CMER Data Use Notification

Proponent: Roads Project Team	**Date**: 27 January 2026
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Project Name/Issue: Road Prescription-Scale Effectiveness Monitoring Project	
Notification: Use of data collected during the Short Time-Scale parameterization experiment in a paper discussing some of the experiment's results and implications.	
Funding Source: NA	**Urgency**: High

Data Description: The PI and other members of the Project Team, principally Dr. Luce, the project PI, are writing a paper discussing the results of the Roads Prescription-Scale Effectiveness Monitoring Project's Short Time-Scale parameterization experiment. This paper, currently entitled *Pumped Fine Sediment from Heavy Vehicle Traffic on Gravel Roads*, discusses estimation of the amount of fine sediment pumped from the road subsurface to the surface during passage of heavy vehicles. The intent is to submit the paper to a peer-reviewed journal by February 2026 at the latest (exact journal and date TBD).The ensuing peer-reviewed paper will be included in this project's Final Report for CMER's review.

Below are the figures and tables presented in the current paper draft. The figures may change slightly as edits to the paper are made, but the content should remain largely the same.

- Table 1 presents results reported from related studies.
- Figure 1 shows example images of sediment pumping to introduce the process
- Figures 2-4 are used in the methods section
    - Figure 2 is a location map
    - Figure 3 shows the general plot layout
    - Figure 4 shows images example measurement units before and after traffic
- Figures 5-7 and Tables 2-3 give the study results
    - Figure 5
    - Table 2
    - Table 3
    - Figure 6
    - Figure 7

Table 1: Studies reporting values that could be interpreted as marginal contributions of sediment per truck pass. Areas were normalized as the area disturbed by wheels, 1.3 m width, by plot length.

Study	Rain Source	Contrasts	Estimate (g/m^2/pass)	Special notes
Reid and Dunne (1984)	Natural		6.54	Single pass during rainfall with runoff
Bilby *et al.* (1989)	Natural	Minor rd. 1 (S=14%)	9.21	Study counted number of axles, we assumed 5 per truck. Mainline site had 40% of secondary site precipitation.
		Minor rd. 1 (S=5%)	10.23	
		Minor rd. 1 (S=3%)	2.99	
		Mainline rd. 1 (S=2%)	1.72	
		Mainline rd. 2 (S=2%)	2.63	
Coker *et al.* (1993)	Artificial	Low runoff site - traffic during rain	8.94	2-axle Nissan 8-t dump truck, 6-wheels
		Low runoff site - traffic before rain	4.13	
		High runoff site - traffic during rain	36.25	
		High runoff site - traffic before rain	6.63	
Luce and Black (2001a)	Natural		6.92	Dump truck & short log truck, 3 axles, 440 pass
van Meerveld *et al.* (2014)	Artificial	Low pcp. intensity	4.96	Friable aggregate in some places
		Med pcp. Intensity	25.79	
		High pcp. intensity	39.49	
		Regression slope	12.90	

