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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R4–ES–2019–0071; FF09E22000 FXES11130900000 201]

RIN 1018–BE00

Endangered and Threatened Wildlife and Plants; Removal of *Chrysopsis floridana* (Florida Golden Aster) from the Federal List of Endangered and Threatened Plants

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to remove the Florida golden aster (*Chrysopsis floridana*), a short-lived perennial, from the Federal List of Endangered and Threatened Plants (List) due to recovery (delist). This determination is based on our evaluation of the best available scientific and commercial information, which indicates that the threats to the species have been eliminated or reduced to the point that the species has recovered and no longer meets the definition of a threatened or endangered species under the Endangered Species Act of 1973, as amended (Act). If this proposal is finalized, the Florida golden aster will be removed from the List.

DATES: We will accept comments received or postmarked on or before **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES**, below) must be received by 11:59 p.m. Eastern Time on the closing date. We must receive requests for public hearings, in writing, at the address shown in **FOR FURTHER INFORMATION CONTACT** by **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

ADDRESSES: You may submit comments on this proposed rule by one of the following methods:

(1) *Electronically*: Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. In the Search box, enter FWS–R4–ES–2019–0071, which is the docket number for this rulemaking. Then, click on the Search button. On the resulting page, in the Search panel on the left side of the screen, under the Document Type heading, check the Proposed Rules box to locate this document. You may submit a comment by clicking on "Comment."

(2) *By hard copy*: Submit by U.S. mail to: Public Comments Processing, Attn: FWS–R4–ES–2019–0071, U.S. Fish and Wildlife Service, MS: JAO (PRB/3W), 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We request that you send comments only by the methods described above. We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us (see *Public Comments*, below, for more information).

Document availability: The proposed rule and supporting documents (including the Species Status Assessment (SSA), post delisting monitoring plan, list of references cited, and 5-year review) are available at *http://www.regulations.gov* under Docket No. FWS–R4–ES–2019–0071. We will notify the public on our website, *https://www.fws.gov/northflorida/*, when these documents are available.

FOR FURTHER INFORMATION CONTACT: Jay Herrington, Field Supervisor, U.S. Fish and Wildlife Service, North Florida Ecological Services Field Office, 7915 Baymeadows Way, Jacksonville, FL 32256; telephone 722–469–4251. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Information Requested

We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial data available and be as accurate and as effective as possible.

Therefore, we request comments or information from other concerned governmental agencies, Native American Tribes, the scientific community, industry, or any other interested parties concerning this proposed rule.

We particularly seek comments on:

(1) Information concerning the biology and ecology of the Florida golden aster;

(2) Relevant data concerning any threats (or lack thereof) to the Florida golden aster, particularly any data on the possible effects of climate change as it relates to habitat, the extent of State protection, and management that would be provided to this plant as a delisted species;

(3) Current or planned activities within the geographic range of the Florida golden aster that may negatively impact or benefit the species; and

(4) Any new information about this species and threats from invasive plants.

Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

Please note that submissions merely stating support for or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or a threatened species must be made "solely on the basis of the best scientific and commercial data available."

You may submit your comments and materials concerning this proposed rule by one of the methods listed in **ADDRESSES**. We request that you send comments only by the methods described in **ADDRESSES**.

If you submit information via *http://www.regulations.gov*, your entire submission—including any personal identifying information—will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review.

However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov*.

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on *http://www.regulations.gov*.

Public Hearing

Section 4(b)(5) of the Act provides for a public hearing on this proposal, if requested. Requests must be received by the date specified in **DATES**. Such requests must be sent to the address shown in **FOR FURTHER INFORMATION CONTACT**. We will schedule a public hearing on this proposal, if requested, and announce the date, time, and place of the hearing, as well as how to obtain reasonable accommodations, in the *Federal Register* and local newspapers at least 15 days before the hearing. For the immediate future, we will provide these public hearings using webinars that will be announced on the Service's website, in addition to the *Federal Register*. The use of these virtual public hearings is consistent with our regulation at 50 CFR 424.16(c)(3).

Supporting Documents

A species status assessment (SSA) team prepared an SSA report for the Florida golden aster. The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial data available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species.

Peer Review

In accordance with our July 1, 1994, peer review policy (59 FR 34270; July 1, 1994), our August 22, 2016, Director's Memo on the Peer Review Process, and the Office of Management and Budget's December 16, 2004, Final Information Quality Bulletin for Peer Review (revised June 2012), we solicited independent scientific reviews of the information contained in the

Florida golden aster SSA report. We sent the SSA report to six independent peer reviewers and received two responses. Results of this structured peer review process can be found at *https://www.fws.gov/northflorida/*. The SSA report was also submitted to our Federal, State, and Tribal partners for scientific review. We received review from two partners (Sheryl Bowman, Environmental Lands Management Coordinator, Hillsborough County, Lake Frances Field Office and Jennifer Possley, Conservation Team Leader/Field Biologist, Fairchild Tropical Botanic Garden). In preparing this proposed rule, we incorporated the results of these reviews, as appropriate, into the final SSA report.

Previous Federal Actions

The Florida golden aster was listed as endangered on May 16, 1986 (51 FR 17974), under the Act. On August 29, 1988, we released a recovery plan for the Florida golden aster. The recovery plan suggested that we consider the species for reclassification to threatened status when 10 geographically distinct self-sustaining populations of the plant are protected in Hardee, Hillsborough, Manatee, and Pinellas Counties, Florida. The latest 5-year review, completed March 20, 2017, indicated that the species' status was improving, assigned a Recovery Priority Number of 8 (indicating moderate degree of threat and high recovery potential), and recommended downlisting to threatened. The Service initiated the Florida golden aster SSA (see above) to aid in determining the appropriateness of reclassifying the species.

Background

A thorough review of the taxonomy, life history, ecology, and overall viability of the Florida golden aster is presented in the SSA report (USFWS 2018, available at https://www.fws.gov/southeast/). A summary of that information is presented here.

Florida golden aster is endemic to xeric (very dry) uplands east and southeast of the Tampa Bay area of central Florida. The historical range of the Florida golden aster is thought to span parts of Hillsborough, Manatee, Pinellas, Highlands, and Hardee Counties, but the true extent of the historical range is uncertain because the ecosystems on which it occurs were rapidly converted to residential, commercial, and agricultural uses after settlement of the region. Agriculture began in 1880 with grazing and production of citrus and row crops. Residential and commercial activity began around 1840, mainly in the Tampa Bay area and beach communities through the 1940s and 1950s, but suburban and rural areas started expanding in the 1960s and 1970s and development has continued at a consistent rate. The species was first collected and described from a specimen in Manatee County in early 1901, with subsequent collections in Pinellas and Hillsborough Counties in the 1920s. The earliest known Manatee County and Pinellas County populations occurred in coastal areas of Bradenton Beach and St. Petersburg Beach. However, these populations have since been extirpated. The last remaining natural population known to occur in Pinellas County was discovered in 1983; however, a housing development eliminated all available habitat by 1985.

When the species was listed as endangered in 1986, nine known extant populations of the species occurred in five locations, all coastal, in southeastern Hillsborough County (Wunderlin et al. 1981, entire). Since listing of the species, increased survey efforts have resulted in the discovery of additional populations, including occurrences further inland. Many of the newly discovered locations have since been acquired as protected sites with active conservation management activities implemented to improve habitat conditions. As discussed below, introductions have occurred on conservation lands in Hardee, Hillsborough, Manatee, and Pinellas Counties. It is not known whether these introduction sites were historically occupied by the Florida golden aster, or if so, how long ago they supported natural populations.

Based on the most current surveys across the species' range (2006–2018), 30 known extant populations, natural and introduced, occur in 5 counties (Hardee–4, Highlands–1, Hillsborough–16, Manatee–5, and Pinellas–4). Populations were delineated using a 2-kilometers (km) separation distance between occurrences (see **Current Condition**, below, for more information). Of these, 25 populations occur entirely or mostly on 22 protected sites, meaning a site that has been acquired in fee simple and placed into long-term conservation, or a conservation easement or other binding land agreement by the site owner that shows a commitment to its conservation in perpetuity. In addition, all sites have a management agreement or plan both developed and implemented. None of the lands occupied by the Florida golden aster are federally owned or managed. The remaining five extant populations occur on private lands or along roadways or railroad lines.

