

Aster borealis

Rush Aster

Asteraceae



ASTBOR_MRB1 By Merel R. Black (CC BY-SA)

***Aster borealis* Plant Rare Plant Profile**

New Jersey Department of Environmental Protection
Division of Parks and Forestry
Office of Natural Lands Management
New Jersey Natural Heritage Program

501 East State Street
P.O. Box 420
Trenton, NJ 08625-0420

Prepared by:
Rebekah A. Buczynski
rebekahbuczynski@gmail.com

June 6, 2019

This report should be cited as follows: Buczynski, Rebekah. 2019. *Aster borealis* Plant Rare Plant Profile. New Jersey Department of Environmental Protection, Division of Parks and Forestry, New Jersey Forest Service, Office of Natural Lands Management, New Jersey Natural Heritage Program, Trenton, NJ. 13 pp.

Aster borealis images and synonyms



Aster junceus by N.L. Britton



Northern Bog Aster © Keto Gyekis



Symphyotrichum boreale by R. Schipper

Life History

Aster borealis is an upright perennial herb from the Composite family (Asteraceae). It is described by Rhoads and Block (2007) as being a slender stemmed plant arising from thin rhizomes with long and very narrow, sometimes clasping leaves. The flower heads are few with 20-50 rays and color that can range from white to blue to purplish. Plant height is about 1-3 feet with stem color varying from a dull green to reddish (efloras 2019). *A. borealis* might be easy to miss amidst its surroundings due to its very slim stem and leaf forms (New York Natural Heritage Program 2019). With close attention the rush aster can be distinguished in the field from similar asters such as *A. lanceolatum*. Aside from its slim form, another strong identifying character of the rush aster is the purple, very pointed ends of the layered bracts at the base of each inchwide flowering head (Minnesota Wildflowers, hereafter "MNWF", 2019). Flowering time throughout *A. borealis*' range is July through October. According to the New York Natural Heritage Program (2019) the optimal time to survey for the aster is late July through August after all buds are in bloom yet before they are all gone to seed.

Pollinator Dynamics

There are no direct studies published to date on the pollinators particular to *A. borealis*. Jones (1978) performed observational studies of many of the species in the genus *Aster* including *Aster junciformis* which later became *Aster borealis* when the genus was more recently split. He stated that many different species of insects are known to pollinate the genera. Flies, bees, and bumblebees tend to visit plants with white colored ray florets while purple flowering asters attract butterflies and moths.

Seed Dispersal

Each flowering head of the rush aster produces 11 or more fruit that are a 2 ribbed achene approximately 1/2 to 2 millimeters long topped by tufts of slender white feathery plumes about 2.5 to roughly 7 millimeters in length. These fine bristles are an anemochorous (wind-dispersed) characteristic that allow the achene to be carried great distances upon maturation via a gust of wind (MNWF 2019).

Habitat

Throughout its range *Aster borealis* occurs in "mostly calcareous areas, fens, marshes, bogs, open cedar-tamarack-spruce swamps, stream and pond margins, wet meadows, [and] swales" (efloras 2019). Wetland habitat varies throughout the range and in the states adjacent to New Jersey. The NY Natural Heritage Program (2019) lists the "inland poor fen, medium fen, red maple-tamarack peat swamp, rich graminoid fen, rich shrub fen, and sedge meadows" as habitats assumed to play host to the rush aster. In Pennsylvania there are rare occurrences in the "cold bogs" of the northwest and northeastern parts of the state (Rhoads & Block 2007). The state-specific habitat as listed in The Floristic Quality Assessment Index for Vascular Plants of New

Jersey are "calcareous fens, marshes, swamps and cold bogs". Several occurrences exist in these habitats across the northwestern portion of the state. The occurrences (some extirpated and some now historic) were found in "peat bogs", "limestone sinks", "boggy meadows", within the "shrubby edges of a limestone marsh", in a "peaty sedge thicket", and growing in a "shrubby limestone fen" (NJ Natural Heritage Program 2019).

