



Wildlife Survey & Photo Service

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July 1, 2004

To: Mr. Thomas L. Pate, PE
Supervising Water Resources Engineer
Solano County Water Agency
508 Elmira Road
Vacaville, CA 95687

Mr. Richard Marovich
Putah Streamkeeper
c/o Solano County Water Agency
508 Elmira Road
Vacaville, CA 95687

RE: Putah Creek NZMS Monitoring Project

Background:

The New Zealand Mud Snail is a highly invasive, aquatic mollusk, that can, in some habitats severely alter the lower aquatic food web. Algal grazing by NZMS may decrease food availability and in some habitats physically displace native invertebrates. Fish species that forage on native invertebrates might be affected if NZMS populations reach 25,000 / m².

In October 2003, New Zealand Mudsnaills were discovered at Fishing Access # 3 on the Yolo County side of Putah Creek. An emergency delineation funded by the U.S. Bureau of Reclamation determined that the NZMS infestation was approximately one mile in length.

The NZMS situation was complicated in February 2004, when storm events caused the overflow of the Lake Berryessa Glory Hole sending a surge of 12,000 CFS down the Putah Creek drainage. That surge extended the range of the known NZMS infestation to approximately 9.67 kilometers (6 miles) in length (see map).

The NZMS infestation complicates several management and environmental factors in the Putah Creek drainage:

1. The unknown impact of NZMS infestation on water conveyance infrastructure.
2. The unknown impacts to drinking water systems and agricultural water supply.
3. The impacts to a highly productive and popular recreational trout fishing area.
4. Impacts to a newly restored salmonid spawning area below the Solano Diversion Dam.

Current NZMS Population Delineation:

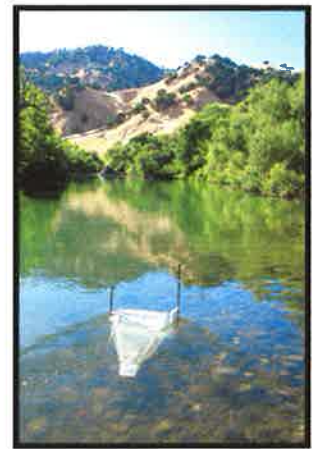
As of July 1, 2004, we have not found any NZMS below (downstream) of the Ruggles Property (N38°30'8.5"; W121°59'22.9"). Surveys at access sites below the Ruggles property have included "D" net sampling, basket colonization, and intense visual surveys. The Ruggles site is approximately 2.90 kilometers upstream from the Winters bridge.

NZMS Population Density:

It is important to establish a baseline population density of the New Zealand Mudsail population in Putah Creek to allow the measurement of impacts on native invertebrates. Measurements will be recorded at several locations in the interdam reach and in Lower Putah Creek. High water levels and velocities have until recently prevented the effective measurement of NZMS populations. Recent development of a 32.5cm² subsurface frame that can be used with a standard "D" net facilitates the measurement of developing NZMS populations in areas too deep or swift for a Surber net.

Interdam Reach. Site JA: Note that this site is approximately 0.5 Kilometer below Fishing Access #3. During the December 2003 Emergency Delineation, NZMS were rare at this site. Although no formal population density was recorded in December 2003, we only found three (3) NZMS at the site. Currently, NZMS at this site are visible on the surface of the rocks. Water depth and velocity were also recorded. Partial data in the table below.

Putah Creek - Riffles at Site JA - 6/28/04		
Site Sample	Collection #	NZMS (#/m ²)
1	893-22JA	1145
2	894-22JA	4450
3	895-22JA	1005
4	896-22JA	2992
5	897-22JA	691
6	898-22JA	1316
7	899-22JA	1240
8	900-22JA	3995



Putah Creek, riffles at Site JA

Movement of NZMS:

My concerns about the movement of NZMS in the invertebrate drift (normal daily movement of non-mollusk invertebrates in the water column) were heightened by two six-hour invertebrate drift samples taken at the site shown above. All samples contained NZMS that were ≤ 1 mm in length. Half of the NZMS were approximately equal to .5mm length (see image on left).



NZMS measuring approximately 0.5mm long move on a strand of floating algae.

Putah South Canal:

On June 31, 2004, I "spot sampled" several highly susceptible sites in or connected to the Putah South Canal, including Terminal Reservoir (2 sites), Green Valley Creek, Waterman Treatment Site, Sweany Creek, and the Putah Diversion Dam. Results: All sites were NEGATIVE for NZMS.

Note: The sample taken at the Diversion Dam consisted of five samples of plant material removed from the algae screens. No NZMS were found in the composite sample. I want to rethink the validity of using the algae screen samples for NZMS determinations. Reason: No New Zealand Mud Snails were found in the sample, yet neither were any of the common invertebrates that I find in plant material collected in Lake Solano. If the composite contained a reasonable sample of the invertebrate community found in the lake and no NZMS then I would consider the sample valid.

Recommended actions for NZMS:

1. Interdam Reach: Work will continue to determine the NZMS population density.

2. Diversion Dam:

Current Situation: Although NZMS have been found upstream and downstream of the Putah South Canal, NO NZMS have been found in the immediate vicinity of the intake for the Putah South Canal.