The most recent surveys showed that just over half of the Florida golden aster individuals occurred in nine introduced populations at eight sites. The earliest introductions took place in 1986; of those 10 introduced populations, 3 are still extant in Hardee and Manatee Counties, while 7 others in Pinellas and Hillsborough Counties failed. Introductions were again initiated during 2008–2013, when Bok Tower Gardens introduced 6 additional populations in Hardee, Manatee, and Pinellas Counties, containing 24,825 plants (as of the most recent censuses, with about 12,000 in one population). All 6 populations had reached sizes >1,000 plants except for the populations at Duette Preserve (2 populations, North and South). However, given that the Duette populations were the most recently introduced populations (2013), have been growing rapidly, and are surrounded by ample habitat and little to no development, they should also reach sizes comparable to the other introduced populations.

According to the most recent surveys, approximately 50,000 individuals exist with over 90 percent occurring in the populations located on protected lands. Although this estimate is the best available information, it gives only an approximation of the true current abundance of the Florida golden aster because surveys are not conducted every year and are conducted differently by various biologists for different purposes. Moreover, population sizes fluctuate annually. Twelve of the 30 populations had more than 1,000 individual plants present when last observed. We note that a 56-km gap occurs between the easternmost naturally occurring population in Manatee County and the nearest naturally occurring population in Hardee County, and it is not presently known whether this gap is due to the lack of suitable habitat, lack of observation, a long-distance dispersal event, or fragmentation of a formerly continuous distribution.

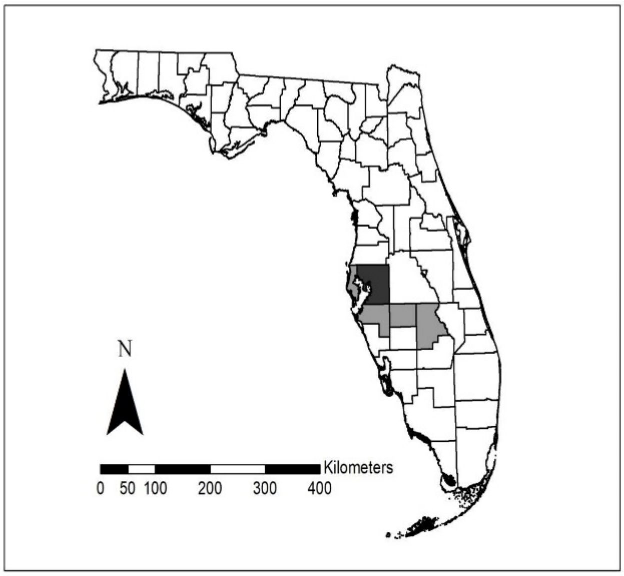

Figure 1. The five Florida counties where the Florida golden aster occurs as of 2017 are highlighted in gray, with Hillsborough County shaded darker gray. At the time of listing in 1986, populations of the Florida golden aster were known to occur only in Hillsborough County.

Regulatory and Analytical Framework

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an “endangered species” or a “threatened species.” The Act defines an endangered species as a species that is “in danger of extinction throughout all or a significant portion of its range,” and a threatened species as a species that is “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” The Act requires that we determine whether any species is an “endangered species” or a “threatened species” because of any of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects. We consider these same five factors in reclassifying a species from endangered to threatened, and in delisting a species (50 CFR 424.11(c)–(e)).

We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term "threat" includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term "threat" may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In determining whether a species meets either definition, we must evaluate all identified threats by considering the species' expected response and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Secretary of the Interior determines whether the species meets the definition of an "endangered species" or a "threatened species" only after the Service conducts this cumulative analysis and describes the expected effect on the species now and in the foreseeable future.

The Act does not define the term “foreseeable future,” which appears in the statutory definition of “threatened species.” Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term foreseeable future extends only so far into the future as we can reasonably determine that both the future threats and the species’ responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. “Reliable” does not mean “certain”; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

It is not always possible or necessary to define foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial data available and should consider the timeframes applicable to the relevant threats and to the species’ likely responses to those threats in view of its life-history characteristics. Data that are typically relevant to assessing the species’ biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.

Analytical Framework

The SSA report documents the results of our comprehensive biological review of the best scientific and commercial data regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent our decision on whether the species should be reclassified or delisted under the Act. It does, however, provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies.

To assess Florida golden aster viability, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years); redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes). In general, the more resilient and redundant a species is and the more representation it has, the more likely it is to sustain populations over time, even under changing environmental conditions. Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

The SSA process can be categorized into three sequential stages. During the first stage, we evaluate an individual species' life-history needs. During the next stage, we assess the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. In the final stage, we make predictions about the species' responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we use the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision.

Summary of Biological Status and Threats

The Act directs us to determine whether any species is an endangered or a threatened species because of any factors affecting its continued existence. The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found on the Southeast Region website at *https://www.fws.gov/southeast/* and at *http://www.regulations.gov* under Docket No. FWS–R4–ES–2019–0071.

Summary of SSA Analysis

As described above, for a species to be viable there must be adequate redundancy (suitable number, distribution, and connectivity to allow the species to withstand catastrophic events), representation (genetic and environmental diversity to allow the species to adapt to changing environmental conditions), and resiliency (ability of a species to withstand unpredictable disturbance). Resiliency for Florida golden aster improves with maintained open habitat. Lambert and Menges (1996) recommend prescribed burning that mimics the historic burn pattern (frequent low-intensity fires in sandhill, less frequent burns in scrub, with fires primarily in late spring and summer) and periodic mechanical disturbance of the ground cover during late winter or early spring when seeds are dispersed. In the absence of fire, habitat openness can be maintained with mowing, hand removal of trees and shrubs near plants, or other mechanical treatments; populations have persisted along periodically mowed right of ways (e.g., underneath powerlines, along roads and railroads) for decades without a prescribed burn program. Populations must be suitably large and connected to provide a reservoir of individuals to cross-pollinate with, as plants will not self-fertilize, and to maintain levels of genetic diversity high enough to prevent harmful consequences from inbreeding depression and genetic drift (Ellstrand and Elam 1993). Redundancy improves with increasing numbers of populations, and connectivity (either natural or human-facilitated) allows connected populations to "rescue" each other after catastrophes. Representation improves with increased genetic diversity and/or environmental conditions within and among populations.

Viability of the Florida golden aster has been and will continue to be impacted both negatively and positively by anthropogenic and natural influences. Historically, the primary threats to the Florida golden aster were habitat loss (resulting from human development) and habitat degradation due to lack of adequate habitat management. As threats to habitat have been alleviated via habitat protection and management, recovery has been further bolstered by captive propagation followed by introduction into unoccupied sites.

Summary of Factors Affecting the Species

Present or threatened destruction, modification, or curtailment of its habitat or range

The main threat to this species at the time of listing was the destruction and modification of habitat. Habitat destruction, modification, and degradation on private lands and habitat degradation from lack of adequate habitat management on public lands remain the primary risk factor to the species. The five populations occurring on private lands remain subject to adverse human activity including mowing, dumping, off-road recreational vehicles use, and land clearing. However, these activities are no longer threats to the 25 populations on public conservation lands because of controlled access and restricted use.

Lack of management, especially the absence of periodic fire, historically led to habitat degradation throughout the species' range. The Florida golden aster occurs in open sandy patches that historically were maintained by fire under natural conditions. Without naturally ignited fires or prescribed fire applications, the habitat becomes overgrown, resulting in unfavorable conditions for the species' persistence. Ideal habitat management is generally regarded as prescribed burning that mimics the historical burn patterns (frequent low-intensity fires in sandhill, less frequent burns in scrub, with fires primarily in late spring and summer) and periodic mechanical disturbance of the ground cover during late winter or early spring when seeds are dispersed (Lambert and Menges 1996, pp. 121–137). Initial burning to restore the openness of degraded habitat involves frequent intense fires, after which burning can be less intense and frequent to simply maintain the habitat. Failing to maintain open scrub habitat can disrupt Florida golden aster reproduction, survival, and dispersal (Lambert and Menges 1996, pp. 121–137).

