

Bugs Below Zero

Project Description:

Winter-active aquatic insects including stoneflies, mayflies, caddisflies, and non-biting midges are able to survive below-zero temperatures and can often be found on snowbanks. They are also a vitally important food for trout and other fish over winter and are sensitive to warming winter temperatures. Join university researchers from around the state to document winter aquatic insect activity and the conditions under which they are active. Data from this project will be open to the public and be used to inform research on the biology of winter-active insects, effects of climate change and habitat use. The data will also be used for education and informing management of streams in winter.

Project question:

- How does winter insect abundance and type of winter-active aquatic insect change with different air temperatures, water temperatures, observation dates, distance from stream, stream characteristics, and landscape characteristics over fall, winter, and early spring?

Posts on how to identify adult winter-active insects and male and female adult midges can be found here: <https://www.bugsbelowzero.com/meet-the-species>

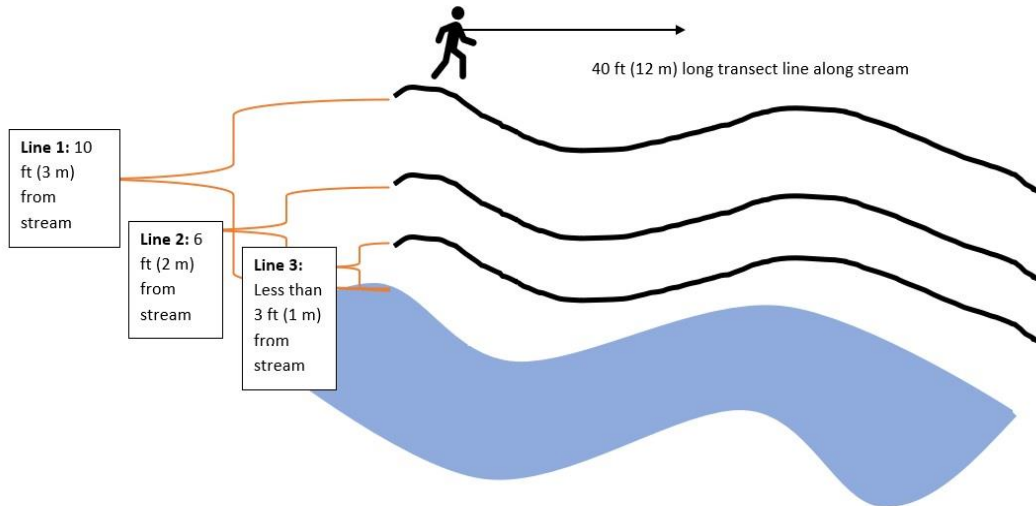
Equipment you may want (optional):

If you want to collect water temperatures and have the means to purchase a thermometer, we recommend an aquarium thermometer (<https://tinyurl.com/4h7bywkd>) that can be dipped into the stream. Make sure that you have solid footing and are not standing on ice when approaching the stream to get a measurement.

ATTENTION: Please upload observations to <https://www.anecdata.org/projects/view/949> after using this form.


Instructions for Collecting Insect And Ecological Data

- Spend at least 30 min and no more than 1 hour slowly walking in a line (called a transect line) about 40 ft (12 m) in length located 10 ft (3 m) from the edge of a stream bank and count the number of insects you see on the snow about 1 ft on either side of you. Repeat the process again at 6 ft (2 m) distance from stream and less than 3 ft (1 m) distance from stream.
 - This will leave you with a total of 3 transect lines that you've walked.
 - If you are collecting data with more than one person or in a group, two people or more can walk the transect lines at the same time. If you are by yourself, you can just walk the 6 ft (2 m) line to collect data.
 - **TIP:** If you want to maximize your chances of finding insects, try to go out on days that are above freezing!



Observation Data Sheet:

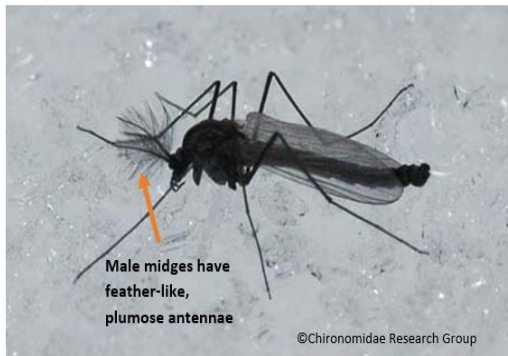
- Name _____ Date _____
- Time that entered field _____
- Time that left field _____
- Role (student, undergrad, faculty, volunteer) _____
 - If student, school name/teacher name _____
- Email _____

- Location of stream (Add GPS location if known)
 - Directions for finding GPS location on Google Maps App on smartphone:
 - Zoom into your location
 - Drop a pin where you can see your location marked by tapping and holding your finger down briefly on the screen above your location
 - A new screen will pop up titled “Dropped pin”
 - Under the space with the location icon () you will see the GPS location information in decimal degree notation. Example: 44.986533 °N, 93.185669 °W
 - Add GPS Coordinates here _____
 - Name of stream if known _____
- Your city of residence _____
- Enter the number of each type of insect that you observe alive on the snow. **TIP:** If you are not in a group, you can just fill in Line 2. For help with identification, see <https://www.bugsbelowzero.com/meet-the-species>.
 - Line 1:
 - No. of Caddisflies _____
 - No. of Stoneflies _____
 - No. of Mayflies _____
 - No. of Midges (chironomids) _____
 - Line 2:
 - No. of Caddisflies _____
 - No. of Stoneflies _____
 - No. of Mayflies _____
 - No. of Midges (chironomids) _____
 - Line 3:
 - No. of Caddisflies _____

- No. of Stoneflies _____
- No. of Mayflies _____
- No. of Midges (chironomids) _____
- When entering observations into Anecdata, upload one image of each insect type you observed to <https://www.anecdata.org/projects/view/949>
 - Image must be close to the example image below in terms of quality.



