

# Species Status Assessment

|                        |                              |                      |                    |
|------------------------|------------------------------|----------------------|--------------------|
| <b>Common Name</b>     | green gentian                | <b>Date Updated:</b> | 2024-03-15         |
| <b>Scientific Name</b> | <i>Frasera caroliniensis</i> | <b>Updated By:</b>   | Gregory J. Edinger |
| <b>Family</b>          | Gentianaceae                 |                      |                    |

**Species Synopsis** (a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):

Green gentian (*Frasera caroliniensis*), also called columbo and American columbo, is a perennial forb/herb in the Gentian Family (Gentianaceae). *Frasera caroliniensis* is the only native species of *Frasera* in NY (Werier et al. 2023).

Green gentian ranges from Michigan, southern Ontario, and western New York southward to South Carolina and northern Georgia, and westward Illinois, Missouri, eastern Oklahoma, and Louisiana. Currently there are 17 populations in western New York, the majority of them in Letchworth State Park, with about 20,000 plants counted statewide between 1985 and 2020. There are about ten historical populations (all last observed before 1967) and one population has been extirpated. Green gentian prefers forested slopes, bluffs, and ridges on calcareous soils that are often a dry, clay-loam or shale (NYNHP 2023, 2024).

Those populations of green gentian on unprotected land may be threatened by logging in the future if it is unrestricted. Some populations at Letchworth State Park have been reduced in recent years but most of the populations in the state are stable at this time. Invasive plant species around some of the populations may affect their future viability, but the ability of green gentian to outcompete invasive plants is unknown (NYNHP 2023, 2024).

## I. Status

### a. Current legal protected Status

|                      |                   |                   |  |
|----------------------|-------------------|-------------------|--|
| <b>i. Federal:</b>   |                   | <b>Candidate:</b> |  |
| <b>ii. New York:</b> | <u>Threatened</u> |                   |  |

### b. Natural Heritage Program

|                      |           |                          |                         |
|----------------------|-----------|--------------------------|-------------------------|
| <b>i. Global:</b>    | <u>G5</u> |                          |                         |
| <b>ii. New York:</b> | <u>S2</u> | <b>Tracked by NYNHP?</b> | On Active Tracking List |

### Other Ranks:

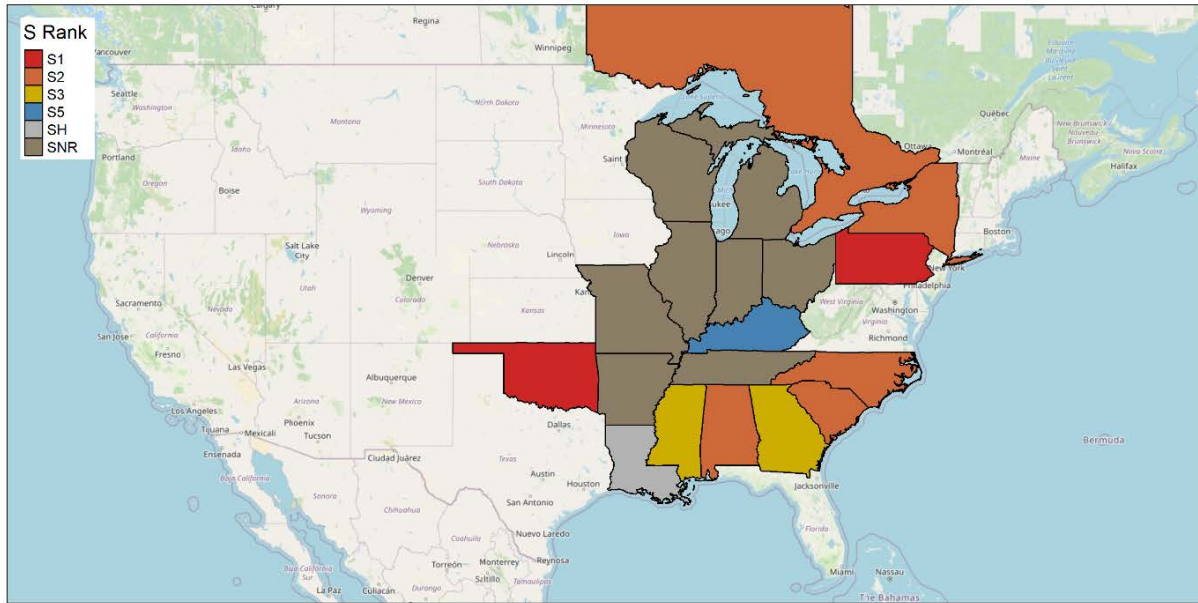
COSEWIC: Endangered/En voie de disparition  
IUCN Red List: Not assessed by IUCN Red List