As with habitat destruction and modification, this threat remains a concern mainly on private and non-conservation lands. Populations that occur on public conservation lands are often being managed to maintain optimal open scrub habitat. However, budget constraints, manageability, conflicting priorities, and other factors (weather, lack of equipment, staff shortages, etc.) may preclude proper management activities even on conservation lands. Additionally, proximity to urbanized areas can limit the number of days available for prescribed burns, and urbanization in the Tampa Bay area is increasing rapidly (Xian et al. 2005, pp. 920–928). To be optimal, burn days must have wind speeds and wind directions that do not unduly burden urbanized areas with smoke. For this reason, large rural tracts of habitat are easier to burn than small tracts tucked into developed areas. Increasing development could lead to further decreases in the ability to conduct prescribed burning in the future, which may or may not be replaced with adequate habitat management by other means (e.g., mowing) that are more expensive than using fire. The type of development also factors into management ability and flexibility, with major roads, schools, hospitals, retirement homes (places with vulnerable populations) weighing more heavily on the decision of if/when to burn than other types of development (Camposano 2018, pers. comm.).

Since the time of listing, conservation efforts for Florida golden aster and other scrub habitat species have reduced the threat of habitat destruction, modification, and degradation. These conservation efforts include acquiring properties where the species naturally occurs, introducing populations on conservation lands, and conducting ongoing habitat management on conservation lands (e.g., prescribed burning). While habitat destruction and modification may still occur on private lands, 83 percent of the sites are on public conservation lands and, therefore, for the most part, are adequately managed and protected. Land acquisitions and introductions have increased the number of established populations within the historical range and have resulted in the expansion of the species' known range. Further, if this rulemaking process results in the species being delisted, it will remain listed as threatened under State laws. The State will develop a management plan and regulatory guidelines to monitor the species. Based on the best available information, we conclude that resources for necessary management activities on conservation lands will continue.

Overutilization for commercial, recreational, scientific, or educational purposes

At the time of listing, this species was not known to be threatened by commercial, recreational, scientific, or educational uses. This factor of the listing process continues not to be a threat to the Florida golden aster at this time.

Disease or predation

Grazing by domestic livestock was initially identified as a stressor because the populations were on private lands and many of the properties were in cattle production. However, at present the 25 populations on conservation lands are not subject to any agriculture practices. No cattle grazing occurs on any of these properties. As to the populations on private lands, acquisition of scrub habitat containing Florida golden aster in Hardee County would allow proper management of these tracts, as has been initiated on public lands in Hillsborough County. Because Hardee County has extensive areas of improved pasture and unimproved pasture, we will assess the effect of cattle grazing on Florida golden aster habitat. Based on the information obtained from this assessment, we will be able to provide management recommendations to cattle ranchers to protect Florida golden aster on private property (Bok Tower Gardens 2020, p. 879). Therefore, we no longer consider grazing to be a threat.

Inadequacy of existing regulatory mechanisms

The Florida Administrative Code 5B–40 (Preservation of Native Flora of Florida) provides the Florida Department of Agriculture and Consumer Services limited authority to protect plants on State and private lands (primarily from the standpoint of illegal harvest). Florida golden aster is listed as an Endangered Plant under this statute, which requires anyone wishing to “willfully harvest, collect, pick, remove, injure, or destroy any plant listed as endangered growing on the private land of another or on any public land or water” to “obtain the written permission of the owner of the land or water or his legal representative” (FAC 5B–40.003(1)(a)). A permit is also required to transport “for the purpose of sale, selling, or offering for sale any plant contained on the endangered plant list which is harvested from such person's own property" (FAC 5B–40.003(1)(c)). The delisting of the Florida golden aster under the Act will not affect this State listing.

A number of sites, consisting of thousands of plants, are now under county and State protection. Specifically, Hillsborough County has purchased considerable acreage through the Endangered Land Acquisition and Protection Program (ELAPP), which contains several large populations. In 1987, Hillsborough County passed the Environmentally Sensitive Lands Ordinance that established the foundation for ELAPP. This program applies to nine populations on six sites in Hillsborough County. In 1990, this ordinance was amended and approved for another 20 years by increasing county taxes to allow additional funds to acquire conservation lands. In November 2008, voters approved the issuance of up to $200 million in bonds for additional purchases.

ELAPP has worked with the Southwest Florida Water Management District and Florida Forever to jointly fund the acquisition of lands. Some of this money is also used for ELAPP to actively manage their properties to benefit Florida golden aster. Therefore, we find that the existing regulatory mechanisms would provide sufficient protections to the species and habitat after delisting, especially on public lands with ordinance protection. Currently, 27 sites where the species occurs are subject to Florida State law. These State and local protections have proven effective. For example, prescribed burning will continue through the ELAPP. Although we acknowledge that this could change in the future, we do not anticipate any future changes to the implementation of these programs at this time.

Other natural or manmade factors affecting its continued existence

Our analyses under the Act include consideration of ongoing and projected changes in climate. The terms "climate" and "climate change" are defined by the Intergovernmental Panel on Climate Change (IPCC). A recent compilation of climate change and its effects is available from reports of the IPCC (IPCC 2014, entire). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). In our analyses, we use our expert judgment to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

The IPCC concluded that the climate system is warming (Pachauri et al. 2014, entire). Effects associated with changes in climate have been observed, including changes in arctic temperatures and ice, widespread changes in precipitation amounts, ocean salinity, and wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves, and the intensity of tropical cyclones (Pachauri et al. 2014, entire). Species that are dependent on specialized habitat types, limited in distribution, or at the extreme periphery of their range may be most susceptible to the impacts of climate change (Byers and Norris 2011, entire; Anacker et al. 2013, pp. 193–210). However, while continued change is certain, the magnitude and rate of change is unknown in many cases. The magnitude and rate of change could be affected by many factors (e.g., weather circulation patterns).

According to the IPCC, "most plant species cannot naturally shift their geographical ranges sufficiently fast to keep up with current and high projected rates of climate change on most landscapes" (IPCC 2014, p. 13). Plant species with restricted ranges may experience population declines as a result of the effects of climate change. The concept of changing climate can be meaningfully assessed both by looking into the future and reviewing past changes.

Using the National Climate Change Viewer and greenhouse gas emission scenario Representative Concentration Pathway (RCP) 8.5, we calculated projected annual mean changes in the period 1981–2010 to those projected for 2025–2049 for maximum temperature, precipitation, soil storage, and evaporative deficit in all counties where Florida golden aster occurs (Adler and Hostetler 2017, entire). We also calculated projected annual mean changes for a more conservative greenhouse gas emission scenario (RCP 4.5) using the same timeframes for maximum temperature, precipitation, soil storage, and evaporative deficit in all counties where Florida golden aster occurs (Adler and Hostetler 2017, entire). Based on these results, all 13 counties within the range of Florida golden aster will be subjected to higher temperatures (annual mean increase of 2.6 degrees Fahrenheit (°F) (RCP 4.5) or 2.9 °F (RCP 8.5)) and slightly higher precipitation (annual mean increase of 0.1 inch per month (RCP 4.5) or 0.2 inch per month (RCP 8.5)) relative to the period of 1981–2010.

Additionally, climate change will likely influence Florida golden aster into the future by affecting habitat suitability and the ability to manage habitat with prescribed fire. Species that are dependent on specialized habitat types, limited in distribution (e.g., Florida golden aster), or at the extreme periphery of their range may be most susceptible to the impacts of climate change (Byers and Norris 2011, entire; Anacker et al. 2013, pp. 193–210). There is evidence that some terrestrial plant populations have been able to adapt and respond to changing climatic conditions (Franks et al. 2014, pp. 123–139). Both plastic (phenotypic change such as leaf size or phenology) and evolutionary (shift in allelic frequencies) responses to changes in climate have been detected. Given enough time, plants can alter their ranges, resulting in range shifts, reductions, or increases (Kelly and Goulden 2008, pp. 11823–11826; Loarie et al. 2008, p. 2502).