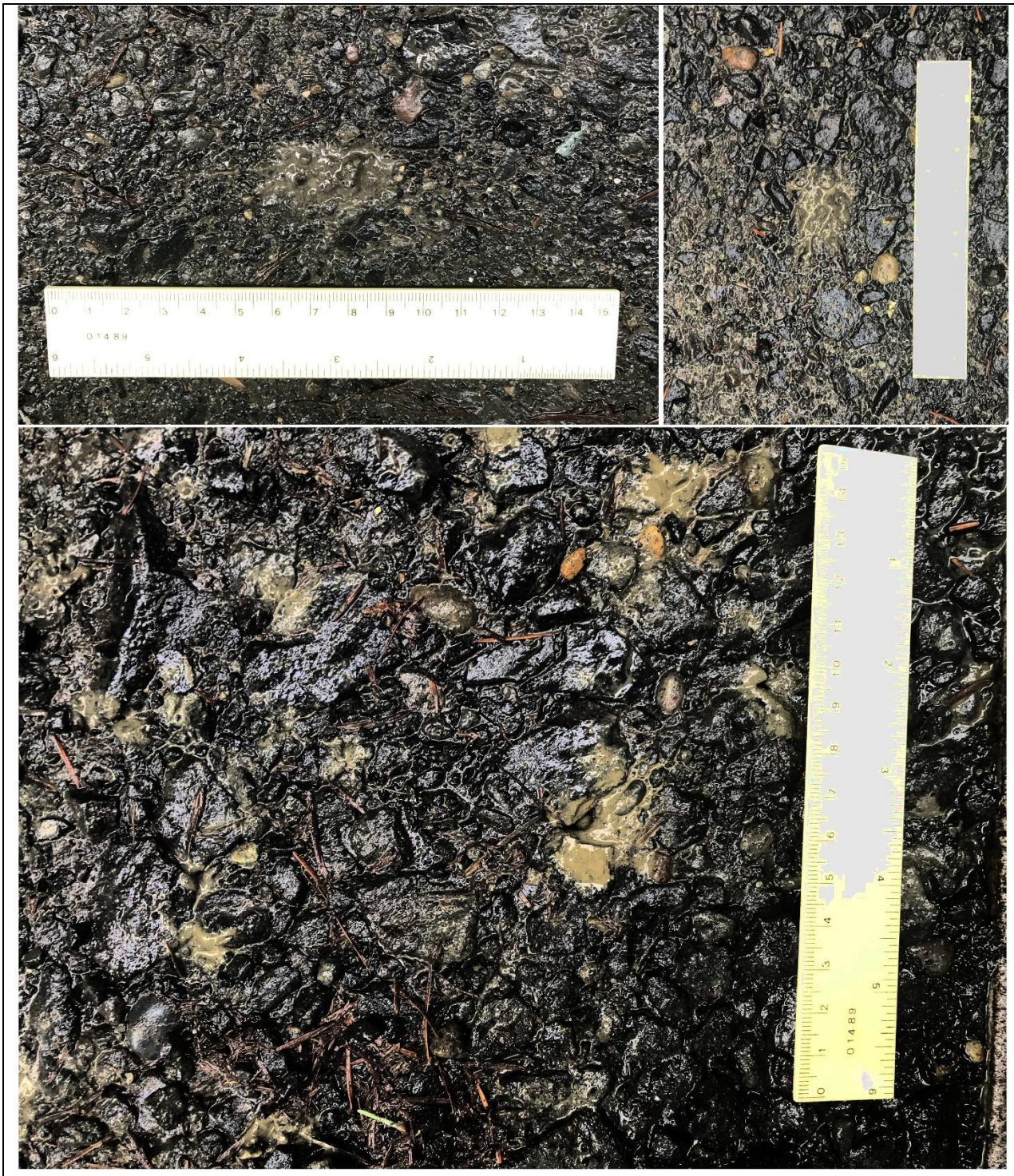

Figure 1: Examples of point production of fine sediments from within roadbed after first pass of a vehicle.