### Status Discussion:

*Frasera caroliniensis* is Threatened in New York (Ring 2023). Currently there are 17 populations in western New York, the majority of them in Letchworth State Park, with about 20,000 plants counted statewide between 1985 and 2020. There are about ten historical populations (all last observed before 1967) and one population has been extirpated. Presently the populations are stable but threats from logging and invasive plants may reduce their abundance (NYNHP 2023, 2024).

## II. Abundance and Distribution

| Region          | Present? | Abundance | Distribution | Time Frame | Listing status or S-Rank | SGCN? |
|-----------------|----------|-----------|--------------|------------|--------------------------|-------|
| North America   | Yes      | Unknown   | Unknown      | Unknown    |                          |       |
| Northeastern US | Yes      | Unknown   | Unknown      | Unknown    |                          |       |
| New York        | Yes      | Unknown   | Unknown      | Unknown    | T                        |       |
| Connecticut     | No       | -         | -            | -          |                          |       |
| Massachusetts   | No       | -         | -            | -          |                          |       |
| New Jersey      | No       | -         | -            | -          |                          |       |
| Pennsylvania    | Yes      | Unknown   | Unknown      | Unknown    | S1                       |       |
| Vermont         | No       | -         | -            | -          |                          |       |
| Ontario         | Yes      | Unknown   | Unknown      | Unknown    | S2                       |       |
| Quebec          | No       | -         | -            | -          |                          |       |



**Figure 11:** *Frasera caroliniensis* North American distribution.

| Percent of North American Range in NY | Classification of NY Range | Distance to core population, if not in NY |
|---------------------------------------|----------------------------|---|
| 1-25%                                 | Peripheral                 | Unknown                                   |

