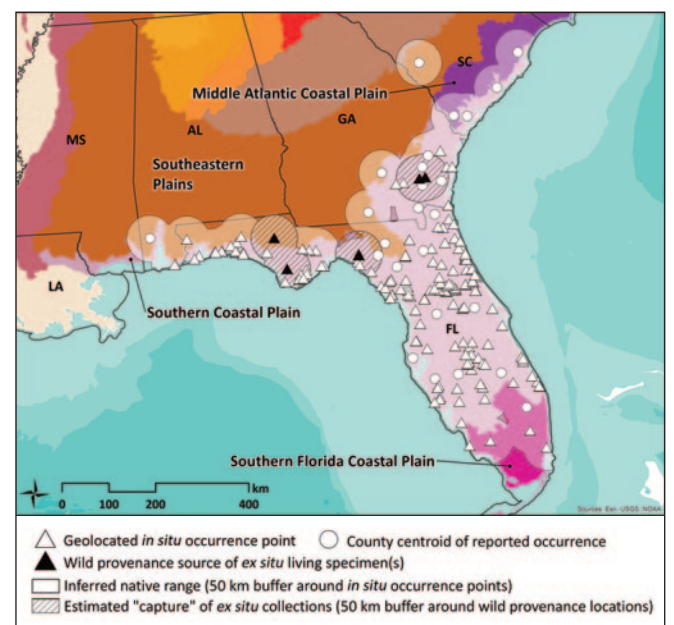


**Figure 4.** *Quercus chapmanii* counties of *in situ* occurrence, reflecting the number of plants from each county in *ex situ* collections.

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.

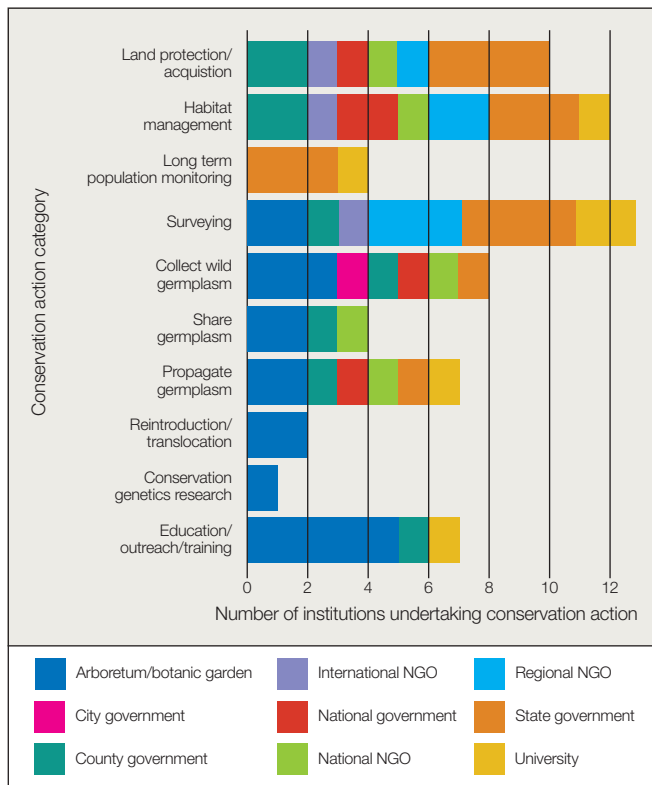
### Estimated *ex situ* representation

Geographic coverage:	13%
Ecological coverage:	54%



**Figure 5.** *Quercus chapmanii* *in situ* occurrence points and *ex situ* collection source localities. U.S. EPA Level III Ecoregions are colored and labeled.<sup>10</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 more information regarding specific coordinates.





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

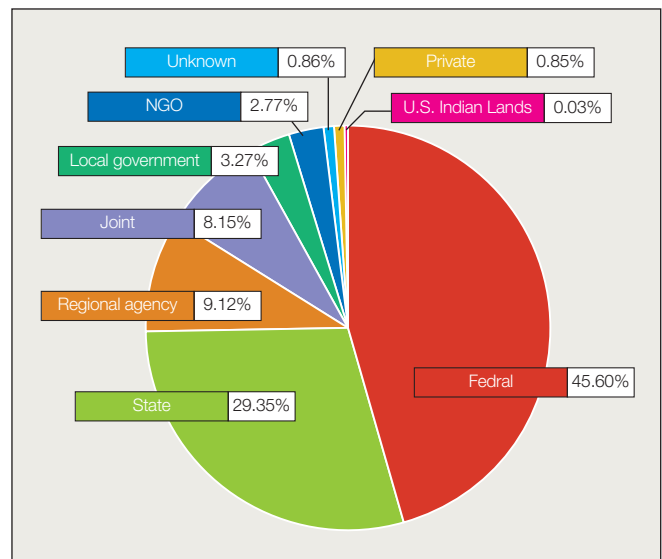
**Land protection:** Within the inferred native range of *Q. chapmanii* in the U.S., 24% of the land is covered by protected areas (Figure 7). However, there are significant populations within protected areas; fragmentation of protected areas generally takes precedence as the source of concern, rather than a lack of protected populations.