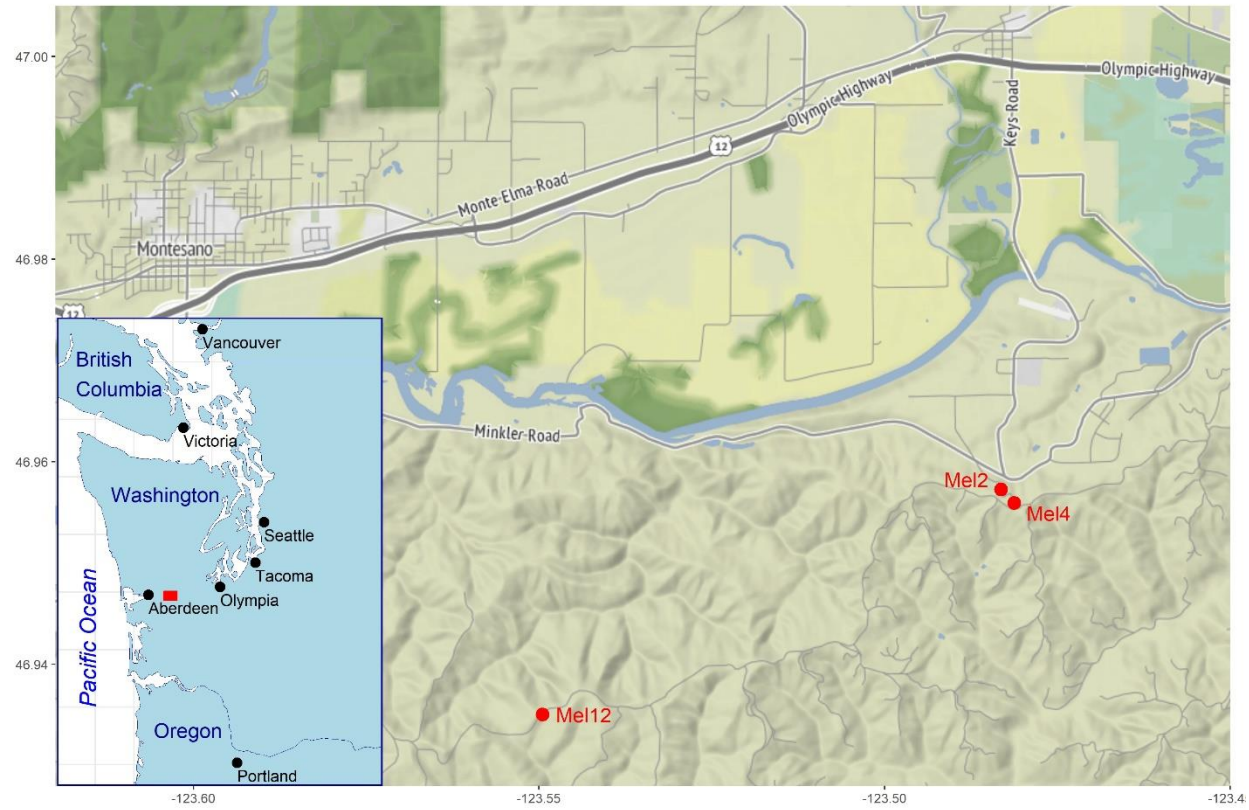

Figure 2: Locations of the three road segments used in this study. The large map covers the area indicated by red rectangle in inset map.

