

# The Bullhead City Pest Abatement Program

Joe Iburg

Former Pest Abatement Manager

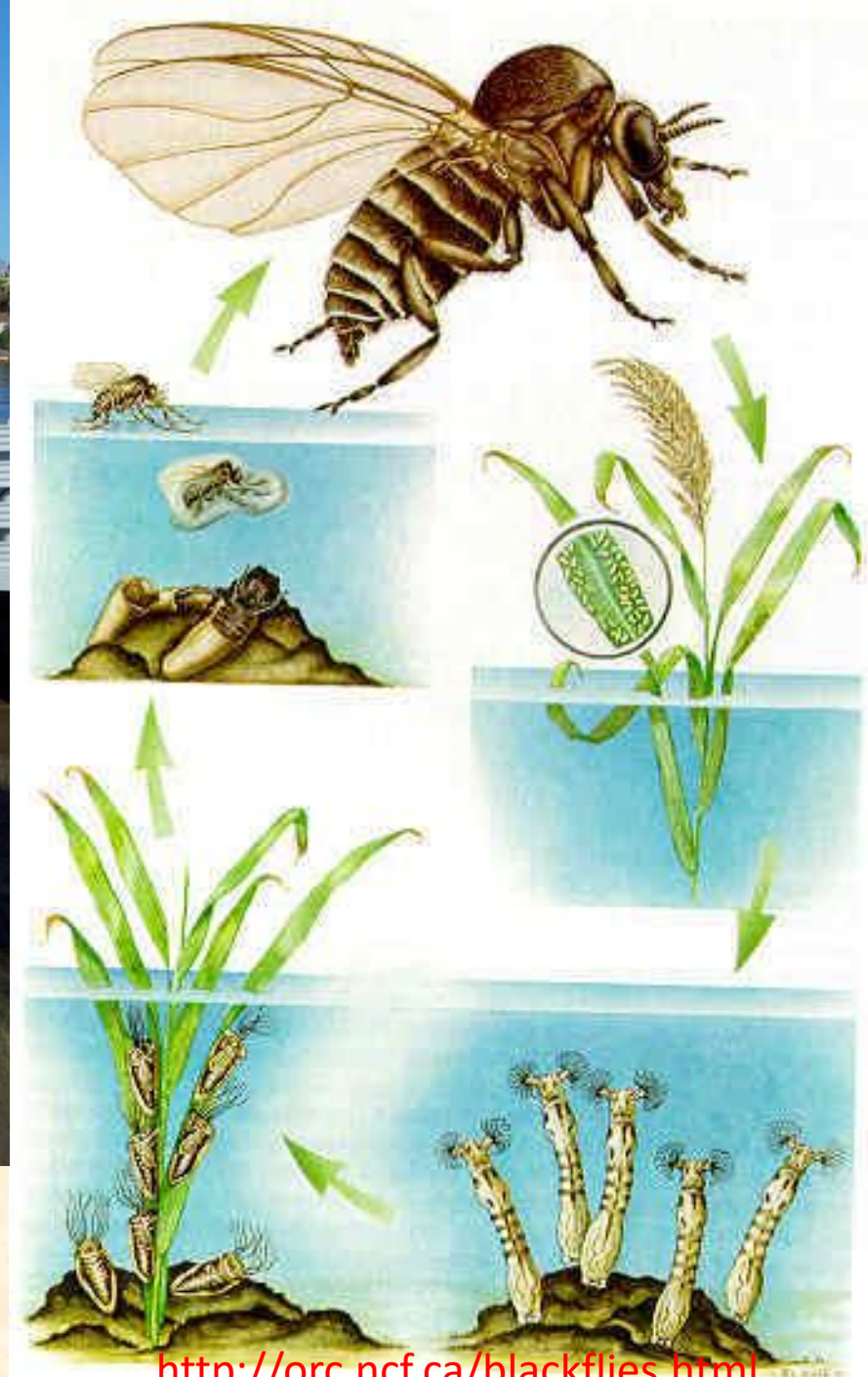
City of Bullhead City, AZ



*Salvador Vianza, Ph.D.*

# Black Flies

- In the early 1970's, residents in the communities of Laughlin and Bullhead City complained about black flies.
- Initial Studies of *S. vittatum* were conducted by Mulla and Lacey in 1976 and 1977 in a cooperative effort with Clark County Vector Control.
- Larval and adult surveys were undertaken to determine the extent of black fly populations.



<http://orc.ncf.ca/blackflies.html>



# Mosquitoes

- Adults concentrate in the brightly lit parks with wet grass, have a huge impact on sport tourism.
- The primary species in the recreational parks is *Psorophera columbiae*, the rice field mosquito.
  - Aggressive species
  - *Aedes vexans*
  - *Culex tarsalis*
- Larvae not present in any of the large retention areas.
- Larvae found in pockets of water in the heavily irrigated grass fields.

# Mosquito control on the AYSO soccer fields in BHC, AZ!!



 shelby new house started this petition to mohave county

There is an overwhelming number of mosquitoes at the AYSO soccer fields and the Four Flex Baseball fields located at Rotary park in Bullhead City, Arizona. Between practices and games, the kids playing and the families supporting them, are practically being eaten alive. The schools are "angry" because of the number of children going to the nurse with bites but literally nothing is working. We have tried sprays, creams, clip ons to keep them away and nothing is stopping them. We have tried every type of "cure" for the itch and nothing seems to help. If the fields aren't sprayed and maintained, I fear it is only a matter of time before someone contracts an illness or has a severe


## Petition Closed

This petition had 570 supporters




mohave county: Mosquito control on the AYSO soccer fields in...

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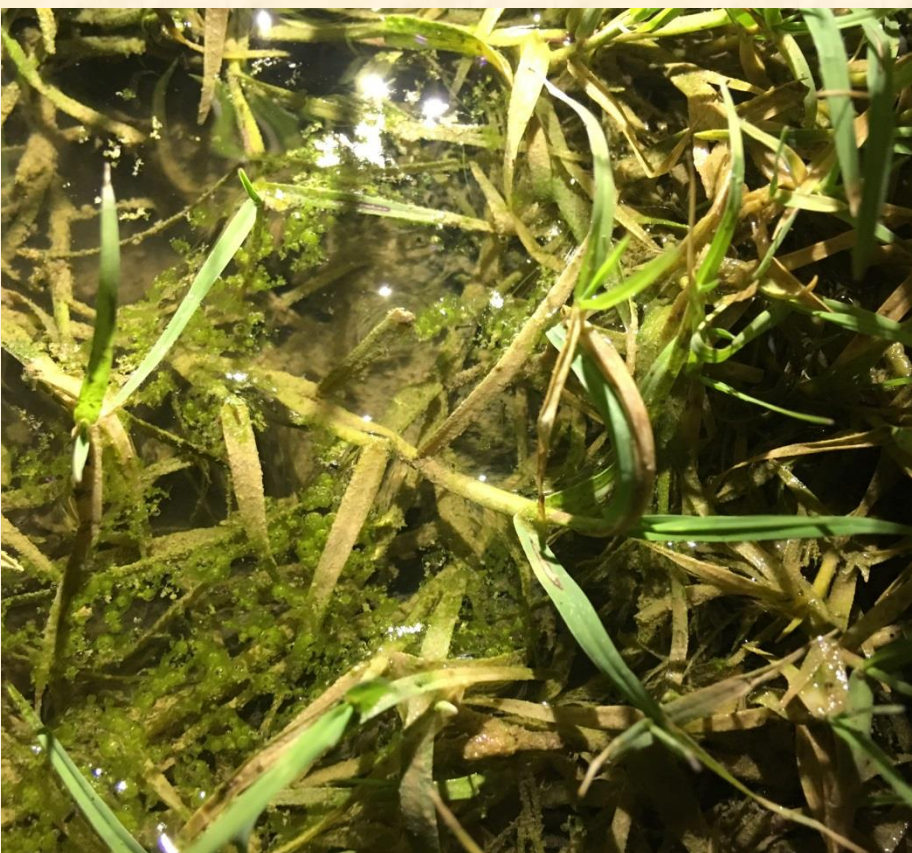
 Tweet to your followers

