

STATE  
THREATENED

## Tomah Mayfly

(*Siphonisca aerodromia*)



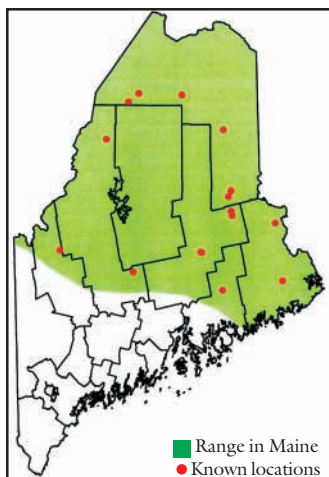
Mark McCollough

### Description

The Tomah mayfly has sometimes been referred to as a living fossil. Nymphs have greatly expanded, wing-like flanges on the abdomen, which are reminiscent of characteristics of fossil mayflies from the Carboniferous era. These large abdominal flanges, as well as small bumps on the thorax (midsection) of both nymphs and adults, distinguish the Tomah mayfly from all other mayflies. It is also an unusually large mayfly, measuring nearly an inch in length. This species is the only representative of its genus in the world.

### Range and Habitat

The Tomah mayfly was first discovered in the early 1900s in northern New York. Unfortunately, in the 1930s a dam was constructed at this original location, and the species was apparently extirpated. It was rediscovered in 1978 at Tomah Stream in Codyville, Maine by a researcher from the University of Maine. It is this site from which the mayfly gets its common name. Extensive surveys in Maine have since located an additional 15 occurrences, and it is possible more may be found. The existing sites are widely distributed throughout western, central, eastern, and



northern Maine. The species has also been recently relocated at a new site in New York. Historic collections were made in Quebec (1941, 1963) and Labrador (1952). Attempts to locate the species in the Maritime Provinces during the early 1990s were unsuccessful.

The Tomah mayfly inhabits small rivers and streams bordered by extensive areas of seasonally flooded sedge

meadow. This is a dynamic habitat, characterized by a short period of flooding from snow and ice melt during April-May, followed by receding water from the floodplain during summer months. Standing water often remains until May or June as pools, channels, or isolated ponds. Tussock sedge and rushes are typically the dominant vegetation in these habitats. The inundated, decomposing sedge provides shelter, bottom surface, and abundant food for an unusually diverse and abundant aquatic invertebrate community.

### Life History and Ecology

Tomah mayflies complete their life cycles in a single year. Eggs are laid in the stream channel during June, and the larvae, or nymphs, hatch the following November or December. The immature mayflies grow slowly beneath the ice, feeding on decomposing vegetation and algae. After snowmelt in March or April, the nymphs migrate from the stream channel to the adjacent inundated floodplain. Here they become predaceous and feed on other species of mayfly nymphs. This predatory behavior is highly unusual for mayflies, most of which feed on dead plant material. In the floodplain, the nymphs grow rapidly.

During the last two weeks of May, the nymphs molt to the final stage of larval development. Finally, in late May and early June, they crawl out of the water onto an upright stem or leaf and molt to the winged subadult form. This “hatching” period occurs mainly during the late morning and early afternoon hours, and the population emerges over a period of about 10 days. The newly emerged subadults then fly to the forest canopy along the stream, and in about 3-4 days molt to the final adult stage. The adults live from 1-9 days, during which mating and egg laying take place over the stream in the early evenings. They do not feed as adults. Female Tomah mayflies have the ability to reproduce parthenogenetically – that is, they do not require a male to fertilize their eggs. Young produced in this manner are identical genetic copies of their mother.

## Threats

Because most of the Tomah mayfly's life is spent in the aquatic stage, it is affected by alterations of the river and stream ecosystems where it lives. Dams have caused extirpation of this species in New York, and the long history of damming rivers in Maine has likely resulted in the loss of some populations. Pollution sources that degrade water quality could affect the survival of eggs and nymphs. Aerial spraying of insecticides could directly affect all life stages. Habitat alteration from dredging, filling, or introduction of non-native plants or fish is detrimental.

## Conservation and Management

The Tomah mayfly is one of the rarest mayflies in the world, and all but one of its currently known populations are found in Maine. Consequently, Maine has an important responsibility in protecting the species. In 1997, the Tomah mayfly was listed as threatened in the state because of its limited number, distribution, and size of populations, and its near-endemic status. It is also a former candidate for federal listing. Despite extensive statewide surveys of over 150 suitable locations, it is currently known from only 16 sites in Maine. Three of these sites – Tomah Stream meadow, Mattagodus Stream, and Thompson Deadwater – are either partly or wholly under conservation ownership by the state, and have the potential to be maintained and managed for the mayfly. The Tomah mayfly shares its habitat with other rare species including the brook floater mussel, yellow rail, Atlantic salmon (endangered), yellow lampmussel (threatened), and bald eagle (threatened).

Researchers at the University of Maine have done many studies to document the life history and habitat requirements of this mayfly. MDIFW is continuing surveys throughout the state to search for new populations, and recovery plans are being drafted to identify conservation goals.

The greatest conservation concern for the Tomah mayfly is protecting its wetland habitat from alteration or degradation resulting from damming, dewatering, alteration of flow, and deterioration of water quality. Adhering to state wetland and Shoreland Zoning laws and water quality Best Management Practices contributes greatly to maintaining the quality of aquatic habitats for this species. Shoreland zoning and LURC zoning standards provide protection of habitat up to 250 feet from larger rivers. Some forest companies voluntarily extend the conservation of intact, forested riparian zones to 330-600 feet for larger rivers.

### Recommendations:

- ✓ Prior to land development or forest harvesting near waterways providing habitat for threatened and endangered species, consult with a biologist from MDIFW to assist with planning.
- ✓ Municipalities should strive to maintain areas adjacent to waterways providing habitat for threatened and endangered species in a low-density, rural setting and identify these areas in comprehensive plans. Consider protecting waterways and a 250-foot upland buffer as Resource Protection Districts.

- ✓ Use voluntary agreements, conservation easements, conservation tax abatements and incentives, and acquisition to protect important habitat for threatened and endangered species.
- ✓ Follow Shoreland Zoning and LURC standards.
- ✓ To preserve water quality and river functions, maintain contiguous, forested riparian habitats at least 250 feet from waterways providing habitat for threatened and endangered species.
- ✓ To preserve adult feeding and maturation habitat for threatened and endangered dragonflies and mayflies, maintain forested buffers and wetlands up to 600 feet from rivers where they occur.
- ✓ Avoid placing roads, houses, yards, and other developments within 250 feet of waterways providing habitat for threatened and endangered species.
- ✓ When projects are proposed within 250 feet of waterways providing habitat for endangered or threatened species, adhere to forestry Best Management Practices (handbook available from the Maine Forest Service, SHS #22, Augusta, ME 04333) and Maine Erosion and Sediment Control Recommendations (available from the Maine Department of Environmental Protection, SHS #17, Augusta, ME 04333).
- ✓ Avoid road crossings or use of heavy equipment in streams or rivers.
- ✓ Avoid stream alteration projects (water withdrawals, dredging, rip-rap, channelization, pipeline crossings, dams) that would alter flow or remove natural stream features such as riffles and pools.
- ✓ Avoid the use of broad-spectrum pesticides within ¼ mile of waterways providing habitat for threatened and endangered species.
- ✓ To maintain or improve water quality, conduct thorough reviews of dam and wastewater discharge proposals. Avoid land uses that would contribute to non-point sources of pollution.
- ✓ It is illegal to introduce fish species. Such introductions could alter aquatic invertebrate communities. 🐝