The climate in the Southeastern United States has warmed about 2 °F from a cool period in the 1960s and 1970s and is expected to continue to rise (Carter et al. 2014, pp. 396–417). Projections for future precipitation trends in the Southeast are less certain than those for temperature are, but suggest that overall annual precipitation will decrease, and that tropical storms will occur less frequently, but with more force (more category 4 and 5 hurricanes) than historical averages (Carter et al. 2014, pp. 396–417). Sea levels are expected to rise globally, potentially exceeding 1 m of sea level rise by 2100 (Reynolds et al. 2012, entire). Local sea level rise impacts depend not only on how much the ocean level itself is increasing, but also on land subsidence and/or changes in offshore currents (Carter et al. 2014, pp. 396–417), and impacts on terrestrial ecosystems can occur via submergence of habitat during storm surges or permanently, salt water intrusion into the water table, and erosion. Of the current populations of the Florida golden aster, only one (Fort De Soto County Park, Pinellas County) is directly vulnerable to inundation from 0.3 meters of sea level rise, a reasonable estimate of sea level rise by 2050. Hotter and drier conditions in the future could lead to fewer days with optimal conditions for prescribed burning, which could lead to reduced habitat quality if land managers are unable to make up for the lack of burning with adequate mechanical treatment.

It is possible that there will be increases in the number of lightning strikes and sizes and severities of resulting fires, which could have a positive or negative effect on specific Florida golden aster populations. Hurricanes similarly could have positive or negative effects on the species. Prolonged flooding could harm populations, but the mechanical disturbance of trees being uprooted from flood events could improve habitat for colonizing species like the Florida golden aster (Menges and Johnson, pers. comm. 2017).

Other potential climate change effects include changes in temperature and precipitation. Projections for future precipitation trends in the Southeast are less certain than those for temperature, but suggest that overall annual precipitation will decrease. Hotter and drier conditions may complicate the ability to manage Florida golden aster with prescribed fires. Some terrestrial plant populations have been able to adapt and respond to changing climatic conditions (Franks et al. 2013, entire). Both plastic (phenotypic change such as leaf size or phenology) and evolutionary (shift in allelic frequencies) responses to changes in climate have been detected. Both can occur rapidly and often simultaneously (Franks et al. 2013, entire). However, relatively few studies are available that (1) directly examine plant responses over time, (2) clearly demonstrate adaptation or the causal climatic driver of these responses, or (3) use quantitative methods to distinguish plastic versus evolutionary responses (Franks et al. 2013, entire).

As noted earlier, only one population (Fort De Soto County Park, Pinellas County) is directly vulnerable to inundation from 0.3 meters of sea level rise, a reasonable estimate of sea level rise by 2050. We have no additional information or data regarding effects of climate change with respect to the Florida golden aster populations into the future; further research will be helpful to determine how this species responds directly to changes in temperature and water availability. However, from this information, we anticipate that effects to Florida golden aster from climate change will be limited and will not rise to the level of a threat.

Other influences not discussed in detail here, either because they are not thought to be a major threat or there is little information available, include invasive plant species like cogongrass *(Imperata cylindrica),* and future genetic consequences of small and/or translocated populations.

Synergistic Effects

Many of the stressors discussed in this analysis could work in concert with each other and result in a cumulative adverse effect to Florida golden aster, e.g., one stressor may make the species more vulnerable to other threats.

Synergistic interactions are possible between effects of climate change and effects of other threats, such as mowing, dumping, off-road recreational vehicle use, and land clearing. However, we currently do not have information to determine the likely effects of climate change on interaction/competition between species, or on drought conditions. Uncertainty about how different plant species will respond under a changing climate makes projecting possible synergistic effects of climate change on Florida golden aster speculative. However, the increases documented in the number of populations since the species was listed do not indicate that cumulative effects of various activities and stressors are affecting the viability of the species at this time. Based on our analysis of future stressors, we do not anticipate that cumulative effects will affect the viability of the species in the foreseeable future. Likewise, climate change, as discussed above, with hotter and drier conditions can add additional complexity to future prescribed burns. Available habitat in those tracts that are easier to burn, and that can be managed by other methods (e.g., mechanical manipulation) will be sufficient. Similarly, most of the potential stressors we identified either have not occurred to the extent originally anticipated at the time of listing or are adequately managed as described in this proposal to delist the species. In addition, we do not anticipate significant stressors to increase on publicly owned lands or lands that are managed for the species.

Current Condition

Delineating Populations

For the SSA, we delineated populations using a 2-km separation distance rule based on species expert opinion, resulting in 30 populations across 5 counties. This strategy differs from the 1-km separation distance rule that was used in the most recent 5-year review, which was based on NatureServe's default criteria for defining plant populations (NatureServe 2004, entire). The team of species experts providing input on the SSA suspected that 1 km is likely an underestimate of the distances that gene flow can regularly occur via pollination. While the exact insect pollinators of the Florida golden aster are not known, studies on multiple bee species (major plant and *Chrysopsis* pollinators) demonstrate foraging distances that regularly exceed 1 km (Greenleaf et al. 2007, pp. 289–296; Hagler et al. 2011, p. 144).

Current Resiliency

Resiliency refers to the ability of populations to withstand stochastic events, whether demographic, environmental, or anthropogenic. Populations with low resiliency are highly vulnerable to stochastic events and face a high risk of extirpation within the next few decades. Populations with moderate resiliency are less likely to be extirpated within the next few decades, but require additional growth (with help of regular habitat management and/or restoration) to become more self-sustaining and resilient to stochastic events. Populations with high resiliency are unlikely to be extirpated within the next 30 years in the absence of catastrophes or significant declines in the quality of habitat management. Populations with very high resiliency are the most robust and resistant to stochastic fluctuations.

In the SSA, we assessed resiliency for each population using three factors: population size, habitat protection, and area of available habitat. Other factors were considered that likely contribute to population resiliency, but data were not available to assess them over all or most of the populations including certain explicit measures of habitat quality, fire management, existence of land management plans, and population trends. While some past survey data are available for many populations, species experts did not feel comfortable comparing population counts across time periods. In many cases, differences in population sizes were likely not a result of increasing populations, but rather of differences in survey methodology, number of surveyors, and/or areas searched (e.g., surveyors who were more likely to visit known patches and not find new patches; alternately, a bias toward larger counts over time as old patches are revisited and additional patches are found). Nevertheless, we are confident that this population data demonstrates resiliency of the species. Regardless, this species has not been extensively studied; therefore, there was some uncertainty in the SSA in precisely how these factors influenced the Florida golden aster population resiliency.

Population Size

Population size is both a direct contributor to resiliency and an indirect indicator of resiliency. Small populations are more susceptible to demographic and environmental stochastic events than larger populations. Small populations are also more likely to suffer from decreased fitness as a result of low genetic diversity from inbreeding or genetic drift (Willi et al. 2005, pp. 2255–2265). For Florida golden aster, large populations are more buffered from the effects of prescribed burning or other disturbances, which are necessary to maintain open habitat, but can temporarily reduce population sizes by killing plants. Indirectly, large population sizes are likely indicative of other conditions that contribute to population resiliency. For example, in the SSA, we did not have adequate data to assess habitat quality and the quality of management at all the

Florida golden aster populations; therefore, we assumed large population sizes likely generally reflected good habitat quality and management (among other factors) compared to smaller populations, though this assumption may not hold in all cases.

We categorized populations into 4 size classes: <100 individuals, 100–500 individuals, 501–1,000 individuals, and >1,000 individuals. Each population size class was associated with one of the following baseline resiliency classes, respectively: low, moderate, high, and very high (explained further below).

We chose the population size threshold between high and very high resiliency of 1,000 individuals because it is the typical population size used to rank element occurrences as having "excellent viability" and likely to persist for the next 20–30 years (NatureServe 2008, entire). This is a generic population size limit that was not specifically tailored to Florida golden aster with empirical data. Further support for using 1,000 individuals as the threshold for the highest resiliency category came from a study of 10-year extirpation rates for populations of varying sizes of 8 short-lived plant species in Germany (Matthies et al. 2004, pp. 481–488). In this study, for 7 of 8 species, the probability of population persistence increased with population size, and all populations of more than 1,000 individuals (flowering plants) persisted for the duration of the 10-year study.