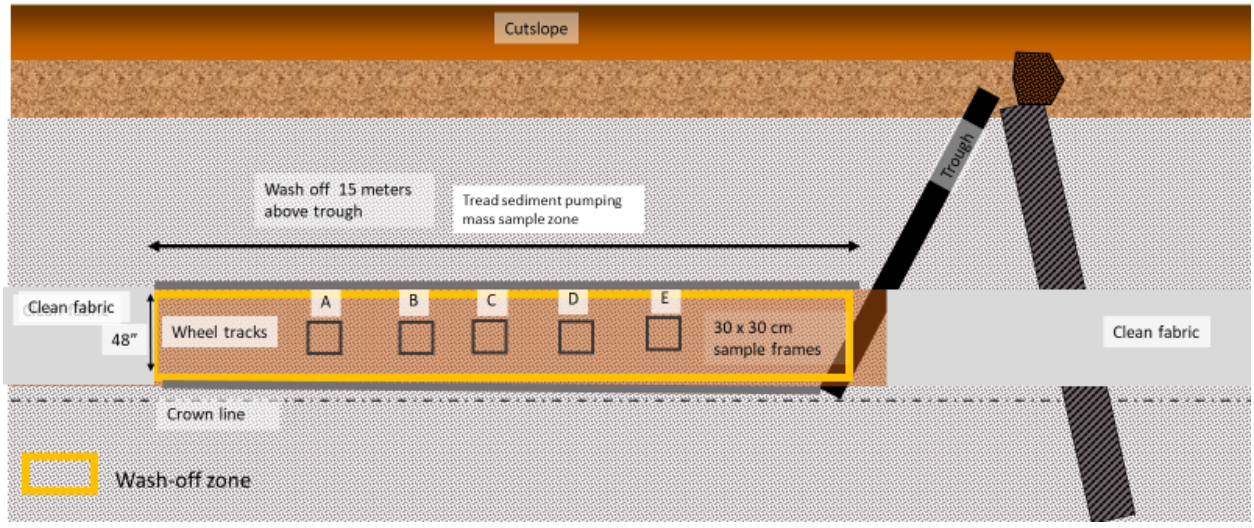

Figure 3: General layout of a plot

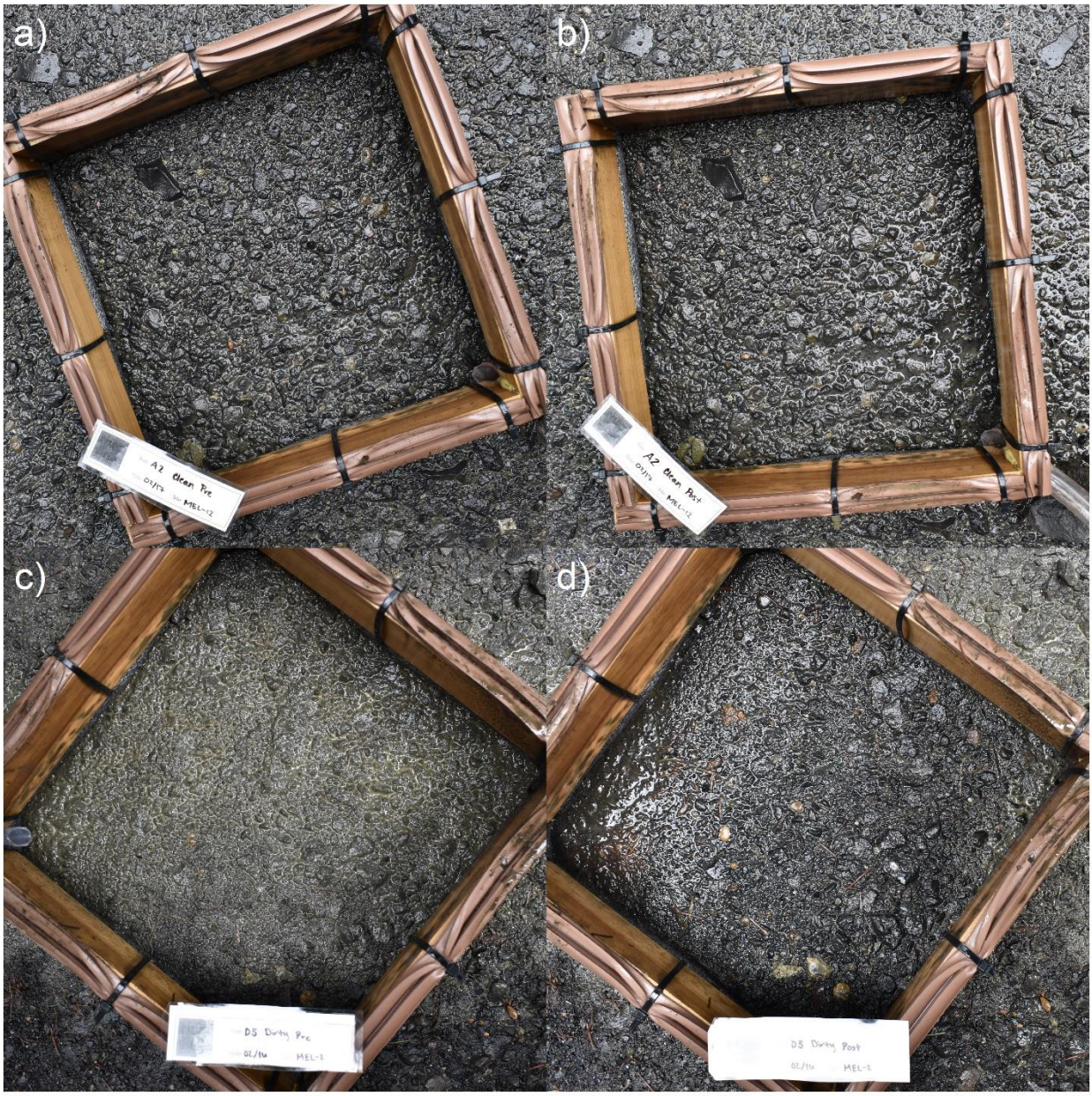

Figure 4: Quadrats prior to and after spraying for a recently cleaned road and one that recently experienced traffic. Top row (a,b) a recently cleaned road with a) prior to spraying and b) after spraying. Bottom row (b,c) a road after traffic with c) prior to spraying and d) after spraying. While there is little difference between a) and b), the change from c) to d) is substantial and is reflected in the measurement of sediment washed from the plot.

