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SCIENTIFIC NOTE

MOSQUITO SPECIES OF NEW YORK STATE: AN UPDATED CHECKLIST WITH PUBLIC AND VETERINARY HEALTH SIGNIFICANCE

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ABSTRACT. We present an updated checklist of mosquito species in New York State, integrating historical records, modern surveillance, and recent literature. A total of 68 species across 10 genera are documented, including invasive taxa (*Aedes albopictus*, *Ae. japonicus*) and historically rare species (*Orthopodomyia alba*, *Or. signifera*). This synthesis emphasizes species of public and veterinary significance, such as *Culex pipiens* and *Culiseta melanura*, vectors of West Nile and eastern equine encephalitis viruses. Analysis of more than 3 million specimens collected since 1999 confirms the absence of *Ae. aegypti*, historically introduced but unable to persist in New York. Urbanization, container-breeding ecology, climate change, and global commerce continue to shape mosquito distributions and pathogen risk. This checklist bridges historic and current data, providing a reliable reference for surveillance, vector control, and future research.

KEY WORDS Arboviruses, invasive mosquitoes, public health entomology, vector surveillance

The mosquito fauna of New York State has been documented for over a century, beginning with Johannsen (1903) and Felt (1904), expanding through Mortimer (1926), Matheson (1944), Barnes et al. (1950), and Jamnback (1969). Means (1979, 1987) provided detailed regional keys and raised the tally to 60 species, whereas Darsie and Ward (2005) listed 59 for New York in their North American synthesis (Johannsen 1903; Felt 1904; Mortimer 1926; Matheson 1944; Barnes et al. 1950; Jamnback 1969; Means 1979, 1987; Darsie and Ward 2005). Our current checklist integrates historic sources, museum vouchers, and contemporary surveillance to document 68 species currently or historically present in the state, emphasizing ecology, public and veterinary relevance (Lukacik et al. 2006, Bajwa 2018, Oliver et al. 2018, Rochlin et al. 2019).

Beyond simple enumeration, the introduction of invasive species such as *Aedes albopictus* (Skuse) and *Ae. japonicus* (Theobald) has reshaped New York's mosquito fauna, reflecting the role of global commerce and urbanization (Bajwa 2018, Rochlin et al. 2019). Historically important species, including *Ae. aegypti* (L.), were introduced during the yellow fever eras but are now absent from modern collections. This context frames not only a taxonomic update but also an ecologic and epidemiologic synthesis of how climate variability, urban heat islands, and human–wildlife interfaces influence distributions and disease risk (Gorris et al. 2023, Madhav et al. 2024, Bajwa and Zhou 2025).

Species records were compiled from historic literature (Johannsen 1903; Barnes et al. 1950; Means 1979, 1987; Darsie and Ward 2005), statewide and New York City (NYC) public health surveillance (1999–2024, >3 million adult and larval specimens), peer-reviewed studies (e.g., Lukacik et al. 2006, Bajwa 2018, Oliver et al. 2018, Rochlin et al. 2019), and museum or voucher holdings (New York State Museum [NYSM]; Department of Health and Mental Hygiene [DOHMH] archives). For each species, we verified taxonomy, distribution, status (native, introduced, rare/historical), public health relevance, and associated pathogens with mapped RefIDs that link to full citations.

We followed Reinert's Aedini revisions and subsequent treatments (Reinert 2000, Harbach and Kitching 2016) and cross-referenced legacy usage to maintain continuity with operational programs that still use older genus or subgenus names. Scientific names are italicized for genus and species only.

Definitions of the checklist fields are provided in the data dictionary (see Table 1), which standardizes occurrence status, geographic notes, ecologic descriptors, and references to ensure consistency across species entries.

This comprehensive checklist documents 68 mosquito species in New York State, bridging historical and modern records. By incorporating taxonomy, ecology, vector competence, and veterinary relevance, it provides a foundational resource for surveillance and public health. The conspicuous absence of *Ae. aegypti* in >3 million NYC specimens since 1999 contrasts with the establishment of *Ae. albopictus* and *Ae. japonicus*, underscoring differing climatic constraints and invasion pathways (Bajwa 2018, Lukacik et al. 2006, Rochlin et al. 2019). Overall, this checklist integrates historical and modern records, clarifies taxonomic inconsistencies (Reinert 2000, Harbach and Kitching 2016), and provides an analytical framework linking ecology to human and veterinary risk in New York State.

