



Field Trip Report

Caddisfly outbreak on the Colorado River below Davis Dam Laughlin NV / Bullhead City AZ



June 25-26, 2018

TWG Meeting Phoenix, AZ

Craig Ellsworth, WAPA Larry Stevens, MNA

Caddisfly infestation below Davis Dam

- 1938: Completion of Parker Dam
- 1951: Completion of Davis Dam •
- 1986: Blackfly suppression program • below Davis Dam
- 1988: Caddis an issue below Parker Dam
- 2001-2005: Caddisfly Abatement Study ٠ below Parker Dam
- 2007: Introduction of guagga
- 2009: Koi herpes virus kills carp in Lake ٠ Mohave
- 2010: Increase in caddis below Davis Dam
- 2013: Reduction in trout stocking •
- Other things to consider: Changes in ٠ nutrients (effluent), particulates, substrate stabilization, water temperature



Smith, R.L., 2005, Colorado River caddisfly bionomics and abatement report, University of Arizona.

Problem caddis: Netspinning caddisfly, Smicridea fasciatella Individual light trap sample weighing 13 lbs (ca. 3.5 million individuals)



Background

No EPT below Glen Canyon Dam*

Hypotheses:

- Hydropower fluctuations
 extirpate aquatic insects
- Hydropeaking reduces % EPT

but...

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- Caddisflies are at nuisance levels below Davis Dam where:
 - daily flow fluctuations are 3x that of Glen Canyon
 - and are out of sync with evening egg laying
- Oviposition study:
 - Not all EPT are edge egg layers



https://www.usbr.gov/uc/rm/amp/twg/mtgs/17jan26/AR19_Kennedy.pdf







Field trip: Laughlin, NV

- May 3-4, 2018
- Participants:
 - Argonne: Kirk and John
 - WAPA: Craig and Shane
 - GCMRC: Ted and Jeff
 - USU Buglab: Scott Miller
 - MNA: Larry Stevens
 - SNWA: Peggy Roefer
 - Bullhead City Pest Abatement: Joe Iburg







Field trip: Laughlin, NV

- Boat trip
- Drift
- Benthics
- Light trap
- Discussions at Mohave Community College
- Field trip report







Laughlin

Davis Dam

Bullhead





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EPT found in the mainstem below Davis Dam

- Netspinning caddis: Hydropsychidae Smicridea fasciatella
- Netspinning caddis #2: Hydropsychidae Smicridea utico
- Purse-case or microcaddis: Hydroptilidae Stactiobiella
- Long-horned caddis: Leptoceridae Nectopsyche diarina
- Mayfly: Baetidae

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• Dragonfly: Gomphidae *Erpetogomphus*



Hydroptilids









https://reeis.usda.gov/web/crisprojectpages/0189210-colorado-river-caddisfly-bionomics-and-abatement.html

Netspinning Caddisfly Hydropsychidae, *Smicridea fasciatella*

BIOLOGY—This is a common and often abundant species in the southwestern United States and northern Mexico. The immature stages are found on rocks and sticks, generally in riffle areas, in flowing water of from a meter to 10-15 meters in width. The larvae construct a typically hydropsychid retreat and net extending into the current. The pupae are generally found in a more protected site enclosed in a shelter of sand and/or organic matter rather solidly held together by silk. The adults are taken at light, often abundantly, at night.

OLIVER S. FLINT, JR. Studies of Neotropical Caddisflies, XVII: The Genus Smicridea from North and Central America (Trichoptera: Hydropsychidae), SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 167







Oviposition study: USU/GCMRC

- Two caddisflies
 - Hydropsyche occidentalis
 - Brachycentrus occidentalis
- Mayfly (*Baetis* spp.)
- Midge (*Eukiefferiella* spp.)
- Fluctuating flows could affect edge specialists
 - Egg desiccation and mortality
 - Reduces emergent substrates for egg laying
- ...but not all EPT are edge specialists





Why is *Smicridea fasciatella* so prevalent below Davis Dam but not below Glen Canyon Dam?

- Flow fluctuations
 - Seasonality
 - Daily
- Substrate
 - Embeddedness
 - Emergent/floating
 - Woody debris
 - Cladophora/chara
- Water quality
 - Anoxic substrates
- Temperature
- Isolation
- Nutrients
- Competition/Predation





Davis Dam

- Current reservoir elevation: 643'
- Penstock elevation: 570' (73')

Glen Canyon Dam

- Current reservoir elevation: 3,612'
- Penstock elevation: 3,490' (122')



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Blinn and Ruiter (2009) caught Smicridea at Lees Ferry

- Smicridea fasciatella at Lees Ferry (rkm 0) and at rkm 15 on the Colorado River
- In the Paria?
- Typo?

Are you getting treatment for that?

Species	Colorado River		
	LOCA	EMER	ABUN
C. arizonensis			
C. pinula			
nyaropsyche sp. Smjoridea fasciatella	K1 K15 PD	8 Aug	A
signata			
YDBOPHLIDAE			
lydroptila sp.	BP	5 Apr	R
1. arctia	K84, K140, K290,	11 Jun-30 Jul	С
	K309, K346, K40	2	







Smicridea fasciatella in the Colorado River basin

Global Biodiversity Information Facility (GBIF.org)

- Parker/Davis
- Las Vegas Wash
- 2 records in Grand Canyon (Pipe Creek)
- Cataract
- San Juan
- Deso/Grey









Question?

If *Smicridea fasciatella* is or ever was in Glen Canyon...

...and if it is a deep-water specialist like *Hydropsyche occidentalis* and can handle high daily stage fluctuations...

...then why is it, or any other deep-water specialist EPT, not more prevelant below Glen Canyon Dam?



Flow fluctuations

- Seasonality
- Daily
- Substrate

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- Embeddedness
- Emergent/shallow
- Woody debris
- Cladophora/chara
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USES 89423888 COLORODO RIVER BELON DRVIS DAM. 87-NV

Davis Dam

- 6.5 feet change
- 4,400 27,000 cfs
- Low water: early morning

Glen Canyon Dam

- 1.5 feet change
- 9,000 17,000 cfs
- Low water: early morning





- Flow fluctuations
 - Seasonality
 - Daily

Substrate

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- Embeddedness
- Emergent/shallow
- Woody debris
- Cladophora/chara
- Water quality
 - Anoxic substrates
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4,400 cfs Early morning Emergent substrates

27,000 cfs Afternoon to midnight



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- Toxic to sensitive EPT
- Only tolerant species present



Ubiquitous below Glen Canyon Dam to the Paria inflow





- Flow fluctuations
 - Seasonality
 - Daily
- Substrate

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- Embeddedness
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http://gcdamp.com/images_gcdamp_com/5/51/20160218_FoodbaseBottleneck.pdf



- Flow fluctuations
 - Seasonality
 - Daily
- Substrate
 - Embeddedness
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What does this mean?

If there is a primary stressor or a combination of stressors that is limiting EPT below Glen Canyon Dam

- It is affecting deep-water specialists as well as edge specialists
- Deep-water specialists can be very successful in a hydropower tailwater

This would indicate that

- daily fluctuations,
- · egg desiccation, and
- lack of emergent substrates

are <u>*not the limiting bottlenecks*</u> for EPT below Glen Canyon Dam.







Next steps

Finish Bugflows

Start thinking about what other experimentation we want to do after Bugflows

- Substrate manipulations
 - Embeddedness
 - Hyporheic anoxia
 - Woody debris / emergent substrates
- Nutrient supplementation
- Change timing of HFEs







Pre-order t-shirts now





I caught Smicridea in Laughlin, NV







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