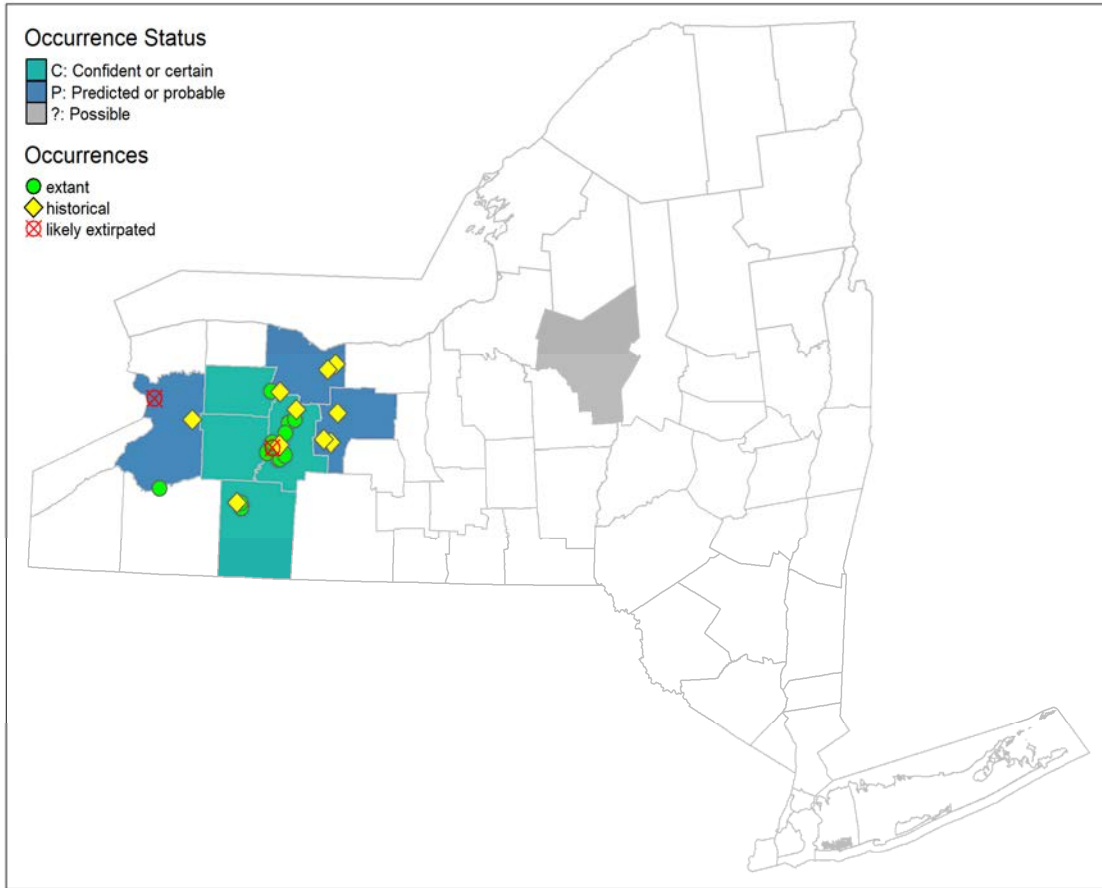
### III. NY Rarity and Trends

#### Trends Discussion

Some populations at Letchworth State Park have been reduced in recent years but most of the populations in the state are stable at this time. Populations on unprotected land may be threatened by logging in the future if it is unrestricted. The long-term trends are not currently known. More surveys and review of historical populations are needed to determine the long-term trends in NY.

#### Details of historic and current occurrence

Green gentian ranges from Michigan, southern Ontario, and western New York southward to South Carolina and northern Georgia, and westward Illinois, Missouri, eastern Oklahoma, and Louisiana. This plant is limited to western New York, particularly on bluffs and ridges adjacent to large streams (NYNHP 2023, 2024).



**Figure 22:** NYS distribution for *Frasera caroliniensis*.

**Table 1.** Number of records (element occurrences) of *Frasera caroliniensis* grouped by the dates known to be extant (the years spanning first observation to last observation) and the number and percent of total of USGS 7.5 minute map quadrangles these observations fall within for New York State.

| Years     | # of Records | # of distinct quads | % of quads in State |
|-----------|--------------|---------------------|---------------------|
| Pre-1995  | 29           | 26                  | 2.6                 |
| 1995-2004 | 8            | 3                   | 0.3                 |
| 2005-2014 | 9            | 4                   | 0.4                 |
| 2015-2023 | 5            | 3                   | 0.3                 |

### Monitoring in New York

Six extant populations of green gentian occur on State Park land and are monitored on a ten-year rotation. None of the other populations have been regularly monitored. One population is on NYS DEC land. The 17 extant occurrences were last observed between 1990 and 2020 with seven of those being last surveyed before 1994 (NYNHP 2023, 2024).

#### **IV. Primary Habitat or Community Type** (from NY crosswalk of NE Aquatic, Marine, or Terrestrial Habitat Classification Systems):

NatureServe broad habitat types: Forest/Woodland, Forest - Mixed, Forest – Hardwood

NYNHP Ecological Communities: Appalachian oak-hickory forest, Appalachian oak-pine forest, Maple-basswood rich mesic forest, Successional shrubland, Beech-maple mesic forest (Edinger et al. 2014, NYNHP 2023, 2024)

#### **Habitat or Community Type Trend in New York**

**Declining:**                      **Stable:**                      **Increasing:**                      **Unknown:** ✓  
**Time Frame of Decline/Increase:**  
**Habitat Specialist**    **Yes:** ✓                      **No:**

#### **Habitat Discussion:**

Green gentian prefers forested slopes, bluffs, and ridges on calcareous soils that are often a dry, clay-loam or shale (NYNHP 2023, 2024). Open deciduous woods on calcareous soils (Rhoads and Block 2000). Dry (oak, hickory, sassafras) or sometimes moist woods and openings (Voss 1996). Rich woods (Gleason and Cronquist 1991). Dryish meadows, rich woods, and calcareous slopes (Fernald 1950). Upland deciduous forest, particularly near the margins and in clearings.

