

What's for Dinner ?

The Effect of *Cinnamomum camphora*
(Camphor Laurel)
on Aquatic Communities

Judy Davies



The River

Input



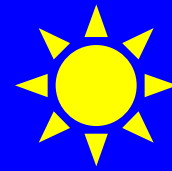
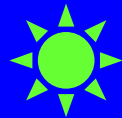
Leaf Litter

Increased UV Light

Phytoplankton



Zooplankton



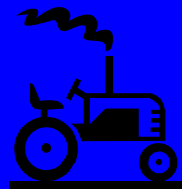
Microbes

Macroinvertebrates

Fish



Birds



Agriculture

Output

Cellulose broken down

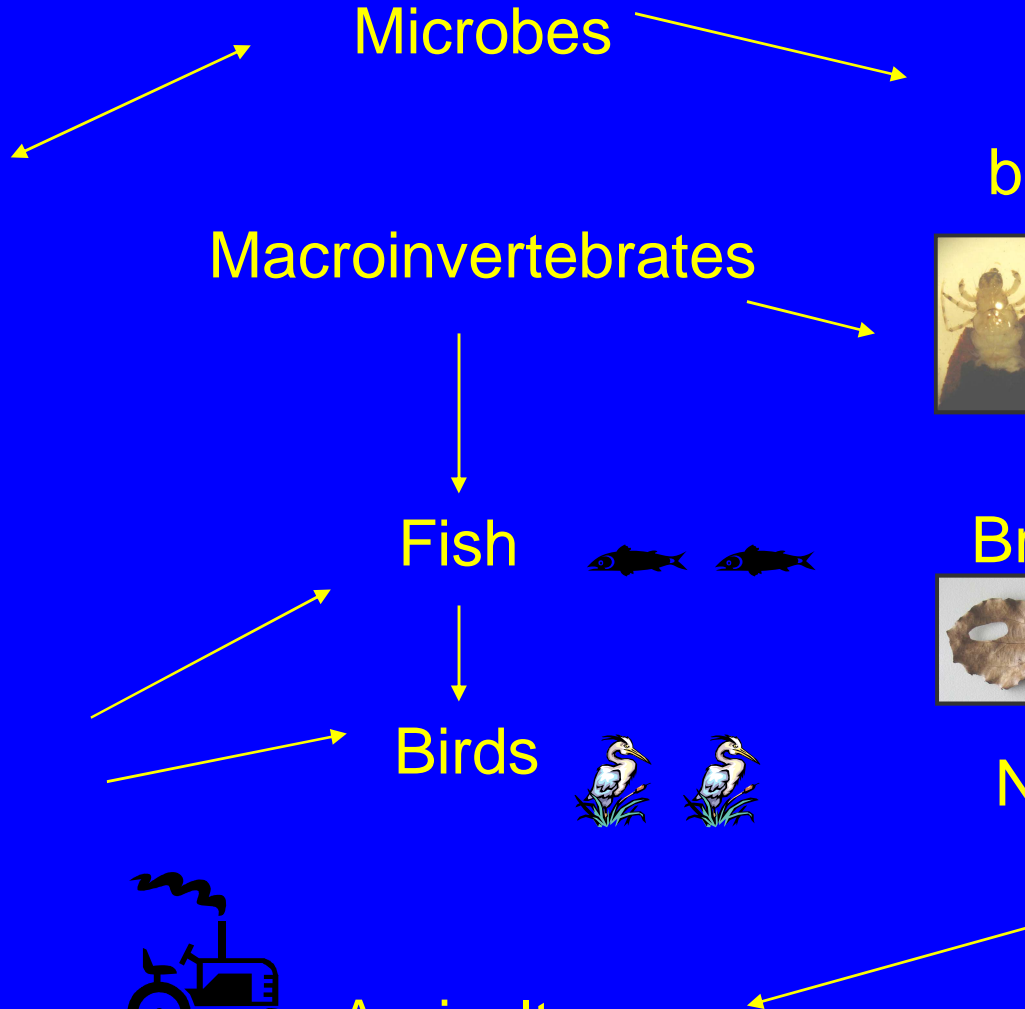


Leaf

Breakdown

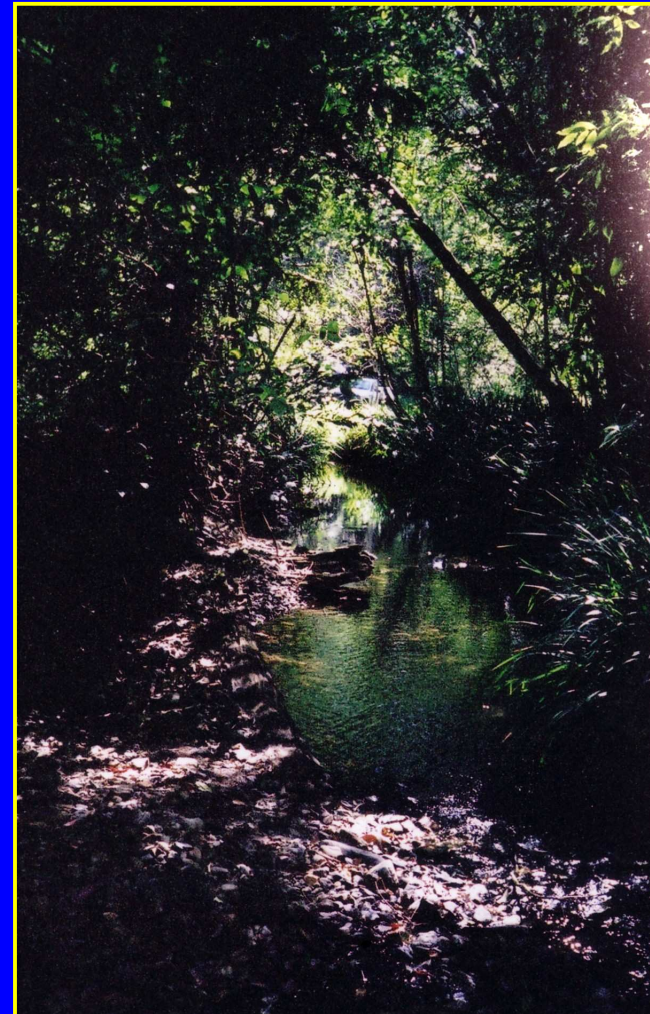


Nutrients



Source of Stream Energy

- Upstream
- Adjacent riparian zone



The Riparian Menu

