Pəskehtəkʷok

Joining of the Branches

Photo: Martin Neptune

Winter 2005 ~ Issue 2

Penobscot Indian Nation
Department of Natural Resources

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WHY DOES ICE FLOAT?

And other stuff about life under frozen water

Ever wonder why we sometimes see dead fish floating in the pond during the spring?

Read this article for some thoughts about what might be going on.

Water differs from most other compounds because it is less dense as a solid than as a liquid. Consequently ice floats, while water at temperatures just above and below freezing sinks. As most compounds change from a liquid to a solid, the molecules become more tightly packed and consequently the compound is denser as a solid than as a liquid. Water, in contrast, is most dense at 4°C (39.2 °F)and becomes less dense at both higher and lower temperatures. Because of this density-temperature relationship, many lakes in temperate climates tend to stratify, that is, they separate into distinct layers.

LAKES AND PONDS IN WINTER

After ice forms the water below is sealed off, not allowing any new oxygen to enter the water from the air. However, oxygen may come from streams flowing in or plants creating it from sunlight (when there is not a deep snow cover). So what this means is that, generally, the amount of oxygen in the water decreases throughout the winter. This is especially true when there is a lot of plant material and other organic matter being broken down, which uses up oxygen in the process (decomposition). This is why sometimes small ponds, like the one on Indian Island, experience fish kills. Because, like us, fish need oxygen to breathe!

Low levels of oxygen can also cause a release of phosphorus from the sediments, worsening water quality problems. When a lake mixes in the spring, this extra phosphorus is food for an increased growth of algae. Large amounts of algae (blooms) in the summer can also result in fatally low levels of oxygen.

RIVERS AND THEIR WINTER LIFE

A few insects are active year round, or only active during the winter months. The immature stages of many aquatic insects are able to remain active throughout the year. The adults of the winter stoneflies are active only during the late winter and early spring months, and certain springtails (nicknamed "snow fleas") and winter scorpionflies are also active during the winter months. Most of these insects are equipped with special body fluids that act as antifreeze and prevent the insects from being harmed by the freezing temperatures.

Winter is a time of dormancy and hibernation for some creatures. In streams, during the harsh winter weather, many aquatic insects continue to develop as larvae. However, the small winter stonefly is one of the species that develops and emerges as an adult during the winter months.

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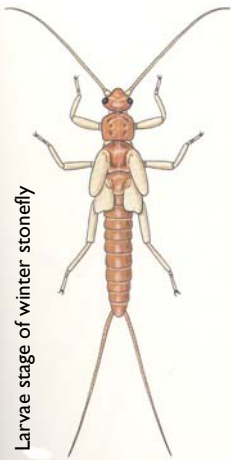

Larvae stage of winter stonefly

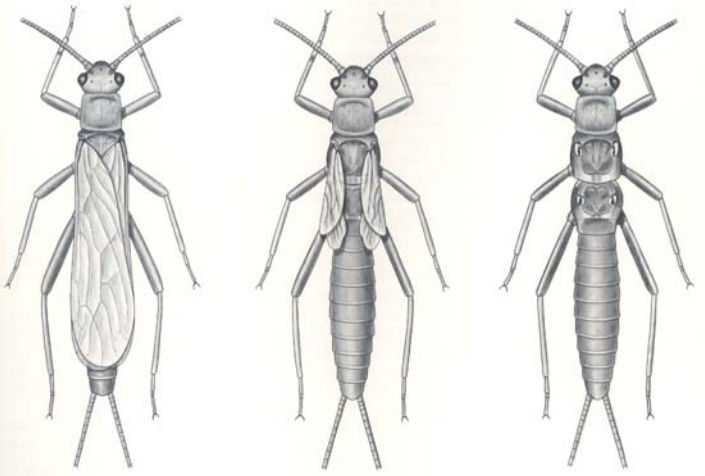
SMALL WINTER STONEFLY INTERESTING FACTS:

- Their life cycle is completely reversed—like working 3rd shift.
- They are believed to be darker in color than other stoneflies so they can absorb more heat from the sun.
- They can often be seen crawling around on the snow and ice.
- They are highly sensitive and cannot tolerate pollution—thus, they are often used as an indicator of water quality.

SMALL WINTER STONEFLY LIFE CYCLE:

1. Eggs hatch in late winter or early spring.
2. Once the water begins to warm larvae migrate downward and eventually settle down in the *hyporheic zone* (See Figure 1).
3. Three to six months of inactivity (known as "diapause") during which they stop growing and developing.
4. As the stream water begins to cool again, larvae become active and feed and grow rapidly through fall and winter.
5. By winter, development is completed and the stoneflies remain active as adults. The harsh cold temperatures are avoided by escaping into tiny caverns in the snow and ice.