The Institute for Regional Conservation has created an online profile for *Q. chapmanii*, which lists 41 specific conservation areas that contain the species.<sup>11</sup> Florida has many public lands with local biologists who monitor ecosystem health, an active native plant society, and a significant non-profit presence (M. Jenkins pers. comm., 2017). In addition, *Q. arkansana* often occurs with stands of *Q. chapmanii* in Florida, potentially providing some indirect protection due to Arkansas oak's distinction as a Threatened species by the Florida Department of Agriculture and Consumer Services (J. Chauncey pers. comm., 2017).

**Sustainable management of land:** Florida scrub is a plant community easily recognized by the dominance of evergreen shrubs and frequent patches of bare, white sand. With more than two dozen threatened and endangered species dependent upon scrub, the community is, itself, considered endangered. Recovery of the community and its associated plants and animals depends upon land protection and effective land management.<sup>7</sup> Many protected areas within Florida do manage for fire (M. Jenkins pers. comm., 2017).

**Population monitoring and/or occurrence surveys:** The APGA-USFS Tree Germplasm Conservation Partnership funded a scouting and collecting trip for *Zamia integrifolia* in 2015, lead by the Montgomery Botanical Center. The team reviewed herbarium specimens of *Q. chapmanii* and *Q. myrtifolia* due to their frequent association with *Z. integrifolia* in the northeastern part of its range, including Camden County, Georgia.<sup>12</sup> Perhaps further collecting efforts for *Z. integrifolia* could include scouting and/or collecting for *Q. chapmanii* as well.

The Florida Natural Areas Inventory (FNAI) documents all species within the majority of state forests by collecting spatial point data. For example, Lake Wales Ridge State Forest has recorded hundreds of data points for *Q. chapmanii* and *Q. inopina* within their boundaries. Florida state forests cover over a million acres of natural land within three-fourths of the state (M. Jenkins pers. comm., 2017).



**Figure 7.** Management type of protected areas within the inferred native range of *Quercus chapmanii*. 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>

**Wild collecting and/or *ex situ* curation:** It is suggested that researchers give at least three months lead time for collection permits with state and federal managed area staff, and six months is recommended (M. Jenkins pers. comm., 2017).

**Propagation and/or breeding programs:** Chapman oak is available at one or two native plant nurseries in southern Florida, as listed by the Natives for your Neighborhood program.<sup>11</sup> The Florida Fish and Wildlife Conservation Commission sometimes also propagate the species for restoration of habitat supporting the federally endangered Scrub Jay (M. Jenkins pers. comm., 2017).

**Reintroduction, reinforcement, and/or translocation:** In 2015, Project Acorn, “a multiyear effort that combines the initiative of the Florida Fish and Wildlife Conservation Commission (FWC), financial backing from the Disney Worldwide Conservation Fund and the work of local volunteers” continued to work towards the restoration of damaged scrub oak habitat within Lake Wales Ridge Wildlife and Environment Area by planting native oaks, including *Q. chapmanii*. The initiative is led by Bill Parken and Nicole Ranalli, who manage volunteers as they collect acorns in the fall, pot the seeds, and plant the seedlings out in the summer. In 2013, the first year of the initiative, 800 scrub oak sprouts were planted; each year following, volunteers planted about 2,500 sprouts, with about 800 participants. Twelve acres had been restored by 2015, and twenty acres is the project goal.<sup>13</sup> The Hilochee Mitigation Bank is also undergoing restoration, and in 2016 the absolute cover of appropriate shrub species had increased from an average baseline of 9.8% to more than 30%. This was accomplished through the planting of oak species including, but is not limited to, *Q. geminata*, *Q. myrtifolia*, and *Q. chapmanii*.<sup>14</sup> Florida Fish and Wildlife Conservation Commission also grows *Q. geminata*, and sometimes *Q. chapmanii*, for restoration of habitat supporting the federally endangered Scrub Jay (M. Jenkins pers. comm., 2017).