One noted community with an extant occurrence in Sussex County New Jersey was a *Larix sp./Betula pumila* thicket (NJNHP 2019). Associated species at a "fairly open, calcareous sedge fen" with "saturated soil, [on a substrate of] peat over limestone" occurrence in Sussex County include: *Acer rubrum* (red maple), *Spiraea latifolia* (white meadowsweet), *Spiraea tomentosa* (steepleshub), *Ilex verticillata* (winterberry), *Ribes hirtella* (hairystem goosebury), *Solidago rugosa* (wrinkleleaf goldenrod), *Pilea fontana* (lesser clearweed), *Potentilla fruticosa*, (shrubby cinquefoil), *Bidens aristosa* (bearded beggarticks), *Toxicodendron radicans* (poison ivy), *Carex lacustris* (hairy sedge), *Osmunda regalis* (royal fern), *Equisetum fluviatile* (water horsetail), and invasives *Lythrum salicaria* (purple loosestrife) and *Microstegium vimineum* (Japanese stiltgrass).

Wetland Indicator Status

This species of aster is obligate wetland (OBL). According to US Army Corps of Engineers National Wetland Plant List Indicator Rating Definitions (USDA, 2019) it "almost always occur in wetlands...and found in standing water or seasonally saturated soils (14 or more consecutive days) near the surface." More specifically, *A. borealis* is considered an "emergent" wetland species with a proportionately greater amount of its biomass occurring above the water line (Lichvar et al. 2012). A further classification made by Bart et al. (2011) regards *A. borealis* as a "calciphile" and an indicator species for calcareous fens.

USDA Plants Code

SYBO2; USDA Plants Code (*Symphotrichum boreale*)
ASBO7; NJ accepted (NJNHP listed as *Aster borealis*)

Coefficient of Conservation (Walz et al. 2018)

CoC = 10; Criteria: Native with a narrow range of ecological tolerances, high fidelity to particular habitat conditions, and sensitive to anthropogenic disturbance (Faber-Langendoen 2018).

Distribution and Range

Figure 1, below, shows a general view of the range & state rarity status of *A. borealis*.