Table 1. Checklist, bionomics, and ecologic characteristics of mosquito species in New York State.[1]

Genus	Taxon: genus (subgenus) species	Typical hosts[2]	Status[3]	Primary larval habitats[4]	Ecology or bionomics (New York centric)[5]	References
Aedes	*Aedes* (*Ochlerotatus*) *abserratus* (Felt and Young)	Mammals (humans, deer)	Native	Woodland vernal, snowmelt pools	Early spring; shaded pools with leaf litter; limited dispersal	Means 1979, 1987; Darsie and Ward 2005; Lukacik et al. 2006; Bajwa 2018
	Ae. (*Stegomyia*) *aegypti* (Linnaeus)	Humans (anthropophilic)	Introduced (not established)	Domestic containers, buildings	Urban, warm microclimates	Lukacik et al. 2006, Bajwa 2018; CDC 2018
	Ae. (*Stegomyia*) *albopictus* (Skuse)	Humans, mammals, opportunistic	Introduced	Containers (tires, buckets, gutters), natural rock pools	Established downstate (New York City, Long Island); diurnal	Bajwa 2018. Rochlin et al. 2019
	Ae. (*Ochlerotatus*) *atlanticus* (Dyar and Knab)	Mammals	Native (southern stray)	Floodwater woodland depressions	Edge of range in New York; synchronous hatching after rains	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Georgecraigius*) *atropalpus* (Coquillett)	Mammals (occasional human)	Native	Rock pools along rivers	Partly autogenous; localized along riparian bedrock	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Ochlerotatus*) *aurifer* (Coquillett)	Mammals	Native	Woodland pools, snowmelt	Boreal associated; early season; localized upstate	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Ochlerotatus*) *canadensis canadensis* (Theobald)	Mammals (humans, deer)	Native	Shaded woodland vernal pools	Very common spring species; multigenerational in wet years	Means 1979, 1987; Lukacik et al. 2006
	Ae. (*Ochlerotatus*) *cantator* (Coquillett)	Mammals (humans)	Native	Coastal salt-marsh floodwater	Long Island marshes; strong flyer; tidal hatch	Means 1979, 1987; Darsie and Ward 2005; Lukacik et al. 2006
	Ae. (*Ochlerotatus*) *cataphylla* Dyar	Mammals	Native	Boreal snowmelt pools, bogs	Early, cold tolerant; Adirondack localized	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Aedes*) *cinereus* Meigen	Mammals	Native	Marshes, meadow pools	Sunlit edges, vegetated margins; widespread	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Ochlerotatus*) *communis* (De Geer)	Mammals	Native	Northern woodland, snowmelt pools	Adirondack, boreal forests; very aggressive in spring	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Ochlerotatus*) *decticus* Howard, Dyar and Knab	Mammals	Native	Bogs, acidic pools	Northern localized; low densities	Means 1979, 1987; Darsie and Ward 2005; Lukacik et al. 2006
	Ae. (*Ochlerotatus*) *diantaeus* Howard, Dyar and Knab	Mammals	Native	Shaded woodland pools	Patchy distribution; spring emergence	Means 1979, 1987; Darsie and Ward 2005

Table 1. Continued.

Genus	Taxon: genus (subgenus) species	Typical hosts[2]	Status[3]	Primary larval habitats[4]	Ecology or bionomics (New York centric)[5]	References
	Ae. (*Ochlerotatus*) *dorsalis* (Meigen)	Mammals	Native	Salt, alkaline flats, coastal edges	Strong dispersal; rapid development after flooding	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Ochlerotatus*) *euedes* Howard, Dyar and Knab	Mammals	Native	Bogs, swamps (northern)	Range margin in New York; scarce	Means 1979, 1987
	Ae. (*Ochlerotatus*) *excrucians* (Walker)	Mammals	Native	Woodland, snowmelt pools	Common spring species statewide	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Ochlerotatus*) *fitchii* (Felt and Young)	Mammals	Native	Woodland pools	Co-occurs with *Ae. canadensis*; spring	Means 1979, 1987
	Ae. (*Ochlerotatus*) *flavescens* (Müller)	Mammals	Native	Marsh, peatland pools	Northern peatlands; localized	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Ochlerotatus*) *grossbecki* Dyar and Knab	Mammals	Native	Woodland swamps	Uncommon; shaded, vegetated waters	Means 1979, 1987
	Ae. (*Protomacleaya*) *hendersoni* Cockerell	Mammals	Native	Tree holes	Suburban woodlots; with *Ae. triseriatus*	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Ochlerotatus*) *impiger* (Walker)	Mammals	Native	Arctic boreal snow pools	Rare Adirondack records; early season	Means 1979, 1987
	Ae. (*Ochlerotatus*) *implicatus* Vockeroth	Mammals	Native	Northern bogs	Localized; boreal association	Means 1979, 1987
	Ae. (*Ochlerotatus*) *intrudens* Dyar	Mammals	Native	Woodland pools	Spring; localized	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Hulecoeteomyia*) *japonicus japonicus* (Theobald)	Opportunistic; mammals, birds	Introduced	Containers; rock pools; tires	Statewide established; cool tolerant	Darsie and Ward 2005, Bajwa 2018
	Ae. (*Ochlerotatus*) *mitchellae* (Dyar)	Mammals	Native	Coastal salt marshes	Long Island; tidal hatch	Means 1979, 1987; Oliver et al. 2018
	Aedes (*Rusticoide*) *provocans* (Walker)	Mammals	Native	Hardwood swamps; early spring	Univoltine; early season	Means 1979, 1987
	Ae. (*Ochlerotatus*) *punctor* (Kirby)	Mammals	Native	Snowmelt woodland pools	Northern distribution; cool spring	Means 1979, 1987
	Ae. (*Ochlerotatus*) *riparius* Dyar and Knab	Mammals	Native	River floodplain pools	Flood-driven emergence; localized	Means 1979, 1987
	Ae. (*Ochlerotatus*) *sollicitans* (Walker)	Mammals (humans)	Native	Eastern salt-marsh floodwater	Strong flyer; abundant on Long Island	Means 1979, 1987; Rochlin et al. 2019
	Ae. (*Ochlerotatus*) *spencerii spencerii* (Theobald)	Mammals	Native	Prairie or floodplain pools	Rare or historical in New York	Means 1979, 1987; Darsie and Ward 2005
	Ae. (*Ochlerotatus*) *sticticus* (Meigen)	Mammals	Native	Floodplain woodland overflow	Synchronous emergence after river floods; dispersive	Means 1979, 1987