**Research:** One institution reported conservation genetics research in the conservation action questionnaire, but no other details are currently known.

**Education, outreach, and/or training:** The Florida Natural Resources Conservation Service (NRCS) has published the Plant List for Conservation Alternatives, which provides a list of species that are appropriate for planting within agricultural filter strips. These strips typically run adjacent to waterways and reduce sediment and chemical runoff, as required or suggested within NRCS Conservation Stewardship or Easement Programs. Chapman oak is included on this list.<sup>15</sup>

**Species protection policies:** No known initiatives at the time of publication.

## PRIORITY CONSERVATION ACTIONS

The conservation status of Chapman oak appears to be currently secure. The species’ distribution, range, and documented localities overlap with a variety of local, state, and federal protected areas. However, regardless of these protections, *in situ* conservation concerns remain. These include human-mediated fire suppression that increases the density and abundance of competitors, habitat fragmentation and degradation, and the effects of climate change.

To address the *in situ* concerns, it is recommended that prescribed burns be performed where appropriate and permissible, *in situ* or “inter situ” plantings of *Q. chapmanii* be considered to mitigate habitat fragmentation, and further research investigates the effects of climate change on Florida scrub habitat and its species. Sustainable management of land, including prescribed burns, will likely require education/training of practitioners, and further climate change research will necessitate population monitoring. With regard to *ex situ* collections, it is furthermore recommended to systematically evaluate and expand the geographic breadth of coverage for *Q. chapmanii*, with a specific emphasis on capturing the populations at the margins of the distribution (Georgia, Mississippi, South Carolina, Alabama, as well as South Florida), and to network these collections in local (southeastern U.S.) botanic gardens, as possible. Bringing these potentially differing genotypes into protective cultivation will help mitigate potential losses from fire suppression, habitat degradation, and climate transition, as well as provide a reserve of germplasm for potential restoration efforts.

### Conservation recommendations for *Quercus chapmanii*

#### Highest Priority

- Sustainable management of land
- Wild collecting and/or *ex situ* curation

#### Recommended

- Education, outreach, and/or training
- Population monitoring and/or occurrence surveys
- Reintroduction, reinforcement, and/or translocation
- Research (climate change modeling; land management/disturbance regime needs)