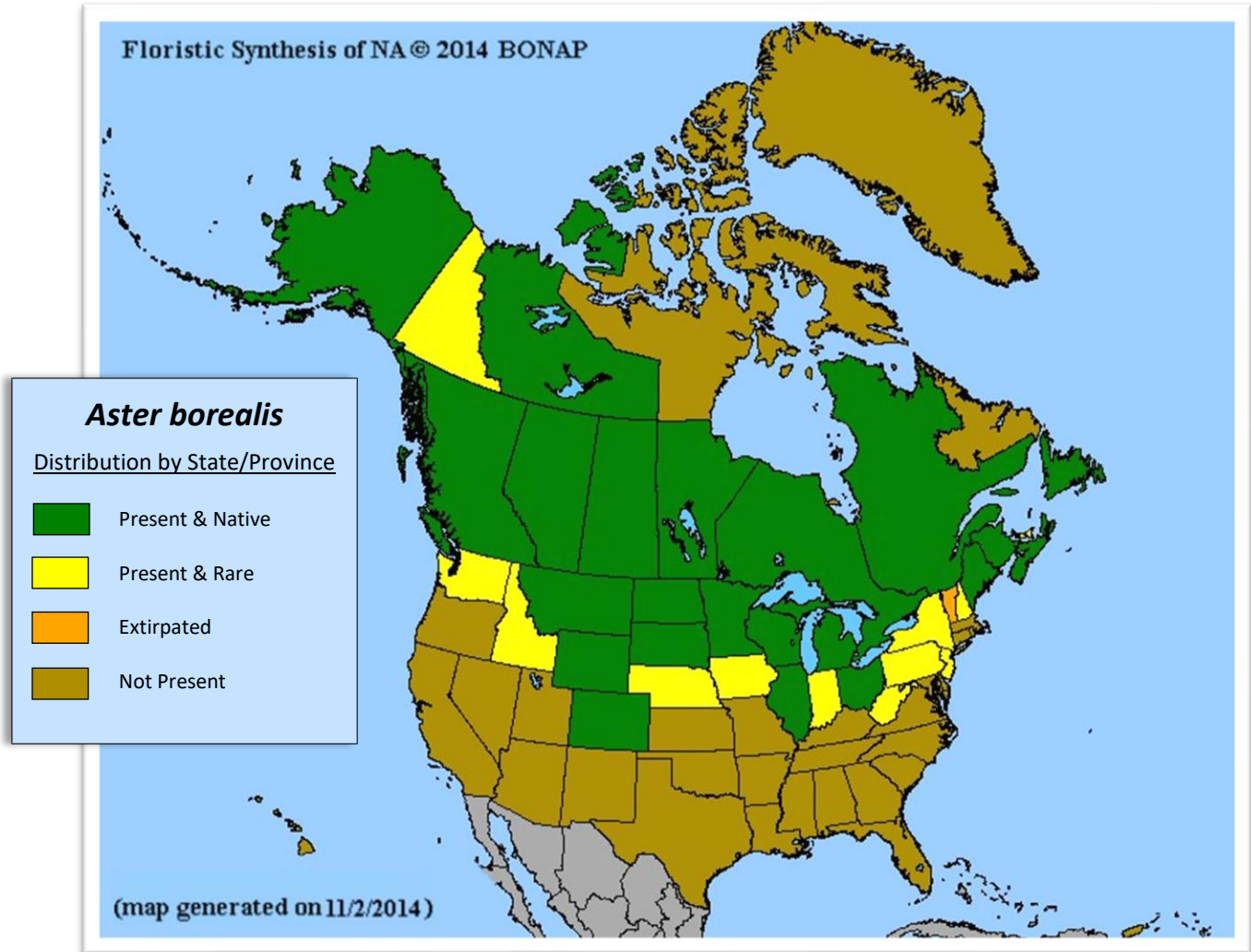


Figure 1 North American State Distribution of Rush Aster; adapted from BONAP (Kartesz 2014)

The following Figure 2, is a county level distribution map focusing on New Jersey and contiguous counties of the surrounding states. This map is compiled from herbarium data and state literature and many occurrences are now historic. A closer look at the current NJ county level distribution and rarity status of the species as documented in the Biotics database will be discussed in the following section on "Conservation Status".