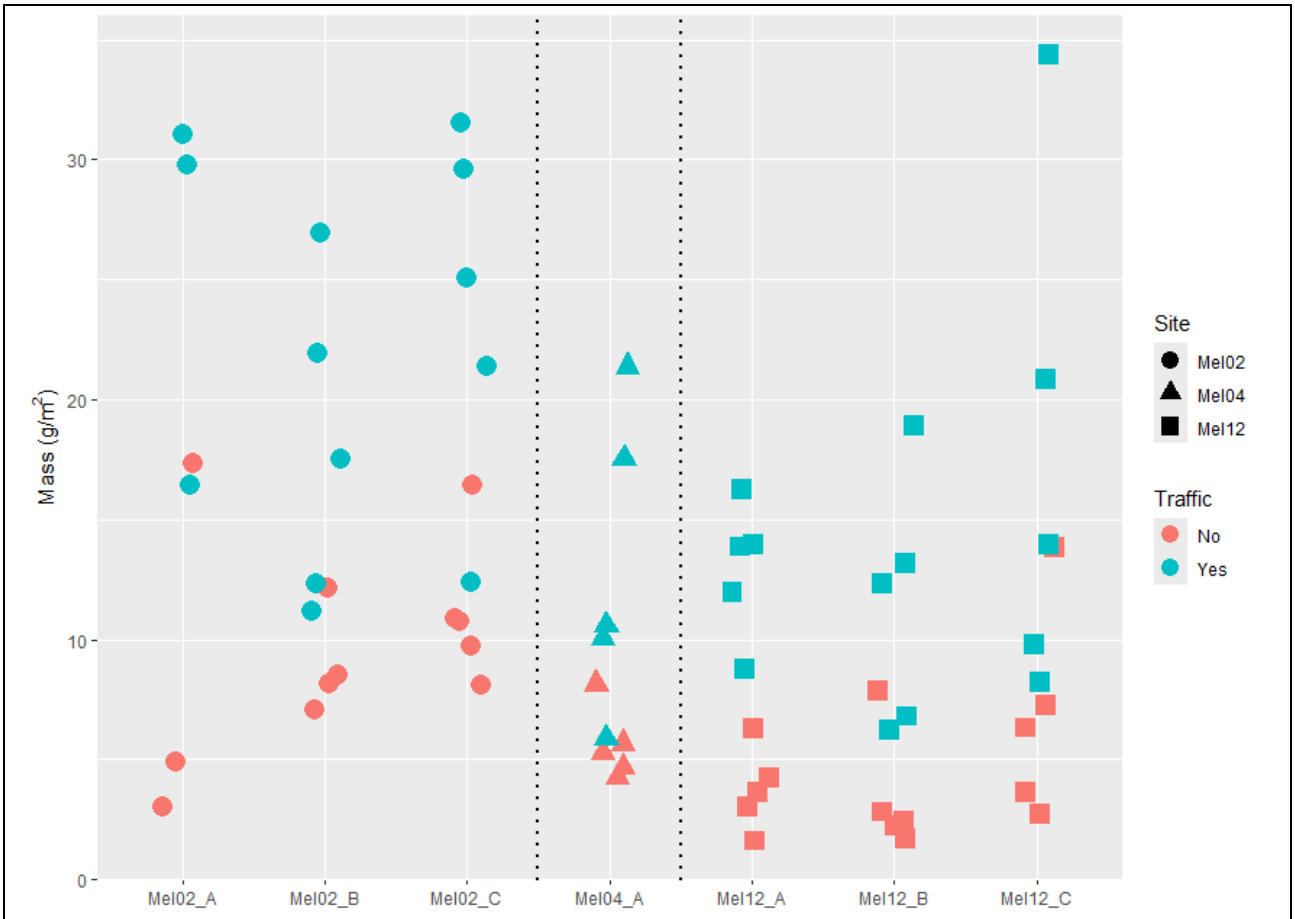

Figure 5: Mass of fine sediment per unit area on surface measured from quadrats with one point representing the measurement from one quadrat. Points are grouped by the individual experimental runs, with 3 repeated experiments at each of Mel02 and Mel12, and only a single experimental run at Mel04.

Table 2: Mass of sediment per square meter before and after traffic at the three sites estimated as the marginal means.