Essential Ingredients for macroinvertebrates growth

Palatable leaves

Tough leaves

Mixed species in the riparian zone is required

So what's the problem?

MONOCULTURES



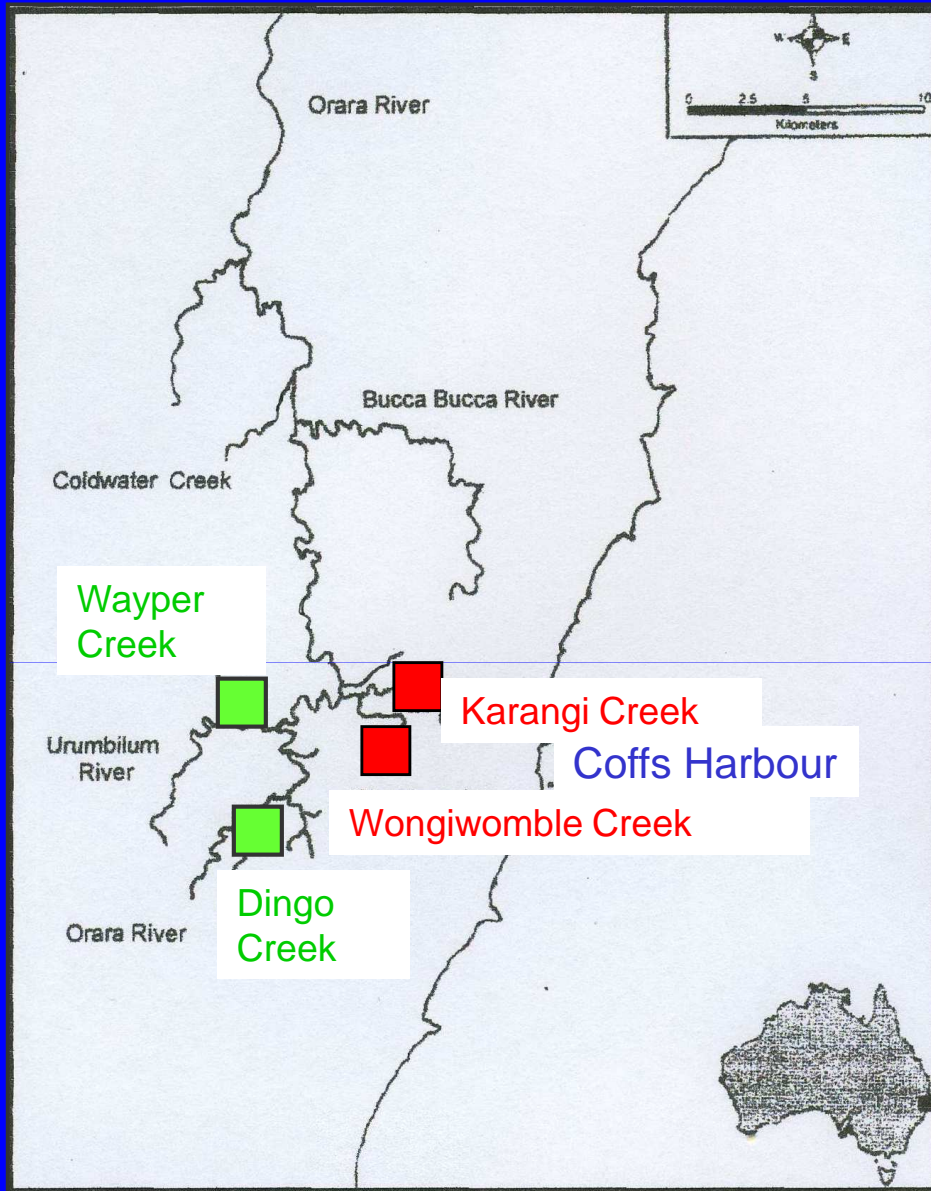
The Riparian Menu

Camphor Laurel Infested streams

What happens if
there is only
Camphor Laurel
for dinner ?



Study sites



-  Camphor Laurel in riparian zone
-  Native vegetation in riparian zone



Shredders - guests for dinner

Calamoceratidae *Anisocentropus* spp



Abundance

Is there a difference in abundance of calamoceratids between the Camphor Laurel infested streams and those with native vegetation in the riparian zone ?