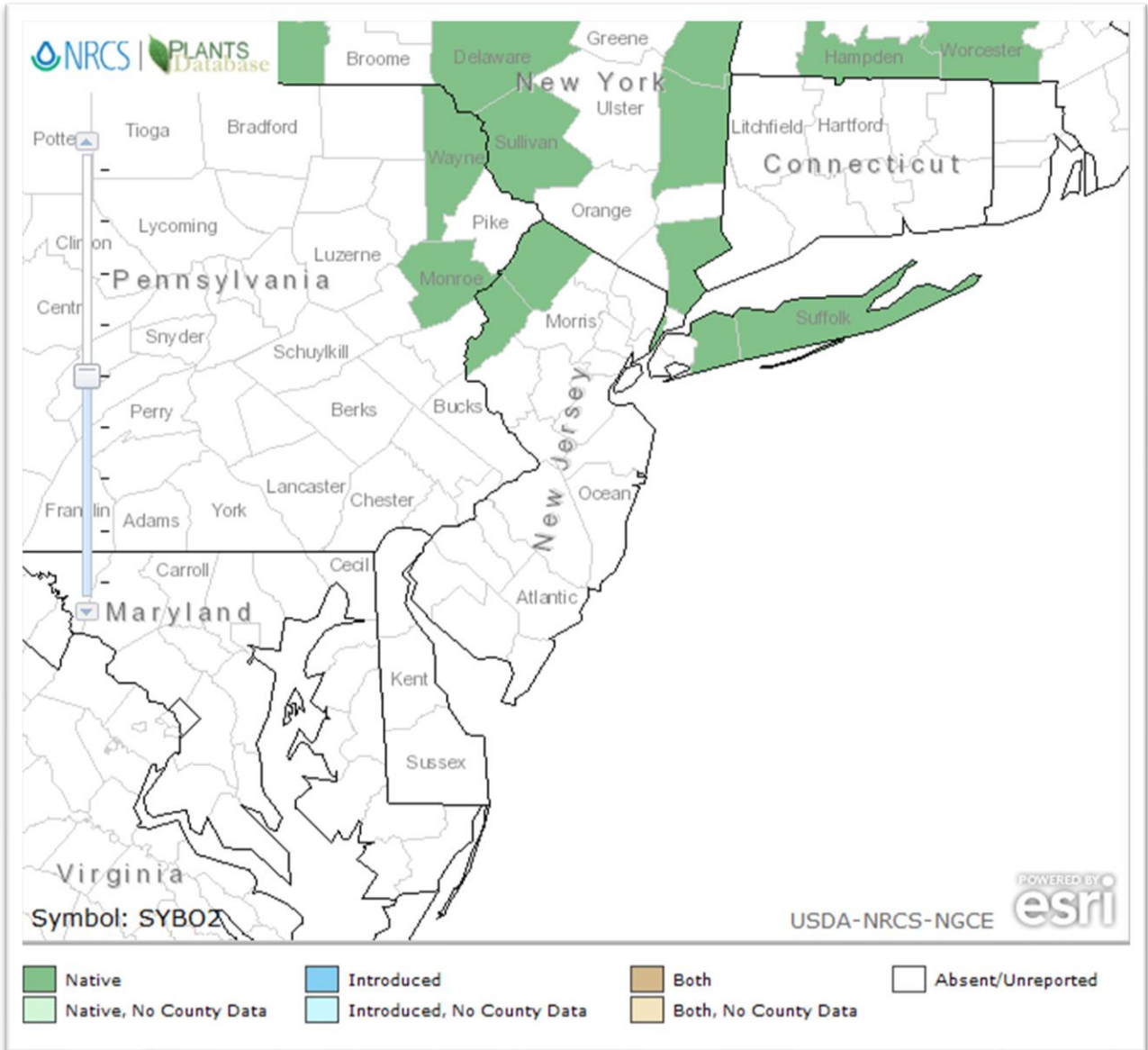


Figure 2 NJ County Distribution of *Aster borealis*; adapted from USDA NRCS Plants Database (2019)

Conservation Status

The map below (Figure 3) from NatureServe Explorer (2018) illustrates a synthesis of data from individual natural heritage programs regarding their state's conservation rank and status.