Table 1. Continued.

Genus	Taxon: genus (subgenus) species	Typical hosts[2]	Status[3]	Primary larval habitats[4]	Ecology or bionomics (New York centric)[5]	References
	Ae. (*Ochlerotatus*) *stimulans* (Walker)	Mammals	Native	Vernal pools	Multivoltine complex; abundant spring	Means 1979, 1987; Lukacik et al. 2006
	Ae. (*Ochlerotatus*) *taeniorhynchus* (Wiedemann)	Mammals (humans)	Native	Coastal salt marshes	Black salt-marsh species; strong day biter	Means 1979, 1987; Darsie and Ward 2005; Lukacik et al. 2006
	Ae. (*Ochlerotatus*) *thibaulti* Dyar and Knab	Mammals	Native	Shaded woodland vernal pools	Localized; spring	Means 1979, 1987
	Ae. (*Protomacleaya*) *triseriatus* (Say)	Mammals (humans, squirrels)	Native	Tree holes; tires	Suburban woodlots; with *Orthopodomyia*	Means 1979, 1987; Darsie and Ward 2005; Lukacik et al. 2006
	Ae. (*Ochlerotatus*) *trivittatus* (Coquillett)	Mammals	Native	Floodplain, floodwater	River valleys; strong flier; postflood surges	Means 1979, 1987; Grimstad 2001
	Ae. (*Aedimorphus*) *vexans* (Meigen)	Mammals (humans, livestock)	Native	Floodwater meadows, fields, ditches	Explosive after rain; multiple generations; long-distance flights	Means 1979, 1987; Lukacik et al. 2006; Lukacik et al. 2006
Anopheles	*Anopheles* (*Anopheles*) *barberi* Coquillett	Mammals	Native	Tree holes	Predatory larvae (unusual); rare	Means 1979, 1987
	An. (*Anopheles*) *bradleyi* King	Mammals	Native	Coastal brackish marshes	Localized on Long Island	Means 1979, 1987; Matheson 1944
	An. (*Anopheles*) *crucians* Wiedemann	Mammals	Native	Permanent marshes, ponds	Localized coastal, downstate	Means 1979, 1987; Darsie and Ward 2005
	An. (*Anopheles*) *earlei* Vargas	Mammals	Native	Cool vegetated pools, bogs	Northern; uncommon	Means 1979, 1987
	An. (*Anopheles*) *punctipennis* (Say)	Mammals (including humans)	Native	Streams, ponds, ditches	Versatile breeder; widespread	Means 1979, 1987; Darsie and Ward 2005; Lukacik et al. 2006; Bajwa 2018
	An. (*Anopheles*) *quadrimaculatus* Say	Mammals (humans)	Native	Sunlit permanent waters	Localized in New York; endophilic tendencies	Matheson 1944; Means 1979, 1987
	An. (*Anopheles*) *Walkeri* Theobald	Large mammals (livestock, deer)	Native	Large cattail marshes	Dispersive; summer peaks	Means 1979, 1987; Lukacik et al. 2006; Bajwa 2018
Coquillettidia	*Coquillettidia* (*Coquillettidia*) *perturbans* (Walker)	Mammals (humans)	Native	Semipermanent cattail wetlands (root attachment)	Larvae pierce roots for oxygen; hard to control	Means 1979, 1987; Lukacik et al. 2006; Bajwa 2018; Oliver et al. 2018
Culex	*Culex* (*Neoculex*) *apicalis* Adams	Amphibians (frogs, salamanders)	Native	Shaded permanent wetlands	Secretive; midsummer activity	Means 1979, 1987
	Cx. (*Melanoconion*) *erraticus* (Dyar and Knab)	Birds, mammals, amphibians	Native	Swamps, marshes, ponds	More common south; localized in New York	Lukacik et al. 2006, Bajwa 2018, Oliver et al. 2018