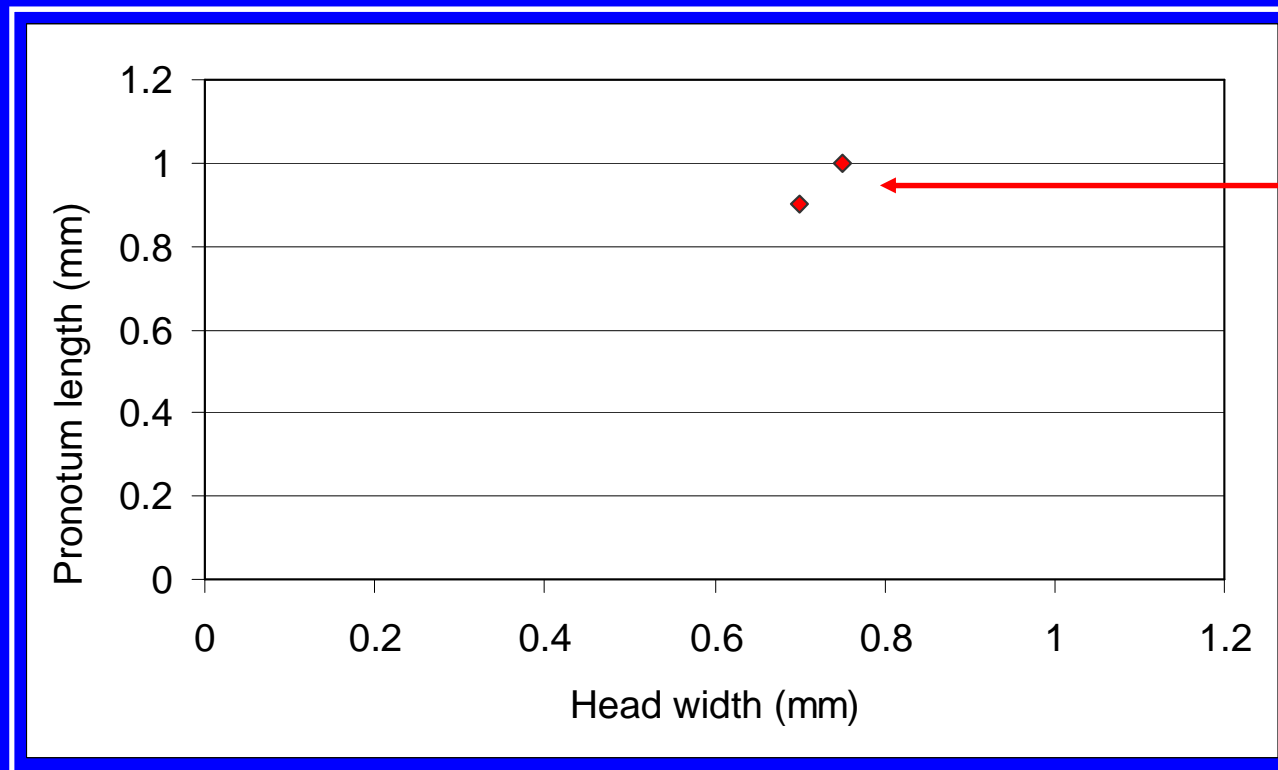
Method

- 30cm² quadrats
- Cohorts of 100 calamoceratids
- Measure size of calamoceratids to determine instar distribution using ocular graticule

(Alvarez and Prado, 2005)

Wongiwoomble Creek - 50 quadrats

Population of calamoceratids and distribution of instars



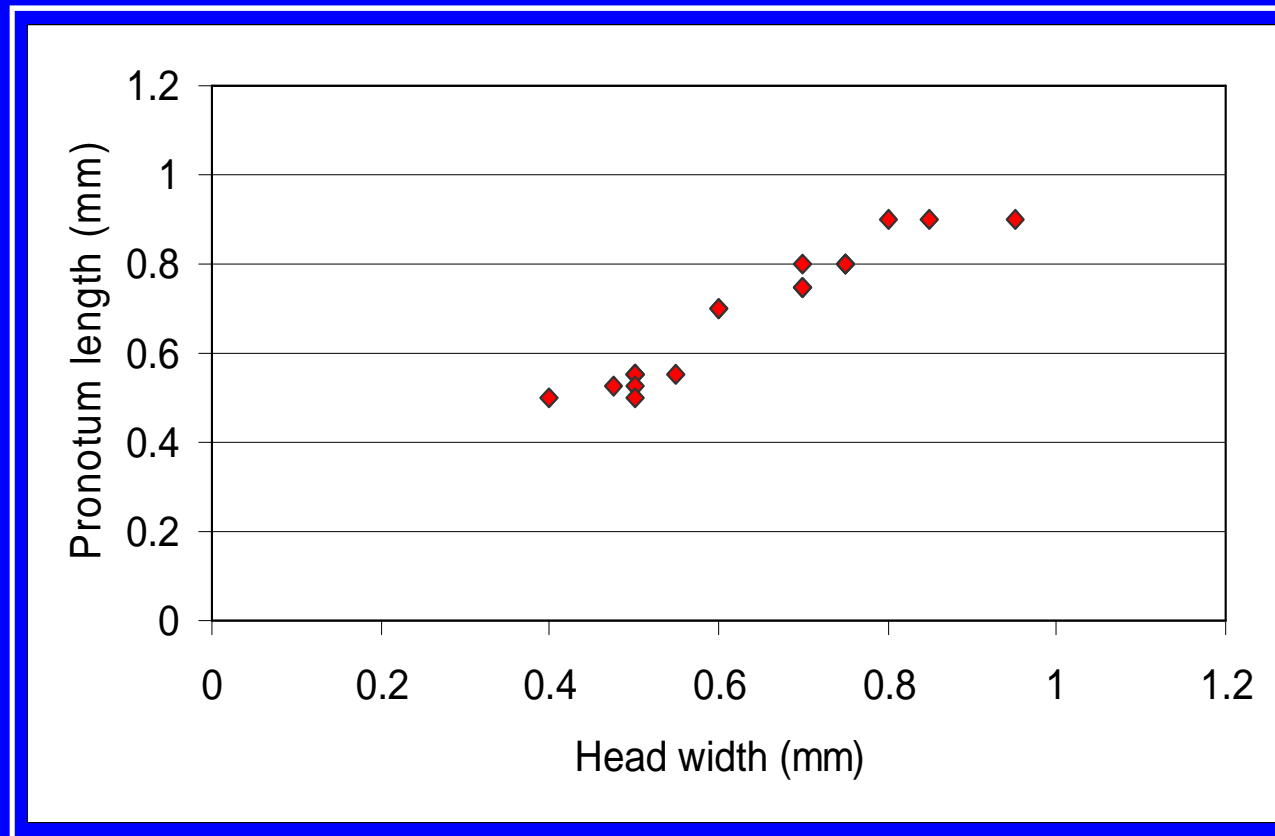
Only two!!