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*Psorophera columbiae*













# Control Measures

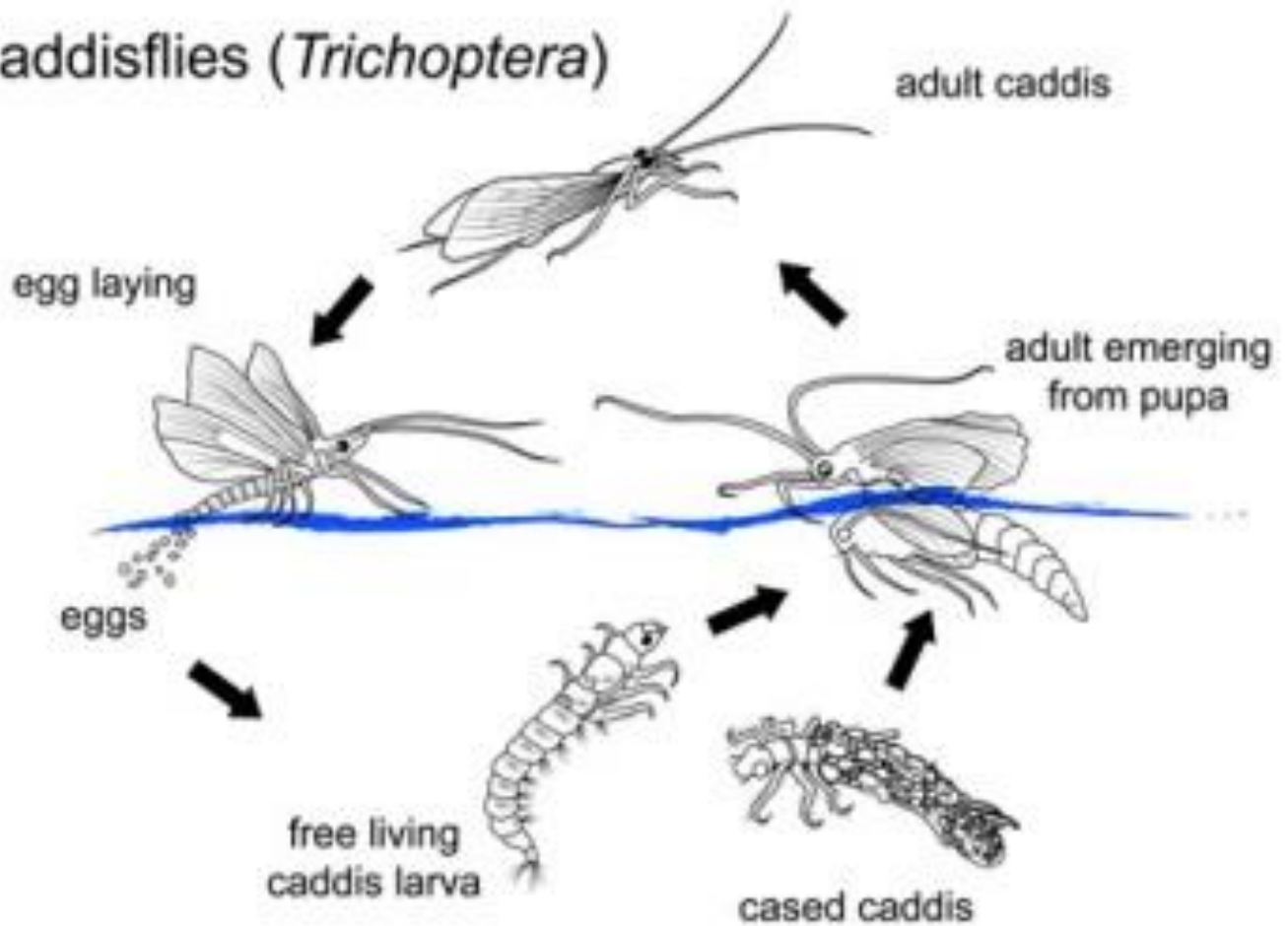
- Altosid/Natular in the sports fields
- Larvicide briquets outside the agricultural gates
- Larvicide applied via backpack spreaders in certain fields
  - VectoLex
  - Altosid XRG
  - Natular
- Aerial application of adulticide following hatch
  - Deltagard
  - Duet
  - Fyfanon
- Fogging of sport fields

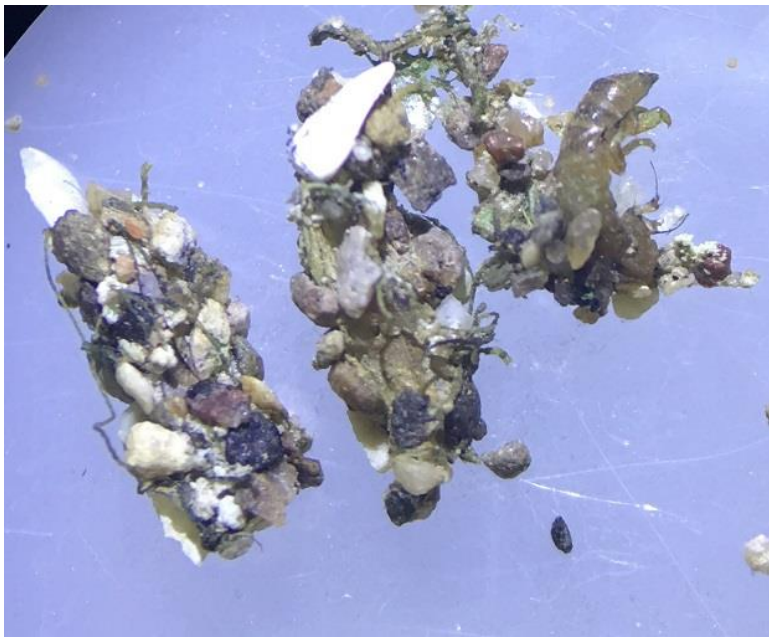






# Caddisflies (*Trichoptera*)









# - The distribution of *Smicridea fasciatella*

12

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY

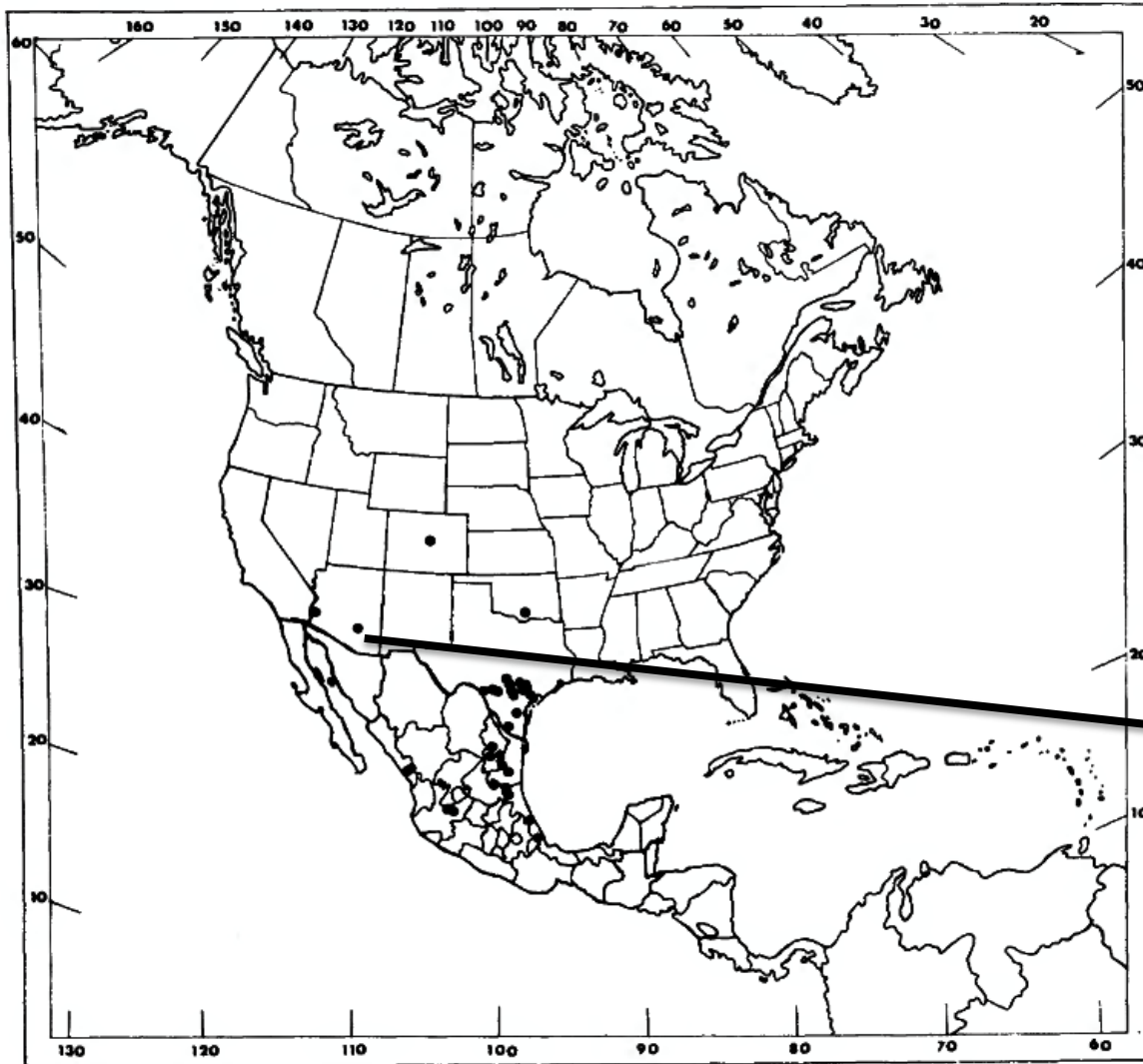


FIGURE 22.—Distribution of *Smicridea fasciatella* McLachlan.



# A Unique Problem

- Caddisflies are rarely a nuisance, so no products have been labeled for caddisfly control.
- Adult spray is ineffective and hazardous to the environment.
- Most existing larvicides are toxic to everything in the river.
- This insect is considered by most to be “harmless”, a part of the “sacred” EPT group. Used as an ecological indicator.
- This area has endangered native species.

# Contributing Factors

- Davis Dam Completion- 1951
- Black Fly Suppression Program- 1986
- Quagga Mussel Introduction- 2007
- Koi Herpes Virus- 2009
- Willow Beach Fishery- 2013
- Other Factors
  - Bats, Swallows, Effluent, Bed Stabilization, Water Temperature, Climate, Unknowns



1-1-2010

# An Overview of the Spread, Distribution, and Ecological Impacts of the Quagga Mussel, *Dreissena rostriformis bugensis*, with Possible Implications to the Colorado River System

Thomas F. Nalepa

NOAA, [thomas.nalepa@noaa.gov](mailto:thomas.nalepa@noaa.gov)



# Mohave carp

Virus isn't a threat to humans, officials say



ARIZONA GAME AND FISH

Thousands of dead carp are washing up along the shores of Lake Mohave.

By Mary Manning



# Willow Beach

- ~80,000 catchable trout/year max
- (2009-2012)-24,000 trout/year
- (2013)- 12,000 trout



FEATURED

# Reduction of fish stocking blamed for growth in caddisfly population

By JULIE FAIRMAN News West Oct 30, 2015 0



Officials from both sides of the Colorado River gathered in Laughlin on Thursday to discuss the caddisfly population explosion and its effect on tourism and other businesses. From left are Clark County Vector Control Sup. Chris Bramley; Don Hendren, president of the Bullhead City Pest Abatement District; Mohave County Sup. Hildy Angius; and Bullhead City Mayor Tom Brady.

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928.704.9850 [AndersonFordBullheadCity.com](http://AndersonFordBullheadCity.com)  
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**SCHEDULE SERVICE APPOINTMENT**

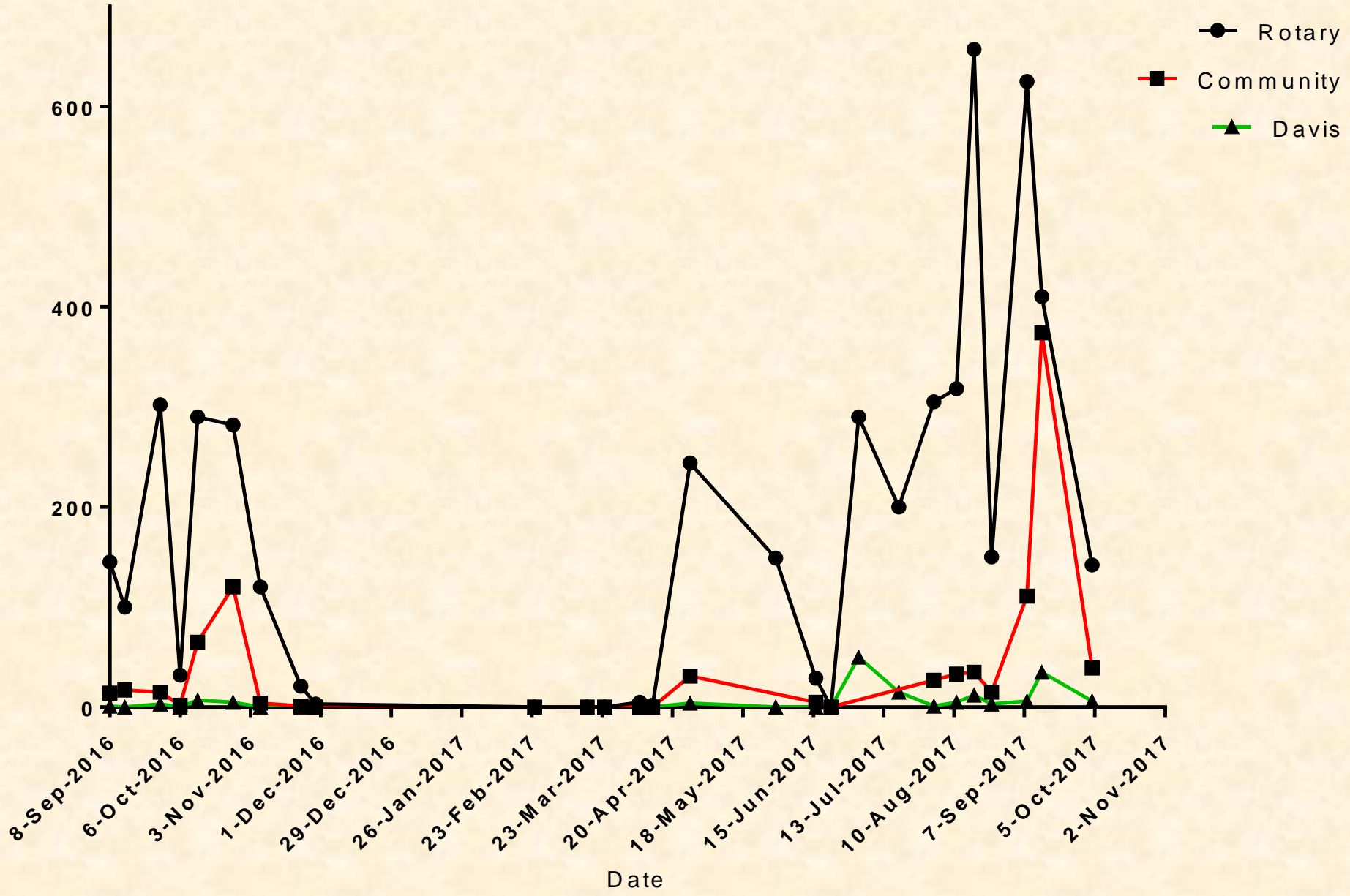
Latest News



# Initial Plan

- Adult traps along river to monitor population
- Coordination with Game and Fish and PAD for trout stocking (F&W- 45,000, PAD- 35,000)
- Evaluation of Black Fly Program
- Larval Sampling
- Repellent Testing
- Fish Gut Analysis
- Pheromone Testing
- Light Trap Testing
- Sex Ratio Analysis
- Extensive Literature Review
- Consultation with Expert Scientists

# Caddisfly Trap Data (Adults)









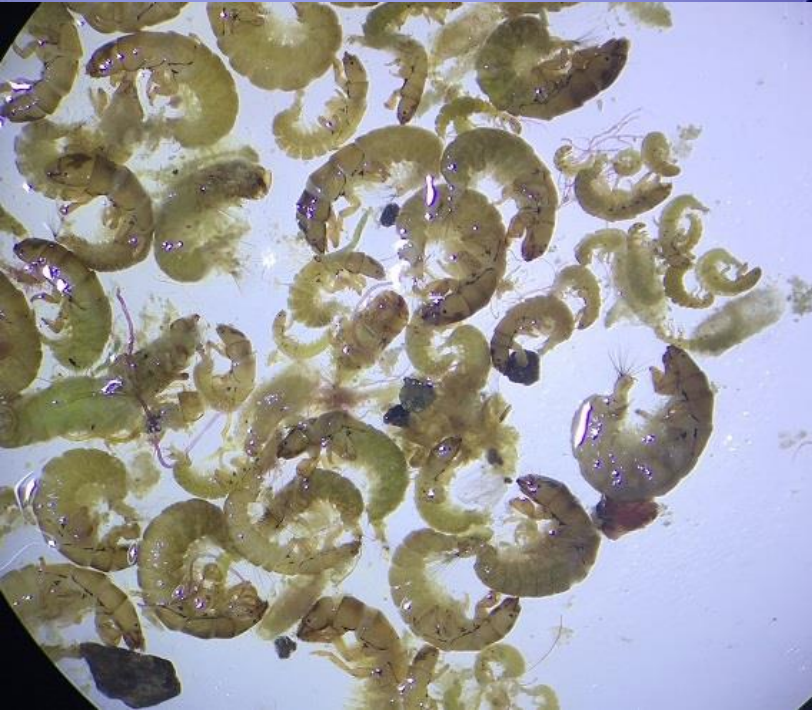
# Larval Sampling



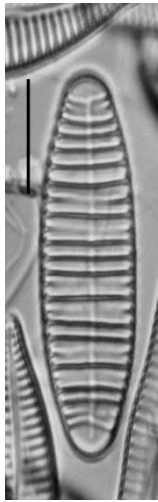
- 63 larvae/ft<sup>2</sup> at Rotary
- 115 larvae/ft<sup>2</sup> at Riverfront Dr.
- 48 larvae/ft<sup>2</sup> near Harrah's
- **179** larvae/ft<sup>2</sup> at Davis Camp Boat Launch
- **78** larvae/ft<sup>2</sup> at Davis Camp Beach
- Millersville University students sorting samples by instar

Values in **RED** have a majority of Hydroptilid larvae.

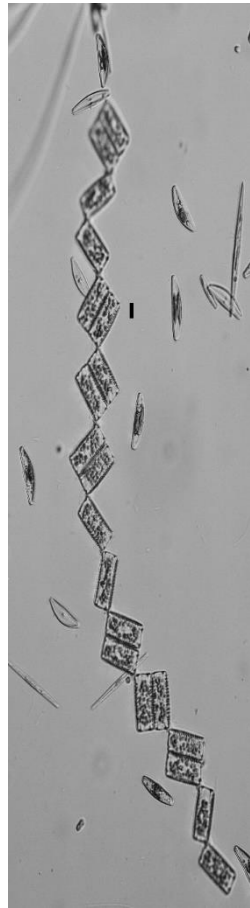




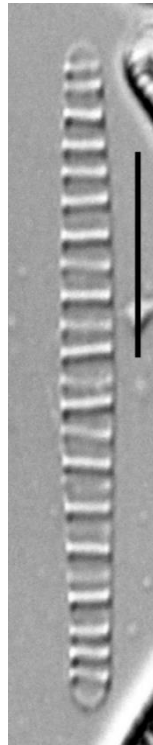




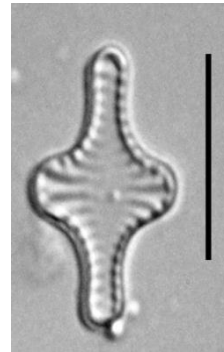
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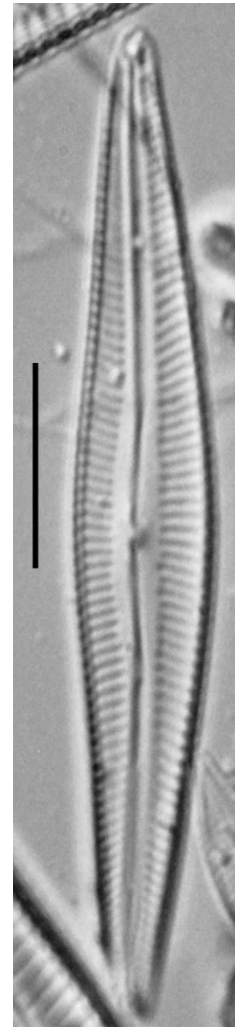
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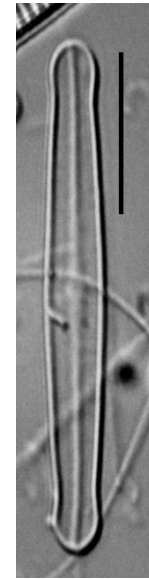
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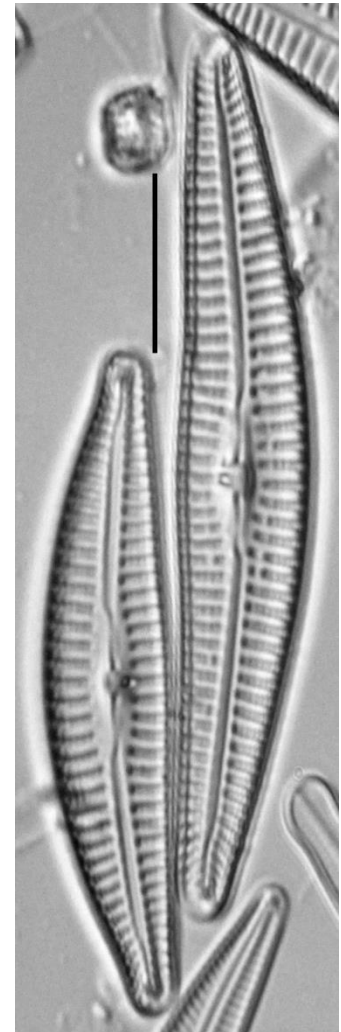
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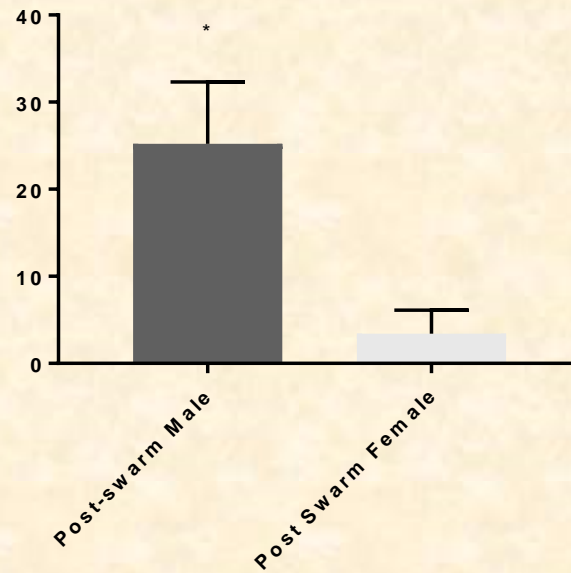
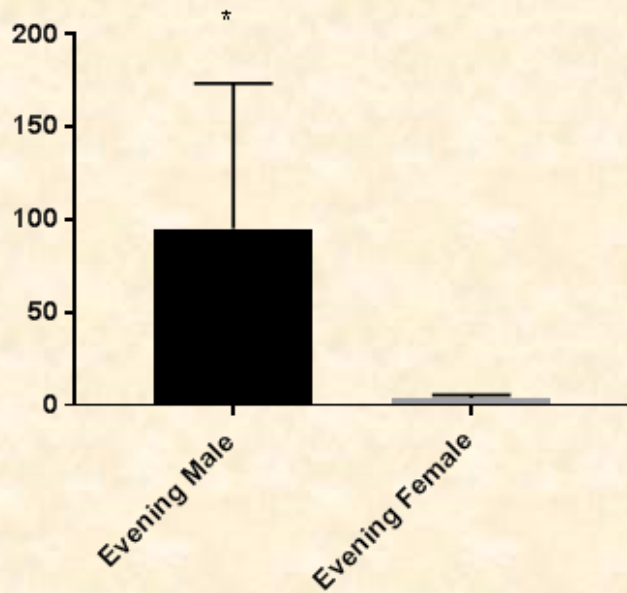
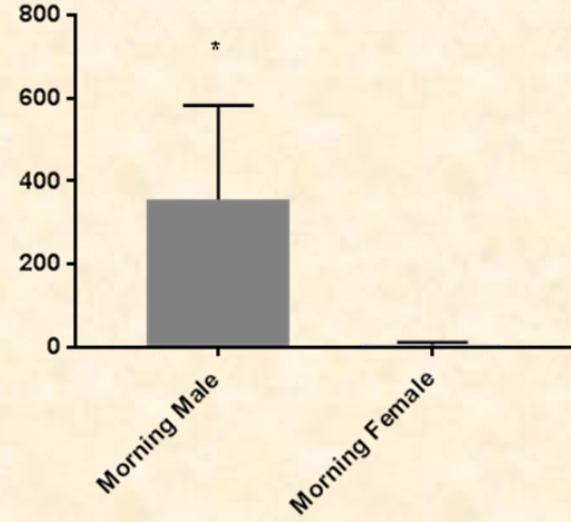
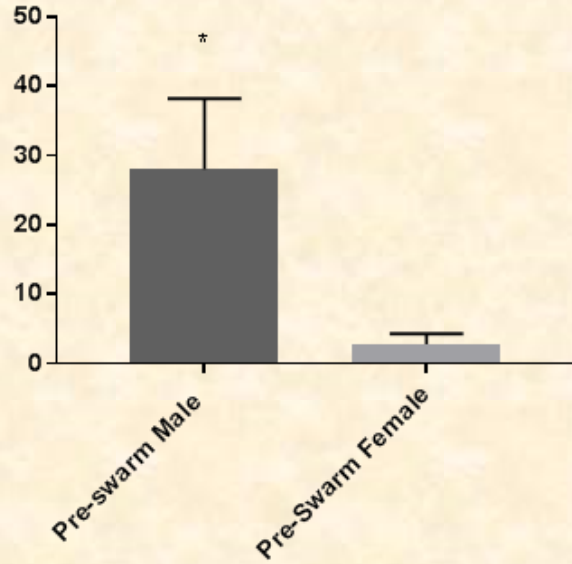


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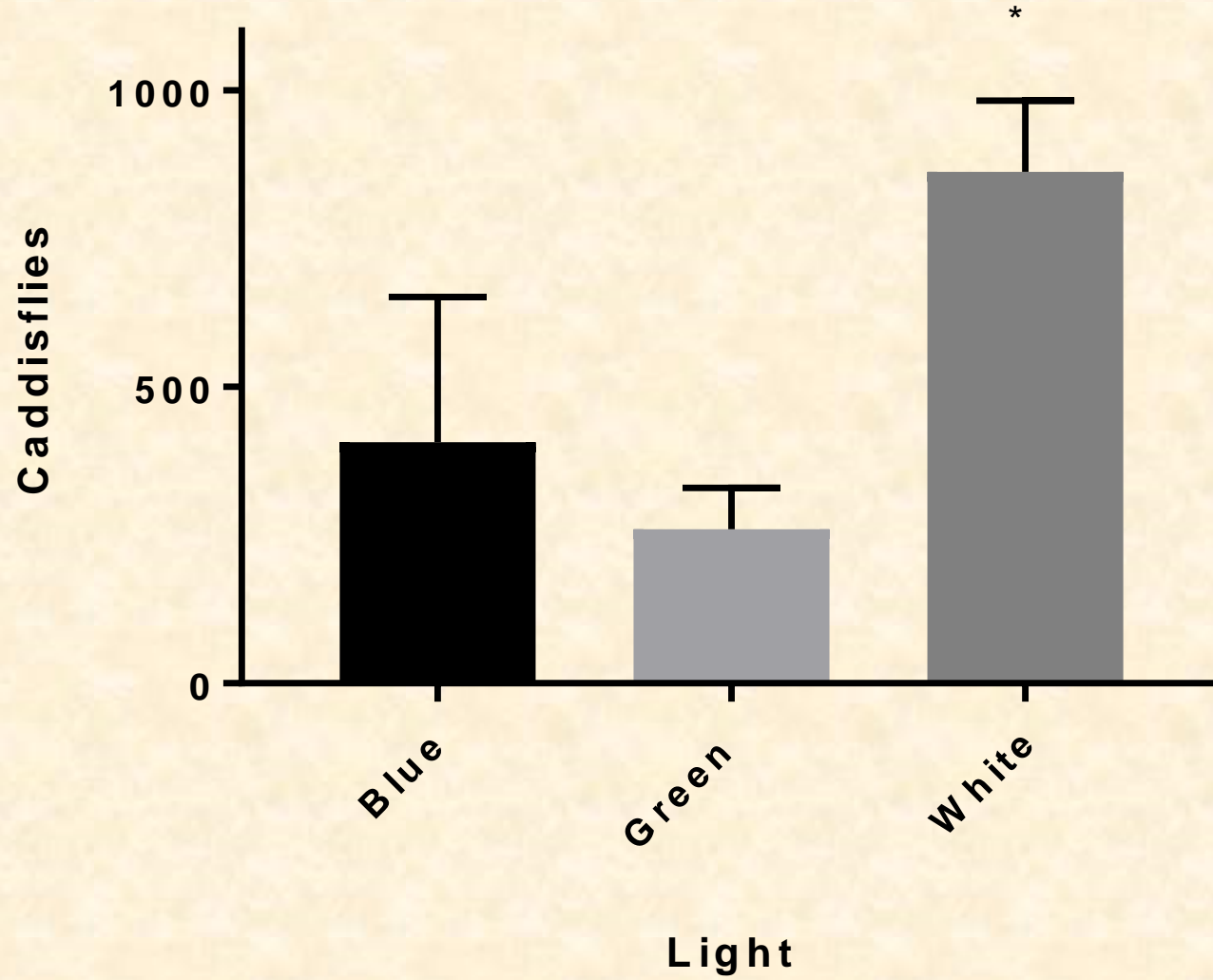
1. *Diatoma vulgare*
2. *Diatoma* chain (girdle view)
3. *Diatoma tenue*
4. *Staurosira construens*
5. *Staurosirella pinnata*
6. *Cymbopleura infirma*
7. *Achnanthisdium* sp.
8. *Cymbella affinis*



# Sex Ratio

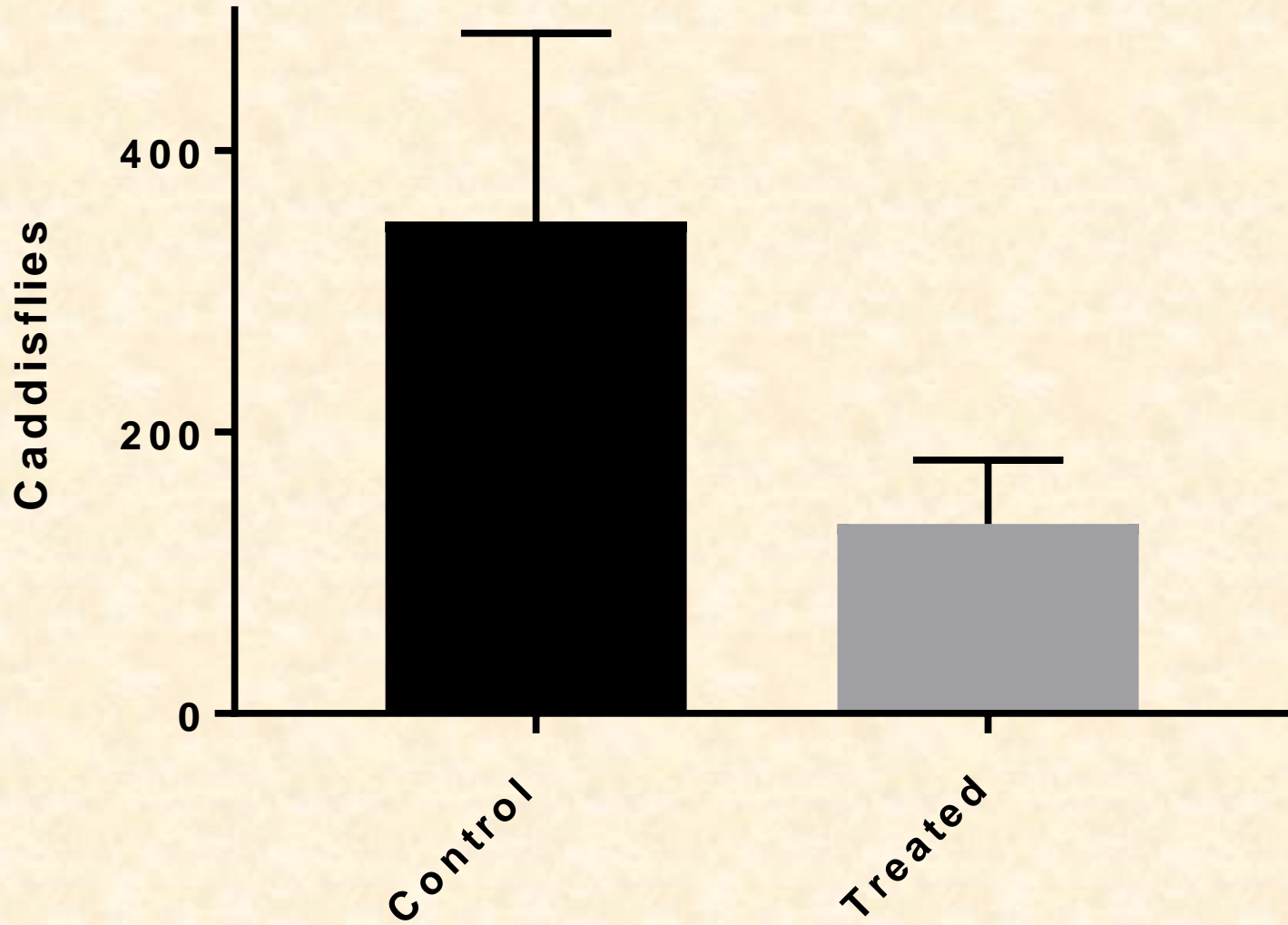


# Light Trap





## 2-Heptanone









# Caddisfly Projects

- Life history of *Smicridea fasciatella*
- Work with Arizona Game and Fish and U.S. Fish and Wildlife on **trout stocking**. Seek other fish options.
- Add substrate to river for trout
- Partial recovery of black fly populations
- Extensive larval sampling
- Fish stomach analysis
  - carp, striped bass, trout
- **Light traps + Pheromones (interrupt mating)**
- **Water quality research (nutrients)**
  - Nutrients↑, Caddisfly↑
  - Pollution↓, Caddisfly ↑
- **Dam release modification?**
- Research other microbials + IGRs that can be used for control (time consuming)
- Research with USGS + F&W



# Trout Considerations

- More catchable trout added now than ever (110,000 this FY)
- Rainbow trout eat all life stages of the caddisfly
- Excess fish add nutrients to the river, could exacerbate the problem
- Consultation with F&W

BIOLOGICAL REPORT 85(7.19)  
SEPTEMBER 1988

THE ECOLOGY OF THE LOWER  
COLORADO RIVER FROM DAVIS DAM  
TO THE MEXICO-UNITED STATES  
INTERNATIONAL BOUNDARY:  
A Community Profile



19970320 063

Fish and Wildlife Service

U.S. Department of the Interior

DISTRIBUTION STATEMENT A  
Approved for public release:

DTIC QUALITY INSPECTED 1



Search ..



## Suit against state shuts down fish stocking in some area lakes

ELIZABETH LARSON  
06 JANUARY 2009

POSTED ON MONDAY, 08 DECEMBER 2008 21:35





# Flow Management



**Source: UNIVERSITY OF ARIZONA** submitted to 

**COLORADO RIVER CADDISFLY BIONOMICS AND ABATEMENT**

<b>Sponsoring Institution</b>	National Institute of Food and Agriculture	<b>Project Status</b>	TERMINATED
<b>Reporting Frequency</b>	Annual	<b>Funding Source</b>	HATCH
<b>Grant No.</b>	(N/A)	<b>Accession No.</b>	0189210
<b>Proposal No.</b>	(N/A)	<b>Project No.</b>	ARZT-136329-H-31-135
<b>Program Code</b>	(N/A)	<b>Multistate No.</b>	(N/A)
<b>Project End Date</b>	Sep 30, 2005	<b>Project Start Date</b>	Jul 1, 2001
		<b>Grant Year</b>	(N/A)

**Project Director**

SMITH, R. L.

**Recipient Organization**

UNIVERSITY OF ARIZONA  
888 N EUCLID AVE  
TUCSON,AZ 85719-4824

**Performing Department**

ENTOMOLOGY

**Non Technical Summary**

Caddis fly adults emerge in mass on the Colorado River near Parker Dam. These insects annoy residents, dissuade tourists, and cause health problems. We will study the biology of caddis flies near Parker dam and attempt to develop a bio-rational integrated management protocol for this problem.

# Diflubenzuron?

RESPONSE OF HYDROPSYCHIDAE (INSECTA: TRICHOPTERA) LARVAE TO DIFLUBENZURON

Author(s): PATRICIA T. BRADT and JEFFREY A. WILLIAMS

Source: *Journal of the Pennsylvania Academy of Science*, Vol. 64, No. 1 (May, 1990), pp. 19-22

Published by: Penn State University Press

[Jpn. J. Sanit. Zool. Vol. 38 No. 4 p. 303-316 1987]

## The effects of diflubenzuron on invertebrates and fishes in a river\*

Kiyoshi N. SATAKE\*\* and Masayuki YASUNO\*\*

*Division of Environmental Biology, National Institute for Environmental Studies,  
Onogawa, Tsukuba, Ibaraki 305, Japan*

(Received: February 7, 1987)

- Levels as low as 2.5 PPB could reduce caddisflies
- Considered “Practically non-toxic” to fish
- Toxic to all invertebrates
- Special use permit would be required
- Affordable



# Scientists hope bug experiment fattens Colorado River fish

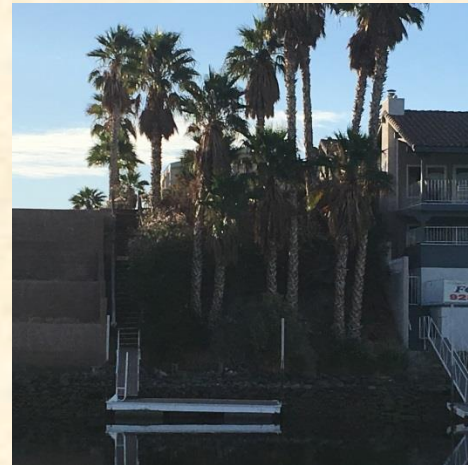
By **FELICIA FONSECA** | The Associated Press

PUBLISHED: April 30, 2018 at 7:49 pm | UPDATED: April 30, 2018 at 8:10 pm



# Homeowner Actions

- Large fans
- Light traps
- Reduce vegetation
- Outdoor lighting
- Screen porch







GREENWOOD  
PROPRANE  
TORCH  
1/2" ORB  
1/2" ORB

# Biology and Possible Control Of Nuisance Caddisflies Of the Upper Mississippi River

by Calvin R. Fremling

Department of Zoology and Entomology

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**AGRICULTURAL AND HOME ECONOMICS EXPERIMENT STATION**  
**IOWA STATE UNIVERSITY of Science and Technology**



# 宇治川における過去半世紀の水文水質特性とトビケラ現存量の変遷 —トビケラ大発生に関わる環境要因の探究—

## Changes in Hydrology, Water Quality, and Caddisfly Biomass for the Past Half-Century in the Uji River

小林草平・竹門康弘

Sohei KOBAYASHI and Yasuhiro TAKEMON

### Synopsis

Biological and environmental data of the past half-century in the Uji River were collected and analyzed to understand key conditions of caddisfly mass emergence, a recent nuisance issue in Uji City. Based on biomass and taxonomic composition, caddisflies seem to have increased after the construction of Amagase-dam in 1964 up to early 1970s. Although some changes since 1960s were detected for flow regime, water temperature, and water quality, these changes explained little of the increase pattern of caddisfly. A reduction of bed-change frequency since 1960s was evident based on the size and location of gravel-bars. Bed stabilization due to reduced sediment supply is a possible factor of the caddisfly increase. Being the outlet of Lake Biwa, Uji River originally possesses a high potential for secondary production, which is an essential condition for the caddisfly mass emergence.

キーワード: 宇治川, トビケラ, 琵琶湖, 天ヶ瀬ダム, 植物プランクトン, 河床安定化  
Keywords: Uji River, caddisfly, Lake Biwa, Amagase Dam, phytoplankton, bed stabilization

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# **Potential Control Strategies for Control of Nuisance Caddis Fly In the CAP Canal**

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**Prepared for:**

**The Central Arizona Project**

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**Prepared by: Renata Claudi, M.Sc., and Tim Dewey**

**RNT Consulting Inc.**

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## Nuisance Caddisflies Associated with an Irrigation System in Arizona, USA

S. Mark Nelson<sup>a</sup>, Fred Nibling<sup>a</sup>, and Albert Graves<sup>b</sup>.

<sup>a</sup> Bureau of Reclamation, P.O. Box 25007, Denver, CO 80225

<sup>b</sup> Central Arizona Project, 23636 North 7<sup>th</sup> Street, Phoenix, AZ 85024

### INTRODUCTION

The Central Arizona Project (CAP) aqueduct system delivers 1.5 million acre feet of water per year across 340 miles of Arizona from Lake Havasu to Tucson via Phoenix. Water is employed for municipal, industrial, agricultural, and Native American uses. Recently (since 2004) large numbers of nuisance caddisflies (Hydropsychidae: *Smicridea fasciatella*) have been associated with the CAP in urban areas of Phoenix, Arizona. Complaints about caddisflies have been received from residences along the canal and there is interest in decreasing caddisflies emerging from the CAP.

Along with control methods, an understanding of *Smicridea* life history was deemed desirable. Literature reviews have suggested that little information is available on life history of this particular species, especially as it relates to canals. Information is needed on when emergence occur, life history characteristics of larval stages, and associations with the rest of the canal benthic community. Understanding life history is critical to management and control of these insect pests.

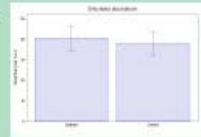
With this in mind, sampling techniques were developed for monitoring *S. fasciatella*. Some potential control methods were also tested.



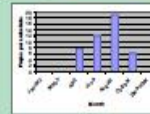
Large numbers of adult caddisflies are attracted to lights and impact the ability to enjoy backyard activities in the evenings.



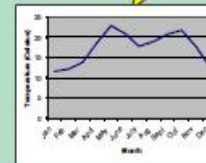
Chaining is a common method used by irrigation districts to remove aquatic macrophytes and sediment accumulations in canals. Data comparing untreated (control) and a chained portion of the canal showed that there were no differences in *Smicridea* abundance before and after chaining.



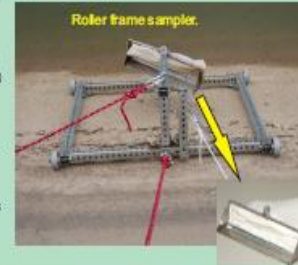
Sticky-trap data indicated that a small peak of emergence occurred early in the year with a larger peak in September. Pupal abundance showed a similar pattern.



Increases in canal water temperature corresponded with adult emergence peaks.

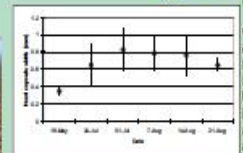


Larval sampling with a net on a long pole was considered ineffective and a sampler on a roller frame was developed. A gate latch allowed deployment of the net at desired depths and this sampler was used for testing some abatement techniques.



Roller frame sampler.

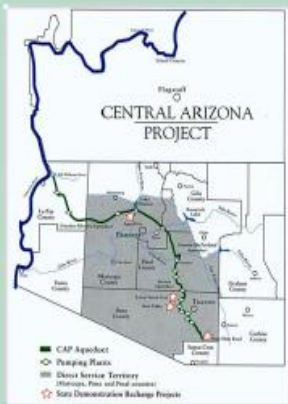
Control of larval *Smicridea* using brushes on a large squeegee was also used along the aqueduct. Tests of brushing with substrates suggested that caddis abundance was impacted, resulting in a 60% decrease in numbers of larval *Smicridea*. However, little damage occurred to larvae removed from substrates.



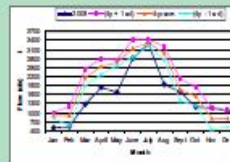
Size variability of larval head capsules suggested recruitment over a long period of time during the summer months.

Gut contents of *Smicridea* consisted largely of fine detritus. Diatoms were very rare in December and May samples, but were common to abundant in July and August. Filamentous algae were also common to abundant on occasion, while insect fragments were only observed occasionally.

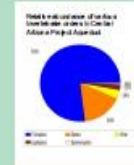
Treatment with copper was considered, however, nominal copper concentrations as high as 100 mg/L had no effect on survival in 24-hr toxicity tests.



Three sites were studied along the canal in the area of Phoenix/Scottsdale. Sticky-traps for adults were set-up along the canal and both active and substrate sampling of larval caddisflies occurred.



Information from substrates indicated that *Smicridea* was the most abundant organism in the canal. *Smicridea* densities averaged 4,700 individuals per square meter and were similar from 2 to 10-m down the side of the canal. Other caddis such as *Helicopsyche*, *Hydroptila*, *Nectopsyche*, and *Oecetis* were only detected in small numbers.



Recently quagga mussels have been discovered in the canal and may have some impact on the macroinvertebrate community. In comparison with other nearby canals, mussel abundance is at low levels and it is thought that *Smicridea* may filter veligers from the water.

*S. fasciatella* life cycle seems to be partially bivoltine but with an extended period of emergence during the summer period. It appears that overwintering occurs in the larval stage.

Methods for control of caddisflies are limited in this environment.

Large amounts of water are transferred using the CAP. The canal is approximately 6-m deep and 30-m across.

# Research Agenda- Multipronged Approach

## 1) Light Trap

Rationale: Control

- Color scheme
- Sticky trap color
- UV light trap w/w-out fans
  - Protocol for Doug
  - 4 nights both lights v. 4 nights uv light only
    - comparison of light competition

## 2) Pheromone research (in earnest)

Rationale: Increase trapping efficacy

- Whole body homogenates for males and females
- Test trapping efficacy
- Serial dilutions

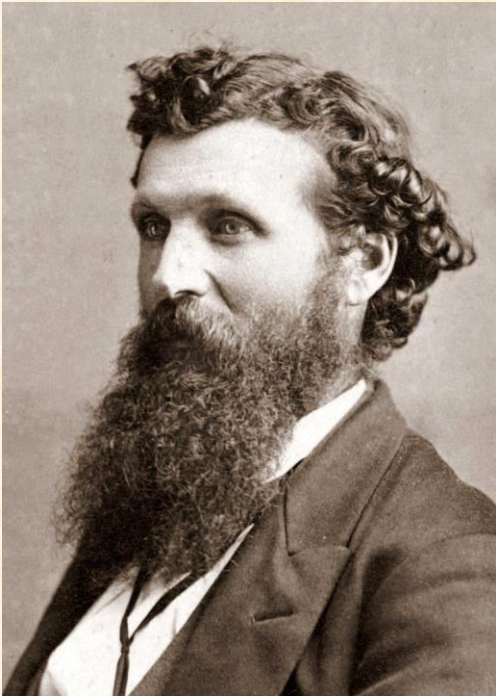
## 3) Insecticide

- Green adulticide (misters, fogging, barrier, repellent)
- Insecticidal paint



- 4) Life History Study (include rationales for each)
  - A) Adult life span
  - B) Adult fecundity
  - C) Adult Densities
  - D) Oviposition ecology
    - Rationale: Hydropeaking effects
      - Where do caddisflies oviposit
      - When do they oviposit (spring/fall – evening)
      - Egg mass density
      - Microhabitat characterization
      - Sampling of dipping individuals
        - Sex, dissect for egg presence
  - E) Egg survivorship
  - F) Larval growth rates \*
  - G) Larval densities
  - H) Larval distribution – in river
  - I) Larval microhabitat characterization

# Questions?



“When one tugs at a single thing in nature, one finds it attached to the rest of the world.” --- John Muir