	Sediment Mass (g/m^2)		
Treatment	Mel02	Mel04	Mel12
Traffic	22.15	13.08	13.96
No-Traffic	9.72	5.6	4.64
[Difference]	12.43	7.48	9.31

Table 3: Statistical evaluation of effects. Because a mixed effects model was used, the p-value for df=59 is a hypothetical best case, while the right two columns indicate the maximum number of degrees of freedom needed to achieve statistical significance at the stated level for the given F value.

	Number of Parameters	F value	p-value for df=59	Maximum error df for p<0.05	Maximum error df for p<0.01
Traffic	1	57.37	2.8×10^{-10}	1.3	2.4
Site	2	6.17	0.0037	4.6	16.5
Traffic:Site	2	0.92	0.4	-	-

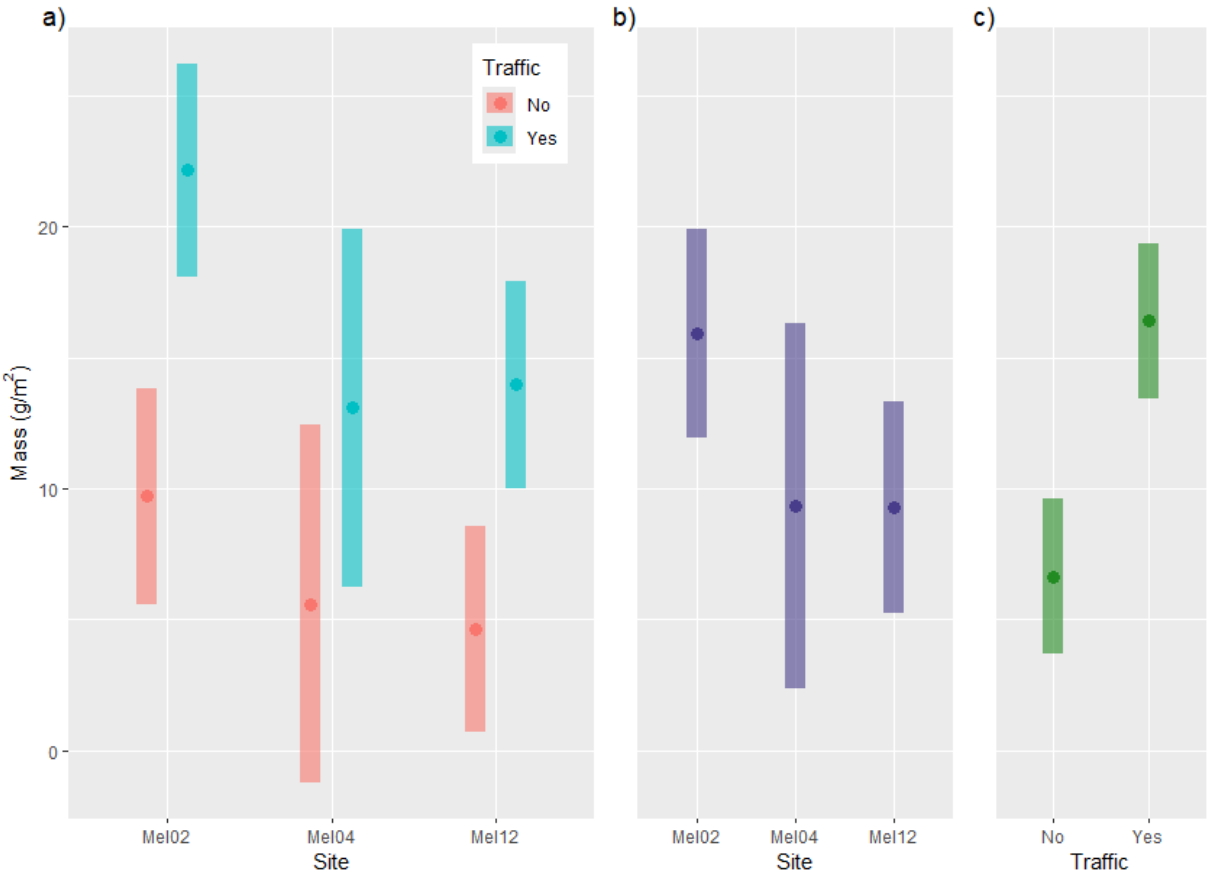

Figure 6: Marginal means and 95% confidence intervals (estimated using Kenward-Roger method) a) for each site-traffic combination, b) by site averaged over traffic, and c) by traffic averaged over sites. a) is the model's interpretation of summarized information from multiple experimental runs in Figure 5 (color choices are retained for comparison). Though a) represents the model's traffic:site interaction effect, it is visually difficult to interpret. b) represents the model's site effect (c.f. Table 3), and c) represents the model's traffic effect (c.f. Table 3).

