

2007 Biomonitoring

Hecla
GREENS CREEK



Aquatic Biomonitoring at Greens Creek 2003-7

- Biomonitoring program initiated in 2001 at Sites 48, 6, & 54 in Greens Creek and Site 9 in Tributary Creek
- Methods include assessments of:
 - Periphyton biomass
 - Benthic macroinvertebrates abundance and classification
 - Juvenile fish population estimates
 - Metals concentrations in whole body juvenile fish
 - Toxicity Testing (Discontinued in 2003)
- 2003 Results reported in: Technical Report No. 04-04, [Aquatic Biomonitoring At Greens Creek Mine, 2003](#)
- 2004 Results reported in: Technical Report No. 05-04, [Aquatic Biomonitoring At Greens Creek Mine, 2004](#)
- 2005 Results reported in: Technical Report No. 06-01, [Aquatic Biomonitoring At Greens Creek Mine, 2005](#)
- 2006 Results reported in: Technical Report No. 07-02, [Aquatic Biomonitoring At Greens Creek Mine, 2006](#)
- 2007 Results reported in: Technical Report No. 08-03, [Aquatic Biomonitoring at Greens Creek Mine, 2007](#)

Greens Creek Flows during Biomonitoring 2003-7



- “Water levels and stream discharges at the Greens Creek and Tributary Creek sites in 2007 were the highest seen during biomonitoring sampling, apparently due to a series of rainfall events in addition to continued runoff from a very heavy winter snowpack” (ADNR, Technical Report No. 08-03)
- “...no evidence of scouring flows during the biomonitoring sampling, and water levels were less than ordinary high water, but gage data show that Greens Creek during the three weeks prior to sampling in 2007 were at or near daily mean maxima for those dates” (ADNR, Technical Report No. 08-03)

Water Year	Sampling Dates	Greens Cr. USGS Gage		Tributary Cr. Field Data	
		feet ³ /sec	meter ³ /sec	feet ³ /sec	meter ³ /sec
2001	July 23	72	2.04	---	---
	July 24	73	2.07	---	---
2002	July 23	51	1.44	---	---
	July 24	57	1.61	---	---
2003	July 22	16	0.45	---	---
	July 23	15	0.42	---	---
2004	July 21	25	0.70	0.1*	<0.01*
	July 22	22	0.62	---	---
2005	July 22	33	0.93	---	---
	July 23	29	0.82	2.7	0.08
2006	July 20	35	0.99	---	---
	July 21	59	1.67	3.4	0.10
2007	July 20	100	2.83	5.4	0.15
	July 21	98	2.78	---	---