Table 1. Continued.

Genus	Taxon: genus (subgenus) species	Typical hosts[2]	Status[3]	Primary larval habitats[4]	Ecology or bionomics (New York centric)[5]	References
	Cx. (*Culex*) *peccator* (Dyar and Knab)	Amphibians or reptiles (herpetophilic)	Native	Woodland swamps, ditches	Secretive; shaded wetlands	Means 1979, 1987
	Cx. pipiens Linnaeus (form *Culex pipiens* f. *molestus* Forsskål)	Birds and humans; autogenous	Native (urban form)	Subterranean basements, sewers	Year-round below ground; stenogamous; hybridizes with surface form	Bajwa and Zuzworsky 2016, Bajwa 2018, Bajwa and Zhou 2025
	Cx. (*Culex*) *pipiens,* Linnaeus form *pipiens*	Birds (ornithophilic); opportunist (New York City)	Native	Aboveground containers; catch basins; storm drains	Late summer peaks; anautogenous	Lukacik et al. 2006, Bajwa 2018, Bajwa and Zhou 2025
	Cx. (*Culex*) *restuans* Theobald	Birds (ornithophilic); opportunist (New York City)	Native	Containers, woodland pools	Early season; precedes *Cx. pipiens*	Lukacik et al. 2006, Bajwa 2018, Oliver et al. 2018, Bajwa and Zhou 2025
	Cx. (*Culex*) *salinarius* Coquillett	Opportunistic (birds and mammals)	Native	Brackish and inland marshes	Coastal and inland; readily human biting	Rochlin et al. 2019; Means 1979, 1987
	Cx. (*Neoculex*) *territans* Walker	Amphibians (frogs)	Native	Permanent ponds; vegetated margins	Females overwinter; amphibian specialist	Means 1979, 1987; Lukacik et al. 2006
Culiseta	*Culiseta* (*Culiseta*) *annulata* (Schrank)	Mammals	Introduced (Palearctic)	Permanent ponds, ditches	Large, cold tolerant; early spring active	Means 1979, 1987; Darsie and Ward 2005
	Cs. (*Culiseta*) *impatiens* (Walker)	Mammals	Native	Cool woodland pools	Early season; shaded pools	Means 1979, 1987
	Cs. (*Culiseta*) *inornata* (Williston)	Mammals	Native	Ponds; ditches	Cool season flights; overwinters as adult	Means 1979, 1987
	Cs. (*Climacura*) *melanura* (Coquillett)	Birds (strongly ornithophilic)	Native	Red maple swamps (subterranean roots)	Swamp specialist; hard to sample	Oliver et al. 2018; Means 1979, 1987
	Cs. (*Culicella*) *minnesotae* Barr	Mammals (limited data)	Native	Sphagnum bogs	Localized northern bog specialist	Means 1979, 1987
	Cs. (*Culicella*) *morsitans* Theobald	Birds and mammals	Native	Cool marshes or ponds	Early season; scattered	Means 1979, 1987
Orthopodomyia	*Orthopodomyia alba* Baker	Birds (ornithophilic)	Native	Tree holes (often conifers)	Coastal, woodland; rare	Means 1979, 1987
	Or. signifera (Coquillett)	Birds (ornithophilic)	Native	Tree holes; containers	Suburban woodlots; common with *Ae. triseriatus*	Means 1979, 1987; Darsie and Ward 2005
Psorophora	*Psorophora* (*Psorophora*) *ciliata* Fabricius	Mammals (humans, livestock)	Native	Floodwater fields, pastures	Very large; predatory larvae; day biting	Means 1979, 1987; Darsie and Ward 2005
	Ps. (*Grabhamia*) *columbiae* (Dyar and Knab)	Mammals (livestock)	Native	Rice fields; floodwater	Synchronous hatch after flooding; southern	Means 1979, 1987

Table 1. Continued.

