APPENDIX G: BEDLOADS - BACTERIA LOAD ESTIMATOR SPREADSHEETS (BLEST)

Loads associated with resuspension of sediment (bedloads) can be estimated using the Bacteria Load Estimation Spreadsheet (BLEST) tool, developed by the Texas Commission on Environmental Quality. By multiplying the occurrence of resuspension flows, sediment scour rates, and estimates of stream width and stream lengths, the fecal coliform bedloads can be calculated. . Because loading is a function of stream width and length, the streams with the largest stream surface area exposed to bed sediment will consequently have the largest bed sediment contribution.

The methodology used in BLEST to estimate bedloads is outlined below:

1. Estimate Average Stream Width (from observations, photos).
2. Estimate Stream Length (from monitoring point, to upstream extent of sediment fines source area).
3. Estimate indicator bacteria resuspension from cohesive sediments (Jamieson et al., 2005). In these calculations, the average resuspension rate for bacteria (11,000 CFU $m^{-2}s^{-1}$) from Jamieson et al. was used.
4. Estimate length of time stream experiences critical shear conditions (used default from BLEST spreadsheet, 0.4 hours, using data from NOAA).
5. Assume shear is occurring along the entire stream reach.

BLEST does not use a fecal coliform resuspension rate in the load calculation. BLEST uses an *E.coli* resuspension rate taken from Jamieson et al. (2005). However, *E. coli* concentrations typically track relatively well with fecal coliform concentrations in the water column, and it is assumed here that using the Jamieson et al. *E. coli* resuspension rates is a reasonably good surrogate for potential fecal coliform resuspension rates.

Alisal Creek Estimated Bedload

Methodology

1. Estimate Average Stream Width (from observations, photos)
2. Estimate Stream Length (from monitoring point, to upstream extent of sediment fines source area)
3. Estimate indicator bacteria resuspension from cohesive sediments (Jamieson et al., 2005)
4. Estimate length of time stream experiences critical shear conditions (used default from BLEST spreadsheet, 0.4 hours, using data from NOAA)
5. Assume shear is occurring along the entire stream reach.

Input Data

	Stream Width (ft)	
Alisal Creek	5	
Number of Rain Days (>0.5 inches precip)	10	
Typical Storm Length	8	
Portion of storm experience shear > Tc =	5%	
Resuspension Rate (cfu/m2/s)	11000	(See Table 3 to right)
cfu/m2/hr	3.96E+07	
cfu/ft2/hr	3.68E+06	
Resuspension rate per storm (cfu/ft2)	1.47E+07	

Table 3. Summary of resuspension parameters computed for the three Swan Creek storm events.

Storm	Critical bed shear stress	Critical flow	Resuspension rate
h	N m^{-2}	m^3 s^{-1}	CFU† m^{-2} s^{-1}
225	1.7	0.37	11 000
550	1.6	0.33	8 200
600	1.5	0.3	15 000

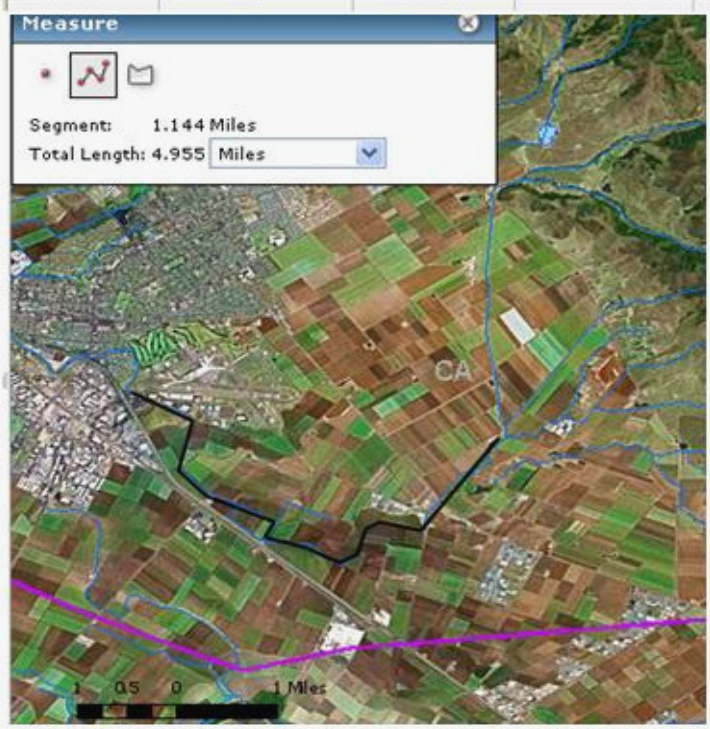
† Colony forming units.