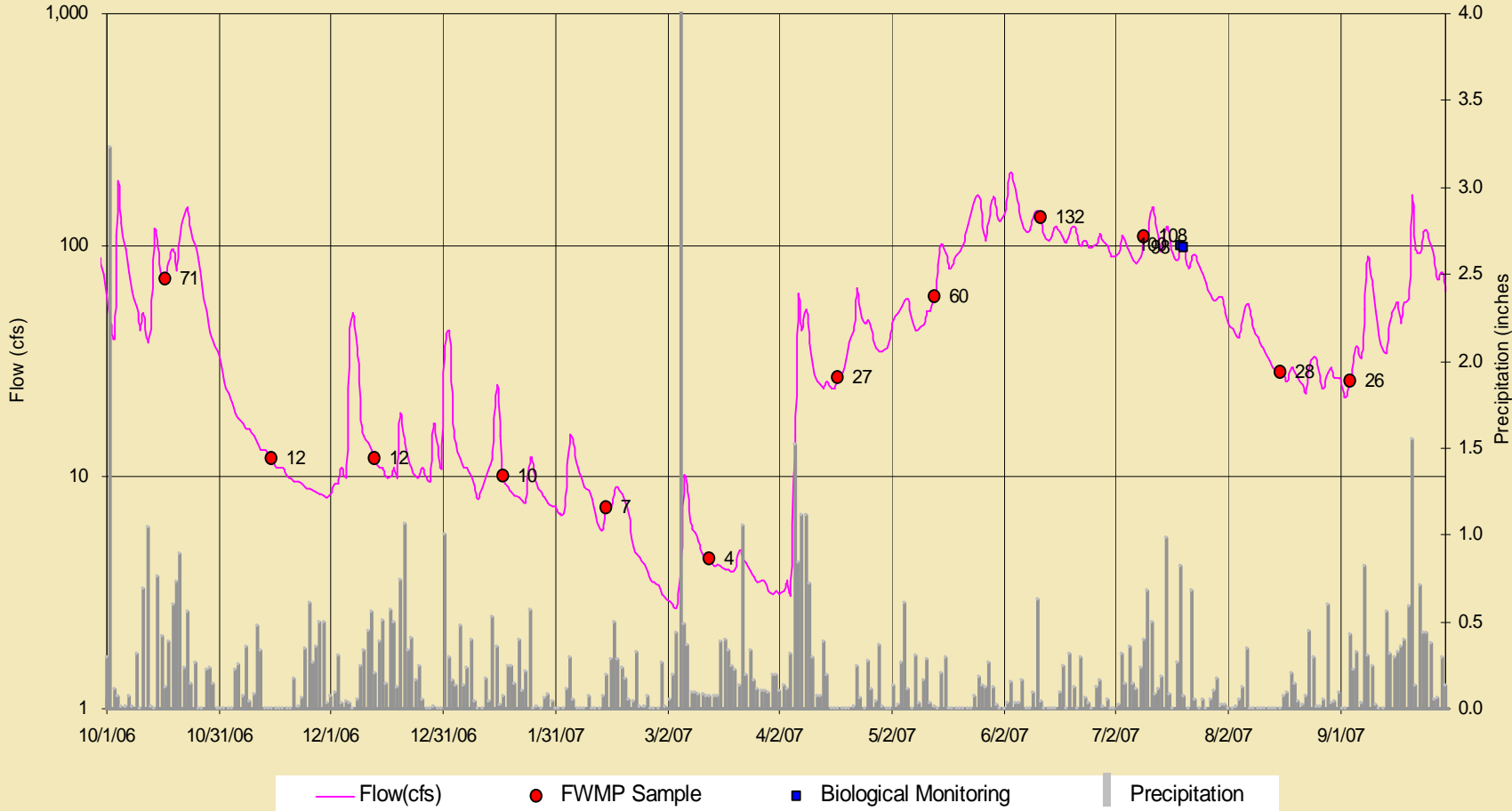
*It is difficult to field measure low discharges in Tributary Creek because of the stream's relatively shallow channel and largely rectangular cross-section.

Mean daily discharge in Greens Creek during biomonitoring sampling periods.
(ADNR Technical Report No. 08-03, Table 1)

