Pigeon wings (*Clitoria fragrans*)

5-Year Status Review: Summary and Evaluation

Photo by Steven Long

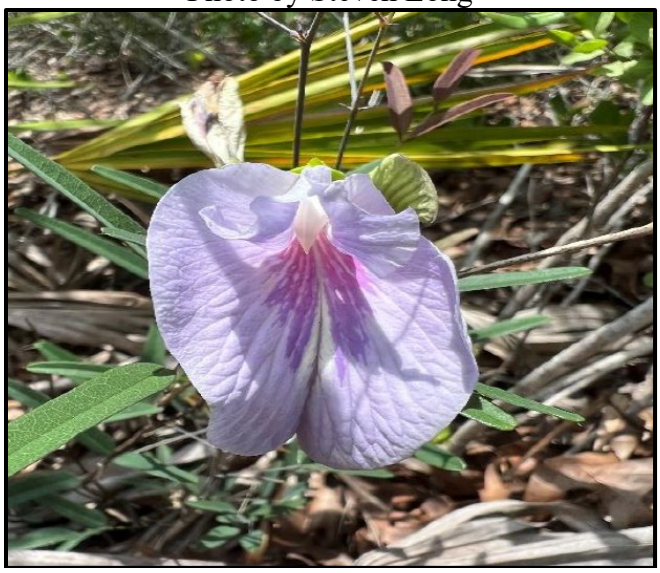

Photo by Olivia Wetsch

U.S. Fish and Wildlife Service
Southeast Region
Florida Ecological Services Field Office
Vero Beach, Florida

March 2025

5-YEAR STATUS REVIEW
Pigeon wings *(Clitoria fragrans)*

GENERAL INFORMATION

Current Classification: Threatened

Lead Field Office: Florida Ecological Services Field Office, Emily Bauer, (772) 226-8133

Review Author(s): Emily Bauer, Florida Ecological Services Field Office, Emily_Bauer@fws.gov

Reviewers:

Lead Regional Office: Southeast Region, Carrie Straight, (404) 679-7226

Date of original listing: May 27, 1993 (Effective Date); April 27, 1993 (58 FR 25746, Publication Date)

Methodology used to complete the review: In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants (50 CFR 424.11). The U.S. Fish and Wildlife Service (Service) evaluated the best available information about pigeon wings' biology, habitat, and threats to inform this status review. We announced initiation of this review in the Federal Register on June 6, 2024 (89 FR 48437), with a 60-day comment period and received no comment(s). The primary sources of information used in this analysis were the 1993 final listing rule (58 FR 25746), the 1999 recovery plan, peer-reviewed reports, agency reports, unpublished survey data and reports, and personal communication with recognized experts. This review was completed by the Service's Florida Ecological Services Field Office, Vero Beach, Florida. All literature and documents used for this review are on file at the field office. All recommendations resulting from this review are the result of thoroughly reviewing the best available information on pigeon wings, along with information and data received from state agencies.

FR Notice citation announcing the species is under active review: June 6, 2024 (89 FR 48437)

Species' Recovery Priority Number at start of 5-year review (48 FR 43098): 14. A recovery priority number of "14" indicates that this is a species with a low degree of threat and high recovery potential.

Review History: Previous 5-year reviews recommending no change in status were published on September 15, 2008 (Service 2008), and December 22, 2020 (Service 2020).

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature
The Integrated Taxonomic Information System (2024) uses the common names sweetscented pigeonwings and pigeon wings (*Clitoria fragrans*) and indicates that the taxonomy for the species is still valid. We are not aware of any changes to the taxonomy of this entity, and it is still considered valid by the Service.

Distinct Population Segment (DPS) (61 FR 4722)
The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listing of a DPS to only vertebrate species. Because the species under review is not a vertebrate, the DPS policy is not applicable.

Recovery Criteria

Recovery Plan or Outline
South Florida Multi-Species Recovery Plan, May 18, 1999 (Service 1999)

Recovery plans are not regulatory documents and are intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. If the recovery criteria defined in the plan are still valid, meeting recovery criteria can indicate that the species no longer requires protections under the Act. However, when recommending whether a listed species should be delisted, the Service must apply the factors in section 4(a) of the Act (84 FR 45020).

