Species Status Assessment

Common Name: Subarctic darner **Date Updated:** December 19, 2023

Scientific Name: *Aeshna subarctica* **Updated By:** Erin L. White

Class: Insecta

Family: Aeshnidae

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

The subartic darner (*Aeshna subarctica*) is a circumpolar boreal species of northern latitudes. The center of its North American range is near the shore of the Hudson Bay in the southern Hudson Bay Taiga ecoregion (Donnelly 2004). The primary range for this species extends from Canada to north central Europe and across Siberia to Japan (Mead 2003). Areas in Canada where it is found include the Yukon, Northwest Territories, and western provinces eastward to Ontario, Quebec, and the Atlantic provinces. In addition to Alaska, *A. subarctica* has been found in northern states such as Maine, Massachusetts, New Jersey, New York, Minnesota, Wisconsin, Montana, Oregon, and Washington (Needham *et al.* 2000).

The species is very spottily distributed and exceedingly rare in the northern United States, but more locales are being discovered through increased survey effort. Until the 1900s, *A. subarctica* was only known from three records in the U.S., including one from New York. The species was recently located in Massachusetts (Nikula *et al.* 2001) and the distribution in Maine expanded three-fold during recent atlas efforts (Brunelle and deMaynadier 2005). Records increased in New Hampshire as well, during the dragonfly survey (P. Hunt, personal communication). As a boreal species, *A. subarctica* was probably much more widespread during colder times than in the recent past, so it is likely that the appearance of these glacial relict populations along the southern range margin are the result of increased survey effort rather than a recent southward range expansion.

New York is at the very southern range extent and the southernmost known record in the species' entire range is in Sussex County, New Jersey (Bangma and Barlow 2010) in close proximity to the New York border. The species is known in New York from three counties, a population at Jam Pond in Chenango County (1973 to 2009), Bloomingdale Bog in Essex County (2011-2021), Spring Pond Bog (2010-2018) and at least 1-4 additional sites in Franklin County (Abbott 2023, iNaturalist 2023, NYNHP 2023), and a 1947 record in nonbreeding habitat from the summit of Blue Mountain, Hamilton County in the Adirondacks (Donnelly 1999). The Jam Pond locale in southern New York is unexpected and it is presumed that local environmental conditions somehow form a very cold, boreal type habitat with a very short growing season there (Beatty and Beatty 1968). This population is possibly extirpated due to negative surveys from 2016-2021 (NYNHP 2023).

There seems to be some variability in habitat, with a definite trend toward bog and fen conditions. In northwestern Canada, the species' larval habitat is restricted to sphagnum bog and deep fens that are dominated by aquatic moss but not overly acidic (Cannings and Cannings 1994). Habitat in the upper midwest consists of muskeg ponds, bogs, and northern swamps (Mead 2003). In Massachusetts, habitat consists of sphagnum bogs and deep fens with wet sphagnum (Nikula *et al.* 2003). In New York, appropriate habitat includes black spruce-tamarack bog and inland poor fen within peatland habitat (New York Natural Heritage Program 2023).

I. Status

a. Current legal protected Status

i. Federal: Not Listed **Candidate:** No

ii. New York: Not Listed

b. Natural Heritage Program

i. Global: G5

ii. New York: S1 **Tracked by NYNHP?:** Yes

Other Ranks:

-NYS 2025 SGCN Status: High Priority Species of Greatest Conservation Need
-IUCN Red List: Least Concern
-Northeast Regional Rank (White et al.2015): R3, shared responsibility

Status Discussion:

At present, there are three-six extant populations of the Subarctic Darner in sphagnum bogs in the Adirondacks. There was an additional disjunct population on the southern tier known from the 1970s. However, they have not been documented there since 2009 despite repeated searching. There may be additional undiscovered populations in the Adirondacks. However, this is primarily a species of Canada and northern Europe, is considered rare in most of the northern states where it occurs, and is not expected to be found in a large number of locations in New York.