Camphor Laurel 97 % *Eucalyptus spp* 1.8%

Species of litter per quadrat: 0.06

Karangi Creek – 50 quadrats

Population of calamoceratids and distribution of instars

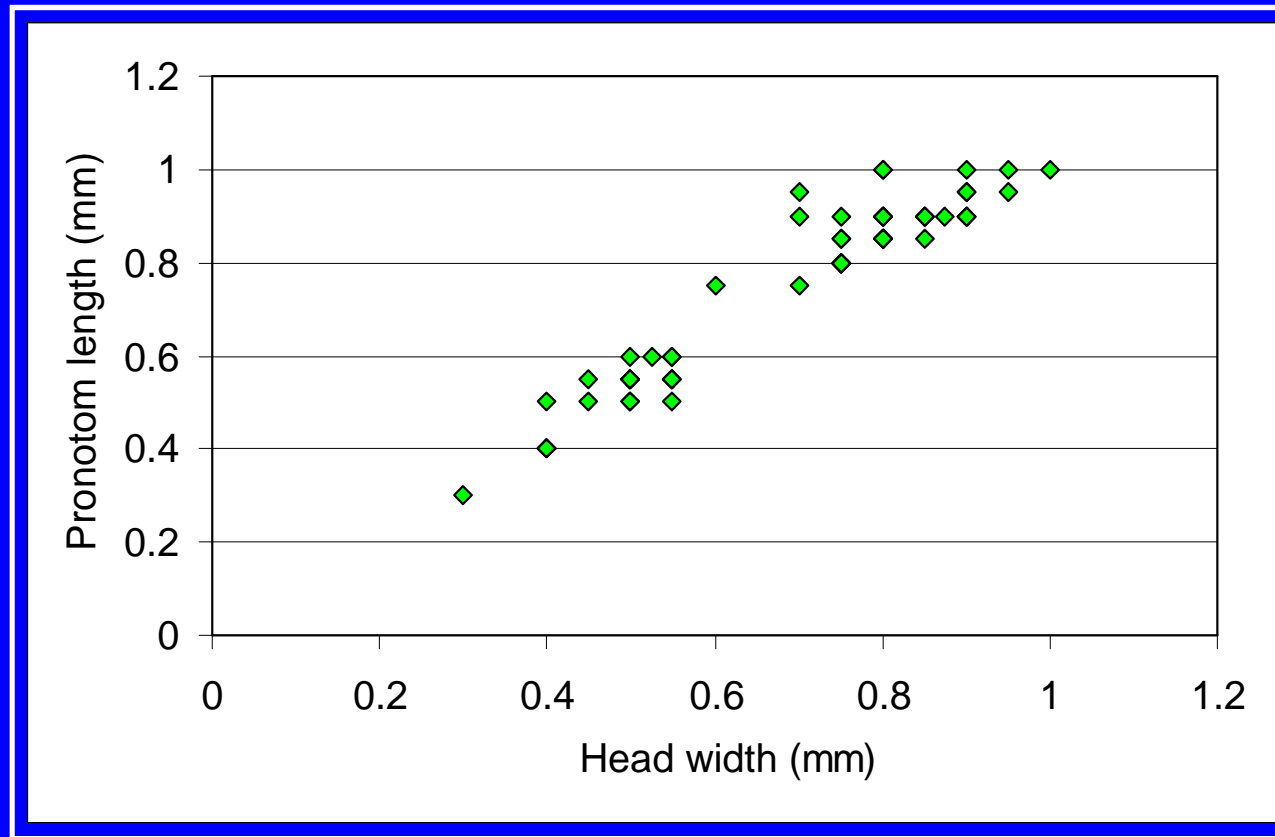


Camphor Laurel 80 % Eucalypt 17.9 %

Mean species of litter per quadrat = 2.5

Dingo Creek - 10 quadrats

Population of calamoceratids and distribution of instars

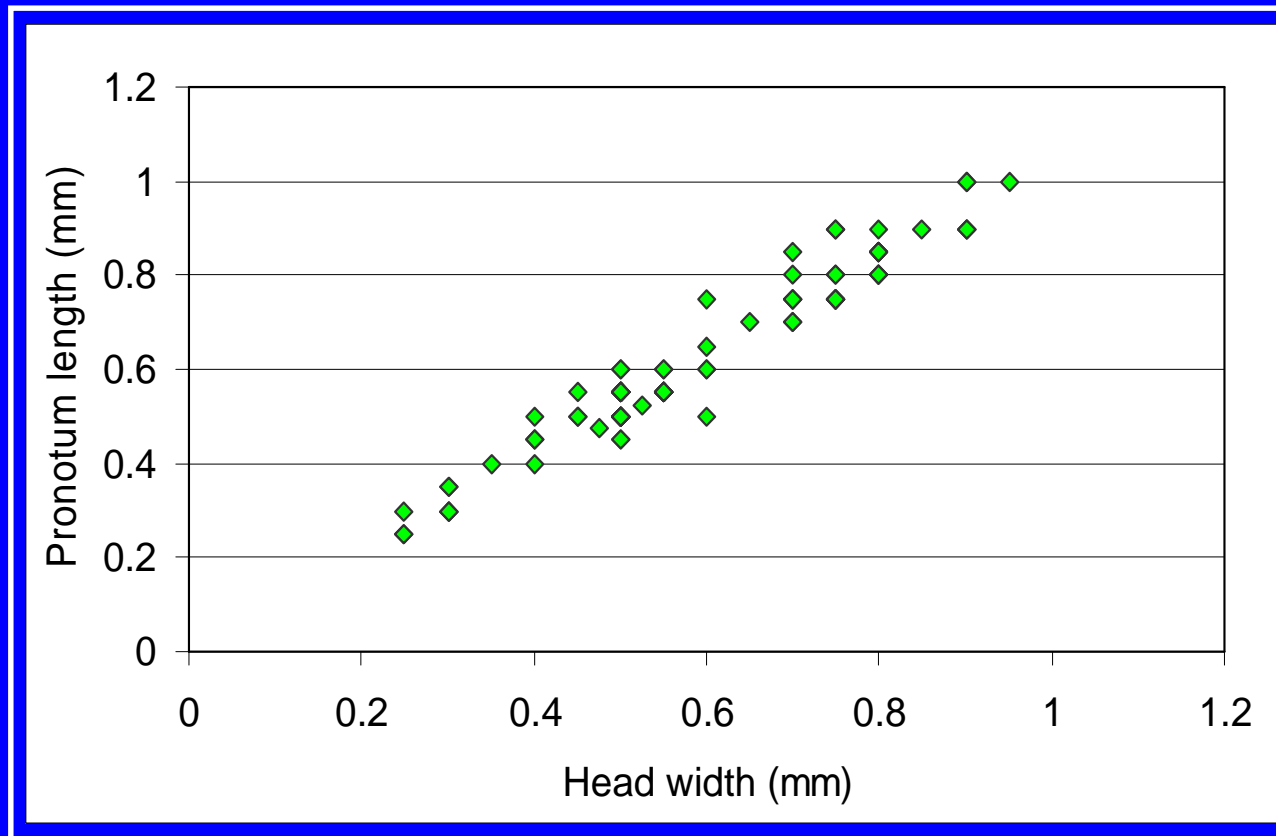