Clitoria fragrans may be delisted when: 1) enough demographic data are available to determine the appropriate numbers of self-sustaining populations and sites needed to ensure 95 percent probability of persistence for 100 years; 2) when these sites, within the historic range of *C. fragrans*, are adequately protected from habitat loss, degradation, and fragmentation; 3) when these sites are managed to maintain the ecotone between xeric oak scrub and high pine that supports *C. fragrans*; and 4) when monitoring programs demonstrate that populations of *C. fragrans* on these sites support the appropriate numbers of self-sustaining populations, and those populations are stable throughout the historic range of the species.

These criteria for pigeon wings have only partially been met. Although most of the populations occur on protected and managed sites, population trends and the numbers of self-sustaining populations and sites needed for a 95 percent probability of persistence is not known. To fully meet these criteria, more data is needed on long-term population trends and the appropriate fire return interval.

Biology and Habitat Summary

A detailed review of the species biology and habitat information can be found in the listing rule (58 FR 25746; Service 1993), Recovery Plan (Service 1999), and previous 5-year review

(Service 2020). Pigeon wings is a soil generalist, occurring on a yellow, white, and gray sands (Menges et al. 2007b; Orzell 2008, pers. comm.; Stout 2008a, pers. comm.), although mainly on yellow sands (Menges et al. 2019). It occurs in a range of xeric upland habitats on the Lake Wales, Winter Haven, and Bombing Range Ridges and on xeric upland sites west of Bombing Range Ridge within Avon Park Air Force Range. Generally, its habitats are sandhill, turkey oak barrens, and scrub (Menges et al. 2019). On the southern third of the Lake Wales Ridge (i.e., the part within Highlands County), it occurs primarily on yellow sands (e.g., Astatula, Paola, and Tavares) in sandhill and oak-hickory scrub, but also on moderately well-drained white sands (Archbold) and on gray sands (Satellite) (Menges et al. 2007a). On the Lake Wales Ridge in Polk and Lake Counties, it is also known from yellow, white, and gray sands. On Avon Park Air Force Range, it is recorded from four gray sand types (Daytona, Narcoossee, Zolfo, and Duette), primarily in sandhill and oak scrub (Orzell 2008, pers. comm.; Stout 2008a, pers. comm.). Orzell reported a small population at Avon Park Air Force Range on Satellite soil (Stout 2008b, pers. comm.).

Pigeon wings is a long-lived (> 5 years) perennial that can undergo belowground dormancy (Weekley 2008, pers. comm.). The species can produce both cleistogamous (self-pollinated) and chasmogamous (cross-pollinated) flowers (Lewis 2007). Overall flower and fruit production is low and the ratio of cleistogamous to chasmogamous flowers can vary through time (Lewis 2007; Faivre 2008, pers. comm.; Weekley 2008, pers. comm.). Generally, populations tend to increase markedly and flower profusely following fire but then decline with time-since-fire (Lewis 2007; Weekley 2008, pers. obs.; Rosner-Katz 2019, pers. comm.). High percent flowering observed in postburn plants suggests they are more likely resprouts than seedling recruits (Weekley 2008, pers. obs.).

Florida Natural Areas Inventory (2024) reported 63 extant populations (this excludes 10 historical, 1 possibly extirpated, and 2 extirpated occurrences) of pigeon wings; however, 24 (38 percent) of these populations have not been observed in over two decades. Pigeon wings occurs on protected lands at 53 (84 percent) of the reported populations. In comparison, the previous 5-year review (Service 2020) reported 45 extant populations (excluding 2 extirpated and 17 historical occurrences) all on protected lands. Florida Natural Areas Inventory (2024) also ranked the estimated viability of the reported populations based on size and condition of the population and the condition of the surrounding landscape. Of the 46 populations that were assigned a viability ranking, 38 (83 percent) had an estimated viability from fair to excellent.