#### **V. Species Demographics and Life History** (include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):

“In the life cycle of *Frasera caroliniensis* Walt., seed germination, seedling establishment, bud dormancy break, rosette expansion and bolting occur before the canopy closes in early May. Flowering occurs from early May to mid-June, and seeds are mature by early to mid-August; most of the seeds are dispersed during late autumn and winter. Senescence of the flowering stalk and/or rosette occurs from mid-June to late August. Temperature and precipitation can cause variations in the timing of phenological events. Plants of *F. caroliniensis* are monocarpic, but they live for many years before flowering. Factors which stimulate flowering are unknown. Size alone does not appear to be the sole determinant of whether or not a plant will flower in a given year. Although plants must grow to a certain minimum size before they can flower, not all plants flower when they reach this minimum size. Thus, there is an overlap in sizes of flowering and nonflowering plants. Green gentian is a long-lived monocarpic perennial. It lives for up to 30 years as a cluster of basal leaves then produces one large flower stalk and dies” (Threadgil et al. 1981a).

“*Frasera caroliniensis* reproductive output is more strongly correlated to stalk width ( $r^2=0.59$ ,  $p<0.01$ ) than it is to stalk height ( $r^2=0.40$ ,  $p<0.01$ ). Point-pattern analysis showed that individuals are significantly aggregated between 1.2 m and 2.4 m ( $p<0.01$ ), suggesting that reproduction in this species may be density-dependent” (Zak and Dimov 2008).

“Anthesis of *Frasera caroliniensis* consists of distinct, but slightly overlapping, staminate and pistillate phases, and this restricts the chances of a stigma receiving pollen from anthers of the same flower. However, the pattern of floral opening on each inflorescence branch and the large number of flowers on the flowering stalk insure that flowers in staminate and pistillate phases are in close proximity to each other at the same time on the same plant. Of the flowers left unbagged and thus exposed to natural pollen vectors 60.2% set fruits, and of the flowers on plants cross-pollinated solely by hand 46.7% set fruit. Transfer of pollen between flowers on the same inflorescence branch yielded 30.5% fruit set, and bagged, unmanipulated flowers had 17.9% fruit set, indicating some degree of autogamy and/or geitonogamy. The most effective pollinators were species of the hymenopteran Family Apidae: *Bombus bimaculatus*, *B. griseocollis*, *B. vagans* and *Apis mellifera*. Larvae of three orders of insects destroyed about 25% of the total seed crop” (Threadgil et al. 1981b).

**Table 2.** Phenology of *Frasera caroliniensis* in New York State (NYNHP 2023).

| Phenology  | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Flowering  |     |     |     |     |     | █   |     |     |     |     |     |     |
| Fruiting   |     |     |     |     |     |     | █   |     |     |     |     |     |
| Vegetative |     |     |     |     | █   |     |     |     |     |     |     |     |

## VI. Threats

Those populations of green gentian on unprotected land may be threatened by logging if it is unrestricted. Invasive plant species around some of the populations may affect their future viability but the ability of green gentian to outcompete invasive plants is unknown (NYNHP 2023, 2024).

**Are there regulatory mechanisms that protect the species or its habitat in New York?**

Yes:

No:



Unknown:

If yes, describe mechanism and whether adequate to protect species/habitat:

**Describe knowledge of management/conservation actions that are needed for recovery/conservation, or to eliminate, minimize, or compensate for the identified threats:**

The surrounding forest should be protected and logging should be restricted to prevent the introduction of exotic species. Any exotic invasive plants should be controlled in areas where green gentian grows (NYNHP 2023, 2024).

Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection) -

<https://www.iucnredlist.org/resources/conservation-actions-classification-scheme>

**Table 3.** Recommended conservation actions for *Frasera caroliniensis*.

| Conservation Actions  |  |
|-----------------------|--|
| Action Category       | Action                                     |
| Land/water protection | 1.1. Site/area protection                  |
| Land/water protection | 1.2. Resource & habitat protection         |
| Land/water management | 2.1. Site/area management                  |
| Land/water management | 2.2. Invasive/problematic species control  |
| Land/water management | 2.3. Habitat & natural process restoration |

## VII. References

### This SSA drew heavily from these resources:

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