Camphor Laurel nil vegetation: native species

Mean species of litter per quadrat = 4.3

Wayper Creek – 4 quadrats

Population of calamoceratids and distribution of instars



Camphor Laurel nil vegetation: native species

Mean species of litter per quadrat = 6.0

Discussion

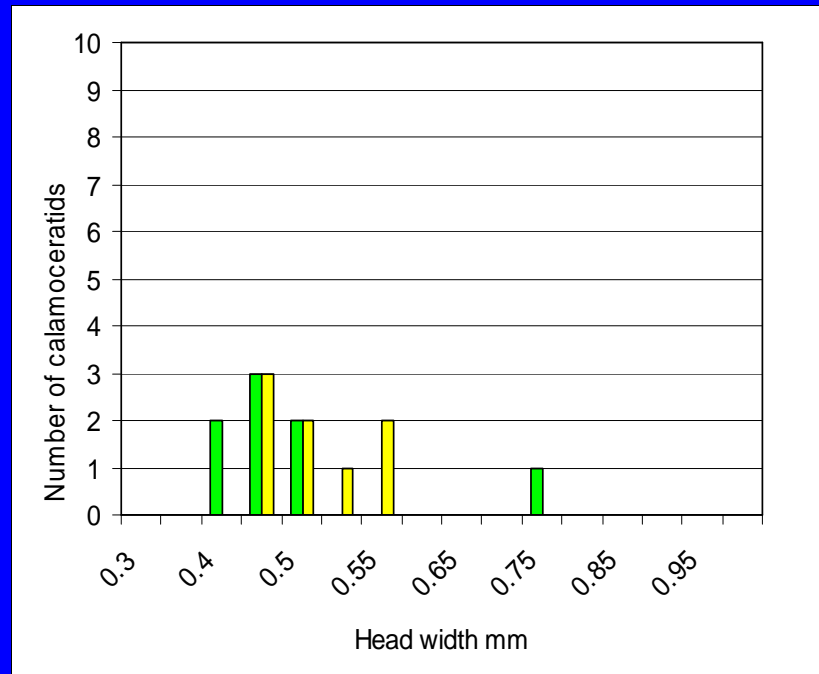
- Camphor Laurel infested streams had fewer calamoceratids
- Camphor Laurel infested streams had a smaller range of instars