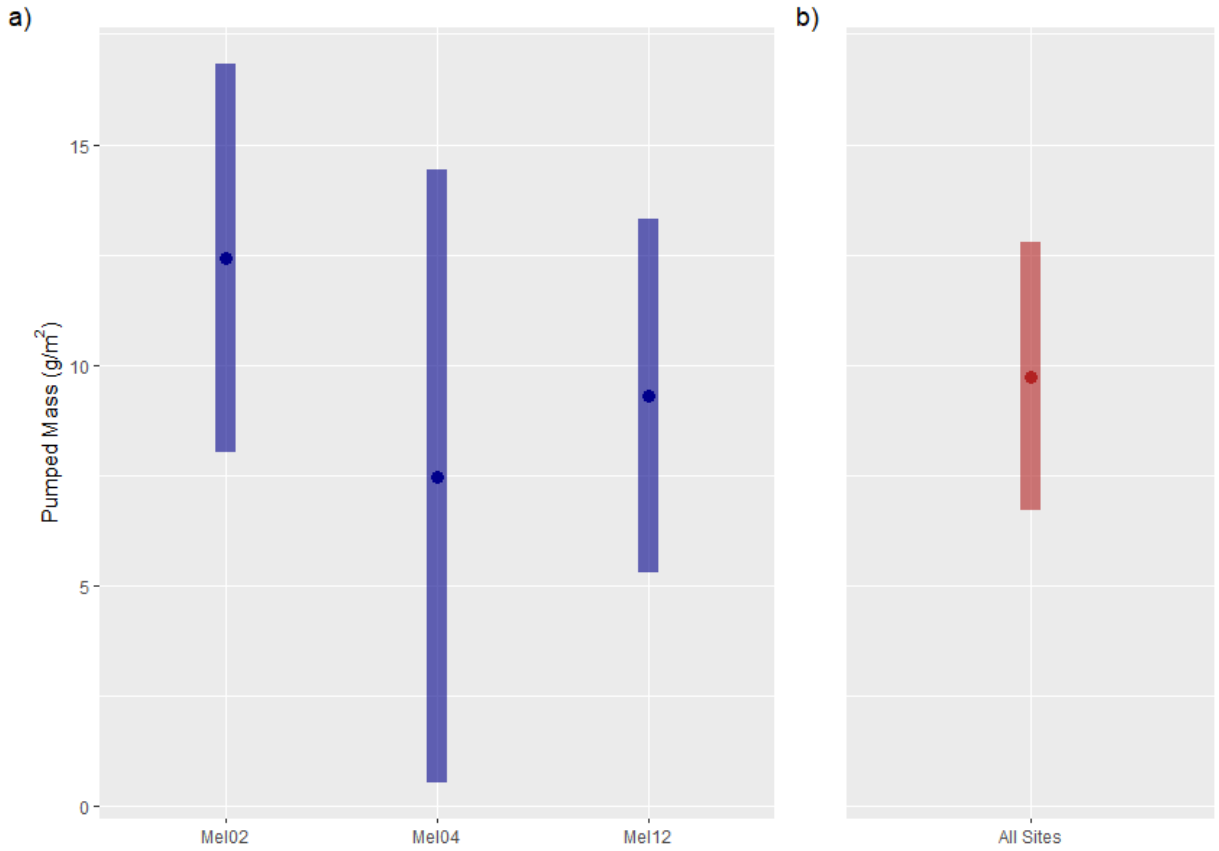

Figure 7: Mean pumped mass estimates from paired contrasts across the traffic effect along with 95% confidence intervals from Kenward-Roger for a) each site and b) averaged across all sites. a) and b) are reductions of Figure 6a and Figure 6c to show the differences in means across traffic levels along with uncertainty in the differences. The differences between pre- and post-traffic plots are the inferred pumped amounts.