- If you see chironomids (midges), how many males and females are there? Look at images below to differentiate males vs. females:



- Count the number of males and females and enter the total number of each from each transect line. **TIP:** If you are not in a group, you can just fill in Line 2.

Line 1: No. of males _____

No. of females _____

Line 2: No. of males _____ Line 3: No. of males _____

No. of females _____ No. of females _____

- Air temperature at beginning of field collection. Can be collected from a smart phone weather app or Googling weather for that location.
 - Air Temperature (Fahrenheit)_____
- Water temperature at beginning of field collection. Can be collected with the aquarium thermometer mentioned under Equipment you may want (at top).
 - Water Temperature (Fahrenheit)_____
- Note weather conditions at beginning of field collection (add a check mark next to the weather conditions).
 - Cloudy
 - Partly cloudy
 - Sunny
 - Snowing
 - Raining
- Note adjacent land use (add a check mark next to the land use category).
 - Crop/field
 - Protected land (e.g., CRP)
 - Pasture
 - Urban
 - Forest (agricultural buffer: i.e., a few trees and then fields)
 - Forest (hardwood/conifer habitat)
- Note stream conditions (use images below to determine condition and add a check mark next to the stream condition category).
 - Completely open-Ice free
 - Partially frozen
 - Largely frozen with few open areas
 - Completely frozen



- Stream habitat (use images below to determine stream habitat type).
 - Collect this data if can see stream bottom (might be closer toward spring)
 - Look at stream bottom over 40 ft. (12 m) of stream near where collecting insect data and estimate by sight the percent that each habitat type makes up within the 40 ft. area.
 - %riffles-fast running water over rocks and little falls, fairly shallow, ripples break surface of the water _____
 - %runs-areas of moderate current, deeper than riffles, smoother flowing surface, ripples do not break surface of water _____
 - %pools-areas where current is slower, water is deeper, and many times debris accumulates _____



- Stream substrate data (**TIP: This is for those who want to be challenged! This data is optional to collect**).
 - Collect this data if can see stream bottom (might be closer toward spring)

- Group 40 ft. (12 m) of stream near where collecting insect data into 8 segments of 5 ft. (1.5 m) in length.
- Look at the stream bottom within each of the 8 segments and group all of the substrates within one size category together to estimate the total percent of that substrate in that segment.
- Write down:
 - Segment 1:
 - % Sand (grain size between <1-20 mm) (smaller than a lady bug)_____
 - % Gravel (20 mm-4 cm) (lady bug size to ping pong ball size)_____
 - % Rock (4-40 cm) (ping pong ball to large basketball)_____
 - % Boulder (40 cm- >1 m) (larger than a large basketball)_____
 - % Woody debris (branches/twigs in stream)_____
 - Segment 2:
 - % Sand (<1-20 mm)_____
 - % Gravel (20 mm-4 cm)_____
 - % Rock (4-40 cm)_____
 - % Boulder (40 cm- >1 m)_____
 - % Woody debris_____
 - Segment 3:
 - % Sand (<1-20 mm)_____
 - % Gravel (20 mm-4 cm)_____
 - % Rock (4-40 cm)_____
 - % Boulder (40 cm- >1 m)_____
 - % Woody debris_____
 - Segment 4:
 - % Sand (<1-20 mm)_____

- % Gravel (20 mm-4 cm) _____
- % Rock (4-40 cm) _____
- % Boulder (40 cm- >1 m) _____
- % Woody debris _____

■ Segment 5:

- % Sand (<1-20 mm) _____
- % Gravel (20 mm-4 cm) _____
- % Rock (4-40 cm) _____
- % Boulder (40 cm- >1 m) _____
- % Woody debris _____

■ Segment 6:

- % Sand (<1-20 mm) _____
- % Gravel (20 mm-4 cm) _____
- % Rock (4-40 cm) _____
- % Boulder (40 cm- >1 m) _____
- % Woody debris _____

■ Segment 7:

- % Sand (<1-20 mm) _____
- % Gravel (20 mm-4 cm) _____
- % Rock (4-40 cm) _____
- % Boulder (40 cm- >1 m) _____
- % Woody debris _____

■ Segment 8:

- % Sand (<1-20 mm)_____
- % Gravel (20 mm-4 cm)_____
- % Rock (4-40 cm)_____
- % Boulder (40 cm- >1 m)_____
- % Woody debris_____

- To get the percent of each substrate type within the whole 40 ft. (12 m), add up each category percent and divide by 8. Example: add all the percentages for sand up from each of the 8 segments and divide by 8.

■ Total sand_____

■ Total gravel_____

■ Total rock_____

■ Total Boulder_____

■ Total woody debris_____

- When entering observations into Anecdata, upload one image of the stream stretch you just observed to <https://www.anecdata.org/projects/view/949>
- Do you have any other ecological observations (birds feeding? Other predators?)