Genus	Taxon: genus (subgenus) species	Typical hosts[2]	Status[3]	Primary larval habitats[4]	Ecology or bionomics (New York centric)[5]	References
	Ps. (*Janthinosoma*) *ferox* (von Humboldt)	Mammals (humans)	Native	Shaded woodland pools	Common forest mosquito; day biting	Means 1979, 1987; Grimstad 2001
	Ps. (*Psorophora*) *howardii* Coquillett	Mammals	Native	Floodwater depressions	Very large; predatory larvae; rare Long Island, downstate	Means 1979, 1987
	Ps. (*Janthinosoma*) *mathesoni* Belkin and Heinemann	Mammals	Native	Woodland floodwater	Localized; similar to *Ps. ferox*	Means 1979, 1987
Toxorhynchites	*Toxorhynchites* (*Lynchiella*) *rutilus septentrionalis* (Dyar and Knab)	(Adults nonbiting)	Native	Tree holes	Larvae prey on other mosquitoes; adults nectar feed	Means 1979, 1987; Darsie and Ward 2005
Uranotaenia	*Uranotaenia* (*Uranotaenia*) *sapphirine* (Osten Sacken)	Annelids, amphibians	Native	Vegetated permanent wetlands	Invertebrate-feeding specialist; iridescent scales	Means 1979, 1987; Reeves et al. 2018
Wyeomyia	*Wyeomyia* (*Wyeomyia*) *smithii* (Coquillett)	Mammals (rare biting)	Native	Pitcher plants (phytotelmata)	Pitcher plant specialist in bogs	Means 1979, 1987; Darsie and Ward 2005

[1] In the city of New York, the *Culex pipiens* complex occurs as 2 ecologically distinct forms: the aboveground *Culex pipiens pipiens* (ornithophilic, enzootic or bridge West Nile virus vector) and the subterranean *Culex pipiens molestus* (autogenous, mammal biting, year-round). Although morphologically indistinguishable, their habitats, host use, and control measures differ (sewer flushing versus aboveground source reduction). Evidence for admixture or hybridization has been reported for the city of New York populations (Seto et al. 2020, Bajwa and Zhou 2025).

[2] Typical hosts, dominant vertebrate groups fed upon (mammals, birds, amphibians, reptiles; opportunistic feeds broadly).

[3] Status: native, naturally occurring in New York; introduced, established via introduction; not established, intercepted or not self-sustaining.

[4] Primary larval habitats: characteristic breeding sites (e.g., tree holes, snowmelt or vernal pools, salt marshes, catch basins).

[5] Ecology or bionomics: seasonality (early spring, multivoltine), dispersal, voltinism, and New York–centric ecologic notes.

Table 2a. Medical and veterinary importance of mosquito species in New York State.[1]

