Determination of drift density of aquatic macroinvertebrates at the Chinogosawa River: Initial Results

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Introduction

Why drift?

- Drift is part of a colonization cycle involving two unidirectional movements upstream and downstream.
- At headwaters, competition for resources result in active drift downstream causing a depletion of the headwater population (Svendsen et al, 2004)

RRL

- It is the benthic community that participates in drift due to many complex biotic and abiotic factors.
- Drift is quite variable in space and time both within and among stream systems (Svendsen et al, 2004)

RRL

- There is also some evidence that increased sediment loads increase macroinvertebrate drift by inducing night like darkness and triggering dispersal.
- Ryan (1991) found that an increase in suspended solids can increase macroinvertebrate drift and may reduce benthic densities as well as community structure.

- Ryder (1989) - sudden increase in the drift densities of stream insects when sediment was artificially introduced into streams.
- Species that cannot travel long distances and are not able to avoid increased turbidity and sedimentation may be most susceptible to these effects

Objectives

- Determine the drift density of macroinvertebrates in the Chinogosawa River
- Determine the differences in the numbers and size composition of macroinvertebrates drifting between day and night

Sampling Sites

- Two drift nets each (upstream and downstream direction)
- Time of collection will be before sunrise and after sunset

Methodology

A. Abiotic factors – pH, water velocity, depth, light intensity, electric conductivity, DO

Methodology
B. Sampling/Collection

- Sampling Method (modified, by Nishimura, 1981)
- Set 2 drift nets (dimension?) in each sampling point
- Total no. of drift nets: 2 drift nets x 4 collection period

Methodology

- Determine drift density of aquatic macroinvertebrates collected
- Identify the collected individuals (Order level)
- Identify or indicate types of feeding habit

Methodology

- Drift density: number of macroinvertebrates captured by the nets per volume of water passing through the nets during a sampling period

- Formula: **Drift density = (N)(100)/ (t)(W)(H)(V)(3600 s/h)**
- N represents no. of macroinvertebrates in a sample; t, time that the net was in the stream (h); W, net width (m); H, mean height of water column in the net mouth (m); and V, mean water velocity at tne net mouth (m/s)
- No. of macroinvertebrates drifting per 100 m3