Monitoring the growth patterns of calamoceratids

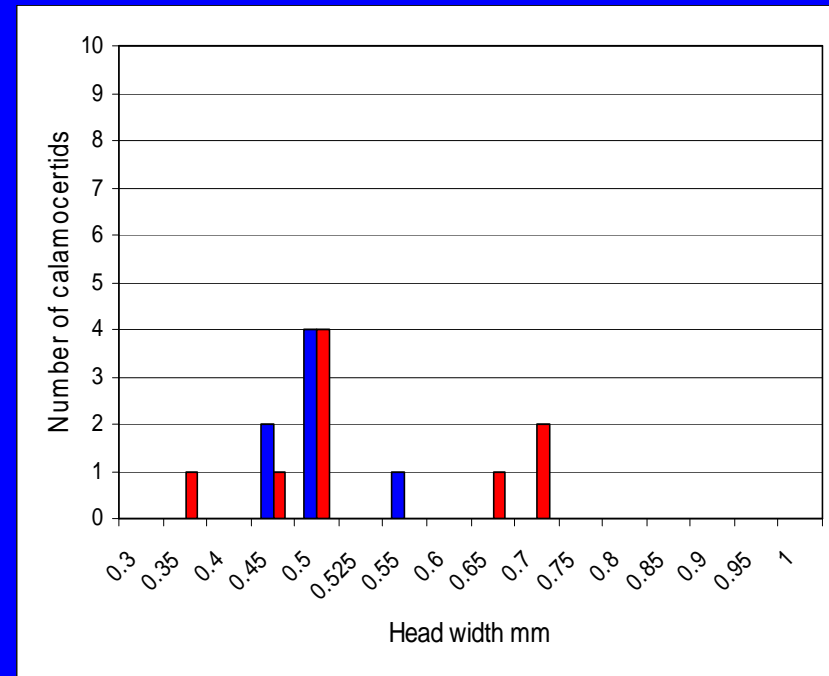
- Water from Camphor Laurel infested stream
- Water from stream with native riparian vegetation
- Calamoceratids
- Eucalyptus (Flooded Gum) leaves (*E. grandis*)
- Camphor Laurel leaves (*C. camphora*)

Growth of calamoceratids 1 day

Native vegetation water



Camphor Laurel vegetation water

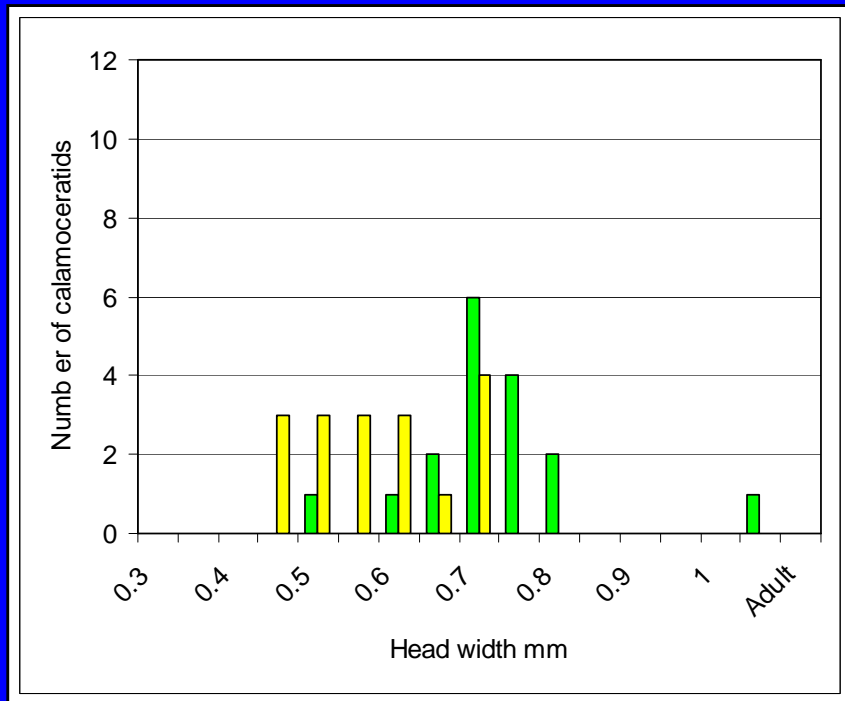


Fed on

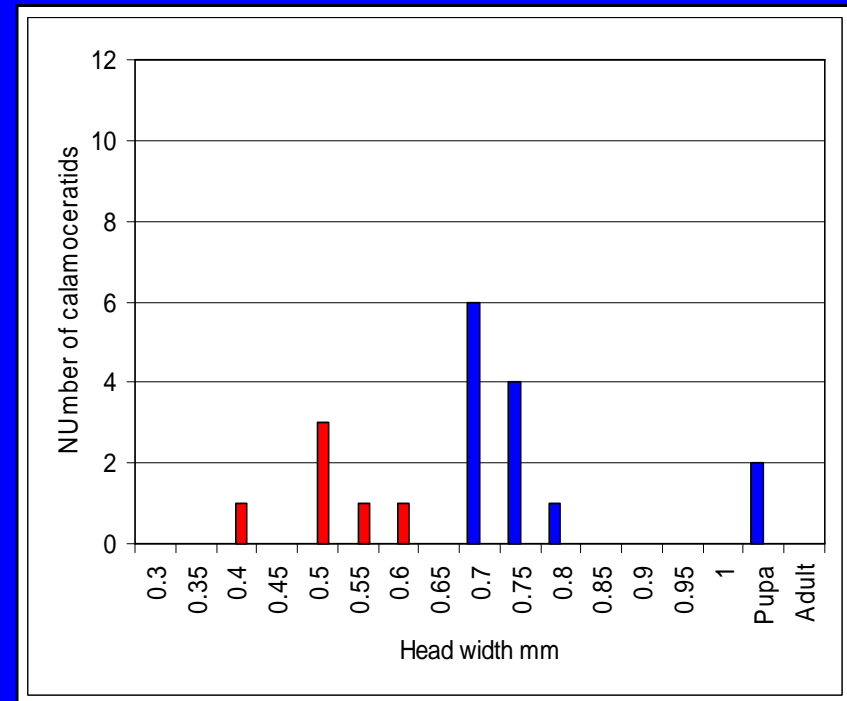
Camphor Laurel
 Flooded Gum
 Camphor Laurel
 Flooded Gum