We obtained the most recent size data for all 30 populations, with data collected as recently as 2018 for some populations, and no older than 2006 for any population. Population sizes have undoubtedly changed since the last surveys for those populations that have not been surveyed as recently, as populations fluctuate in response to management actions, time since management, environmental events, stochastic demographic processes, etc. Thus, the reported numbers reflect best available estimates for population sizes, rather than precise counts meant to represent actual current population sizes. According to the SSA, population sizes included all plants counted, whether flowering or not. Survey data for some populations provided separate counts for each life stage, but for many populations, survey data were simply numbers with no information about whether that number was only flowering plants, or all plants (USFWS 2017, p. 22). Using total plant numbers, and assuming that ambiguous counts were minimum counts of total plants in each population, we were conservative in our population counts. The alternative of assuming that ambiguous counts were of only flowering adult plants, when they may have included basal rosettes, would inflate population sizes in cases where the assumption was wrong.

Habitat Protection

Habitat was considered "protected" if it was acquired in fee simple and placed into long-term conservation by a nongovernmental, local, State, or Federal entity, or a binding land agreement. Protected sites have management plans developed and being implemented. The effect of the degree of habitat protection on resiliency is discussed below.

Habitat Area Available

The Florida golden aster population sizes fluctuate, and can occur in high densities in small patches of habitat. However, as a general rule of thumb, for a given population size, a population covering a large area will be more resilient than a population covering a small area. A perturbation of the same size will have a proportionally larger effect on small-area populations than large-area populations. In assessing population resiliency, we considered the amount of habitat available rather than the amount of habitat occupied for two reasons. First, the amount of area occupied was very uncertain for most populations. Surveys are likely to return to known patches of the Florida golden aster, but new patches can be easily missed and it is likely that the data we had underestimates the true amount of area occupied by the Florida golden aster. Adding to the uncertainty, the most current spatial data for some populations came from 2006, and may no longer reflect the current distribution at those sites. Second, population footprints are not always static across available habitat; the Florida golden aster can spread into unoccupied areas as populations grow, or shift across a landscape as different areas become more or less suitable or both. For this reason, we used the amount of habitat available for populations to occupy currently, grow into, or shift into as a factor contributing to population resiliency. We identified available habitat within a 2-km radius around known occurrences, consistent with the assumption we made about pollinator movement when delineating populations. We characterized the available habitat for populations as small or large, with 14.2 hectares as the threshold between the two groups. This value was selected based on natural breaks in the data and expert input.

Classifying Resiliency Based on the Selected Factors

Resiliency classes were based primarily on population size as described above, with four resiliency classes corresponding to four population size categories. Populations with fewer than 100 individuals were determined to have low resiliency. Within the three higher population size categories (100–500, 501–1,000, and >1,000 plants), populations were assigned a baseline resiliency score associated with their population size (moderate, high, or very high, respectively). This baseline score could then be lowered by either of the two other factors, habitat protection and habitat area available (Table 1).

Table 1. Strategy for assigning current resiliency scores to populations of Florida golden aster.

<table>
<tr><th>Population Size
(# plants)</th><th>Habitat
Protected</th><th>Habitat
Not Protected</th><th>Habitat Area
Available</th></tr>
<tr><td rowspan="2"><100</td><td rowspan="2" colspan="2">Low</td><td>Small</td></tr>
<tr><td>Large</td></tr>
<tr><td rowspan="2">100–500</td><td>Low</td><td>Low</td><td>Small</td></tr>
<tr><td>Moderate</td><td>Low</td><td>Large</td></tr>
<tr><td rowspan="2">501–1,000</td><td>Moderate</td><td>Moderate</td><td>Small</td></tr>
<tr><td>High</td><td>Moderate</td><td>Large</td></tr>
<tr><td rowspan="2">>1,000</td><td>High</td><td>High</td><td>Small</td></tr>
<tr><td>Very High</td><td>High</td><td>Large</td></tr>
</table>

Populations that occur on non-protected lands were assigned to the resiliency class one step lower than they would if they were on protected lands. By doing this, we did not mean to discount the importance of populations on non-protected lands to the viability of the species or imply that owners of these parcels are managing the land poorly or are harming the Florida golden aster. Large populations of Florida golden aster can be supported on private lands. For example, when private landowners burn pasture to improve forage for cattle, they may improve habitat for Florida golden aster. However, even large populations of fire-adapted scrub plants can rapidly decline due to poor management (e.g., *Polygal lewtonii*, Weekley and Menges 2012, entire; *Warea carteri*, Quintana-Ascenscio et al. 2011, entire), and these lands that are not protected for conservation are at higher risk of changes in management or land use that could harm Florida golden aster populations. For populations that extend across property boundaries and contain individuals occurring on both protected and non-protected lands, we used the protection status that applied to the majority of individuals to classify the entire population.

Populations occupying or surrounded by a small area of available habitat were assigned to the resiliency class one step lower than they would if they existed within a larger area of available habitat, as they are less able to withstand and recover from perturbations or shift across a landscape as habitat quality changes. For any populations experiencing both of these resiliency-reducing conditions (small habitat area on non-protected lands), their resiliency score was only reduced one step rather than being reduced twice, once for each factor. The Duette populations were the most recently introduced populations (2013). They have been growing rapidly and are surrounded by ample habitat and little to no development; therefore, these two populations were projected to increase from high to very high resiliency.

Summaries of the 30 delineated populations and their resiliency scores can be found in the SSA and in Table 2, below. In conclusion, resiliency scores remained stable.

Table 2. Summary of current resiliency scores by protected status for Florida golden aster.

Resiliency Class	All Populations	Protected	Not Protected
Very High	7	7	0
High	11	10	1
Moderate	6	5	1
Low	6	3	3

Current Redundancy and Representation

Redundancy for Florida golden aster is naturally low because it is an endemic species with a narrow range around the Tampa Bay region in Florida and Hardee County farther inland (with one population just across the border in Highlands County). The entire species' range spans five counties, with half of the populations occurring in Hillsborough County (Figure 2). The longest distance between two populations is 131 km. However, as this is a narrow-ranging endemic, the spatial distribution of populations across its range does confer a moderate amount of redundancy, defined as the ability of the species to withstand catastrophic events. Catastrophic events could include, among others, too frequent fires, droughts, disease outbreaks, or hurricanes with prolonged flooding, each of which have impacts at a different spatial scale. No information is known about seedbank resiliency in the soil for this species; without knowing this, it is difficult to predict long-term impacts of catastrophes.

The 30 known populations are distributed in 3 main groupings. There is about 20–30 km between each of the groupings, providing a buffer around each that may protect them from catastrophic events affecting the others (e.g., disease outbreak, depending on transmission type and vectors). Within each geographic cluster, there are at least two highly or very highly resilient populations, which could serve as sources to naturally recolonize populations lost to catastrophic events. The Hardee-Highlands cluster has the lowest redundancy (two moderately resilient populations, six populations total) and is the most isolated from the other clusters. The Pinellas cluster has the next lowest redundancy of resilient populations (3 highly resilient populations, 4 populations total), and the Hillsborough-Manatee cluster has the highest redundancy (13 resilient populations, 20 populations total). Another factor contributing to redundancy is the wide range of property ownership; with so many managing entities, the species as a whole is buffered against poor management of any one entity (e.g., due to budget issues or changing priorities). Based on the spatial distribution of resilient populations managed by a variety of entities across a narrow range, current redundancy is considered qualitatively to be low to moderate. Rather than solely relying on this rather subjective classification in assessing the current viability of the species characterizing current redundancy is most useful in comparison to redundancy under the future scenarios.