From Jamieson et al., 2005

Wet day = Day with Precip >0.5 inches, from Salinas #2 Weather Station (ave. 10 Wet days per year at Salinas #2)

Load Calculation

Stream	Stream Width (ft)	Stream Length (ft)	MPN/yr	MPN/wet day
Alisal Creek	5	24298	1.79E+12	1.79E+11



Stream length = Monitoring point ALI-AIR, to upstream limit of fines sediment source

Reclamation Ditch Estimated Bedload

Methodology

1. Estimate Average Stream Width (from observations, photos)
2. Estimate Stream Length (measured from monitoring point, to upstream extent of sediment fines source area)
3. Estimate indicator bacteria resuspension from cohesive sediments (Jamieson et al., 2005)
4. Estimate length of time stream experiences critical shear conditions (used default from BLEST spreadsheet, 0.4 hours, using data from NOAA)
5. Assume shear is occurring along the entire stream reach.

Input Data

	Stream Width (ft)	
Reclamation Ditch Creek	10	
Number of Rain Days (>0.5 inches precip)	10	
Typical Storm Length	8	
Portion of storm experience shear > Tc =	5%	
Resuspension Rate (cfu/m2/s)	11000	(See Table 3 to right)
cfu/m2/hr	3.96E+07	
cfu/ft2/hr	3.68E+06	
Resuspension rate per storm (cfu/ft2)	1.47E+07	

Table 3. Summary of resuspension parameters computed for the three Swan Creek storm events.

Storm	Critical bed shear stress	Critical flow	Resuspension rate
h	N m^{-2}	m^3 s^{-1}	CFU† m^{-2} s^{-1}
225	1.7	0.37	11 000
550	1.6	0.33	8 200
600	1.5	0.3	15 000

† Colony forming units.

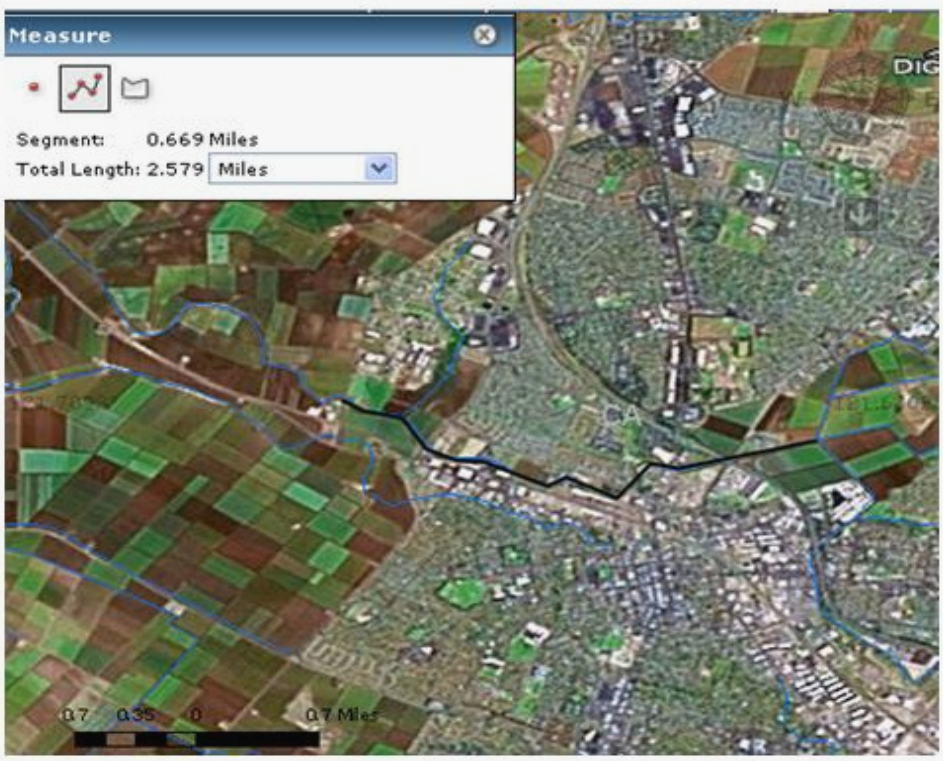
From Jamieson et al., 2005

BLEST Calculation:

Wet day = Day with Precip >0.5 inches, from Salinas #2 Weather Station (ave. 31 Wet days per year at Salinas #2)

Load Calculation

Stream	Stream Width (ft)	Stream Length (ft)	MPN/yr	MPN/wet day
Reclamation Ditch	10	13704	2.02E+12	2.02E+11



Stream length = Monitoring point REC-VIC, to upstream limit of subwatershed (Carr Lake)

Tembladero Slough Estimated Bedload

Methodology

1. Estimate Average Stream Width (from observations, photos)
2. Estimate Stream Length (from monitoring point, to upstream extent of sediment fines source area)
3. Estimate indicator bacteria resuspension from cohesive sediments (Jamieson et al., 2005)
4. Estimate length of time stream experiences critical shear conditions (used default from BLEST spreadsheet, 0.4 hours, using data from NOAA)
5. Assume shear is occurring along the entire stream reach.

Input Data

	Stream Width (ft)	
Tembladero Slough	15	
Number of Rain Days (>0.5 inches precip)	10	
Typical Storm Length	8	
Portion of storm experience shear > Tc =	5%	
Resuspension Rate (cfu/m2/s)	11000	(See Table 3 to right)
cfu/m2/hr	3.96E+07	
cfu/ft2/hr	3.68E+06	
Resuspension rate per storm (cfu/ft2)	1.47E+07	

Table 3. Summary of resuspension parameters computed for the three Swan Creek storm events.

Storm	Critical bed shear stress	Critical flow	Resuspension rate
h	N m^{-2}	m^3 s^{-1}	CFU† m^{-2} s^{-1}
225	1.7	0.37	11 000
550	1.6	0.33	8 200
600	1.5	0.3	15 000

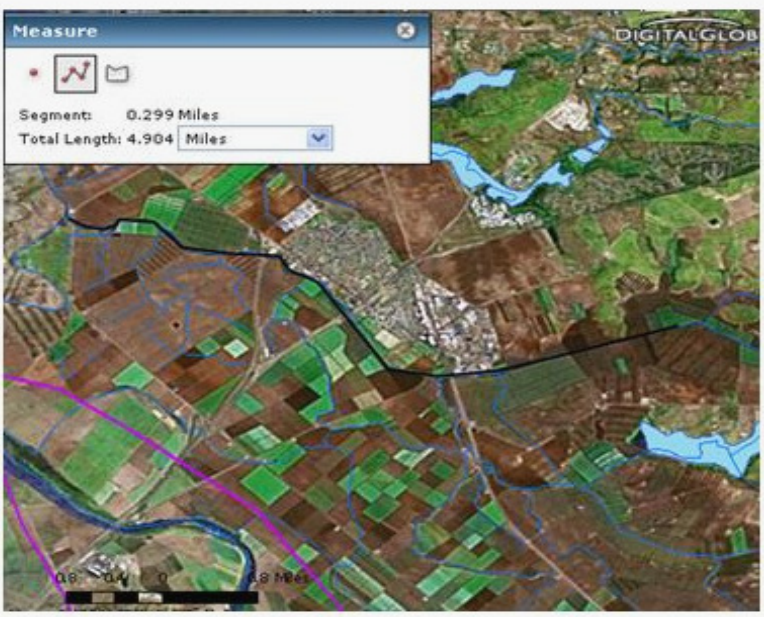
† Colony forming units.

From Jamieson et al., 2005

Wet day = Day with Precip >0.5 inches, from Salinas #2 Weather Station (ave. 31 Wet days per year at Salinas #2 Weather Station)

Load Calculations

Stream	Stream Width (ft)	Stream Length (ft)	MPN/yr	MPN/wet day
Tembladero Slough	15	25872	5.71E+12	5.71E+11



Stream length = Monitoring point TEM-MOL, to upstream limit of fines sediment sources (merrit drain)