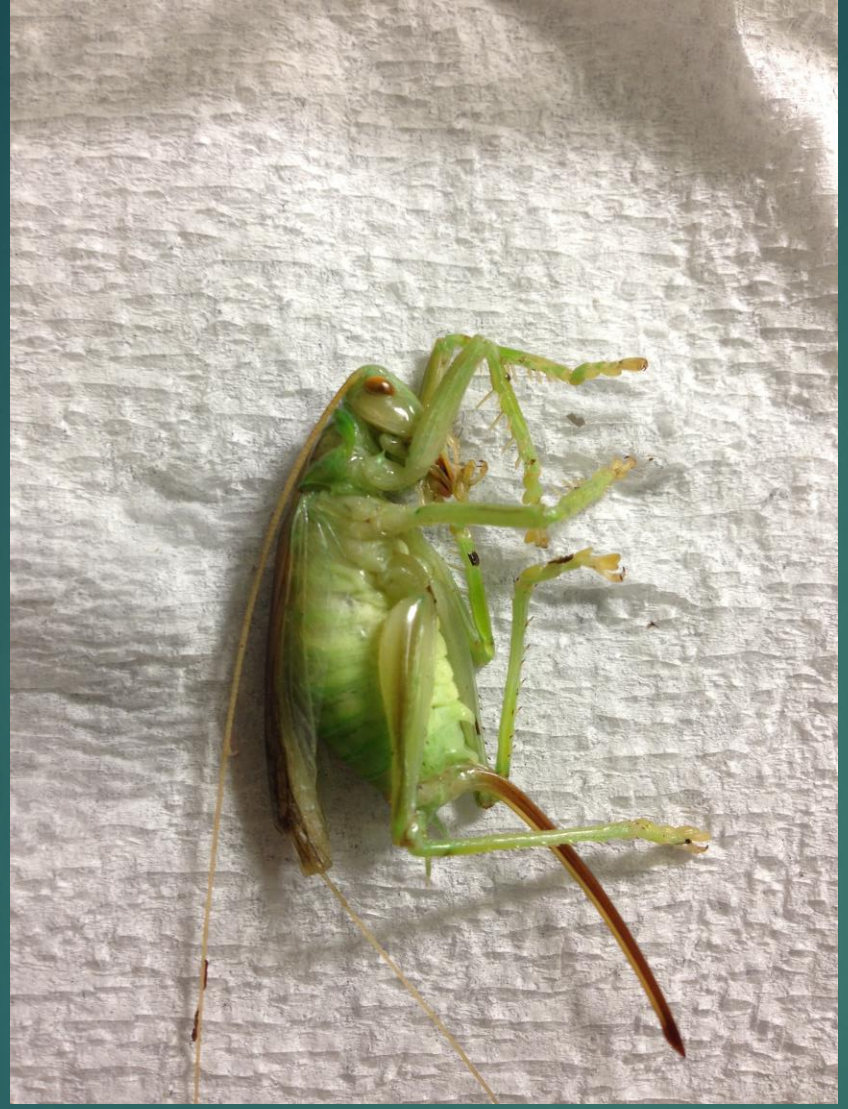
METHODOLOGY

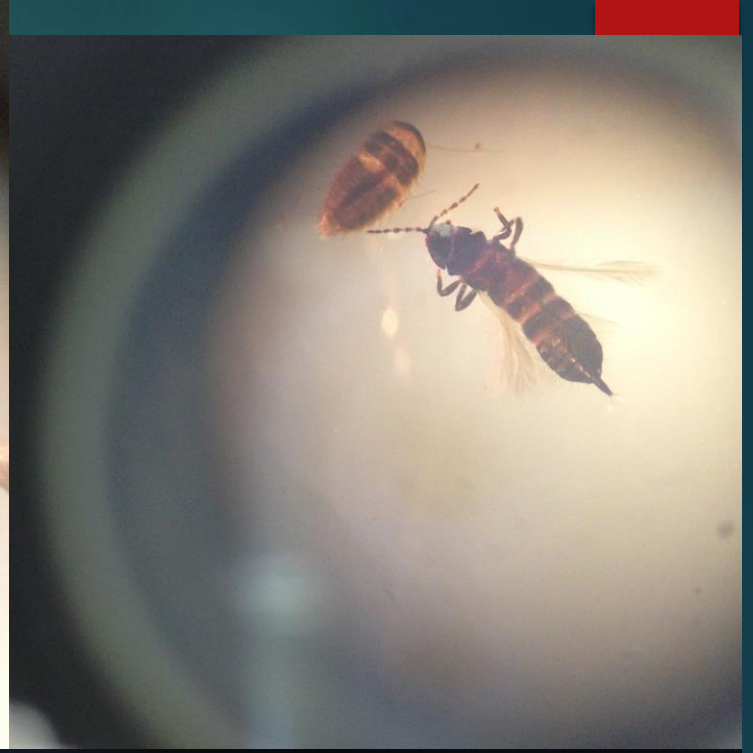
Drift nets set
at Chinogosawa river stream

Results

(A: downstream net)

Chinogosawa	6:45	9:45	3:15	9:15
Taxa				
Turbellaria	1	1	2	
Oligochaeta		1	4	1
Ephemeroptera	3	17	106	51
Odonata	1		1	
Plecoptera	11	17	23	19
Megaloptera		5	10	6
Trichoptera	21	30	43	24
Coleoptera (terrestrial)	2	7	4	3
Lepidoptera	1		4	
Diptera	16	28	19	14
Hymenoptera	4		4	2
Hemiptera				1
Unidentified 1(terrestrial)	1 infected with fungus			
Unidentified 2 (terrestrial)	1			
Unidentified 3 (aquatic)	2			
Decapoda (new record)	2			
Orthoptera	1		1	
Araneae (terrestrial)	1			
	67	106	221	121





Results

ABIOTIC PARAMETERS

Flow rate: 13 beeps in 30 secs (130/30)

DO: 9.28 mg/L

Temp: 15.01 Celsius

pH: 6.26

Depth: 25 cm

A (before sunset)

Drift density = (67)(100)/ (3)(0.23 m)(0.15 m)(4.33)(3600 s/h)

= 6700/1613.36

= 4.15 => no. of invertebrates drifting per 100 m3 of water

Results

B (after sunset)

Drift density = (106)(100)/ (3)(0.23 m)(0.15 m)(4.33)(3600 s/h)

= 10600/1613.36

= 6.57 => no. of invertebrates drifting per 100 m3 of water

C (before sunrise)

Drift density = (221)(100)/ (3)(0.23 m)(0.15 m)(4.33)(3600 s/h)