Growth of calamoceratids after 21 days

Native vegetation water



Camphor Laurel vegetation water

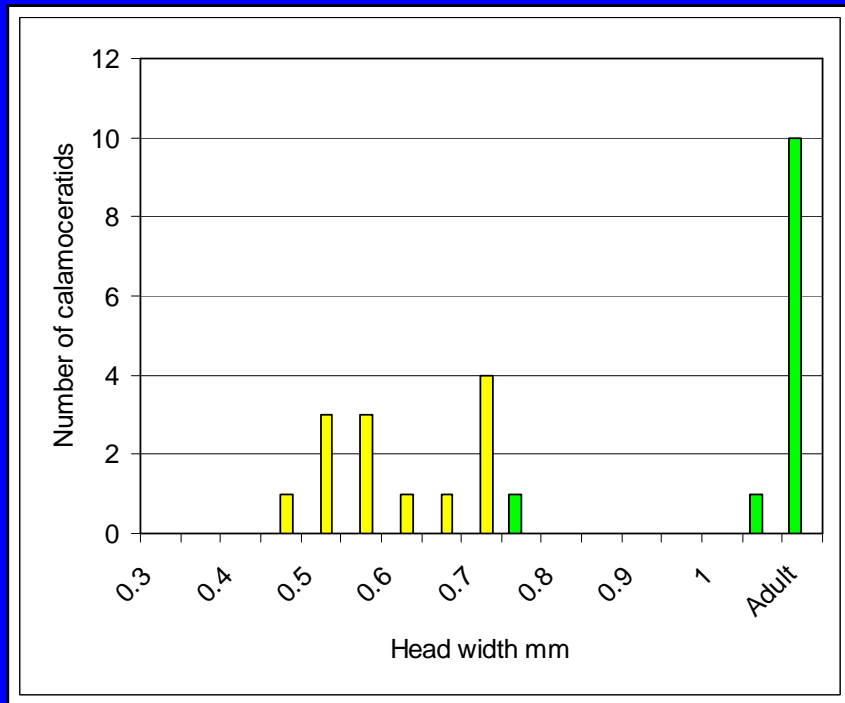


Fed on:

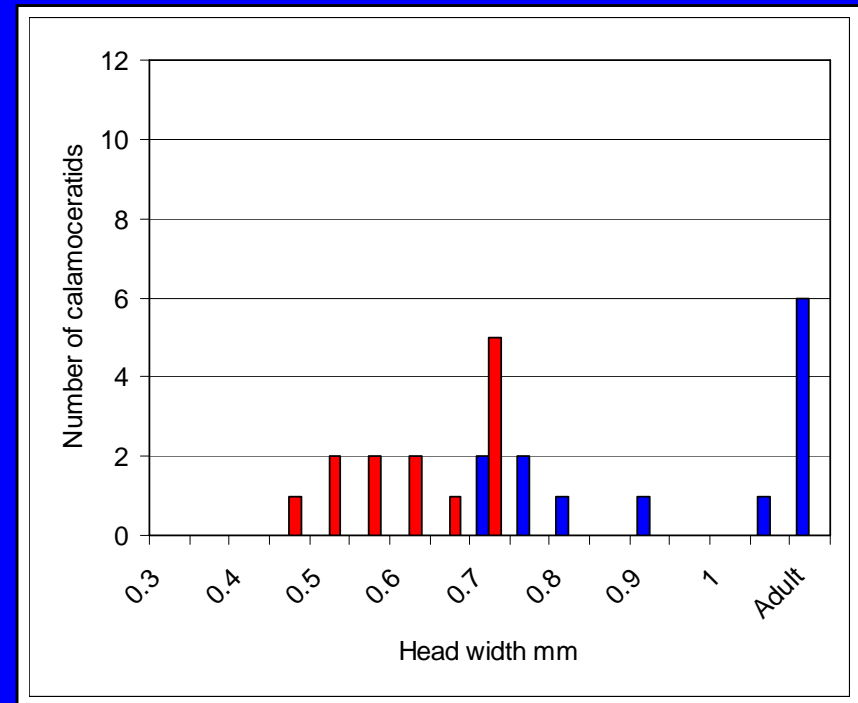
Camphor Laurel
 Flooded Gum
 Camphor Laurel
 Flooded Gum

Growth of calamoceratids after 42 days

Native vegetation water



Camphor Laurel vegetation water



Camphor Laurel
 Flooded Gum
 Camphor Laurel
 Flooded Gum

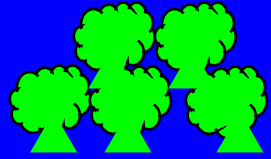
Discussion

- Chemical compounds in leaves
 - Camphor Laurel – 1-8 cineole, α pinene, camphor
 - Eucalyptus leaves - phenols
- Toughness of leaves – property of Eucalypt and Camphor Laurel leaves.
- Insufficient energy in macroinvertebrates “energy bank”.