Species	Medical or veterinary importance	Pathogens isolated or implicated	Biting habits	Vector category	References
Aedes aegypti	Major global vector (dengue, Zika, chikungunya, yellow fever); not established in New York	DENV, ZIKV, CHIKV, YFV (global)	Aggressive daytime indoor, outdoor biter	Nuisance or vector role: not currently established in New York State	Turell et al. 2005, Farajollahi et al. 2011, CDC 2018, WHO 2020
Ae. albopictus	Vector potential: WNV, dengue, chikungunya	WNV (New York detections), DENV or CHIKV (elsewhere)	Day biting; peridomestic; aggressive	Nuisance or potential major vector	Farajollahi et al. 2011, Bajwa 2018, Pereira et al. 2020
Ae. canadensis canadensis	Important early season nuisance; JCV surveillance tested	JCV (surveillance), rare isolations	Day biter in shade; aggressive	Potential or secondary vector	Means 1987, Lukacik et al. 2006
Ae. cantator	EEEV or WNV bridge potential; local outbreaks	EEEV, WNV (detections)	Day, evening; aggressive coastal biter	Nuisance or minimal role	Means 1987, Darsie andWard 2005
Ae. hendersoni	La Crosse cycle associate; nuisance	LACV (associations)	Shade biting; peridomestic	Nuisance or minimal role	Means 1987, Darsie and Ward 2005
Ae. japonicus japonicus	WNV, JCV potential	WNV (detections), JCV (surveillance)	Day, evening; suburban	Nuisance or minimal role	Darsie and Ward 2005, Rochlin et al. 2019
Ae. mitchellae	EEEV, WNV potential; local nuisance	EEEV, WNV (detections)	Dusk, evening; coastal	Nuisance or minimal role	Means 1987, Oliver et al. 2018
Ae. sollicitans	EEEV, WNV bridge vector; major coastal nuisance	EEEV, WNV (detections)	Day and dusk; aggressive	Major vector	Means 1987, Rochlin et al. 2019
Ae. sticticus	Outbreak-prone nuisance; JCV potential	JCV (potential)	Dusk, evening; aggressive	Potential or secondary vector	Means 1987
Ae. triseriatus	Primary La Crosse virus vector in east	LACV (vector)	Shade-loving day or evening biter	Major vector	Means 1987, Darsie and Ward 2005
Ae. trivittatus	JCV, WNV potential; nuisance	JCV, WNV (detections)	Day, dusk; aggressive	Potential or secondary vector	Means 1987, Grimstad 2001
Ae. vexans	Major nuisance; bridge vector JCV, CVV, WNV	JCV, CVV, WNV (detections)	Dusk or night; will bite daytime in shade	Potential or secondary vector	Means 1987, Lukacik et al. 2006
Anopheles punctipennis	Historic secondary malaria vector; nuisance	*Plasmodium vivax* (lab)	Day in shade and dusk or night; outdoor	Nuisance or minimal role	Means 1987, Darsie and Ward 2005
An. quadrimaculatus	Primary historical malaria vector (east)	*Plasmodium* spp. (historic)	Night biting; often near dwellings	Nuisance or minimal role	Matheson 1944, Means 1987
Coquillettidia perturbans	EEEV bridge vector; aggressive nuisance	EEEV (virus detections)	Dusk, night; strong outdoor biter	Major vector	Means 1987, Oliver et al. 2018
Culex erraticus	EEEV bridge in South; uncommon but increasing in New York	EEEV (south); WNV occasional	Crepuscular, nocturnal; vegetated edges	Nuisance or minimal role	Turell et al. 2005, Oliver et al. 2018, Pereira et al. 2020, Bajwa, personal communication

Table 2a. Continued.

Species	Medical or veterinary importance	Pathogens isolated or implicated	Biting habits	Vector category	References
Cx. pipiens form *molestus*	Urban nuisance; implicated via hybrids in WNV spillover	WNV (urban cycles)	Readily bites humans indoors throughout the year; outdoor feeding observed in spring and summer	Potential vector	Fonseca et al. 2004, Farajollahi et al. 2011, Bajwa and Zuzworsky 2016, Bajwa 2018
Cx. pipiens form *pipiens*	Primary enzootic WNV vector in NY	WNV (New York)	Night; occasional human biting in suburban areas, major human biter in New York City	Major vector	Lukacik et al. 2006, Andreadis et al. 2010, Farajollahi et al. 2011, Bajwa 2018, Bajwa and Zhou 2025
Cx. restuans	Seeds WNV in spring	WNV (New York)	Night biter; rare human biting in suburban areas; bites humans in New York City	Major vector	Lukacik et al. 2006, Andreadis et al. 2010
Cx. salinarius	Bridge vector for WNV/EEEV	WNV, EEEV	Night biting; aggressive near wetlands	Major vector	Means 1987, Turell et al. 2005, Rochlin et al. 2019
Culiseta melanura	Primary enzootic EEEV vector in Northeast	EEEV (cycle maintenance)	Rare human biting	Major vector	Means 1987, Oliver et al. 2018
Psorophora ferox	JCV concern; nuisance	JCV (associations)	Daytime in shade; very aggressive	Potential or secondary vector	Means 1987, Grimstad 2001, Turell et al. 2005

[1] Medical or veterinary importance: major vector, bridge vector, or nuisance relevance in New York. Pathogens isolated or implicated: arboviruses or parasites detected or historically associated in New York or nearby northeast region. Biting habits: host preference (ornithophilic, mammalophilic, opportunistic), diel (day, dusk, night), aggressiveness. Pathogens mentioned in the table: YFV, Yellow fever virus; DENV, dengue virus; ZIKV, Zika virus; CHIKV, chikungunya virus; WNV, West Nile virus; JCV, Jamestown Canyon virus; EEEV, eastern equine encephalitis virus; LACV, La Crosse encephalitis virus; CVV, Cache Valley virus; *Plasmodium vivax,* a species of malaria-causing parasites; and *Plasmodium* spp. (malaria-causing parasites).

