



Water Quality Indicators

INTRODUCTION

A small set of stream hydrology and water quality indicators with documented linkages to watershed conditions and aquatic biological community integrity will be selected for use in this project.

Water quality standards for many potential stream pollutants have been established to protect and improve stream water quality.

Water quality standards have not been established for nutrients or total suspended solids, which have been observed to increase in association with basin development.

State standards do exist for stream turbidity, but these standards are based on a comparison to background levels and the standard does not include a clear definition of how background levels should be established or the frequency and duration that should be used in the application of the standard.

SELECTING INDICATORS

There is a biological basis for the turbidity standard but no linkage has been made between turbidity and stream biological integrity, although such a linkage has been made between total suspended solids (TSS) and the Benthic Index of Biological Integrity (B-IBI)

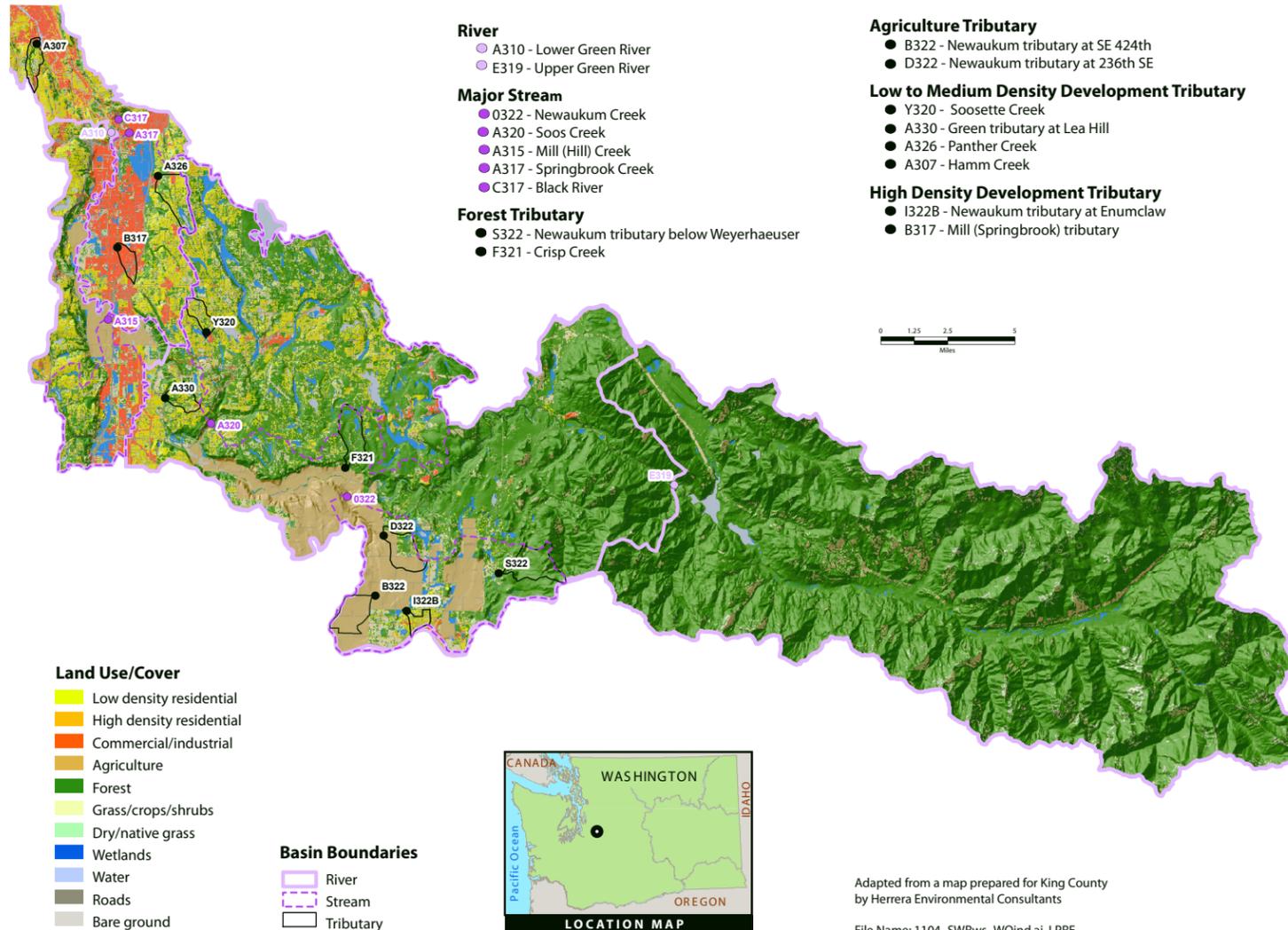
The project scope designated TSS as the first priority water quality indicator.

