

SCIENTIFIC NOTE

BEAVER PONDS IN UPSTATE NEW YORK AS A SOURCE OF ANTHROPOPHILIC MOSQUITOES

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ABSTRACT. Surveys for anthropophilic mosquitoes conducted over a 30-year period in proximity of beaver ponds in 3 research sites in Otsego County, New York, indicate that none of the ponds seemed to support significant populations of permanent water mosquitoes. The only site sampled before impoundment previously had supported large populations of *Aedes punctor* and *Aedes stimulans* and lesser numbers of other "northern *Aedes*"-type anthropophilic species.

KEY WORDS Mosquitoes, beavers, New York

Studies of mosquito populations in a research site in upstate New York from 1968 to 1972 recorded large populations of *Aedes punctor* (Kirby) and *Aedes stimulans* (Walker) and lesser numbers of other "northern *Aedes*" spp. (Butts 1974). Beaver (*Castor canadensis* Kuhl) subsequently impounded large areas of larval breeding sites, making them unsuitable for development of such species (Butts 1986). Sampling through the summer of 1991 showed that populations remained low and that species characteristic of permanent water had not become established (Butts 1992). This lack of utilization of the impoundment prompted studies of available established beaver ponds.

The original studies were conducted on the 146-ha (360-acre) Upper Site of the State University of New York Oneonta Biological Field Station located west of Otsego Lake and just north of the Village of Cooperstown (Butts 1974). This was the only site sampled before impoundment. What had been a swamp forest and a low area around a remnant bog are now beaver ponds of approximately 6 ha (15 acres) and 12 ha (30 acres), respectively.

The 2nd site, Rum Hill, encompasses 121 ha (300 acres) immediately adjacent to the highest point in Otsego County and about 8 km (5 mi) northwest of the Upper Site. Rum Hill is covered largely by 2nd-growth deciduous species, conifer plantations of varying age, and open fields previously used for pasture and forage production but now abandoned. A series of stepwise beaver ponds covering about 2 ha (5 acres) and a smaller impoundment consisting of a small pond constructed by the previous owner and subsequently enlarged by beavers are present. A steep slope along the northern boundary overlooks a beaver pond of approximately 32 ha (80 acres) on the adjoining property.

The 3rd site, Greenwoods Conservancy, is a tract of more than 445 ha (1,100 acres) in the town of Burlington, Otsego County, about 19 km (12 mi) west of the Upper Site. Greenwoods contains an

extensive wetland of about 28 ha (70 acres) consisting of a sphagnum mat surrounded by open water. The impoundment has existed for more than 30 years, and water level has been maintained by periodic reinforcement of the original beaver dam by conservancy personnel. A series of stepwise beaver ponds lie in the drainage above the wetland. Another stepwise series of separate ponds of about 2 ha (5 acres) and 0.8 ha (2 acres) is also present.

Collection of landing or biting mosquitoes within arm's length reach of a seated observer with an exposed forearm were made by inverting small vials charged with ethyl acetate over stationary mosquitoes. In regular sampling surveys a series of sites was established adjacent to impoundments so as to maximize collection of species developing therein. Collections were made for 20 min/site at approximately weekly intervals at Rum Hill from June 3 to September 7, 1987; and at Greenwoods from June 10 to August 3, 1993; June 9 to September 28, 1994; July 25 to September 15, 1995; June 13 to September 9, 1996; and June 4 to August 26, 1997.

Opportunistic landing or biting collections were made in 2 blinds on the Upper Site at approximately weekly intervals from 1986 to 1996 during observation of resident waterfowl. Periods of 2+ h/day were spent in early morning (generally from 1st light) or late evening (generally until last light). Dates of collections varied from year to year, but earliest observations were made on April 22 and latest on November 15. Centers for Disease Control-style miniature light traps (Hauscher Machine Works, Toms River, NJ) were used occasionally (without attractants) in all 3 research sites and occasional larval surveys were made using a standard dipper.

Of the mosquitoes collected (Table 1) on the Upper Site, 24 are "northern *Aedes*" (*Ae. punctor*, *Ae. stimulans*, *Ae. canadensis* (Theobald), *Ae. cinereus* (Meigen), and *Ae. excrucians* (Walker)), 5 are temporary-pool *Aedes* spp. with multiple generations,

Table 1. Mosquitoes collected during summers in 1986 through 1997 in 3 research areas in Otsego County, New York.

Species	Upper Site 1986-96	Rum Hill 1987	Greenwoods 1993-97
<i>Anopheles earlei</i> Vargas	13	—	—
<i>An. punctipennis</i> (Say)	4	2	12
<i>Aedes vexans</i> (Meigen)	3	—	—
<i>Ae. excrucians</i> (Walker)	1	—	—
<i>Ae. stimulans</i> (Walker)	8	—	—
<i>Ae. canadensis</i> (Theobald)	11	3	20
<i>Ae. cinereus</i> (Meigen)	1	—	1
<i>Ae. punctor</i> (Kirby)	3	—	58
<i>Ae. trivittatus</i> (Coquillett)	2	—	3
<i>Ae. provocans</i> (Walker)	—	2	1
<i>Ae. fitchii</i> (Felt and Young)	—	—	1
<i>Ae. triseriatus</i> (Say)	3	—	3
<i>Ae. hendersoni</i> Cockerell	3	2	1
<i>Coquillettidia perturbans</i> (Walker)	15	5	19
<i>Culex pipiens</i> L.	1	—	—
<i>Cx. restuans</i> Theobald ¹	4	—	3
<i>Cx. territans</i> (Walker) ¹	3	—	—
<i>Culiseta melanura</i> (Coquillett) ¹	2	—	3
<i>Cs. morsitans</i> (Theobald) ¹	—	—	2

¹ Species collected only by methods other than landing or biting.

and 5 are tree hole breeders. None of these species are likely to be able to develop in the impoundment. Of the remaining 42 specimens, 15 are *Coquillettidia perturbans* (Walker), which is confined to permanent standing water, and 27 are of species known to develop in a variety of aquatic habitats. Seven of the 14 specimens from Rum Hill are "northern *Aedes*" or tree hole breeders, 5 are restricted to permanent water, and 2 can develop in a variety of larval habitats. Eighty-nine of the 136 specimens collected at Greenwoods are either "northern *Aedes*" or tree hole breeders, 19 are permanent-water breeders, and 28 are species with varied larval developmental requirements. In all cases those species not confined to permanent water and neither "northern *Aedes*" nor tree hole breeders might be developing in the impoundments. The small numbers collected over the course of this study would indicate that such development would be quite limited.

Although a somewhat localized sampling, these results seem to agree with a previous finding that pest mosquitoes in the mountains in New York State are largely *Aedes* spp., which breed in snow-melt pools (Means 1979). The 1 site sampled before impoundment supported populations of such species. Counts made in 1977 of 309 landings on the (clothed) back of the author in 20 min contrast sharply with numbers in Table 1. Analysis of these results suggests that the commonly heard indictment of beavers as a source of mosquito problems deserves further attention and that generalized

treatment without previous surveillance is counter-indicated. Surveys should include investigations of drainage areas above impoundments where elevation of the local water table may result in persistence of vernal pools for longer periods than in surrounding areas. This seems to be the case in Greenwoods. Equally important to note is that relationships indicated herein may not hold for other geographic areas where larger populations of permanent-water mosquitoes are more common.

Specimens upon which this article is based are housed in the permanent collection of the SUNY Oneonta Biological Field Station, Cooperstown, NY.

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