Action Planned (funded): Sampling traps will be set up in the lake at several sites to monitor the NZMS in the vicinity of the canal intake.

3. Putah South Canal:

Current Situation: Spot checks have not found any NZMS at selected sites in the canal, conveyance creeks, or the Terminal Reservoir.

Recommended Action:

- 1. Develop a comprehensive plan to monitor selected sites in the Putah South Canal and sensitive conveyances such as Sweany Creek. I will forward my recommendations by July 15, 2004.**

4. Lower Putah Creek:

Current Situation: Intensive surveys have found NZMS downstream only as far as the Ruggles Property which is 1.7 kilometers downstream from the Diversion Dam.

Action Planned (funded):

- 1. Downstream surveys will continue to track the movement of NZMS.**
- 2. Downstream surveys will determine the NZMS density at selected riffles using accepted protocols.**
- 3. Downstream surveys will determine the movement of NZMS via the invertebrate drift.**

Report Submitted 7/4/04

Ken W. Davis

Attachments: Map of 2004 NZMS population

Sample Inventory Report

Sample Biomonitoring Manual Page



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Putah Creek, Yolo County, CA
NZMS Population Delineation
Known Infestation Length: 9.67 Kilometers
7/1/04
Prepared by: Ken W. Davis, Aquatic Biologist

2003 - 2004
Upstream Delineation
N 38° 30' 52.2"
W 122° 4.0' 3.4"
> Fishing Access #2



As of 7/1/04
Downstream Spread NZMS
N 38° 30' 8.5"
W 121° 59' 22.9"
Ruggles Riffles

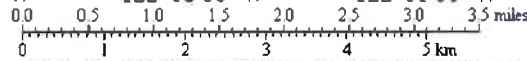
Pardehsa's Store

Lake Solano

Diversion Dam

KEY

-  = NZMS population in 2003
-  = NZMS population in 2004





Waterway: Putah Creek
County: Solano
Collection Date: 4/16/04

Site: Hasbrook Weir / Putah Creek Road
State: CA
Investigator: Ken W. Davis

Species # 1:



Latin Name: *Nixe criddlei*
Common Name:
Family: Heptageniidae
Image Number: 836-22R10-137-001
Comments: 2 specimens at site. First occurrence in Putah Creek in this study.

Species # 2:



Latin Name: *Ephemerella*
Common Name:
Family: Ephemerellidae
Image Number: 836-22R10-67-32
Comments:

Species # 3:



Latin Name: *Tricorythodes*
Common Name: Tricos
Family: Lepthohyphidae
Image Number: 836-22R10-172-2
Comments:

Species # 4:



Latin Name: *Siphonurus occidentalis*
Common Name: Gray Drakes
Family: Siphonuridae
Image Number: 836-22R10-209-00
Comments: Common below outfall from pond on north side of creek.

Invertebrate Inventory Report Sheet



Waterway: Putah Creek
County: Solano
Collection Date: 4/16/04

Site: Hasbrook Weir / Putah Creek Road
State: CA
Investigator: Ken W. Davis

Species # 5:



Latin Name: Callibaetis sp.
Common Name: Speckled Dun
Family: Baetidae
Image Number: 836-22R10-66-021
Comments:

Species # 6:



Latin Name: Identification pending
Common Name:
Family:
Image Number: 802-106-E78-990
Comments:

Species # 7:



Latin Name: Identification pending
Common Name: Blackflies
Family: Simuliidae
Image Number: 836-22R10-182-1
Comments:

Species # 8:



Latin Name: Identification pending
Common Name: Blackflies
Family: Simuliidae
Image Number: 802-106C62-011
Comments :

Invertebrate Inventory Report Sheet



Waterway: Putah Creek
County: Solano
Collection Date: 4/16/04

Site: Hasbrook Weir / Putah Creek Road
State: CA
Investigator: Ken W. Davis

Species # 9:



Latin Name: Identification pending
Common Name:
Family:
Image Number: 836-22R10-208-A1
Comments:

Species # 10:



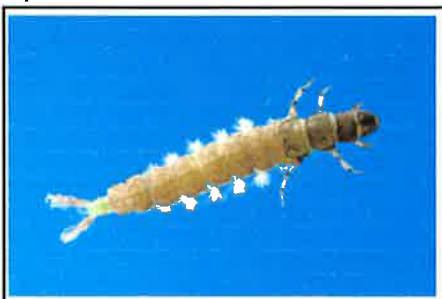
Latin Name: Identification pending
Common Name:
Family:
Image Number: 836-22R10-201-01
Comments:

Species # 11:



Latin Name: Identification pending
Common Name: Leech
Family:
Image Number: 836-22R10-19-02
Comments:

Species # 12:



Latin Name: *Hydropsyche californica*
Common Name: Spotted Sedge
Family: Hydropsychidae
Image Number: 836-22R10-H2-2
Comments:



Waterway: Putah Creek
County: Solano
Collection Date: 4/16/04

Site: Hasbrook Weir / Putah Creek Road
State: CA
Investigator: Ken W. Davis

Species # 13:



Latin Name: Isoperla sp
Common Name: Little Yellow Stones
Family: Perlodidae
Image Number: 836-22R10-XX-56
Comments:

Species # 14:



Latin Name: Identification pending
Common Name:
Family:
Image Number: 836-22R10-XX-2
Comments:

Species # 15:



Latin Name: Identification pending
Common Name:
Family:
Image Number: 836-22R10-263-8
Comments:

Species # 16:



Latin Name:
Common Name:
Family:
Image Number:
Comments:

Invertebrate Inventory Report Sheet

Species: Cottus gulosus
Common: Riffle Sculpin
Family:
Image #: 877-22R10-98-08
Waterway: Lower Putah Creek

Site: Hasbrook Weir
Method: Basket Sampler (gravel)
County: Solano
State: California
Date: 6/11/04



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Cottus gulosus



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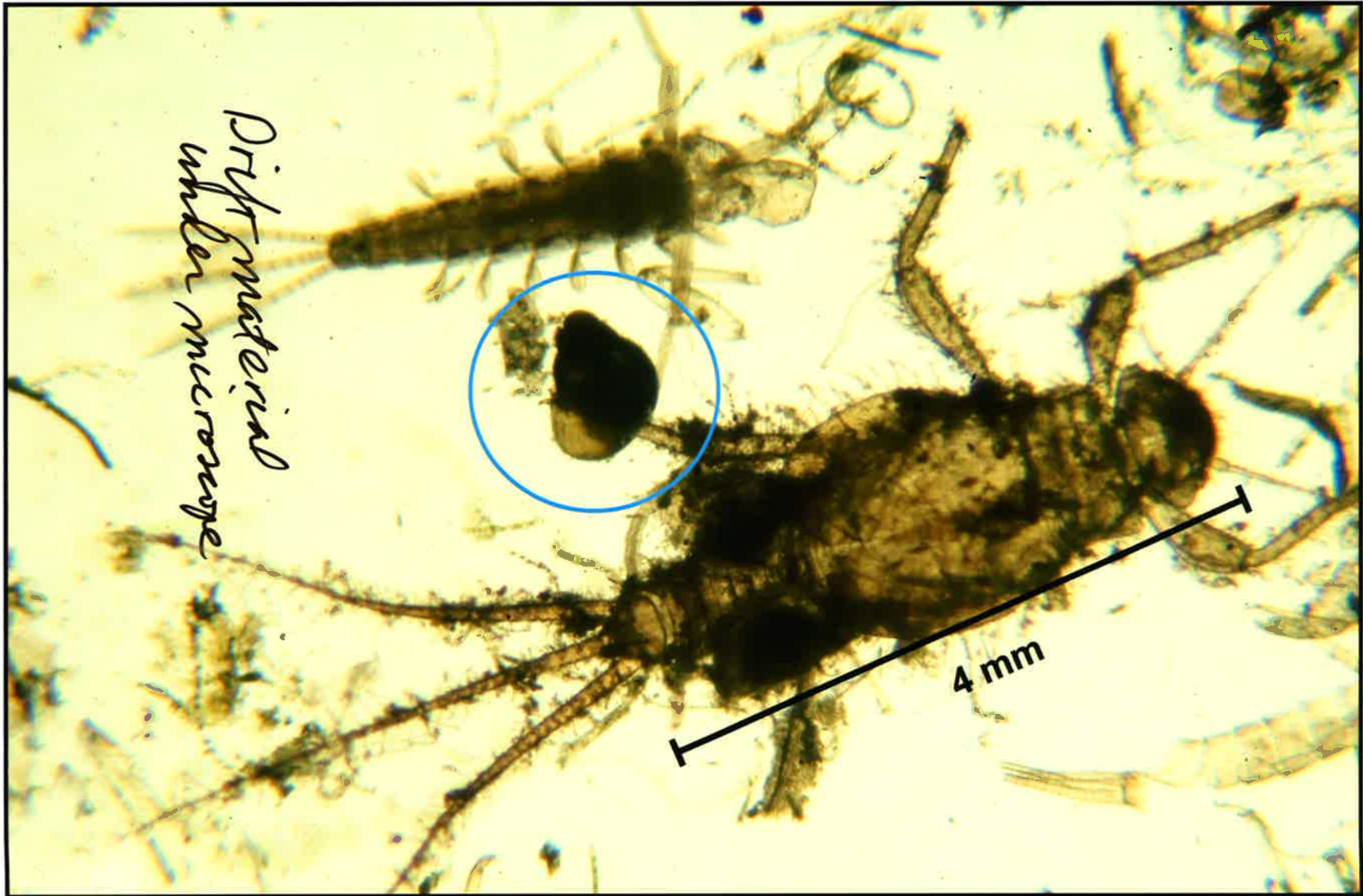
Date collected: May 27, 2004
Waterway: Putah Creek
County: Yolo
State: California

Species: *Potamopyrgus antipodarum*

Common Name: New Zealand Mudsnail

Image / Collection #: 865-22H-41-M5

Investigator: Ken W. Davis



Potamopyrgus antipodarum