Cartoon by Primary School Student (aged 11)



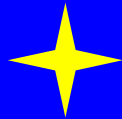
Input



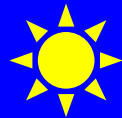
Camphor Litter

Increased UV Light

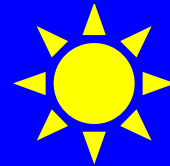
Phytoplankton



Zooplankton



The River



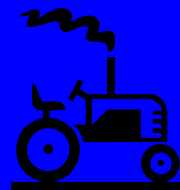
Microbes

Macroinvertebrates

Fish



Birds



Agriculture

Productivity decreased

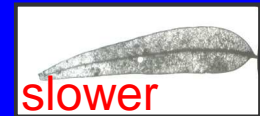
Output

Cellulose broken down



Leaf

Breakdown



Nutrients

Nutrients

Monitoring Camphor Laurel
regenerated areas

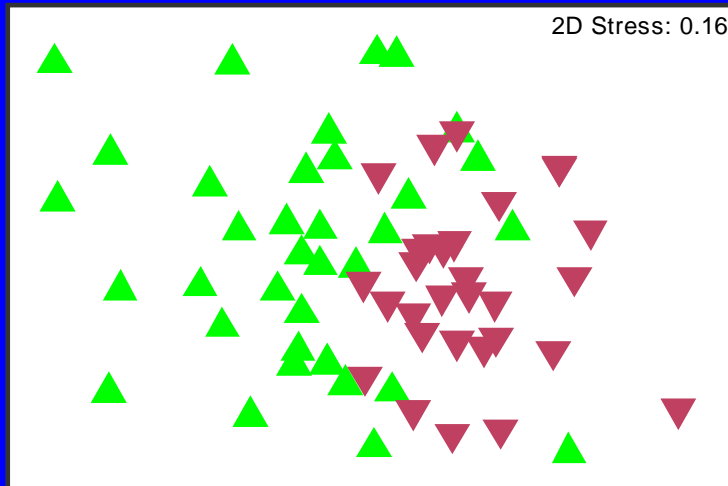
An Aquatic perspective

Method

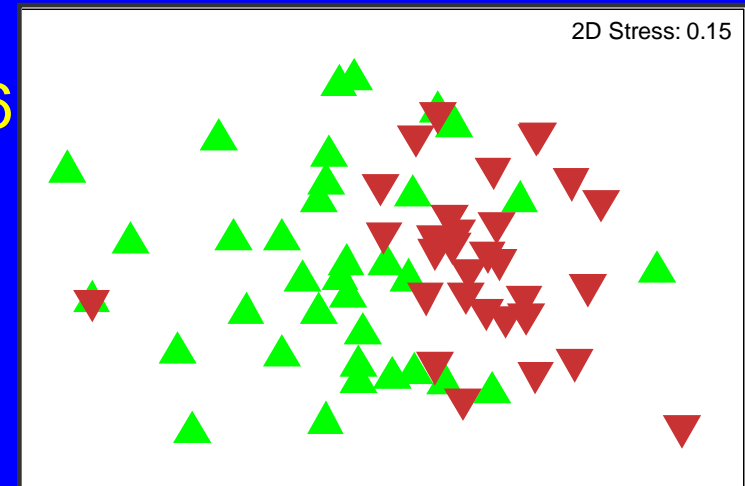
- 15 Leafpacks in 3 retention areas within 50 m
- 14 Days
- Decomposition rates
- Identification of Macroinvertebrates
- Statistical Analysis

Monitoring 100% defoliated Camphor Laurel Riparian Zone Wongiwomble Creek 3 years after Regeneration Management

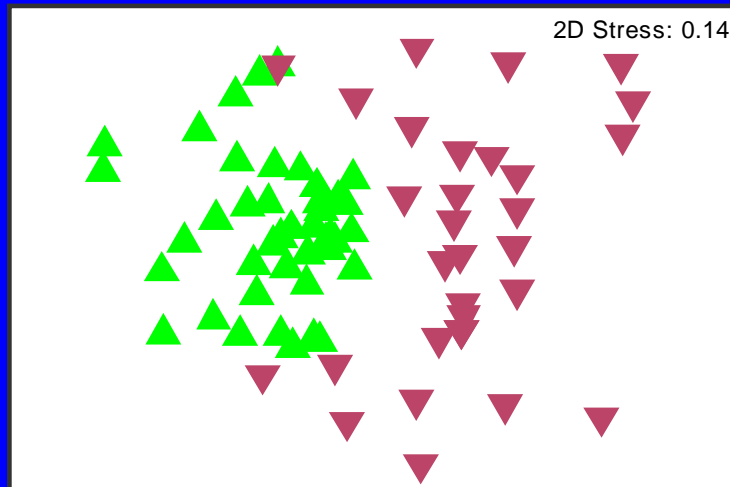
2005



2006



2007



$P = 0.001$ in all graphs

▲ Native creek

▼ Defoliated creek

Flooding in August 2007 may account for increasing difference in creek communities in September 2007

Recommendations

- Defoliation of Camphor Laurels in riparian zones – optimum percentage ??
- Plant native trees
- Extend present areas rather than adopt a “patch” policy – transport of litter downstream
- Continue to monitor treated sites – until more definite trends are seen – as a guide for future Management Plans

Conclusion

The health of our rivers will improve
with effective support

from

The Northern Rivers Invasive
Plant Action Strategy

Acknowledgements

- My husband, John, my son, Mark, and the people in the Orara Valley that make this research possible.
- James Seccombe for his cartoon
- Coffs Harbour City Council for continuing financial support from the Environmental Levy