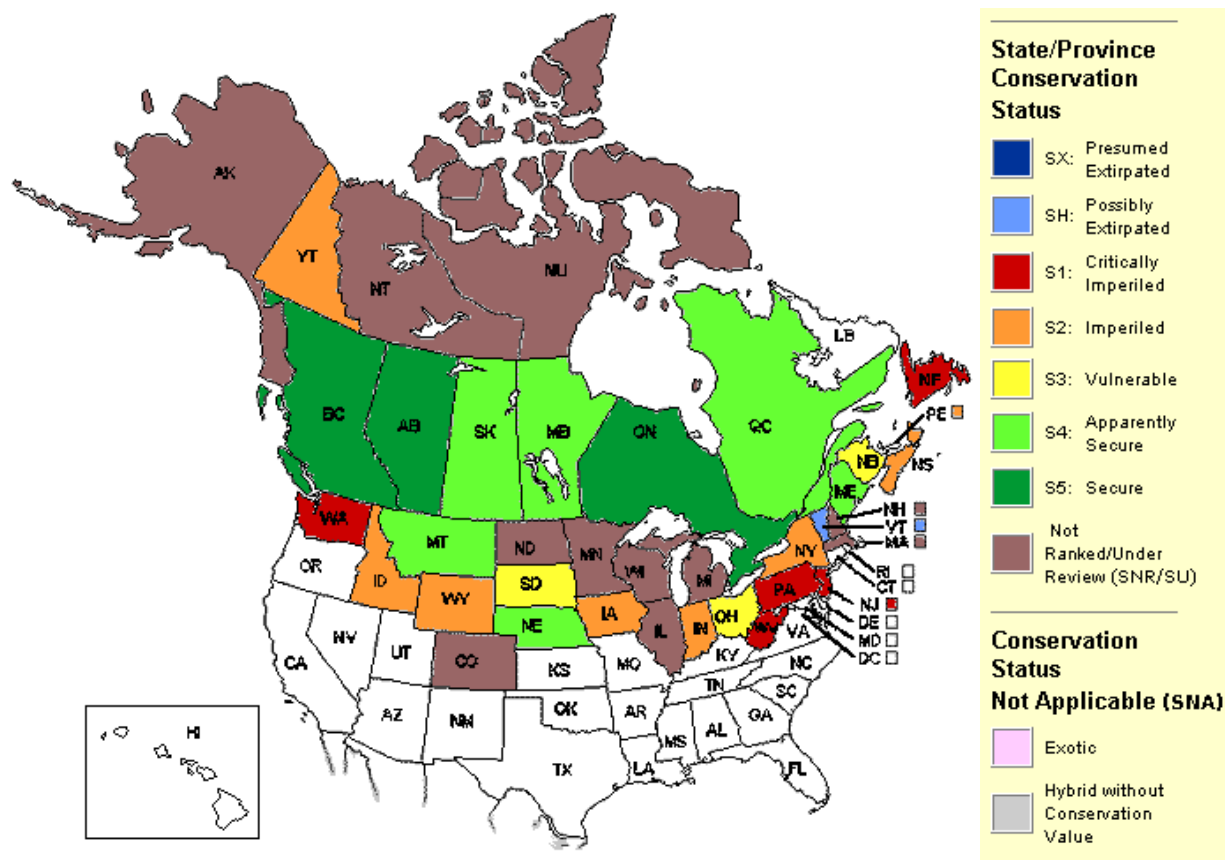


Figure 3 Conservation Status of *Aster borealis*

Aster borealis is considered globally stable (G5) meaning that worldwide, the species is "secure: common; widespread and abundant" (NatureServe 2019) but is critically imperiled in many states throughout its range. Rush aster is considered endangered (E) in New Jersey and according to the state's Natural Heritage Program that status indicates a "Native New Jersey plant species whose survival in the State or nation is in jeopardy". The state rank of S1, in accordance to the Nature Conservancy element ranks used by the New Jersey Natural Heritage Program (2010) defines the species as "Critically imperiled in New Jersey because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres). Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical area of the state. Also included are elements which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered."

The other status codes indicate that the species is "HL" or "protected by the Highlands Water Protection and Planning Act within the jurisdiction of the Highlands Preservation Area" and "LP" meaning that the "taxa [is] listed by the Pinelands Commission as endangered or threatened within their legal jurisdiction. Not all species currently tracked by the Pinelands Commission are tracked by the NJ Natural Heritage Program (NJNHP 2010). A complete list of endangered and

threatened Pineland species is included in the “New Jersey Pinelands Comprehensive Management Plan”.

Threats

Few studies have been done directly regarding the ecological threats to the rush aster in New Jersey. Being that *Aster borealis* is an indicator species of calcareous fens and that there is much in the literature regarding ecological threats to fens in North America we can ascertain that threats to rich-fens (aka high pH/calcareous/limestone/minerotrophic fens) will likely disturb the indicator/obligate species within them. Therefore, threats to the habitat of rush aster, which is restricted to calcareous fens and marl seeps in New Jersey, are essentially direct threats to the species.

Johnson and Walz (2013) note that threats to (*Aster borealis*) *Symphyotrichum boreale* include non-native invasive species, aggressive native species, changes in hydrology, water quality degradation, dumping, development and fragmentation, and habitat alteration due to climate change. A Climate Change Vulnerability Index assessment of 70 State Endangered Plant Species in New Jersey (Ring et al. 2013) reported that *Aster borealis* (*Symphyotrichum boreale*) is Moderately Vulnerable to climate change, primarily due to the potential shift in species geographic range.