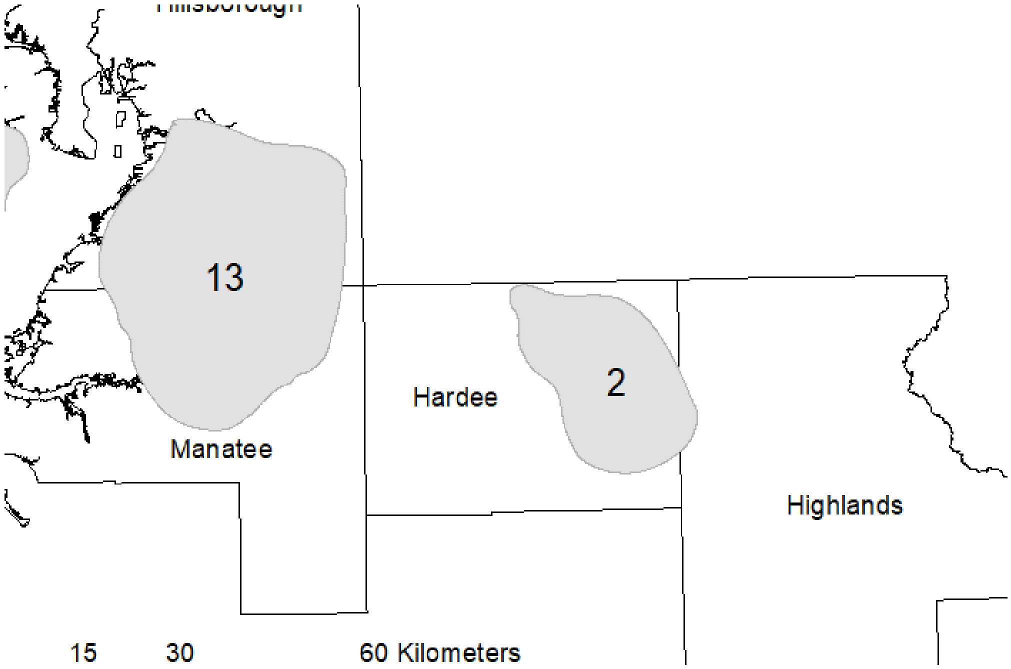

Figure 2. Spatial distribution of Florida golden aster populations in three main geographic clusters across five counties in Florida. The number of populations with high and very high resiliency is shown within each cluster.

Representative units for this species could not be defined based on available data, with representation defined as the ability of the species to adapt to changing environmental conditions. Species experts contributing to the SSA suspect that there might be representative units with different genetic adaptations associated with soil differences, elevation above the water table, fire regime, or habitat structure. However, there are no data currently to confirm or refute these hypotheses. Genetic studies have found little to no genetic clustering among populations, with 80 percent of observed genetic variation occurring within populations, and only 20 percent of the variation attributable to between-population differences (Markham 1998). These results support the existence of a single representative unit for the species. However, that study did not examine genetic markers known to be associated with adaptive traits. Vital rates and morphology were observed to differ between individuals from different source populations that were grown at Bok Tower Gardens and introduced to other sites (Campbell 2008). This observation provides evidence that there might be adaptive differences between different "types" of the Florida golden aster across the species' range. However, without any firm evidence to define representative units, we refrain from doing so here. Future research on the Florida golden aster genetics and life history and habitat differences can provide a more definitive basis for defining representative units in future iterations of the SSA.

Future Condition—Analytical Framework

For the SSA, we developed three plausible future scenarios under which to capture the breadth of all likely future variability and assess the future viability of Florida golden aster in terms of resiliency, redundancy, and representation. Based on expert opinion, the lifespan of the Florida golden aster, ideal fire-return intervals (at least every 10 years), uncertainty about future conditions, and lack of knowledge about aspects of Florida golden aster ecology, we chose to project populations 20 years into the future under each scenario, although some of these projections could be reasonably expected to continue for some time after the 20 years. With approximately 30 years of real data and trends, we project that the same trends will continue into the future for about 20 to 30 years. The three hypothetical future scenarios are Status Quo, Pessimistic, and Targeted Conservation.

In considering development as a threat, for our 20-year future projection we used the SLEUTH (Slope, Land use, Excluded, Urban, Transportation and Hillshade; Jantz et al. 2010, p. 34:1–16) data sets from the years 2020 and 2040 and examined the area predicted, with at least 80 percent probability, to be urbanized. The most important factors identified by species experts to consider into the future were habitat quantity and quality.

Therefore, our assessment was both quantitative, calculating the area within the 5-km buffer surrounding each population that was urbanized at each time point, and qualitative, inspecting the distribution of urbanization and major roads within that area (e.g., is the urbanization concentrated to one side of the population or completely surrounding it?).

With both the quantitative and qualitative assessments, we categorized populations as having either low risk or high risk of development impacting management for Florida golden aster. We defined high risk of impacting management as >50 percent chance of negatively impacting management, and <50 percent for low risk. Populations classified as having low risk from development averaged 7.9 percent developed area within the 5-km buffer by 2040, with a range of 0 to 39 percent developed. Populations classified as having high risk from development averaged 45.5 percent developed area within the same buffer, ranging from 23 to 85 percent. For three populations with a percent of developed area in the overlapping range between the two categories (23 to 39 percent developed), the deciding factor between low risk and high risk was the distribution of development and roads around the population.

Habitat Quantity

Habitat quantity can be negatively impacted by development or land use change (particularly on private lands) or positively impacted by land acquisition, restoration, and introductions into unoccupied sites that already have presumably suitable habitat.

Habitat Quality

Habitat quality is closely tied to active habitat management to maintain openness either by prescribed burning or by other types of management. In constructing our scenarios, we considered two avenues by which future habitat management can be influenced, the level of habitat management effort and the amount and type of development near the Florida golden aster populations (to the extent the development affects the ability to conduct management actions, such as prescribed burns). First, the managing entities can choose their desired level of management effort by implementing (or not) a management plan or by allocating funding or personnel to or away from habitat management among competing priorities and limited resources. For our scenarios, we allowed for three levels of habitat management effort by managing entities. The first was management for stability, a moderate level of management that would be expected to maintain populations at their current size. The other two management levels were an increase, or a decrease, compared to management for stability. An increase in management effort would be expected to grow populations, while a decrease in management would be expected to result in population declines.

The second avenue by which future habitat management can be influenced is development, particularly major roads and types of development associated with "vulnerable" human populations (e.g., schools, hospitals). This kind of development surrounding habitat limits management via prescribed burns by limiting the days that burns can take place—weather conditions have to align to ensure proper smoke management. For example, if a population is surrounded by nearby development to the north and west, it can only be burned when the wind is blowing to the south and east. As more development surrounds populations, there is less flexibility for prescribed burns. However, the appropriate radius around populations within which development might impact management ranges from 0.8 km up to 8.0 km as the appropriate radius depends on a variety of factors for each burn, including the type of development, temperature, humidity, wind conditions, size of the planned burn, risk tolerance of those implementing the burn, and other factors. For the SSA, we chose an intermediate value, 5 km, in which to examine current and predicted future development. In choosing this concrete value, we acknowledged that this number is in reality quite variable, and some burns will need to consider areas greater or less than 5 km away, but this value allowed us to gain a general understanding of the risks of development on managing surrounding populations.

Within a 5-km radius around the Florida golden aster occurrences, we used geographic information systems (GIS) to examine current and projected urbanization and roads. Urbanization data came from the SLEUTH model, and road data was available from the Florida Department of Transportation. The SLEUTH model has previously been used to predict probabilities of urbanization across the Southeastern United States in 10-year increments, and the resulting GIS data are freely available (Belyea and Terrando 2013, entire). For our 20-year future projection, we used the SLEUTH data sets from the years 2020 and 2040 and examined the area predicted, with at least 80 percent probability, to be urbanized. Our assessment was both quantitative, calculating the area within the 5-km buffer surrounding each population that was urbanized at each time point, and qualitative, inspecting the distribution of urbanization and major roads within that area (e.g., is the urbanization concentrated to one side of the population or completely surrounding it?). With this quantitative and qualitative assessment, we categorized populations as having either a low risk or a high risk of development impacting the ability to manage the population.

These two aspects of future management—(1) management resources and willingness of the entity to manage and (2) impacts of surrounding development on management—interacted in our future scenarios in the following way: with decreases in management effort (compared to management for stable populations), population resiliency decreased one level. With management for stability, population resiliency stayed the same as the current condition resiliency when there was low risk of development impacts; but where there was a high risk, resiliency decreased one level, reflecting that management will be more challenging with higher risk from development. With increases in management effort, population resiliency increased when there was low risk of development impacts, but stayed the same when there was a high risk; the increased management effort canceled out the increased risk caused by development.