WY2007 Greens Creek Flow

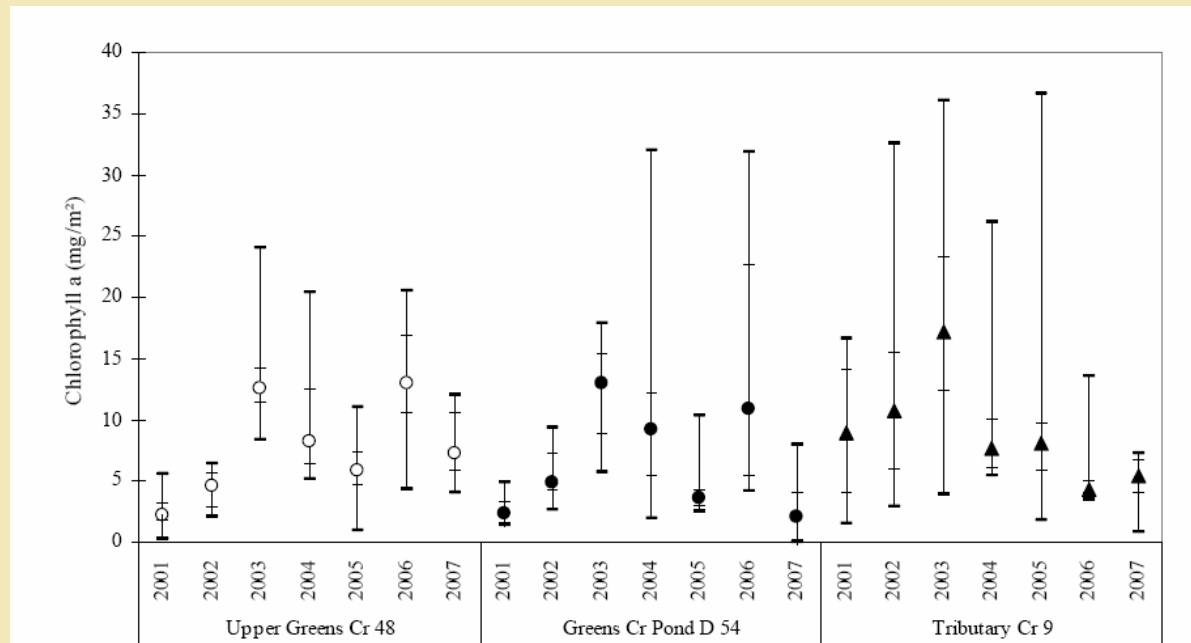


WY2007- Greens Creek Hydrograph/Precipitation



Periphyton Biomass Results

- “Periphyton biomass at the Greens Creek sites has shown a similar pattern over the seven years sampled, with lower values in 2001 and 2002 followed by a peak in 2003 and decreases in 2004 and 2005, an increase again in 2006, and down from that in 2007” (ADNR Technical Report No. 08-03)
- “The pattern of periphyton biomass at the Tributary Creek site was generally similar to that at the Greens Creek sites in 2001 through 2004, but is typically more variable within each year, had less of a decline in 2005, further decline in 2006, and a slight increase in 2007” (ADNR Technical Report No. 08-03)