Lake Wales Ridge State Forest conducts Levels 1 and 3 monitoring and habitat management including oak reduction and controlled burns as staffing allows. Annual survival at Lake Wales Ridge State Forest is relatively high, ranging from 80.4 to 95.2 percent, with generally stable subpopulation sizes (Florida Department of Agriculture and Consummer Services [FDACS] 2023).

We are not aware of any other additional new biology or habitat information since the most recent species review that impacts the status of the species, and all of information provided in the last 5-year review remains valid (Service 2020).

Threats (Five-Factor Analysis) Summary

The status of a species is determined from an assessment of factors specified in section 4 (a)(1) of the Act, including: Factor A: the present or threatened destruction, modification, or curtailment of its habitat or range; Factor B: overutilization for commercial, recreational, scientific, or educational purposes; Factor C: disease or predation; Factor D: the inadequacy of existing regulatory mechanisms; Factor E: other natural or manmade factors affecting its continued existence. A summary of this assessment is detailed below.

Factor A (Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range): As identified in the previous 5-year review (Service 2020), habitat loss through development and land conversion, inadequate fire management, and non-native plant species continue to remain threats for pigeon wings throughout its range. Development and land conversion are especially likely on private or non-conservation lands (Carr and Zwick 2016). Even on protected conservation sites, inadequate habitat management remains a threat.

Factor B (Overutilization for Commercial, Recreational, Scientific, or Educational Purposes): We have no indication that overutilization for commercial, recreational, scientific, or educational purposes poses a significant threat for the species.

Factor C (Disease or Predation): As identified in the previous 5-year review (Service 2020), researchers have noted heavy herbivory on leaves, flowers, and fruits by insects and complete predation of whole plants by vertebrates (Stout and Lewis 2004; Lewis 2007; Faivre 2008, pers. comm.; Weekley 2008, pers. obs.). It is well known that both invertebrate and vertebrate herbivory of plants can severely impact the fecundity and reproductive output at both the individual (Amsberry and Maron 2006) and population level (Maron and Crone 2006). However, the population level impact of predation specifically on pigeon wings has not been determined. We have no indication that disease poses a significant threat for the species.

Factor D (Inadequacy of Existing Regulatory Mechanisms): Pigeon wings is listed as endangered by the State of Florida on the Regulated Plant Index (FDACS Rule 5B-40). This law regulates the taking, transport, and sale of listed plants. However, property owners are not prohibited from destroying populations of listed plants nor are they required to manage habitats to maintain populations. In conclusion, there are no existing regulatory measures that reduce or remove the threat of loss of populations or removal/destruction of plants on private property and existing regulatory mechanisms are inadequate to protect this species.

Factor E (Other Natural or Manmade Factors): As identified in the previous 5-year review (Service 2020), isolated populations within a limited and fragmented geographic range and climate change are threats for pigeon wings. Pigeon wings occurs within a relatively limited geographic range that is highly fragmented, and remaining scrub areas that provide habitat for pigeon wings have become more isolated from each other, thereby making adequate resiliency, redundancy, and representation more challenging. Florida's average annual temperature has risen more than 2 degrees Fahrenheit (˚F) since 1900 and estimates project further increases between 2.3–11.4˚F by 2100, depending on the greenhouse gas emission rates and the region in Florida (Runkle et al. 2022). Summer precipitation is projected to decrease throughout the range of the species. In addition, the higher projected temperatures would increase the rate of soil moisture

loss, exacerbating the risk of drought conditions (Runkle et al. 2022). Scrub species, in general, can tolerate drought conditions, but it is unclear how this anticipated future threat will fully affect species like pigeon wings or the ability to implement appropriate habitat management including prescribed fire.

