



November 10, 2004

**Subject: Invertebrate Survey using Benthic Gravel Basket**

Site: Hasbrook Weir

**Aquatic Survey Report**

**DRAFT 2**

Background:

Under contract with the U.S. Bureau of Reclamation, I tested the use of several types of benthic samplers to detect and monitor the movement of New Zealand Mudsnails (NZMS).



Hasbrook Weir showing downstream flow. November 2004.

Traditional survey and monitoring protocols were not applicable in deep water, aquatic macrophyte beds, and in water-conveyance systems such as the Putah South Canal. A variety of materials, including gravel, wood, beer cans, ceramic, and tiles, were used in the samplers to "attract" NZMS. We quickly noticed that native invertebrates were quick to colonize the samplers loaded with native gravel. A trap developed under the USBR contract (Putah Invertebrate Trap), shown left loaded with native rocks, was colonized in seven days by species representing twelve different families of



Putah Invertebrate Trap loaded with native rocks.

native invertebrates. Ninety percent of the species are considered primary prey for salmonids.

Additional Use for Basket Samplers:

I used the Putah Invertebrate Trap and the much larger Basket Sampler in various habitats to detect NZMS. The preliminary data from several sites was intriguing as it appeared to support the contention that native invertebrates might quickly colonize gravel introduced to augment salmonid spawning.



Benthic Gravel Basket

Hasbrook Weir:

My initial work at the Hasbrook Weir Restoration Site, to develop the Putah Creek Inventory and monitor the area for NZMS, suggested that this restored site supported a significant number and diversity of native invertebrates. Native gravel has been introduced to the site over the last ten years.

Using a highly biased decision, I loaded two basket samplers with clean gravel from the Hasbrook site. One basket was placed at an optimum site in the creek (shade, water depth, and flow regime) on the north side of the weir. The second basket was placed 200 yards upstream in a site that is typical of the channelized area of Putah Creek which might be prime for future gravel augmentation.



**Hasbrook Weir Collection 877:** Removed from Putah Creek 6/11/04. For more information, refer to Collection Number 877-22R10D. Protocol under development. All specimens photographed then preserved in ETOH.

Species in sample	Common name	Weir (gravel) No. 877-22R10D	Channelized (no gravel) No. 878-22R10A
<i>Hydropsyche californica</i>	net-building caddisfly	912	0
<i>Baetis tricaudatis</i>	Bluewing Olive Mayfly	183	0
<i>Prosimulium sp.</i>	blackflies	704	0
<i>Cottus gulosus</i>	Riffle sculpin	3	0
Damselfly # 242	ID Pending	6	24
Damselfly # 189	ID Pending	0	3
<i>Nixe criddlei</i>	Flathead mayfly	2	0
<i>Ephemerella sp.</i>	Red quill Mayfly	4	0
Leech (ID Pending)	Leech	1	0
<i>Tricorythodes minutus</i>	Trico	2	1
<i>Sialis</i>	Orl fly	0	3
<i>Caenis sp.</i>	White-winged sulphur	2	4
<i>Callibaetis sp.</i>	Speckled Dun	0	3
<i>Grammarus sp.</i>	Scud	0	13
<i>Corixa sp</i>	Water boatman	0	4
<i>Cambarus robustus</i>	crayfish	0	1
Native snail # 201	ID Pending	0	1
Native snail # 208	ID Pending	0	1
<i>Potamopyrgus antipodarum</i>	New Zealand Mudsail	0	0
Total Individuals / basket		1819	58
<b>Estimated / cubic foot</b>		<b>8617</b>	<b>275</b>

## Results:

The results of this sample were interesting and significant for the following reasons:

1. Contained two riffle sculpin which are a water quality species (Moyle)
2. Contained two mayfly species which typically prefer cold, oxygen-rich water.
3. Contained 704 *Prosimulium* larvae which are prey for salmonid fry (Crain)
4. Colonization at the channelized site represented only 3.1% of the total number of species colonized at the weir site and 1.3 % of the species known as salmonid prey, larvae or adult.



**Hasbrook Weir Collection 1098:** Samplers placed in optimum sites and left for **12 days**. Sampler removed during Biomonitoring Training Session 11/3/04. Refer to Collection Number 1098-22R10K. Note that this should not be directly compared with the preceding page as the sampler was in the water for only twelve days and the time of year.

Species in sample	Common name	Weir (gravel) No. 1098-22R10K	Channelized (no gravel) No. 1097-22R10A
<i>Hydropsyche californica</i>	net-building caddisfly	77	0
<i>Baetis tricaudatis</i>	Bluewing Olive Mayfly	8	1
<i>Prosimulium sp.</i>	blackflies	72	1
<i>Cottus gulosus</i>	Riffle sculpin	0	0
Damselfly # 242	ID Pending	1	2
Damselfly # 189	ID Pending	0	0
<i>Nixe criddlei</i>	Flathead mayfly	0	0
<i>Ephemerella sp.</i>	Red quill Mayfly	0	0
Leech (ID Pending)	Leech	0	0
<i>Tricorythodes minutus</i>	Trico	0	0
<i>Sialis</i>	Orl fly	0	1
<i>Caenis sp.</i>	White-winged sulphur	0	0
<i>Callibaetis sp.</i>	Speckled Dun	0	0
<i>Grammarus sp.</i>	Scud	0	0
<i>Corixa sp</i>	Water boatman	0	0
<i>Cambarus robustus</i>	crayfish	0	1
Native snail # 201	ID Pending	0	0
Native snail # 208	ID Pending	0	0
ID Pending	Water mites	13	4
Chironomidae	Midges	3	2
<i>Potamopyrgus antipodarum</i>	New Zealand Mudsnaill	0	0
Total Individuals / basket		174	12
<b>Estimated / cubic foot</b>		<b>824</b>	<b>56.5</b>

Results:

1. Colonization at the channelized site after 12 days, represented 6.8% of the total number of species colonized at the Weir site.

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## Discussion:

The use of benthic samplers has potential for monitoring New Zealand Mudsnails and native invertebrates in a variety of situations and habitats. The samplers have demonstrated a high rate of invertebrate colonization in a relatively short period of time.

## Recommendation:

1. The use of native gravel appears to be important when selecting substrates for use in benthic samplers.
2. Standardization of wet days (time in water) needs to be determined in the next series of samples. "In-water time" of thirty to forty-two days is recommended by some workers.
3. Trap vandalism has been a problem as several traps have been taken from the creek. River otters are also suspected of random "trap vandalism."
4. The commercially available wire basket (round) might be better designed in a square or rectangular format. Round baskets tend to roll away if not secured.

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