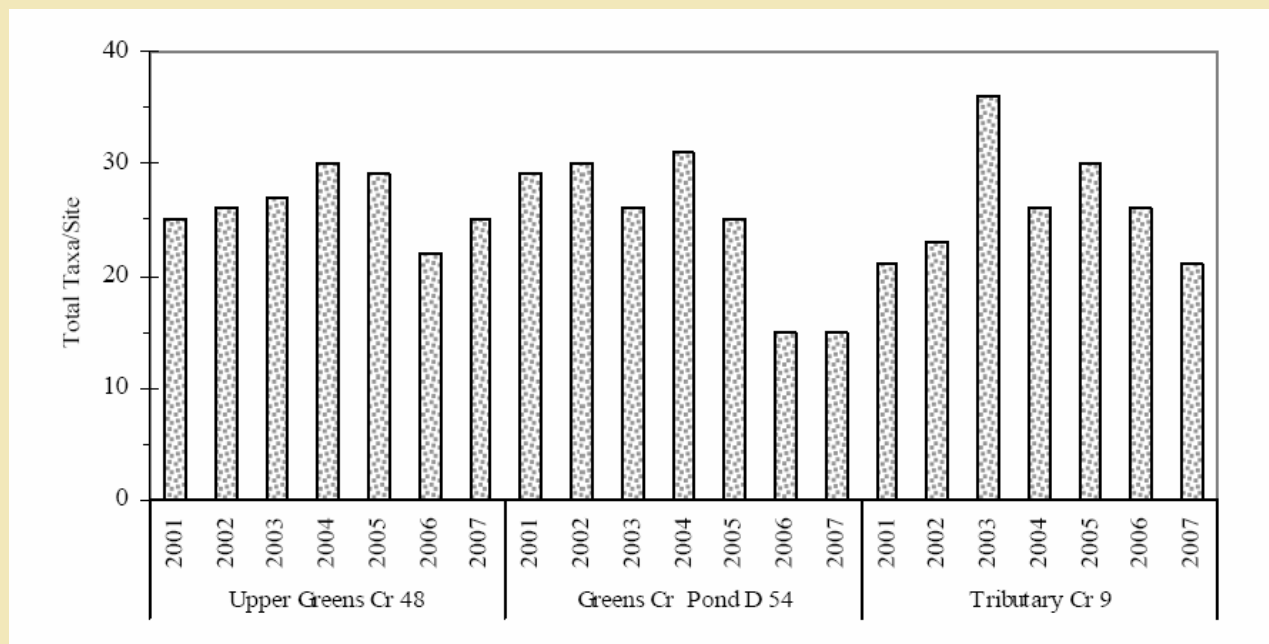


Comparison of estimated periphyton biomass (medians and ranges) among biomonitoring sites, 2001-2007.

(ADNR Technical Report No. 08-03, Figure 29)

Benthic Macroinvertebrates Results

- “All three of the biomonitoring sites had complex invertebrate communities with abundant numbers of taxa (taxonomic richness) per sample” (ADNR Technical Report No. 08-03)
- “The number of taxa per site (richness) was the lowest encountered in this biomonitoring project at the two Greens Creek sites and at Tributary Creek Site 9. Richness was not statistically different between sites in 2007” (ADNR Technical Report No. 08-03)

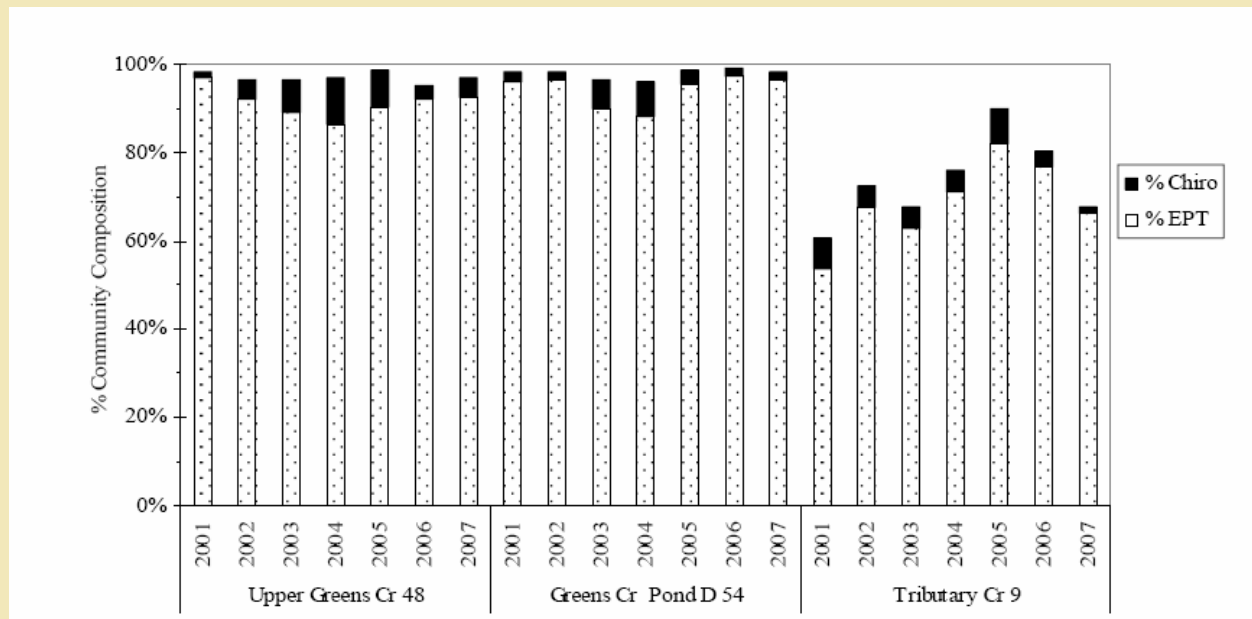


Comparison of benthic macroinvertebrate taxonomic richness among biomonitoring sites, 2001-2007.