Table 2b. Other documented mosquitoes of New York State (nonmajor vectors).[1]

Species	Medical or veterinary importance[1]	Pathogens isolated or implicated[2]	Biting habits[3]	Vector category	References
Aedes abserratus	Early spring woodland nuisance biter; no arbovirus role	None documented	Daytime biter; shaded woods; aggressive	Nuisance or minimal role	Means 1987
Ae. cinereus	Possible Jamestown Canyon virus exposure; widespread nuisance	Jamestown Canyon virus (potential)	Daytime biter; shaded wetlands and fields	Nuisance or minimal role	Means 1987, Turell et al. 2005
Ae. stimulans complex	Aggressive spring biters; no confirmed vector role	None confirmed	Daytime spring biter in woods	Nuisance or minimal role	Means 1987
Ae. intrudens	Early season nuisance in woodlands; no confirmed vector role	None documented	Daytime woodland biter	Nuisance or minimal role	Means 1987
Ae. spencerii	Western New York presence; rare nuisance	None documented	Limited info; dusk biter	Nuisance or minimal role	Means 1987
Ae. euedes	Northern boreal species; no known role	None documented	Unknown; presumed woodland biter	Rare or historical	Means 1987
Culiseta morsitans	No known role; present in NY	None documented	Unknown	Nuisance or minimal role	Means 1987
Culex territans	Amphibian feeder; no human or arboviral role	None documented	Feeds on amphibians; nonbiting to humans	Nonvector	Means 1987, Darsie and Ward 2005
Anopheles walkeri	Historic presence; no known arbovirus role	None documented	Evening biter in vegetated habitats	Nuisance or minimal role	Means 1987
Psorophora howardii	Large, aggressive biter; potential Cache Valley virus or West Nile virus involvement	Cache Valley virus or West Nile virus (possible)	Aggressive daytime biter; recently expanding in New York	Potential or secondary vector	Turell et al. 2005, Pereira et al. 2020

[1] Medical or veterinary importance: major vector, bridge vector, or nuisance relevance in New York.
[2] Pathogens isolated or implicated: arboviruses or parasites detected or historically associated in New York or nearby northeast region.
[3] Biting habits: host preference (ornithophilic, mammalophilic, opportunistic), diel (day, dusk, night), aggressiveness.

Table 3. Summary of mosquito species by occurrence status and epidemiologic relevance in New York State[1]

Category	Number of Species	Representative Species	Remarks
Native	51	*Aedes vexans*, *Cx. pipiens*, *Cs. melanura*	Endemic fauna widespread statewide
Introduced/Established	2	*Aedes albopictus*, *Ae. japonicus*	Stable populations in urban areas
Introduced/Not Established	1	*Ae. aegypti*	Absent from current surveillance
Urban Form	1	*Cx. pipiens f. molestus*	Subterranean/autogenous form
Historical/Rare	12	*Orthopodomyia alba*, *Ae. spencerii*	Documented ≤ twice since 1900

[1] Genus-level overview. Among the ten genera recorded in New York State, *Aedes* is the most diverse, with 29 species, including two established invasives (*Ae. albopictus*, *Ae. japonicus*) and numerous native floodwater and woodland taxa. *Anopheles* follows with seven species, chiefly inhabiting vegetated pools and streams, none currently of medical importance. *Culex* comprises five species - four native and one introduced (*Cx. erraticus*) - that include the principal vectors of West Nile and Eastern equine encephalitis viruses. *Culiseta* includes five species, notably the enzootic EEEV vector *Cs. melanura*. Less speciose genera—*Coquillettidia*, *Psorophora*, *Toxorhynchites*, Uranotaenia, and Wyeomyia - each occur with one or a few representatives, ranging from saltmarsh breeders to phytotelm specialists. Overall, native species (n = 51) dominate the state's fauna, while introductions remain few and localized, underscoring the long-term ecological stability of New York's mosquito assemblage.

Table 2 details the subset of mosquito species with confirmed or suspected pathogen associations. The table emphasizes both public health and veterinary relevance, supported by inline references. In addition to the core checklist, 7 species have been added since the last statewide synthesis: *Ae. albopictus*, *Ae. japonicus*, *Culex erraticus* (Dyar and Knab), *Psorophora howardii* Coquillett, *Culiseta annulata* (Schrank), *Ae. spencerii* (Theobald), and *Ae. euedes* Howar, Dyar and Knab (Table 1). Their inclusion reflects recent surveillance records and literature updates. Table 3 summarizes the distribution of all 68 species by genus and status category.

During the past 5 years, *Cx. erraticus* has increased nearly 4-fold in collections, particularly in Staten Island, Queens, and The Bronx. This species, which was unrecorded as positive for West Nile virus (WNV) from 2000 through 2015, has now become one of the more abundant species in late summer collections, with concurrent increases in the minimum field infection rate for WNV (Bajwa and Zhou, personal communication).