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Unknown	Unknown	Last assessment US 1985; Canada 2012		-
Northeastern US	Yes	Unknown	Increasing	Pre and post 2000		-
New York	Yes	Unknown	Unknown	Pre and post 2005	S1;	No
Connecticut	No	-	-			-
Massachusetts	Yes	Unknown	Unknown		T; S1	Yes
New Jersey	Yes	Unknown	Unknown		S3	Yes
Pennsylvania	No	-	-			-
Vermont	Yes	Unknown	Unknown		S1	Yes
Ontario	Yes	Unknown	Unknown		S4	-
Quebec	Yes	Stable	Stable		S5	-

Column options
Present?: Yes; No; Unknown; No data; (blank) or Choose an Item
Abundance and Distribution: Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
SGCN?: Yes; No; Unknown; (blank) or Choose an item

Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

The New York State Dragonfly and Damselfly Survey was conducted from 2005-2009, but there are no organized, regular monitoring or survey activities directed toward this species or to sites where it has been documented, except for Jam Pond where it was last observed in 2009 despite survey effort every five years (NYNHP 2023). It seems to have persisted at Bloomingdale Bog and Spring Pond Bog for about a decade based on iNaturalist sightings (iNaturalist 2023).

Trends Discussion *(insert map of North American/regional distribution and status):*

There is no estimate of population size for this species based on statewide occurrences, but they are currently known from three-six locations, most first documented since 2010. Any new location information on the species in New York may be reflective of heightened interest in surveying for this species rather than a population increase or a range expansion (NYS DEC 2006). The site known since the 1970s may no longer have Subarctic Darner present (New York Natural Heritage Program 2023). There are likely additional undiscovered populations in the Adirondacks and perhaps elsewhere in the state where bogs are found. However, this is primarily a species of Canada and northern Europe, is considered rare in most of the northern states where it occurs, and is not expected to be found in a large number of locations in New York. The number of recent records along the southern margin of the species range (the northern states) are most likely the result of increased collecting/search effort rather than a recent southward range expansion (Paul Novak, pers. comm.).

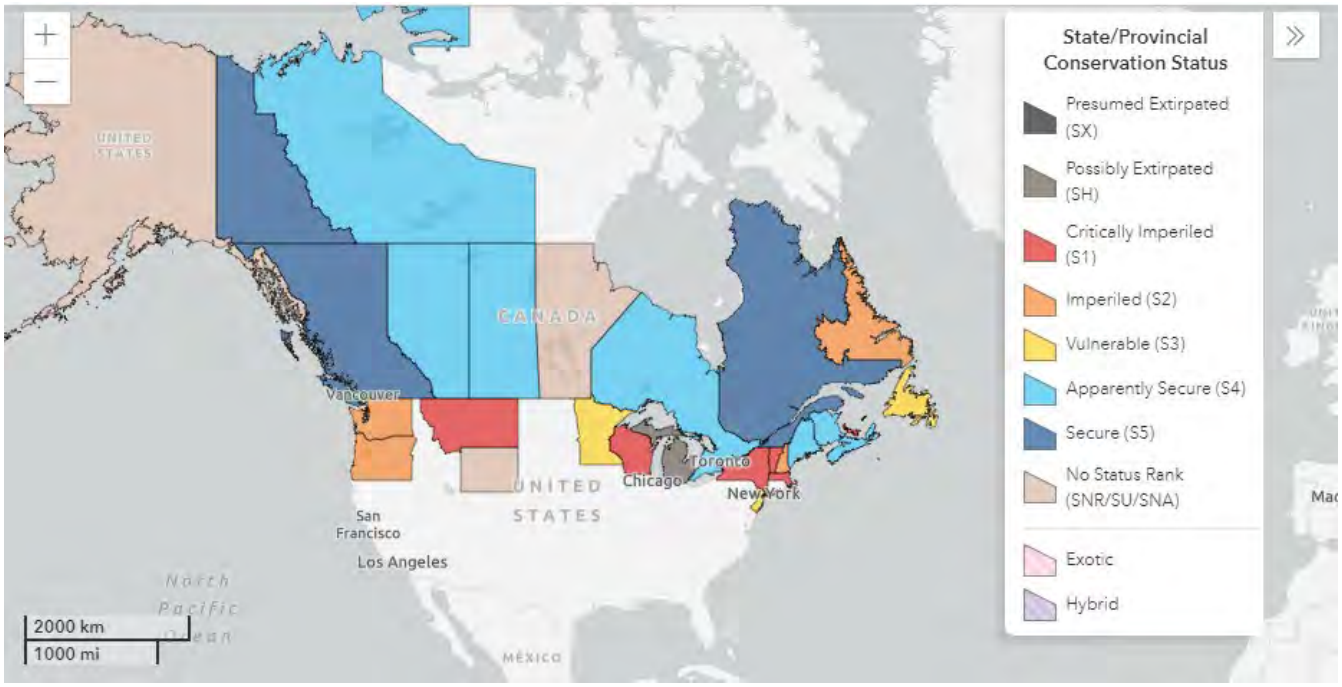

Figure 1. Conservation status of the Subarctic Darner in North America (NatureServe 2023).

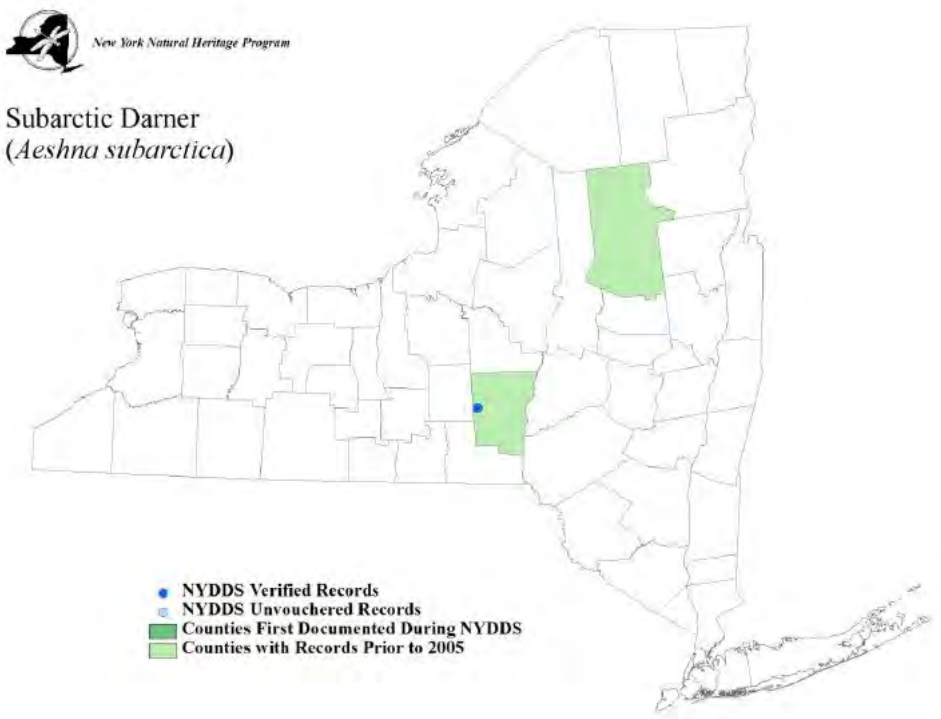

Figure 2. Occurrence record of the Subarctic Darner in New York during the NYDDS (White *et al.* 2010).

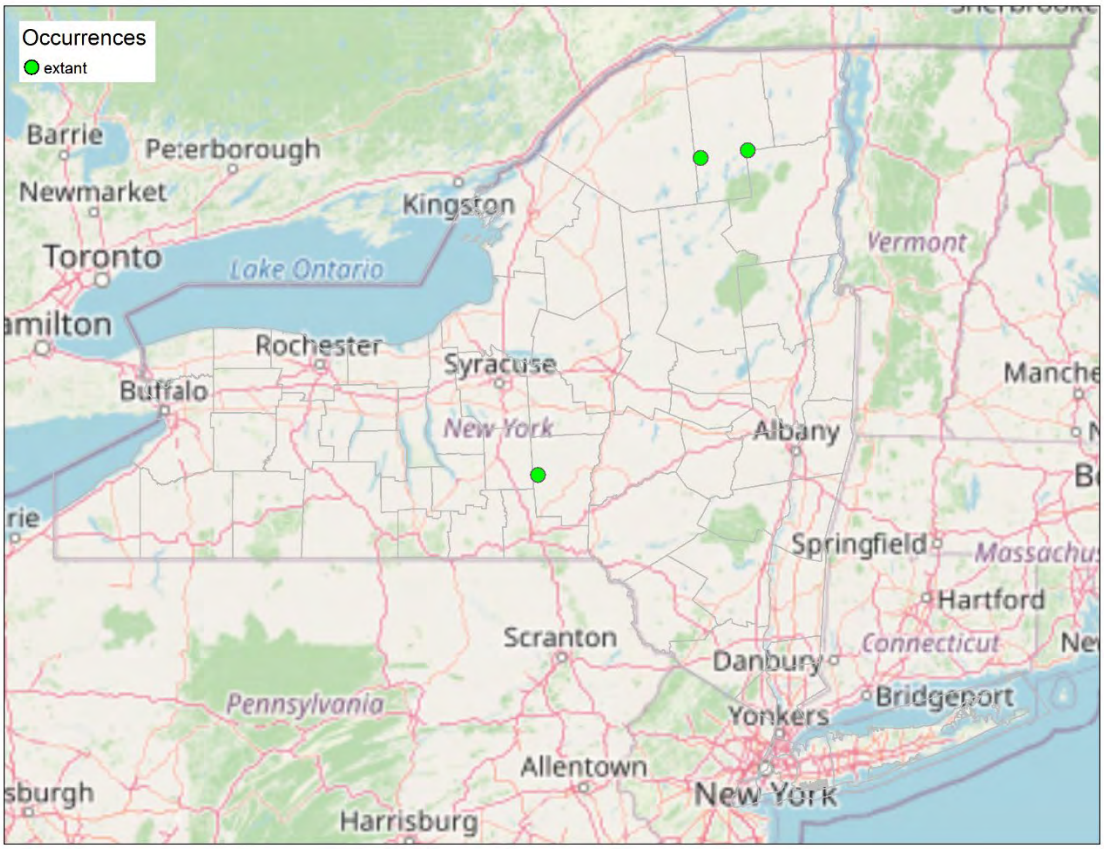

Figure 3. NYNHP element occurrence records for the Subarctic Darner in NY (NYNHP 2023a).

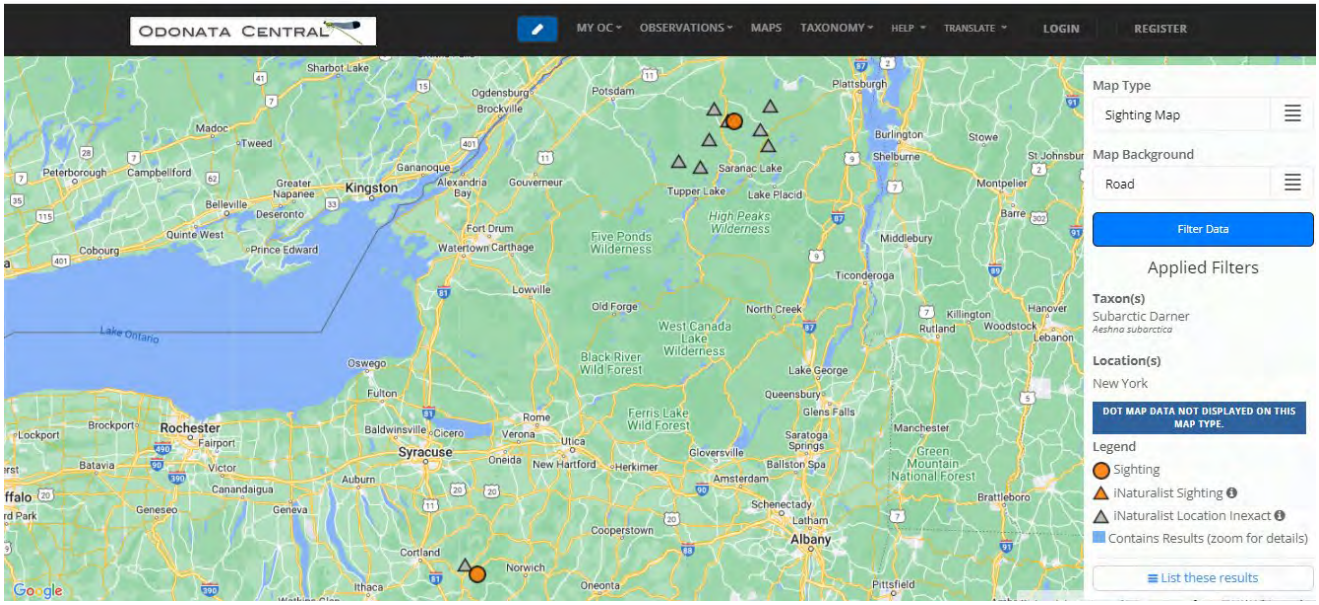

Figure 4. Distribution of the subarctic darner in New York (Abbott 2023).

III. New York Rarity *(provide map, numbers, and percent of state occupied)*

Years	# of Records	# of Counties	% of State
Pre-2004	2	2	<1-3%
2005-2009	1	1	<1%
2010-2023	3-6	2	<1-3%

Table 1. Records of subarctic darner in New York.

Details of historic and current occurrence:

Aeshna subarctica is primarily a European and Canadian species. Until the mid-1990s, it was known from only three localities in the United States, including one site in the southern tier of New York State (Donnelly 1992).

The Chenango County population was discovered in 1973 (Donnelly 1999) and was last observed in 2009. With survey effort there in 2016, 2017, and 2021, this population is possibly extirpated though habitat remains. There is also a historical location from Hamilton County. A population in Essex County has been observed from 2011-2021 and *A. subarctica* have been observed in 2-5 sites in Franklin County since 2010 (Abbott 2023, iNaturalist 2023, NYNHP 2023a).

If it occurs in 2/62 counties, that is very roughly about 3% of the state, though the occupied area of those counties is rather small. There are likely additional undocumented populations in northern NY and the % of the state can be estimated to be <1-3% currently.

New York's Contribution to Species North American Range:

Percent of North American Range in NY	Classification of NY Range	Distance to core population, if not in NY
1-25%	Peripheral	~450 mi to stable core

Column options
Percent of North American Range in NY: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item
Classification of NY Range: Core; Peripheral; Disjunct; (blank) or Choose an item

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

1. Boreal Forested Peatland
2. Open Acidic Peatlands
3. Open Alkaline Peatlands

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Habitat/ Community Trend	Time frame of Decline/Increase
Yes	Yes	Declining	Declining long-term, stable short-term

Column options
Habitat Specialist and Indicator Species: Yes; No; Unknown; (blank) or Choose an item
Habitat/Community Trend: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

Habitat Discussion:

The habitat for this species has been described as muskeg ponds, bogs, and northern swamps (Mead 2003), whereas Nikula *et al.* (2003) describe the habitat in Massachusetts as sphagnum bogs and deep fens with wet sphagnum. The New York habitat includes sphagnum bogs, black spruce-tamarack bog, highbush blueberry bog thicket, and inland poor fen (New York Natural Heritage Program 2023).

V. Species Demographic, and Life History:

Breeder in NY?	Non-breeder in NY?	Migratory Only?	Summer Resident?	Winter Resident?	Anadromous/ Catadromous?
Yes	Choose an item.	Choose an item.	Yes	Yes	Choose an item.

Column options
First 5 fields: Yes; No; Unknown; (blank) or Choose an item
Anadromous/Catadromous: Anadromous; Catadromous; (blank) or Choose an item

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

"The nymph of *A. subarctica* is aquatic and is thought to develop in soupy sphagnum pools found in bogs and deep fens. The amount of time required for development of the eggs and nymphs is uncertain. The eggs probably hatch within a month but the nymphs may take as long as 3-4 years before reaching maturity. After eclosion, the immature dragonflies will spend several days or more in the upland areas, often some distance from the breeding site" (Massachusetts NHESP 2023).

Males patrol the breeding site by flying over wetter areas of bogs and fens. Aggressive interactions often occur if more than one male is present. Females appear when ready to breed. Female *A. subarctica* oviposit in soupy sphagnum pools or along the edges of bogs. The number of eggs laid is not known (Massachusetts NHESP 2023).

Flight dates for this species in Massachusetts are from mid-July to mid-September (Nikula 2003), whereas flight dates in the western Great Lakes states extend to the end of September (Mead 2003). Dunkle (2000), gives a somewhat longer flight period of early June to early October. The few observations for New York are from late August to late September (NYNHP 2023), but the full flight season is probably similar to that listed above for other states.

VI. Threats *(from NY 2015 SWAP or newly described):*

Little published information is available citing specific cases of negative impacts to bog and fen odonates, but any activities that degrade the sensitive hydrology of these habitats would threaten populations of this species. Examples include peat mining, ditching, filling, eutrophication, direct effects of pesticides (e.g. for mosquito control or from agricultural runoff), and increases in the sediment load of the wetland (such as might result from agricultural runoff or removal of vegetation from the adjacent uplands). Succession could also threaten some sites as shallow pools fill in with vegetation over time. Removal of large areas of forest or shrub habitats adjacent to occupied wetlands could also threaten populations as these adjacent habitats are important for recently emerged adults until they reach maturity (New York Natural Heritage Program 2023).

Threats to NY Populations	
Threat Category	**Threat**
1. Climate Change & Severe Weather	Habitat Shifting & Alterations
2. Climate Change & Severe Weather	Temperature Extremes
3. Pollution	Industrial & Military Effluents (acid rain, mercury)
4. Climate Change & Severe Weather	Droughts

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:

The Freshwater Wetlands Act provides protection for wetlands greater than 12.4 acres in size under Article 24 of the NYS Conservation Law. The Adirondack Park Agency has the authority to regulate smaller wetlands within the Adirondack Park.

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

Management/conservation actions have not been identified for this species at the known site in New York. Information on population size at this site may be valuable in assessing the continued persistence of this isolated population.

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2006) includes recommendations for the following actions for odonates of bogs, fens, and ponds, and for the subarctic darner in particular.

Habitat monitoring:

____ Support and encourage habitat monitoring efforts that would complete the baseline assessment of habitat quality and threats.

Habitat research:

____ Support and encourage research projects that will help define preferred habitat in order to guide future monitoring, restoration and habitat protection efforts.

New regulation:

____ Recommendations for official state endangered, threatened, and special concern listing are an anticipated result of the statewide inventory. It is expected that at least a few species will be recommended for listing and officially adding these species to the list would constitute a specific action.

Population monitoring:

____ Conduct surveys to obtain repeatable, relative abundance estimates for these species at known sites and newly discovered sites where access permission to conduct surveys is obtained (as indicated in the State Wildlife Grant Odonate Inventory Project).

Action Category	Action
1. Land/Water Protection	Resource and habitat protection
2. Land/Water Protection	Site/area protection
3. Land/water management	Site/area management
4. Land/water management	Habitat & natural process restoration
5. Land/water management	Invasives/problematic species control
3. Education and Awareness	Awareness & Communications
3. Education and Awareness	Training
4. Law and Policy	Policies and Regulations

Table 3. Recommended conservation actions for subarctic darner

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Date first prepared	August 7, 2012
First revision	February 11, 2014 (Samantha Hoff)
Latest revision	December 19, 2023 (Erin L. White)