Future Condition—Future Scenarios

Status Quo

Under the Status Quo scenario, no new protected areas were acquired and no new populations were introduced. Management efforts for all populations were maintained at current levels, assuming that the ability to manage would not be hampered by funding or political issues, climate change, or other factors. As discussed above, currently there are 30 known extant populations, natural and introduced, occurring in 5 counties (Hardee, Highlands, Hillsborough, Manatee, and Pinellas). Of these, 25 populations occur entirely or mostly on 22 protected sites, "protected" referring to a site that was acquired in fee simple and placed into long-term conservation by a nongovernmental, local, State, or Federal entity, or a conservation easement or other binding land agreement by the site owner that shows a commitment to its conservation in perpetuity, and this scenario assumes that that commitment will be honored. Of the introductions since 2008, all had reached sizes >1,000 plants except for the populations at Duette Preserve (2 populations, North and South).

Pessimistic

Under the Pessimistic scenario, management effort on all populations decreased, presumably as an effect of a wide-scale change in priorities or resources, resulting in a drop in resiliency scores across the board. Additionally, based on uncertainty in whether populations on non-protected lands would continue to be managed in a way that is compatible with continued Florida golden aster persistence, in this scenario all populations on non-protected lands were assumed to be lost due to presumed land use or management change. As with the Status Quo scenario, no new protected areas were acquired, and no new populations were introduced.

Targeted Conservation

Under the Targeted Conservation scenario, populations with high and very high resiliency were managed to maintain their rank; in cases where populations had a high risk of development limiting the ability to manage, this involved an increase in management effort compared to what would be needed to maintain the same level of resiliency for a population with a low risk of development impacts. Populations with currently moderate resiliency on protected lands received management effort increases to either move them into the high-resiliency class (low risk from development) or maintain moderate resiliency (high risk from development). Conservation resources were steered towards maintaining and growing these larger populations, and not as much towards rescuing populations that currently have low resiliency. Additionally, five new sites were selected across the species' range in which to introduce new populations, thus improving species redundancy.

Likelihood of Scenarios

Of these three scenarios, the Status Quo scenario is the most likely to occur, although the Targeted Conservation scenario represents a likely future if both habitat-focused management (prescribed burning and mechanical or manual habitat management) by a variety of partners/managing entities and species-specific conservation (captive propagation and introductions) are prioritized and well-funded. The Pessimistic scenario was unlikely; given that Florida golden aster populations span so many different ownerships, it is unlikely that all of the different managing entities will develop the land especially when there are other co-occurring threatened, endangered, and candidate species occupying the same habitat (e.g., Florida scrub-jay, *Aphelocoma coerulescens*; eastern indigo snake, *Drymarchon couperi*; gopher tortoise, *Gopherus polyphemus*). The Targeted Conservation scenario was not likely with current conservation resources, but could reflect a likely future if both habitat-focused management (e.g., prescribed burning) by a variety of partners/managing entities and species-specific conservation (e.g., captive propagation and introductions) are prioritized and well-funded.

Future Resiliency

Future (20 years) resiliency of Florida golden aster populations under three scenarios was summarized in the SSA (Table 3). As implied by the scenario name, resiliency of populations under the Pessimistic scenario was predicted to be poor, with only 7 highly resilient populations, a decrease from 18 currently highly or very highly resilient populations. Under the Status Quo scenario, we expected resiliency to drop to 12 highly or very highly resilient populations due solely to the effect of development limiting the ability to adequately manage habitat. Under the Targeted Conservation scenario, focused management and conservation efforts to counteract detrimental effects of urbanization, grow existing populations, and introduce new populations were expected to result in significant gains in resilient populations, with an increase from 18 to 27 highly or very highly resilient populations expected.

Table 3. Summary of resiliency scores tallied across all populations of Florida golden aster for the current condition and future condition under three hypothetical scenarios: Status Quo, Pessimistic, and Targeted Conservation.

Resiliency Class	Current	Status Quo	Pessimistic	Targeted Conservation
Very High	7	4	0	9
High	11	8	7	18
Moderate	6	11	11	2
Low	6	3	5	2

Likely Extirpated	NA	4	7	4

Future Redundancy and Representation

Redundancy 20 years in the future was expected to decrease compared to current condition under the Status Quo and Pessimistic Scenarios. In all scenarios, the majority of highly and very highly resilient populations were found in Hillsborough and Manatee Counties. All redundancy of highly resilient populations in Pinellas County and the Hardee and Highlands Counties cluster is lost under the Pessimistic scenario. In the Status Quo scenario, where drops in resiliency were due to development risks to management, no highly resilient populations remained in the heavily urbanized Pinellas County. Even in the Targeted Conservation Scenario, redundancy within Pinellas County did not improve, but both the number and distribution of highly resilient populations in the other two clusters did improve.

As in the **Current Condition** section of this preamble, we did not assess representation in the future due to a present lack of information needed to delineate representative units.

Recovery Criteria

Section 4(f) of the Act directs us to develop and implement recovery plans for the conservation and survival of endangered and threatened species unless we determine that such a plan will not promote the conservation of the species. Recovery plans must, to the maximum extent practicable, include “objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions [of section 4 of the Act], that the species be removed from the list.”

Recovery plans provide a roadmap for us and our partners on methods of enhancing conservation and minimizing threats to listed species, as well as measurable criteria against which to evaluate progress towards recovery and assess the species’ likely future condition. However, they are not regulatory documents and do not substitute for the determinations and promulgation of regulations required under section 4(a)(1) of the Act. A decision to revise the status of a species, or to delist a species is ultimately based on an analysis of the best scientific and commercial data available to determine whether a species is no longer an endangered species or a threatened species, regardless of whether that information differs from the recovery plan.

There are many paths to accomplishing recovery of a species, and recovery may be achieved without all of the criteria in a recovery plan being fully met. For example, one or more criteria may be exceeded while other criteria may not yet be accomplished. In that instance, we may determine that the threats are minimized sufficiently and that the species is robust enough that it no longer meets the definition of an endangered species or a threatened species. In other cases, we may discover new recovery opportunities after having finalized the recovery plan. Parties seeking to conserve the species may use these opportunities instead of methods identified in the recovery plan. Likewise, we may learn new information about the species after we finalize the recovery plan. The new information may change the extent to which existing criteria are appropriate for identifying recovery of the species. The recovery of a species is a dynamic process requiring adaptive management that may, or may not, follow all of the guidance provided in a recovery plan.

The recovery plan for the Florida golden aster was issued by the Service on August 29, 1988. The primary objective of the recovery plan was to provide sufficient habitat for the Florida golden aster, both through protection of the sites and proper vegetation management. The plan called for establishment of new populations of the species. Reclassification of this species to threatened could be considered if 10 geographically distinct populations were established in its 3 native counties. Delisting could be considered if 20 such populations were secured (USFWS 1988, p. 3). Currently, Florida golden aster occurs in 30 geographically distinct populations across 5 counties, and 18 of these populations are high or very high resiliency, as consistent with delisting criteria (see Table 2 in discussion above).

Determination of Florida Golden Aster Status

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of "endangered species" or "threatened species." The Act defines an endangered species as a species that is "in danger of extinction throughout all or a significant portion of its range," and a threatened species as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." For a more detailed discussion on the factors considered when determining whether a species meets the definition of an endangered species or a threatened species and our analysis on how we determine the foreseeable future in making these decisions, please see Analytical Framework, above.