Synthesis

Pigeon wings occurs in xeric upland scrub within a limited and fragmented geographic range in central Florida. Significant improvement has been made since the time of listing in the acquisition of protected sites, with most (84 percent) of the reported populations now occurring within protected areas. However, more than one-third (38 percent) of the reported pigeon wings populations have not been observed in over 20 years, and their status is largely unknown. Additional surveys are needed to assess the status of these populations. While habitat management, including prescribed fire and oak thinning, is conducted on some of the protected sites with extant populations as staffing and funding allows, lack of appropriate habitat management continues to be a threat for the species. Additionally, the limited geographic range and isolated populations due to habitat loss and fragmentation present additional risk for pigeon wings. Anticipated climate change factors such as altered temperature and precipitation patterns will likely worsen these threats. Due to the probability of continued population losses at unprotected sites and the lack of adequate habitat management at many sites, pigeon wings continues to meet the definition of threatened under the ESA.

RECOMMENDED FUTURE ACTIVITIES

- Quantitative surveys (e.g., Weekley et al. 2001; Stout and Lewis 2006; Malatesta 2008, pers. comm.) of pigeon wings populations at several sites to establish the basis for level 2 monitoring (*sensu* Menges and Gordon 1996) to track changes in population size over time and in response to management treatments. These surveys should be repeated at defined intervals (e.g., annually, bi-annually, every five years; both before and after imposition of management treatments) and take place within well-defined areas (e.g., within plots small enough to be searched thoroughly and thereby reduce inconsistencies in sampling intensity).
- Where monitoring is being conducted, data should be collected on fire and other management activities to aid in the interpretation of trends and to identify the most favorable treatments.
- Conduct surveys to assess the status of populations that occur on unprotected sites and to evaluate the feasibility of protecting additional pigeon wings populations. Any new populations discovered should be added to the Florida Natural Areas Inventory database.
- Demographic data need to be collected across the full geographic range of pigeon wings, from both scrub and high pine habitats, and from populations responding to contrasting management treatments (e.g., fire alone vs. various mechanical treatments being used as a substitute or pre-treatment to fire). Demography needs to be related to fire management parameters, including fire frequency, time-since-fire, fire intensity, and fire patchiness.
- As we learn more about the fire requirements of pigeon wings**,** prescriptions should be adjusted to a frequency and intensity appropriate to avoid habitat degradation.
- Study the seed production, seedling establishment, and seedling survival at various populations.
- Study the floral biology, pollination ecology, and demography in detail throughout the

species' range, including comparison of pollinator numbers to chasmogamous flowers at different populations.
- Careful data collection is needed to further investigate plant dormancy, which may be an important trait allowing persistence at a site through unfavorable times.
- The extent of invertebrate and vertebrate predation on pigeon wings needs to be quantified.
- Genetic studies should be conducted to understand the genetic diversity of the species; this may aid in the identification of new acquisition needs.

REFERENCES

Amsberry, L.K., and J.L. Maron. 2006. Effects of herbivore identity on plant fecundity. Plant Ecology 187:39-48.

Carr, M. H., and P.D. Zwick. 2016. Florida 2070. Mapping Florida's Future – Alternative Patterns of Development in 2070. University of Florida. Gainesville, Florida.

Faivre, A.E. 2008. Personal communication. Cedar Crest College. Email attachment of 18 April 2008.

Florida Department of Agriculture and Consumer Services (FDACS). 2023. Lake Wales Ridge Scrub Plant Monitoring and Management, Florida Statewide Endangered and Threatened Plant Conservation Program 2023 Annual Report from Lake Wales Ridge State Forest. 129 pp.

Florida Natural Areas Inventory. 2024. Element Occurrence and Geodatabase. Florida Natural Areas Inventory, Tallahassee, FL.

Integrated Taxonomic Information System. 2024. https://www.itis.gov/ Website Accessed 8 August 2024.

Lewis, M.N. 2007. Life history and reproductive biology of *Clitoria fragrans* relative to fire history on the Avon Park Air Force Range. Masters Thesis, University of Central Florida, Orlando, FL. 44 pp.

Malatesta, A.R. 2008. Personal communication. Florida Division of Forestry. Email of 16 April 2008.

Maron, J.L., and E. Crone. 2006. Herbivory: effects on plant abundance, distribution and population growth. Proceedings of the Royal Society of London, Biological Sciences 273:2575-2584.