Invasive *Ae. albopictus* and *Ae. japonicus* are now established and regularly encountered in NYC and Long Island (Bajwa 2018). By contrast, *Ae. aegypti* has not been detected despite intensive surveillance (>3 million specimens since 1999), consistent with a lack of overwintering and sustained colonization in the current climate (NYC DOHMH and New York State Department of Health [NYSDOH] surveillance, historical context in Matheson 1944, Barnes et al. 1950).

Among the 68 species, 23 have confirmed or suspected associations with human or veterinary pathogens (Tables 2a and 2b). Core WNV vectors include *Cx. pipiens* (L.), *Cx. restuans* Theobald, and *Cx. salinarius* Coquillett (Lukacik et al. 2006, Bajwa 2018, Rochlin et al. 2019, Keyel et al. 2021, Bajwa and Zhou 2025). *Culiseta melanura* (Coquillett) maintains, eastern equine encephalitis virus (EEEV) enzootically, whereas salt-marsh mosquitoes such as *Ae. sollicitans* (Walker), *Ae. taeniorhynchus* (Wiedemann), and *Cx. salinarius* serve as bridge vectors (Oliver et al. 2018). Spring *Aedes*, for example, *Ae. provocans* (Walker), *Ae. punctor* (Kirby), and *Ae. Sticticus*, are implicated in Jamestown Canyon virus cycles (Rosen and Rozeboom 1954, Grimstad 2001, Andreadis et al. 2008, Ngo et al. 2023). Vector roles for dog heartworm, *Dirofilaria immitis* Leidy, include *Ae. vexans* (Meigen) and *Coquillettidia perturbans* Walker (Ledesma and Harrington 2011, Rochlin et al. 2019).

Container-breeding *Cx. pipiens* remains the dominant urban vector and key driver of WNV cycles in New York, thriving in stormwater infrastructure and peridomestic habitats (Lukacik et al. 2006, Bajwa 2018, Rochlin et al. 2019). The potential occurrence of *Cx. pipiens* f. *molestus* Forsskål in subterranean environments (e.g., sewer systems) warrants targeted genetic and ecologic surveys, given its autogeny and mammal-biting tendencies (NYC operational reports, see also Darsie and Ward 2005 for taxonomy). Eleven species regularly exploit artificial containers, reinforcing the need for urban source reduction.

Aedes albopictus is now established from NYC through Long Island, whereas *Ae. japonicus* is widespread statewide (Bajwa 2018). *Aedes aegypti* is historically linked to yellow fever introductions via maritime traffic; seasonal populations likely occurred but failed to overwinter (Matheson 1944, Barnes et al. 1950). Despite New York's ongoing role as a major air and sea hub, more than 3 million mosquitoes collected in NYC since 1999 have yielded no *Ae. aegypti*, indicating the current absence and climatic unsuitability for persistence (Bajwa 2018).

Orthopodomyia alba Baker remains known only from a 1950 Ithaca record, whereas *Or. signifera* Coquillett persists sporadically in Nassau, Rockland, and NYC boroughs (Barnes et al. 1950, Bajwa 2018). *Culex apicalis* Adams (western) and *Cs. annulata* (Old World) are documented but scarce, and voucher-backed confirmations and periodic reassessment are recommended (Means 1987, Darsie and Ward 2005, Bajwa 2018).

Beyond human health, veterinary outcomes merit emphasis: *Cs. melanura*–EEEV cycles pose risk to equines; *Ae. vexans* and *Cq. perturbans* contribute to *D. immitis* transmission; and WNV affects horses statewide (Oliver et al. 2018, Rochlin et al. 2019). Integrating veterinary morbidity data with mosquito surveillance will strengthen risk assessments.

Warmer winters and longer growing seasons are projected to expand the overwintering range and seasonal abundance of container-breeding *Aedes* and *Culex* species in the northeast, potentially elevating WNV risk and enabling northward range shifts (Kramer et al. 2019, Paz 2019, Madhav et al. 2024). Urban heat island effects may facilitate localized persistence of invasive *Aedes* and extend biting seasons. Conversely, highly cold-limited species (*Ae. aegypti*) remain unlikely to overwinter under the present conditions; however, episodic introductions at coastal ports will continue. Scenario-based planning and thermal suitability modeling should be integrated with surveillance to prioritize interventions when climatic suitability and human exposure intersect (Gorris et al. 2022, Madhav et al. 2024).

Looking ahead, climate-driven changes in thermal suitability and season length are likely to alter mosquito phenology, distributions, and pathogen dynamics in the region (Gorris et al. 2021, Madhav et al. 2024, Bajwa and Zhou 2025). Sustained, voucher-anchored surveillance, routine molecular verification, integration of veterinary data, and scenario-based risk mapping will be essential to anticipate and mitigate mosquito-borne disease threats in New York State.

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