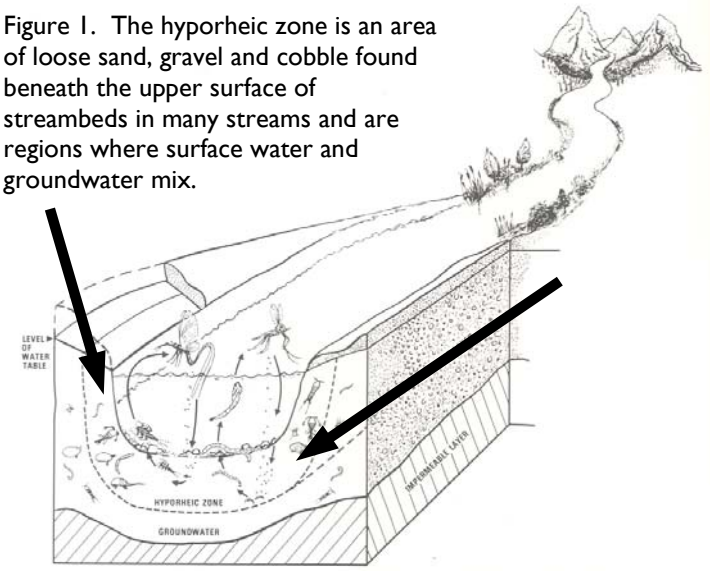
Adult stage of winter stoneflies



This picture shows three varieties of adult wings, from left to right, **fully-winged, short-winged, and micro-winged**.

Perhaps because of their narrow tolerances for cold environments and how often some of these stoneflies are micro-winged they tend to stay located in very specific areas. This characteristic has been found useful in tracking the geological and evolutionary history of an area.

Figure 1. The hyporheic zone is an area of loose sand, gravel and cobble found beneath the upper surface of streambeds in many streams and are regions where surface water and groundwater mix.

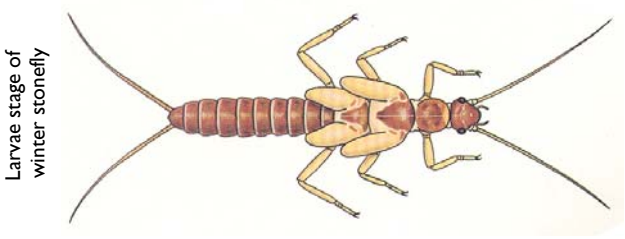


SMALL WINTER STONEFLY HABITAT AND ROLE:

- They inhabit riffles and free flowing waters and are most common in small streams.
- They are known as "shredders" because of their feeding behaviors—they shred leaves and twigs into smaller pieces. Shredding makes the smaller pieces available to other organisms.
- Larvae can consume up to 30% of their body weight each day, even during the coldest winter months.
- They are an important food source—serving as protein for other invertebrate predators such as fish, birds, and salamanders.

The following list of species of winter stoneflies have their presence in Maine confirmed:

Two-knobbed Snowfly (Allocapnia maria)
Boreal Snowfly (Allocapnia minima)
Pygmy Snowfly (Allocapnia pygmaea)
Manitoba Snowfly (Capnura manitoba)
Angulate Snowfly (Paracapnia angulata)
Northeastern Snowfly (Paracapnia opis)


Larvae stage of winter stonefly

Material in this article was taken from a variety of sources including:

Water on the Web
waterontheweb.org/under/lakeecology/05_stratification.html
Maine Stream Team newsletter
www.state.me.us/dep/blwq/newslet/mstpnews-03-01.pdf

Check Out Our New Web Pages!

DNR is getting a new electronic look.

In order to continually improve upon our appearance to members of the community and our representation of the Penobscot Nation to the rest of the world, we have been redesigning our web pages. We hope that this will give everyone a better idea of the work that is done in the Department, by whom and its quality. These pages also contain locations for you to download information as well as links to other web site resources.

The work started with the Water Resources Program and has blossomed from there. As you can see from the graphic to the right (an image of the DNR home page) every program has a link, even if it is just one page with contact information for now. Some pages have categories listed that don't have a link to them yet. These sites will continue to be under construction and updated so please keep coming back to see what's new!

Here is a list of the pages and the links that are active right now:

1) **Adminstration**

2) **Air Quality**
   - 2a) **Who We Are**
   - 2b) **What We Do**
   - 2c) **DNR Newsletter (downloads available)**

3) **Conservation Law Enforcement**

3) **Forestry**
   - 4a) **Who We Are**
   - 4b) **Harvest Areas**
     - **Alder Stream (download available)**
     - **Carrabassett Valley (download available)**
     - **Mattamiscontis (download available)**
   - 4c) **DNR Newsletter (downloads available)**

5) **GIS Mapping**
   - 5a) **Who We Are**
   - 5b) **Services**
   - 5c) **Maps to Download (downloads available)**
     - **Indian Island (downloads available)**
   - 5d) **DNR Newsletter (downloads available)**

6) **Water Resources**
   - 6a) **Fish consumption advisory (download available)**
   - 6b) **Who We Are**
   - 6c) **What We Do**
     - **Physical and chemical monitoring**
     - **Biological monitoring**
   - 6d) **DNR Newsletter (downloads available)**

7) **Wildlife**
   - 7a) **Who We Are**
   - 7b) **Hunting Statistics/Regulations**
   - 7c) **DNR Newsletter (downloads available)**

We thank James Francis and Hugga Dana for letting us use their artwork and photographs on these pages.

If you have any comments about the web site please feel free to call or email Angie Reed at areed@penobscotnation.org or 817-7360. We welcome your feedback and want to make these pages as useful as possible for you.