Menges, E.S., and D.R. Gordon. 1996. Three levels of monitoring intensity for rare plant species. Natural Areas Journal 16:227-237.

Menges, E.S., S.M. Koontz, K.T. Charton, and S.A. Smith. 2019. Rare plant biology and management on the Lake Wales Ridge. Report to Florida Fish and Wildlife Conservation Commission. May 2019. 63 pp.

Menges, E.S., C.W. Weekley, S.I. Hamzé, and R.L. Pickert. 2007a. Soil preferences for federally-listed plants on the Lake Wales Ridge in Highlands County, Florida. Florida Scientist 70:24-39.

Menges, E.S., C.W. Weekley, G.L. Clarke, and S.A. Smith. 2007b. Further demographic research on five state-listed Lake Wales Ridge endemic plants. Annual report to the Endangered and Threatened Plant Conservation Grants Program, Division of Plant Industry, Tallahassee, FL. 88 pp.

Orzell, S.L. 2008. Personal communication. Avon Park Air Force Range. 14 April 2008.

Rosner-Katz, H. 2019. Personal communication. Florida Department of Agriculture and Consumer Services. 23 August 2019.

Runkle, J., K. Kunkel, S. Champion, R. Frankson, B. Stewart, W. Sweet, and S. Rayne. 2022. Florida State Climate Summary. NOAA Technical Report NESDIS 150-FL. 5 pp.

Stout, I.J. 2008a. Personal communication. University of Central Florida. Email correspondence from 22 April 2008.

Stout, I.J. 2008b. Personal communication. University of Central Florida. Email of 1 July 2008.

Stout, I.J., and M.N. Lewis. 2004. Monitor rare and endangered plants at Avon Park Air Force Base, Florida. Quarterly report October 1 – December 31 to Avon Park Air Force Range, FL. 4 pp.

Stout, I.J., and M.N. Lewis. 2006. Monitor rare and endangered plants at Avon Park Air Force Base, Florida. Biannual report to Avon Park Air Force Range, FL. 6+ pp.

U.S. Fish and Wildlife Service (Service). 1993. Endangered and Threatened Wildlife and Plants; Endangered of Threatened Status for Seven Central Florida Plants. Final Rule. Federal Register 58:25746-25755.

U.S. Fish and Wildlife Service (Service). 1999. South Florida multi-species recovery plan. U.S. Fish and Wildlife Service, Atlanta, GA. 2178 pp.

U.S. Fish and Wildlife Service (Service). 2008. Pigeon wings (*Clitoria fragrans*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Vero Beach, FL. 18 pp.

U.S. Fish and Wildlife Service (Service). 2020. Pigeon wings (*Clitoria fragrans*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Vero Beach, FL. 22 pp.

Weekley, C.W. 2008. Personal communication. Archbold Biological Station. 20 May 2008.

Weekley, C.W. 2008. Personal observation. Archbold Biological Station. 2 June 2008.

Weekley, C.W., S.I. Hamzé, R.L. Pickert, and E.S. Menges. 2001. GPS/GIS mapping of federally-listed scrub plants of the Lakes Wales Ridge in Highlands County, Florida. Final report to U.S. Fish and Wildlife Service Office, Jacksonville, FL. 14+ pp.

U.S. Fish and Wildlife Service
Status Review of Pigeon Wings (*Clitoria fragrans*)

Status Recommendation: On the basis of this review, we recommend the following status for this species (50 CFR § 424.11). A 5-year review presents a recommendation of the species status. Any change to the status requires a separate rulemaking process that includes public review and comment, as defined in the Act.

__X__ No change needed.

FIELD OFFICE APPROVAL:

Acting Division Manager, Florida Ecological Services Field Office, U.S. Fish and Wildlife Service

Approve NICOLE COLANGELO Digitally signed by NICOLE COLANGELO Date: 2025.03.24 10:08:26 -04'00' Date _____

* In the Florida Ecological Services Field Office, the Classification and Recovery Division Manager has delegated authority to approve 5-year reviews that do not recommend a status change.