= 22100/1613.36

= 13.70 => no. of invertebrates drifting per 100 m3 of water

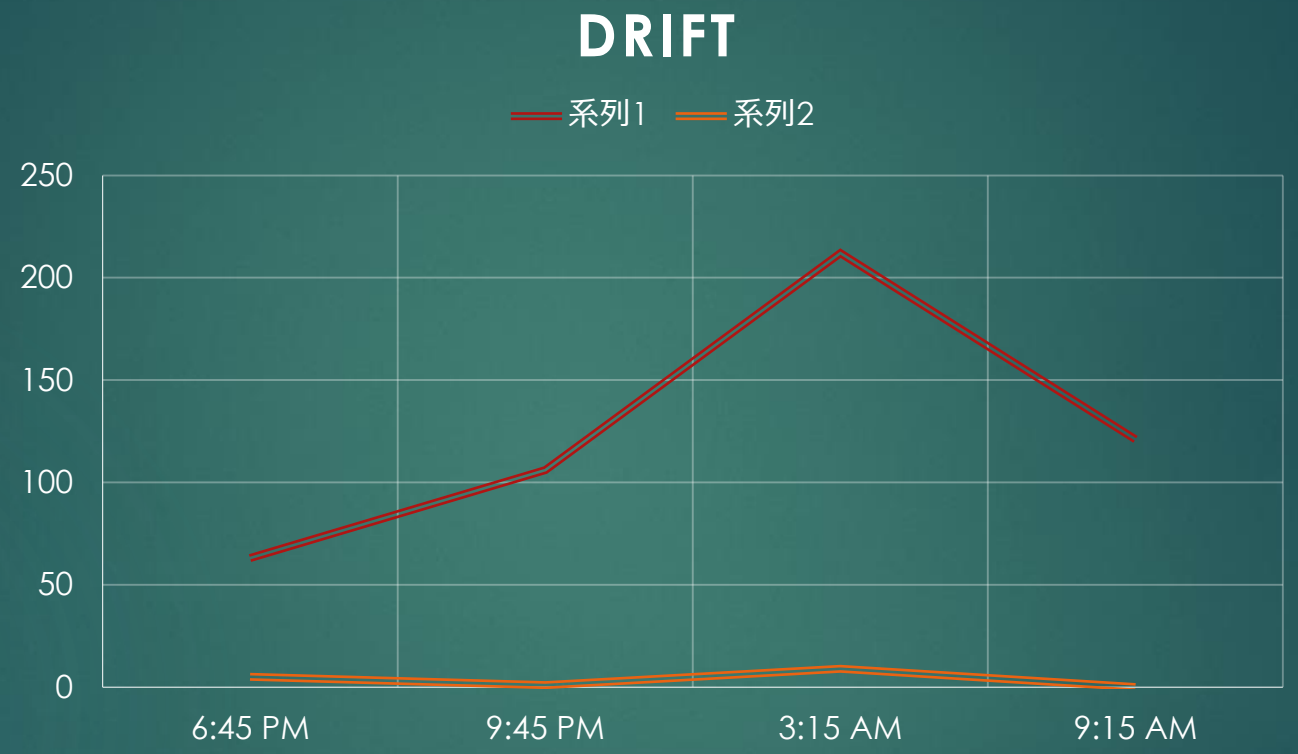
B (after sunrise)

Drift density = (121)(100)/ (6)(0.23 m)(0.15 m)(4.33)(3600 s/h)

= 12100/3226.71

= 3.75 => no. of invertebrates drifting per 100 m3 of water

RESULTS



- Series 1: Downstream movement
- Series 2: Upstream movement

DISCUSSION

- Highest drift density is at 3:15 am
  - assumption is this is due to predation by fish and drift is a form of escape (adaptation)
- Emergence was observed (e.g., Orthoptera)
- Ephemoreptera – most abundant during the sampling (they are considered collectors)
- Presence of ecosystems-interactions (aquatic ecosystem and terrestrial ecosystem)
- Precipitation might have an effect on the density of drift [precipitation → inducing sedimentation & turbidity → drift at night]

Macroinvertebrates Feeding Habits

- Collectors: Ephemeroptera -> Ephemerellidae
- Filterers: Ephemeroptera -> Ephemeridae
- Predators: Plecoptera -> Chloroperlidae
- Shredder: Trichoptera -> Lepidosmatidae

- They contribute in the nutrient cycling and degradation of organic matter such as leaf litters.

THANK YOU