Status Throughout All of Its Range

After evaluating threats to the species and assessing the cumulative effect of the threats under section 4(a)(1) factors, we find that the present or threatened destruction, modification, or curtailment of its habitat (Factor A), which was the basis for listing the species, is no longer a threat. At the time of listing, Florida golden aster was thought to persist only in Hillsborough County. Now, the species is known to occur in four additional counties: Hardee, Highlands, Mantee, and Pinellas Counties. While destruction and modification of habitat is still the primary threat, its magnitude has been greatly reduced since listing. Further, under the recovery plan for the species, delisting could be considered if 20 populations were secured. The number of known extant populations (NatureServe 2004) has increased from 9 (1986) to 30 (2017) as a result of additional surveys, habitat restoration, and outplanting within the historical range of the species. Of those 30 populations, 25 are located on protected conservation lands, 22 of which have been determined to have at least moderate resiliency. We expect current levels of management to continue on these conservation lands at these locations and anticipate the number of individuals within the populations to increase. Thus, after assessing the best available information, we conclude that the Florida golden aster no longer meets the Act's definition of an endangered species.

For the determination of whether the species is likely be become endangered within the foreseeable future throughout all of its range, and thus meet the definition of a threatened species, we considered the “foreseeable future” as 20 years into the future under the three hypothetical future scenarios. Under all three scenarios evaluated, Florida golden aster is expected to continue to persist across its currently known range. Under the status quo scenario, which is also the most likely to occur, 12 populations are projected to be high/very high resiliency and 11 moderate—across all 3 geographic clusters, as habitat modification is no longer a threat for the populations on protected lands and current management of those lands is expected to continue. Four populations (3 natural and 1 introduced), currently in low condition are projected to become extirpated. Even under the Pessimistic scenario, which is least likely to occur, 7 populations are projected to be in high condition and 11 in moderate condition, all on protected lands with conservation management expected to continue at some level. Given that the majority of populations projected to remain extant, and with at least moderate resiliency, at the end of the projection period are on protected lands managed for scrub habitat, it is unlikely the species will become endangered in the foreseeable future throughout all of its range.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. Because we have determined that the species is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we will consider whether there are any significant portions of its range in which the species is in danger of extinction or likely to become so in the foreseeable future—that is, whether there is any portion of the species’ range for which both (1) the portion is significant; and, (2) the species is in danger of extinction now or likely to become so in the foreseeable future in that portion. Depending on the case, it might be more efficient for us to address the “significance” question or the “status” question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question for a certain portion of the species’ range, we do not need to evaluate the other question for that portion of the species’ range.

For Florida golden aster, we chose to evaluate the status question (i.e., identifying portions where Florida golden aster may be in danger of extinction or likely to become so in the foreseeable future) first. We considered whether the threats are geographically concentrated in any portion of the species' range at a biologically meaningful scale now or in the foreseeable future. We examined the following threats: development and climate change, including cumulative effects. Currently, there are 30 known extant Florida golden aster populations occurring in 5 counties (Hillsborough, Manatee, Pinellas, Highlands, and Hardee Counties) with 25 of these populations occurring on conservation lands (Federal, State, and conservation easements). Climate change, as discussed above, is primarily acting upon the species across its range, except for sea level rise, which would only potentially affect one population at Fort De Soto County Park in Pinellas County. As this would potentially impact just a single population out of 30 populations, we do not consider this concentration of threats to be at a biologically meaningful scale.

Although development is currently concentrated in Pinellas County, that activity would negatively impact in the foreseeable future only five populations, which occur on private lands or along roadways or railroad lines. However, two of these populations have high and moderate resiliency (the remaining three populations have low resiliency), and this pattern will continue in the future. The Pinellas County populations are currently in low condition, and some may become extirpated in the foreseeable future due to development. Therefore, our examination leads us to find that there is substantial information that the Pinellas County populations may become in danger of extinction within the foreseeable future.

We then proceeded to consider whether this portion of the range (i.e., the Pinellas County populations) is significant. For the purposes of this analysis, the Service is considering significant portions of the range by applying any reasonable definition of "significant." We assessed whether any portions of the range may be biologically meaningful in terms of the resiliency, redundancy, or representation of the entity being evaluated. This approach is consistent with the Act, our implementing regulations, our policies, and case law.

Currently, the Pinellas County populations are introduced populations and represent a small portion (less than 10 percent based on current extant populations) of the species' range. Further, these populations were all introduced after listing (i.e., are not naturally occurring populations) and are not contributing much to the viability of the species. If these populations become extirpated, the Florida golden aster would lose some redundancy, but the loss of this portion of the species' range would still leave sufficient resiliency (populations with moderate to high resiliency), redundancy, and representation in the remainder of the species' range such that it would not notably reduce overall viability of the species. Therefore, these populations do not represent a significant portion of the species' range.

. We conclude that the Florida golden aster is not in danger of extinction nor likely to become so in the foreseeable future in a significant portion of its range. This approach is consistent with the courts' holdings in *Desert Survivors* v. *Department of the Interior*, No. 16-cv-01165-JCS, 2018 WL 4053447 (N.D. Cal. Aug. 24, 2018), and *Center for Biological Diversity* v. *Jewell*, 248 F. Supp. 3d, 946, 959 (D. Ariz. 2017).

Determination of Status

Our review of the best available scientific and commercial data available indicates that Florida golden aster is not in danger of extinction nor likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Therefore, we find that Florida golden aster does not meet the definition of an endangered or threatened species, and we propose to remove Florida golden aster from the List.

Effects of this Proposed Rule

This proposal, if made final, would revise 50 CFR 17.12(h) to remove Florida golden aster from the Federal List of Endangered and Threatened Plants. The prohibitions and conservation measures provided by the Act, particularly through sections 7 and 9, would no longer apply to this species. Federal agencies would no longer be required to consult with the Service under section 7 of the Act in the event that activities they authorize, fund, or carry out may affect Florida golden aster. There is no critical habitat designated for this species.

Post-Delisting Monitoring

Section 4(g)(1) of the Act requires us to monitor for not less than 5 years the status of all species that are delisted due. Post-delisting monitoring (PDM) refers to activities undertaken to verify that a species delisted due to recovery remains secure from the risk of extinction after the protections of the Act no longer apply. The primary goal of PDM is to monitor the species to ensure that its status does not deteriorate, and if a decline is detected, to take measures to halt the decline so that proposing it as a threatened or endangered species is not again needed. If at any time during the monitoring period, data indicate that protective status under the Act should be reinstated, we can initiate listing procedures, including, if appropriate, emergency listing. At the conclusion of the monitoring period, we will review all available information to determine if re-listing, the continuation of monitoring, or the termination of monitoring is appropriate.

Section 4(g) of the Act explicitly requires that we cooperate with the States in development and implementation of PDM programs. However, we remain ultimately responsible for compliance with section 4(g) and, therefore, must remain actively engaged in all phases of PDM. We also seek active participation of other entities that are expected to assume responsibilities for the species' conservation after delisting.

Concurrent with this proposed delisting rule, we announce the draft PDM plan's availability for public review at *http://www.regulations.gov* under Docket Number FWS–R4–ES–2019–0071. We seek information, data, and comments from the public regarding Florida golden aster and the PDM plan. We are also seeking peer review of the draft PDM plan concurrently with this comment period. We anticipate finalizing the PDM plan, considering all public and peer review comments, prior to making a final determination on the proposed delisting rule.

Required Determinations

Clarity of the Proposed Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all proposed rules in plain language. This means that each proposed rule we publish must:

(a) Be logically organized;

(b) Use the active voice to address readers directly;

(c) Use clear language rather than jargon;

(d) Be divided into short sections and sentences; and

(e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**. To better help revise the proposed rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act need not be prepared in connection with determining and implementing a species' listing status under the Endangered Species Act. We published a notice outlining our reasons for this determination in the *Federal Register* on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments" (59 FR 22951), Executive Order 13175, and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. There are no Tribal interests affected by this proposal.

References Cited

A complete list of references cited is available on the Internet at *http://www.regulations.gov* under Docket Number FWS–R4–ES–2019–0071.

Authors

The primary authors of this proposed rule are staff members of the Service's Southeastern Region Recovery Team and the North Florida Ecological Services Field Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

§ 17.12 [Amended]

2. Amend § 17.12(h) by removing the entry for "*Chrysopsis floridana*" under "FLOWERING PLANTS" on the List of Endangered and Threatened Plants.

Martha Williams,

Principal Deputy Director,

Exercising the Delegated Authority of the Director,

U.S. Fish and Wildlife Service.

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