Hydrological changes mean habitat shifts in a wetland. Hanel (2006) stated that if something should cause a site like a fen to become too wet it will go beyond the saturation threshold a species has evolved to accept and alternately if it were to dry out that would allow for larger woody species to move in and take over. Causation of major hydrological changes to fens can take place relatively far away as groundwater supplies are either physically or chemically disturbed along the route. Development of infrastructure utilizing impermeable building materials, roads, and sewer systems all divert rainfall away from recharging the local water table. Agricultural practices such as irrigation can lower the water table and herbicide applications can contaminate it. Forestry practices pose a threat by increasing chances of erosion and altering flow dynamics as well (Camp & Gamon 2011; Johnston 2016).

A site in New Jersey now ranked as extirpated was presumably destroyed due to hydrologic changes that followed the construction of a dam. A second site of extant occurrences maintains low numbers of rush aster due to peat mining in a nearby location (NJNHP 2019).

Management Summary and Recommendations

The NY Natural Heritage Program (2019) offers the broad strategy (with no measurements defined by the author) for conserving and improving on the status of the rush aster in their state by "provid[ing] a large buffer to the wetlands where it occurs to protect the water quality and preserve the hydrology of the wetlands." The New Jersey Bureau of Forest Management has two documents: the N.J.A.C. 7:7A Freshwater Wetlands Protection Act Rules (2019) and the Wetlands Best Management Practices Manual (1995) that can be used to help outline more

specific buffer zones during forestry activities occurring in areas containing sensitive species. Integrated habitat management recommendations for *Aster borealis* and other endangered plant species and wildlife species of greatest conservation need in calcareous fens are reported in Johnson and Walz (2013). Maintaining hydrological integrity and water quality, managing succession, invasive species, and recreational use of the habitat are recommended.

According to Johnson and Walz (2013) and Significant Habitats and Habitat Complexes of the New York Bight Watershed: Upper Wallkill River Valley, Complex #29 (NOAA), the federally listed endangered Bog Turtle (*Clemmys muhlenbergii*) occupies calcareous wetland complexes. "Favorable habitats [of Bog turtle] are calcareous wetlands, especially open fens dominated by sedges and other vegetation less than 1 meter (3.3 feet) tall" (NOAA) where rush aster can occur in and around the periphery of in shrubbier habitat. While *A. borealis* is not federally endangered it could potentially fall under the same protection rules due to habitat overlap. Buffer zones of at least 150 feet from a federally protected species habitat area must be instated in all New Jersey Forestry activities unless an exemption is obtained (New Jersey Bureau of Forest Management 1995). Calculations which could potentially increase the buffer zone must be performed uniquely to the areas of timber harvest interest to account for erosion control due to variation in percent slope.

These forestry management practices could also be applied to species-specific habitat patches where no federally endangered species occurrences are documented yet the habitat is considered suitable, or Rank 1, as determined by the NJ Landscape Project Version 3.3 (New Jersey Division of Fish and Wildlife 2017) for potentially providing home to listed wildlife. Assessing specific numeric buffer zones that threaten the habitat of *A. borealis* means tracing the hydrology of the groundwater supply to the wetland. Meanwhile, a general, yet effective approach on several levels is water conservation itself. "Reducing water use and reducing areas of impermeable surfaces are good goals for individuals, communities, and metropolitan areas alike when striving to improve conditions for fens, bogs, and other wetlands" (Johnston 2016).

Synonyms

Botanical Name

Aster borealis (Torr. & Gray) Prov.

Botanical Synonyms

Aster junciformis Rydb.

Aster franklinianus Rydb.

Aster junceus auct. non Aiton

Aster laxifolius var. *borealis* Torr & Gray

Symphyotrichum boreale (Torr. & A. Gray) A. Löve & D. Löve

Common Names

Rush Aster

Northern Aster

Bog Aster

Boreal Aster

Rush-like Aster

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