(ADNR Technical Report No. 08-03, Figure 32)

Benthic Macroinvertebrates Results (cont)

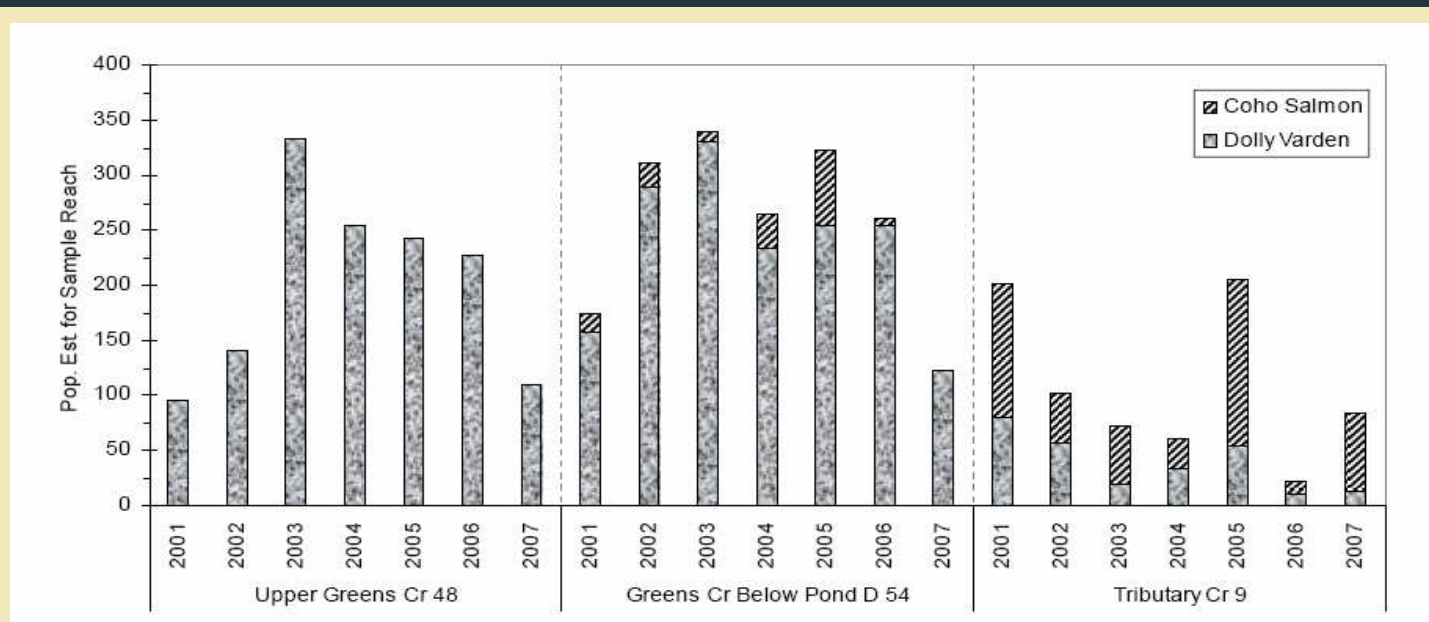
- “The percent EPT metric, based on the concept that most Ephemeroptera, Plecoptera, and Trichoptera taxa are sensitive to pollutants (Merritt and Cummins 1996), was high in all of the biomonitoring sites in each of the years sampled, and much higher than the percent of Chironomidae, which has been relatively constant at the Tributary Creek site but variable in the three Greens Creek sites” (ADNR, Technical Report No. 08-03)



Comparison of proportions of EPT taxa and Chironomidae among sites, 2001-2007.
(ADNR Technical Report No. 08-03, Figure 33)