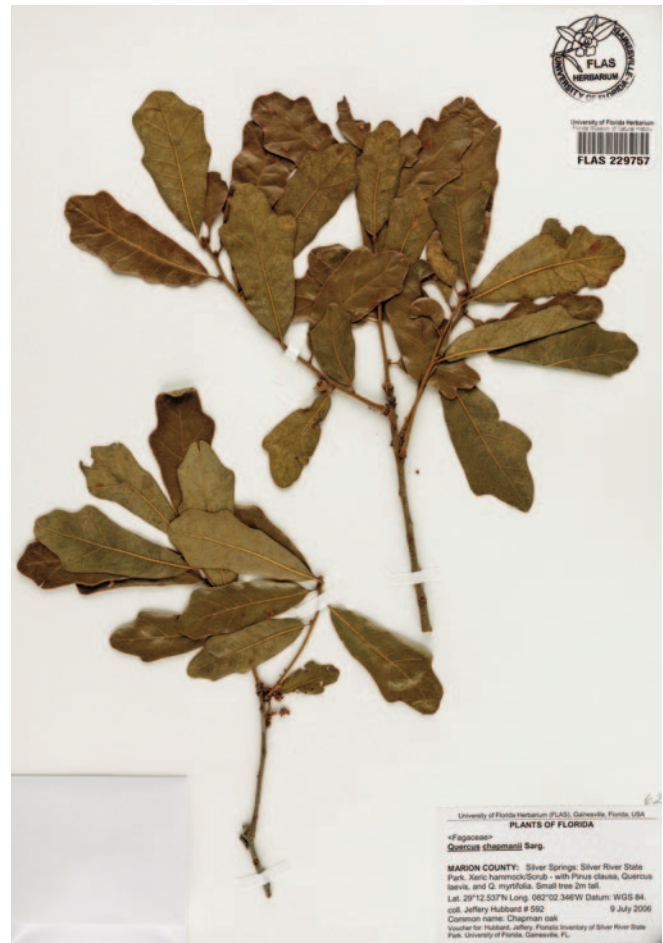




Ron Lance

## REFERENCES

1. Stein, J., Binion, D., & Acciavatti, R. (2003). *Field guide to native oak species of eastern North America*. Forest Service, U.S. Department of Agriculture.
2. Coastal Plain Plants. (n.d.). *Quercus chapmanii*. Retrieved from [http://coastalplainplants.org/wiki/index.php/Quercus\\_chapmanii](http://coastalplainplants.org/wiki/index.php/Quercus_chapmanii)
3. McDougall, S. (n.d.). Chapman oak - *Quercus chapmanii*. Retrieved from <http://northamericantrees.com/quercus-chapmanii.html>
4. Kartesz, J. T. (2018). The Biota of North America Program (BONAP). Taxonomic Data Center, Floristic Synthesis of North America, Version 1.0. Chapel Hill, NC. Retrieved from <http://www.bonap.net/tdc>
5. U.S. Geological Survey, Gap Analysis Program (GAP). (2016, May). Protected Areas Database of the United States (PAD-US). Version 1.4 Combined Feature Class. Retrieved from <https://gapanalysis.usgs.gov/padus/data/download/>
6. Komarek, E. V. (1964). The natural history of lightning. In *Proceedings, third annual Tall Timbers fire ecology conference*. Tallahassee, FL: TallTimbers Research Station.
7. U.S. Fish and Wildlife Service. (1999). *Multi-species recovery plan for south Florida*. Vero Beach, FL: South Florida Ecological Services Field Office. Retrieved from <https://www.fws.gov/verobeach/ListedSpeciesMSRP.html>
8. Florida Natural Areas Inventory. (2010). *Guide to the natural communities of Florida: 2010 edition*. Tallahassee, FL. Retrieved from: <https://www.fnai.org/naturalcommguide.cfm>
9. Defenders of Wildlife. (n.d.). Climate change and Florida Scrub jays. Retrieved from [http://www.landscape.org/article/FL/climate\\_scrub\\_jays/1/](http://www.landscape.org/article/FL/climate_scrub_jays/1/)
10. U.S. EPA Office of Research & Development. (2013, April). Ecoregions of the Conterminous United States. National Health and Environmental Effects Research Laboratory (NHEERL). Retrieved from [ftp://ftp.epa.gov/wed/ecoregions/us/us\\_eco\\_l4.zip](ftp://ftp.epa.gov/wed/ecoregions/us/us_eco_l4.zip)
11. The Institute for Regional Conservation. (n.d.). Natives for your neighborhood. Delray Beach, FL. Retrieved from <https://regionalconservation.org/beta/hfn/default.asp>
12. Griffith, P., Calonje, M., Goldman, D., & Black, A. (2016, April 8). *APGA-USFS Gene Conservation Partnership: 2015-2016 scouting/collecting trip for Zamia integrifolia*, Phase 1 report. Retrieved from <http://www.montgomerybotanical.org/media/expeditions/USAFFlorida2016.pdf>
13. Cameron, R. (2015, May 27). Project Acorn: Putting Florida scrub oaks back where they belong. International Oak Society. Retrieved from <http://www.internationaloaksociety.org/content/project-acorn-putting-florida-scrub-oaks-back-where-they-belong>
14. Environmental Consulting and Design Inc. (2016). Hilochee Mitigation Bank. Gainesville, FL.
15. Natural Resources Conservation Service. (2006). Florida NRCS plant list for conservation alternatives. Retrieved from <https://efotg.sc.gov.usda.gov/references/Delete/2006-11-25/FloridaNRCSPlantListforConservationAlternativescommon.pdf>



University of Florida Herbarium (FLAS), Gainesville, Florida, USA  
**PLANTS OF FLORIDA**  
 «Fagaceae»  
*Quercus chapmanii* Berg.  
**MARION COUNTY:** Silver Springs: Silver River State Park. Xeric hammock/scrub - with *Pinus clausa*, *Quercus laevis*, and *Q. myrtilloides*. Small tree 2m tall.  
 Lat. 29°12.537'N Long. 82°02.346'W Datum: WGS 84  
 coll. Jeffery Hubbard # 592 9 July 2006  
 Common name: Chapman oak  
 Number for Habitat: Jeffery, Florida Inventory of Silver River State Park, University of Florida, Gainesville, FL.



University of South Florida Herbarium 233640  
 FAMIL: Fagaceae COUNTY: Highlands Co., N.C.  
 SCIENTIFIC NAME: *Quercus chapmanii* STATE: Florida  
 AUTHOR: Bergstr.  
 COMMON NAME(S): Chapman's oak  
 COMMENTS: