Species Status Assessment

Common Name: Spiny salmonfly **Date Updated:** 7/22/24

Scientific Name: *Pteronarcys comstocki* **Updated By: Luke Myers**

Class: Insecta

Family: Pteronarcyidae

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

This is an uncommon species distributed patchily from New Brunswick southeast to Kentucky and Tennessee (DeWalt et al. 2023, Nelson 2000) and is considered vulnerable to extirpation or extinction throughout its range (Natureserve 2008Update). This is known from scattered localities in the Adirondacks, Mohawk Valley, and the Great Lakes Plain (Fig. 45e). Adults have been reported in the state from late May to early June (Fig. 47). This species prefers cold pristine rivers of mountainous areas at elevations ranging from 164 to 442 m asl (Fig. 46).

There are five known occurrences of the spiny salmonfly in the state, including historical records from the Lake Champlain (Essex Co.), Upper Hudson (Herkimer/Hamilton, Oneida/Herkimer counties), and SE Lake Ontario (Tompkins CO.) watersheds, and one current record from the Lake Champlain (Essex Co.) watershed. Isolated populations of *P. comstocki* have also been reported from New Brunswick, Maine, Pennsylvania, West Virginia, Virginia, and Kentucky (Nelson 2000, Stark et al. 2010). Records from Myers et al. (2010) are the first reports of this relatively rare species from the state in more than 65 years.

I. Status

a. Current legal protected Status

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

ii. **New York:** Not listed

b. Natural Heritage Program

i. **Global:** G3

ii. **New York:** SNR **Tracked by NYNHP?:** No

Other Ranks:

-New York 2025 SGCN status: Species of Greatest Conservation Need
-COSEWIC: Not listed
-IUCN Red List: Not listed
-Northeast Regional SGCN: Not listed

Status Discussion:

The spiny salmonfly is globally ranked Vulnerable due to isolated populations throughout its range.

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Unknown	Unknown			(blank)
Northeastern US	Yes	Unknown	Unknown			No
New York	Yes	Unknown	Unknown			Yes
Connecticut	No	N/A	N/A			(blank)
Massachusetts	No	N/A	N/A			(blank)
New Jersey	No	N/A	N/A			(blank)
Pennsylvania	No data	Unknown	Unknown			Unknown
Vermont	No	N/A	N/A			(blank)
Ontario	No	N/A	N/A			(blank)
Quebec	No	N/A	N/A			(blank)

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):*

None

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

Trend information for this species is unknown.

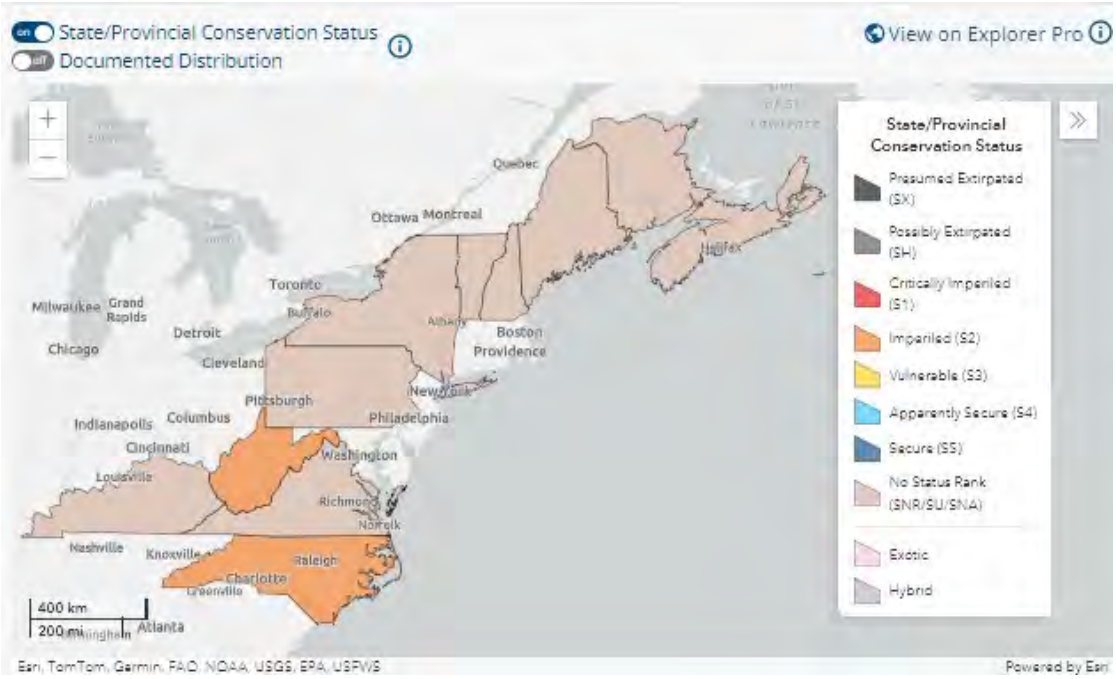

Figure 1. Conservation status of *Pteronarcys comstocki* in North America (NatureServe 2023)

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

Rarity information about this species in New York is unknown.
Stoneflies, mayflies, and caddisflies are difficult to fully document, and thus abundance and distribution remain largely uncertain despite the confirmed occurrences that exist. The recent surveys done by Myers et al. (2010) of the Upper Hudson, Lake Champlain, and NE Lake Ontario watersheds provided a wealth of new information on mayflies, but surveys should be done throughout the rest of the state to get a more complete understanding of abundance and distribution.

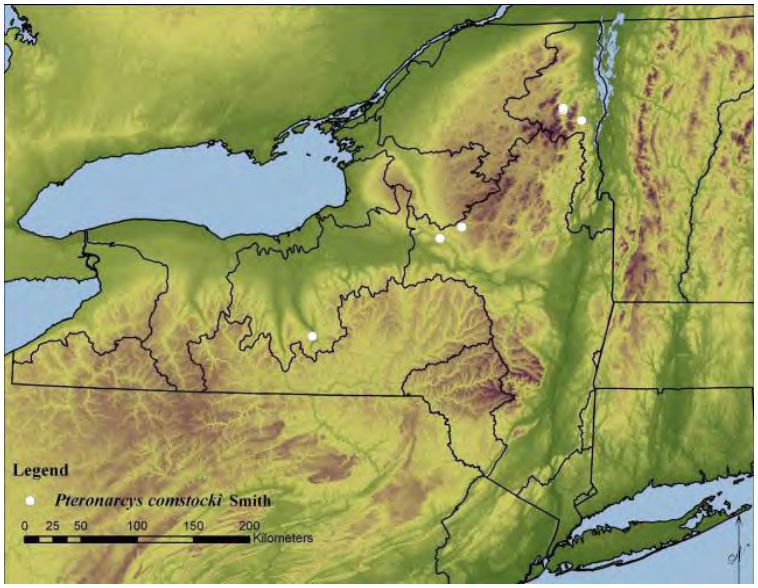

Figure 2. Records of *Pteronarcys comstocki* (Smith) in New York

Years	# of Records	# of Distinct Waterbodies/Locations	% of State
Pre-2000	_____	4	_____
2000- 2023	_____	1	0-5%

Table 1. Records of *Pteronarcys comstocki* in New York.

Details of historic and current occurrence:

Essex Co: Keene, Tributary of Ausable River, June 20, 1941, 1 exuvia, T.H. Frison and H.H. Ross (INHS)

Herkimer/Hamilton Co.: Wilmurt, 1 female (Holotype, CUIC)

Oneida/Herkimer Co.: Trenton Falls (Needham and Claassen 1925)

Tompkins Co.: Tarbel, June 1, 1915, 1 female, W.T. Davis (CUIC).

Essex Co: reared, May 27, 2008, Boquet River, Rt. 9N, S. Elizabethtown, 44.2125N, 73.5839W, May 23, 2008, 1 male, 1 female, L. Myers, B. C. Kondratieff, and R. W. Baumann (NYSM); Same location,

May 23, 2008, 4 exuvia, L. Myers, B. C. Kondratieff, and R. W. Baumann (NYSM); Same location, May 23, 2008, 2 exuvia, L. Myers, B. C. Kondratieff, and R. W. Baumann (CSUC).

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%	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):*

a. Riverine, coldwater stream

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Habitat/ Community Trend	Time frame of Decline/Increase
(blank)	Yes	Unknown	

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:

Small to medium sized streams and rivers (Myers et al. 2010).

V. Species Demographic, and Life History:

Breeder in NY?	Non-breeder in NY?	Migratory Only?	Summer Resident?	Winter Resident?	Anadromous/ Catadromous?
Yes	(blank)	(blank)	Yes	Yes	(blank)

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):*

Although the nymphal biology of this species has not been studied it is likely that it requires several years to complete its life cycle. Other members of this genus have been observed to mature in 1-4 years depending on the species and geographic location of the study (Nelson 2000). During the field surveys in eastern New York mature nymphs of this species were collected in the spring months from large woody debris in the main stream channel of the Boquet River. Removal of large woody debris from stream channels and riparian areas could be detrimental to populations of this species. Larvae reportedly feed on detritus but can be facultative predators (Myers, pers. comm.).

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

Threat Level 1	Threat Level 2	Threat Level 3	Spatial Extent	Severity	Immediacy	Trend	Certainty
4. Transportation & Service Corridors	4.1 Roads & Railroads	4.1.1 Roads (runoff)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
4. Transportation & Service Corridors	4.1 Roads & Railroads	4.1.3 Bridges (construction/ maintenance)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
5. Biological Resource Use	5.3 Logging & Wood Harvesting	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
7. Natural System Modifications	7.2 Dams & Water Management/Use	7.2.1 Water level management using dams (altered hydrology, sedimentation)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.1 Invasive Non-Native Plants & Animals	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
9. Pollution	9.1 Domestic & Urban Wastewater	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
9. Pollution	9.2 Industrial & Military Effluents	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
9. Pollution	9.3 Agricultural & Forestry Effluents	9.3.1 Nutrient loads (run off, algal blooms)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
9. Pollution	9.6 Excess Energy	9.6.1 Light pollution	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
11. Climate Change	11.1 Habitat Shifting & Alteration	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
11. Climate Change	11.4 Changes in Precipitation & Hydrological Regimes	11.4.2 Droughts	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.

Table 2. Threats to *Pteronarcys comstocki*.

Any activity which might lead to water contamination, siltation, warming of waterways, or the alteration of natural hydrology could directly and indirectly impact riparian habitats and *Pteronarcys comstocki* populations. Such threats might include roadway and agricultural runoff, industrial pollution, dams, bridge construction and maintenance, logging activities, and development near riparian habitats (NYS DEC 2005). In addition, siltation decreases the amount of sunlight that reaches aquatic plants (EPA 2005) and lowers the quality of habitats needed for a variety of aquatic species (NYS DEC 2005). Point source pollution, such as effluents from municipal and industrial facilities, contribute to the degradation and pollution of aquatic habitats (EPA 2022, NYS DEC 2005, Mahar and Landry 2013, Strayer et al. 2004).

Altering natural waterflow can degrade habitat and restrict species movement. Dams directly restrict or impede species movement, alter the flow of water, change the water temperature, and contribute to sedimentation (NYS DEC 2005, Zaidel et al. 2021). Groundwater removal from tapping springs can impact water sources for spring and seep species (pers. comm. Luke Myers).

Light pollution is a known threat to aquatic invertebrates as artificial light at night has been shown to alter the behavior, movements and habitat choice of these animals (Ganguly and Candolin 2023).

While modern day agricultural and silvicultural practices are an important aspect of the New York State economy, it is important to consider the effects on ecosystems and species. As these practices move closer to rivers, the natural riparian buffers are often removed. Riparian buffers maintain stream temperature and slow or prevent runoff of sediments from upland soil disturbances. Furthermore, they slow or reduce runoff from farm fields and pastures, such as contaminants from pesticides, fertilizers, manure, and sludge, into waterways (EPA 2005, NYS DEC 2005, Souza et al. 2020). Excessive fertilizer use can lead to algal blooms that can be deadly to aquatic life and overgrazing of livestock in fields could introduce pathogens, oxygen-demanding organics and solids, and invasive species to aquatic ecosystems (EPA 2005).

Approximately 10% of introduced, non-native species could have an impact on the health of ecosystems (McCormick et al. 2009). Invasive plants tend to outcompete native plants and can change natural processes (NYS DEC 2005). There is an increased risk of runoff and erosion when these plants are along streams and rivers. Aquatic invasive plants and animals can alter the water chemistry, change the nutrient regime, or decrease the dissolved oxygen levels. Introduced fish can alter trophic relationships resulting in a change in native fish populations and decreased water quality (McCormick et al. 2009).

Climate change is another threat that is likely to have lasting effects on riverine systems. Irregular weather patterns can cause extreme drought, flooding, and temperature fluctuations. Heat waves are expected to be more intense (Frankson et al. 2022). The Northeast Region of the United States is expected to experience an increase in precipitation, more frequent storms, and higher than normal temperatures (EPA 2016, EPA 2022). Precipitation is expected to increase 10% to 15% in southern New York and 15 to 20% in northern New York by 2050 (Frankson et al. 2022). Extreme flooding can cause widespread erosion and runoff with added risk of contamination if flooding occurs at remediation sites, industrial sites, or wastewater treatment facilities (EPA 2016, EPA 2022). Temperature increases can significantly alter ecosystems. As water temperatures rise, the amount of dissolved oxygen decreases and evaporation increases, potentially lowering lake and stream levels (EPA 2022). Any combination of these events could change species distributions (EPA 2022) and those that cannot adapt or migrate may be extirpated from some areas (NYS DEC 2005).

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 Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Environmental Conservation Law.

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

Protect water quality and reduce contamination and hydrological alteration (such as agricultural or road runoff, shoreline development, and damming) (NYS DEC 2005). Protect stream quality by maintaining both a riparian buffer that includes herbaceous and/or woody vegetation along the shoreline, and a significant forested buffer. These buffers reduce sediment and contaminant runoff (EPA 2005, NYS DEC 2005, Souza et al. 2020), provide shade, regulate temperature, and provide organic matter to animals (Hughes and Vadas 2021). Riparian zones with herbaceous and woody vegetation showed improved "indicator scores" for macroinvertebrates and fishes in the Midwest (Hughes and Vadas 2021).

Remove barriers to maintain or restore natural flow to waterways. Where removal is not possible, research alternatives that allow flow above and below a barrier.

In general, avoid stream crossings. If crossings are unavoidable, use Best Management Practices (BMP) to minimize disturbance to streams. Time periods of disturbance when water flow is low or normal and install stream-crossing structures at a right angle to the stream (Watershed Agricultural Council Forestry Program 2018). Temporary methods to reduce runoff include water bars, gravel, geotextile fabric, rubber belt deflectors, open top culverts, strawbales, silt fencing, control blankets, and straw wattles (Watershed Agricultural Council Forestry Program 2018). Restore the disturbed area with native species as soon as possible. Areas that have been logged may also need ruts to be smoothed to reduce surface runoff (Watershed Agricultural Council Forestry Program 2018). Hughes and Vadas (2021) suggest that Best Management Practices may need to be applied to entire stream lengths and catchments to fully restore an aquatic ecosystem. If this is not possible, restore or manage a larger area around the directly disturbed area.

In general, tailor agricultural management plans to local conditions (e.g., soils, slope, land use). Often these plans aim to reduce pollution and increase farm productivity, but incentives could also be used to encourage sustainable farming practices. Proper management typically reduces runoff by 20-90% (EPA 2005). Practices to reduce runoff and erosion include cover crops, crop rotation, tillage, mulching, terraces, diversion, and water and sediment control basins (NYS Soil and Water Conservation Committee 2023). Consider using Integrated Pest Management (IPM) as an alternative to pesticide use. If pesticides and fertilizers are used, they should only be applied when needed, in the proper amount, and timed appropriately. In addition, rotate livestock to avoid overgrazing and to allow for vegetation regrowth. In heavy use areas, consider a runoff management system that reduces contamination of nearby streams and soils (EPA 2005, NYS Soil and Water Conservation Committee 2023). If needed, provide alternative water sources and shade to keep animals out of sensitive areas (EPA 2005). Large livestock farms may benefit from a

manure waste treatment system, such as, anaerobic digestion, liquid/solid separation, composting, biological and chemical amendments, and waste facility cover (NYS Soil and Water Conservation Committee 2023).

Invasive species management can be time consuming and costly. Reduce the likelihood of non-native species being introduced into waterways. Boat-washing stations at boat launches can reduce transport of invasive plants and animals to new waterbodies. Educate anglers about the risk of releasing unused baitfish. If vulnerable species are present, consider a baitfish ban. Mechanical removal of some invasive plants may be needed in some rivers and streams. The use of pesticides to remove invasives can have a negative effect on ecosystems (McCormick et al. 2009) and should be a last resort to control invasive species.

Climate change is a global challenge. However, there are local actions that can help mitigate extreme weather events. Industrial and municipal infrastructure should be improved or replaced to be more resilient to flooding events (EPA 2016, NYS Comptroller 2023). Some suggested actions include installing or improving pumps to remove floodwater from facilities and installing protective structures, such as floodwalls. Ensure that existing bridges, dams, levees, seawalls, retaining walls, and wind barriers are prepared for extreme weather (NYS Comptroller 2023). Decrease runoff and erosion severity by installing large culverts, planting vegetation along riverbanks, and protecting and restoring wetlands (EPA 2016, NYS Comptroller 2023).

Public outreach is an important tool for conservation. Many of the threats to aquatic habitats and species can have direct and indirect effects to human health and recreation. In addition, outreach and incentives for various industries would be valuable. Improvements to municipal and industrial treatment facilities was noted by NYS DEC (2005) and further improvements and plans to deal with spills should continue to be encouraged.

Action Category	Action	Description
A.1 Direct Habitat Management	A.1.1.1.2 Manual removal	Manually remove invasive plants
A.1 Direct Habitat Management	A.1.2.4.1 Plant for erosion management	Implement and maintain riparian buffers to reduce sedimentation and runoff
A.1 Direct Habitat Management	A.1.3.0.0 Mitigate human environmental impact	Implement temporary runoff reduction measures
A.1 Direct Habitat Management	A.1.3.1.0 Manage Access	Implement boat washing stations to reduce transport of invasives between waterbodies
A.1 Direct Habitat Management	A.1.3.3.0 Remove and improve anthropogenic infrastructure	Remove barriers to natural flow in waterways where feasible

Action Category	Action	Description
A.1 Direct Habitat Management	A.1.3.3.0 Remove and improve anthropogenic infrastructure	Remove and improve industrial/municipal infrastructure to be more flood resilient
A.1 Direct Habitat Management	A.1.3.3.2 Culverts	Install culverts to reduce runoff and erosion severity
B.3 Outreach	B.3.1.0.0 Outreach, communication, and distribution	Educate anglers about the risks of releasing unused baitfish
B.5 Economic and Other Incentives	B.5.0.0.0 Economic and other incentives	Use incentives to encourage sustainable or alternative farming practices
C.7 Legislative and Regulatory Framework or Tools	C.7.2.0.0 Create or amend policies, guidelines, or best practices	Consider baitfish bans in locations with vulnerable species
C.7 Legislative and Regulatory Framework or Tools	C.7.2.2.0 Create or amend best practices or guidelines	Use Best Management Practices when crossing streams, consider water flow when constructing in or around stream.

Table 3. Recommended conservation actions for *Pteronarcys comstocki*)

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for stoneflies and mayflies of lotic waters, and for spiny salmonfly in particular.

Habitat management:

____ Monitor activity in the riparian zone and actual waters where these mayflies and stoneflies are found (or will potentially be found).

Habitat research:

____ Determine the critical habitat of the species.

Population monitoring:

____ Survey sites within the historical ranges of these species.

VII. References

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