Juvenile Fish Community

- Dolly Varden population estimates for 2007 were similar at Site 54 and Site 48 in Greens Creek
- “In 2007, as in 2006, Tributary Creek site 9 Dolly Varden productivity was lower than in either of the two Greens Creek sites” (ADNR, Technical Report No. 08-03)
- Dolly Varden density estimates were near regional averages for Site 54 and approximately 1/2 the regional average at Site 48 while at Site 9 the density estimate was 1/3 the average for that channel type.
- Coho density in 2007 at Tributary Creek Site 9 was twice the regional average for that channel type, however no Coho salmon were captured at the Greens Creek Below Pond D site 54, following poor capture rates in 2006

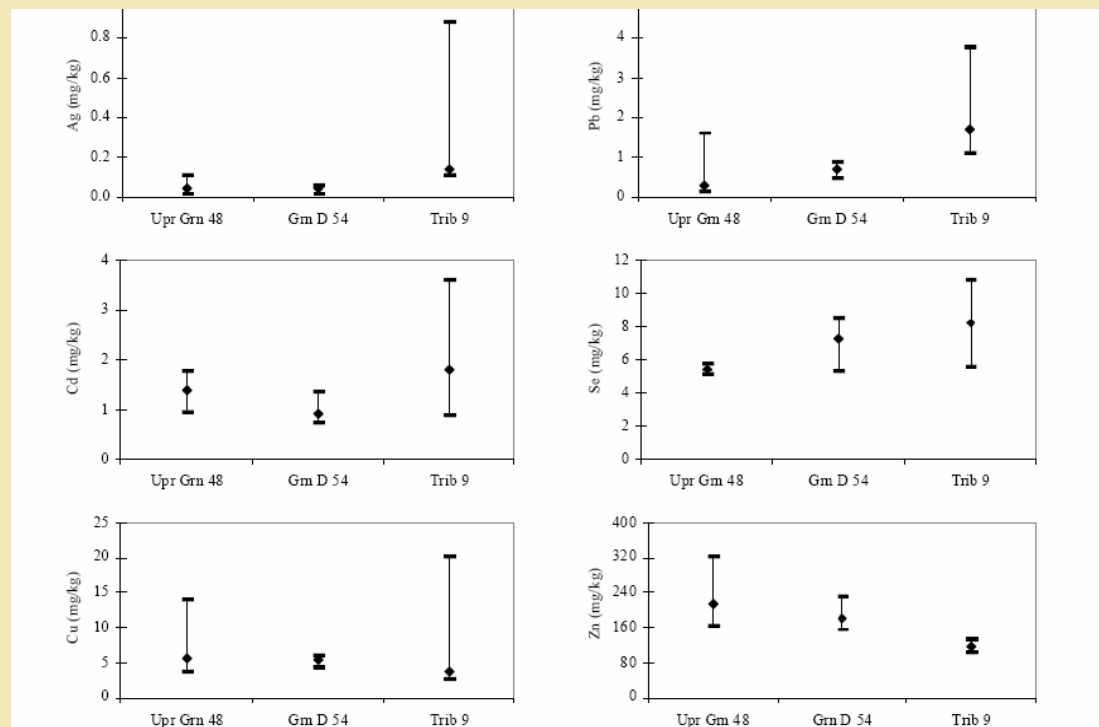


Estimated fish densities in the biomonitoring sites

(ADNR Technical Report No. 08-03, Figure 35)

Metals in Juvenile Fish 2007

- “Mean ranks for concentrations of silver, copper, lead, and zinc were not statistically different between the two Greens Creek sites in 2007” (ADNR, Technical Report No. 08-03)
- “Compared to the control values from Upper Greens Creek, fish tissues values from treatment Greens Creek below pond D site 54 had significantly higher Se and significantly lower Cd” (ADNR, Technical Report No. 08-03)
- Tributary Creek site 9 fish a significantly higher Ag and Cd than Site 54 fish, higher Pb and Se than site 48 fish, and lower Zn than Greens Creek fish



Comparison of metals in whole body fish among sites, 2007.
(ADNR Technical Report No. 08-03, Figure 36)



Hecla



GREENS CREEK