TSS serves as a transport medium for sediment associated contaminants such as nutrients, trace metals, organic contaminants and pathogens.

Water quality standards have been established for specific trace metals (typically as dissolved concentrations), organic contaminants and pathogen indicators.

EXISTING DATA

A previous King County project in the Green River watershed produced a large database of base flow and storm event stream water quality data, including storm event sampling for TSS, turbidity, phosphorus (total and dissolved) and trace metals (total and dissolved copper, lead, and zinc were frequently detected).



Correlation of benthic index of biotic integrity (B-IBI) scores with physical & chemical variables in Puget Sound lowland streams

Instream Variable	Linear Correlation Coefficient (r)*	
	1994	1995
% Fines (1994)	-0.87	-0.79
% Fines (1996)	-0.68	-0.48
% Embeddedness	-0.73	-0.64
Pebble-Count D10	0.70	0.60
IGDO/DO Interchange Ratio	0.68	0.63
BFW/BFD Ratio	0.68	0.63
Pool Frequency (BFW-Spacing)	-0.61	-0.62
LWD Frequency (BFW-Spacing)	-0.61	0.50
LWD Volume (m ³ /km)	0.57	0.53
Baseflow Conductivity (uS/cm)	-0.57	-0.56
Sediment Zn (ug/L)	-0.61	-0.37
Sediment Pb (ug/L)	-0.61	-0.75
Storm EMC TSS (mg/L)	-0.27	-0.62
Storm EMC TP (ug/L)	-0.73	-0.84
Storm EMC TZn (ug/L)	-0.79	-0.82

*Spearman rank correlation; all r-values significant at the 0.05 level.

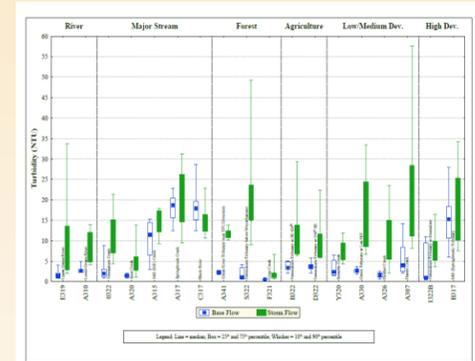


Figure B-6. Base and storm flow turbidity levels measured at sites in the Green-Duwamish watershed, 2001 - 2003.

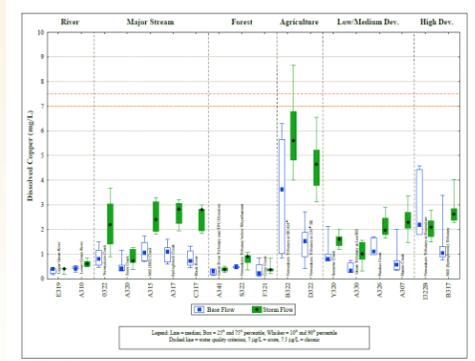


Figure B-15. Base and storm flow dissolved copper concentration measured at sites in the Green-Duwamish watershed, 2001 - 2003.

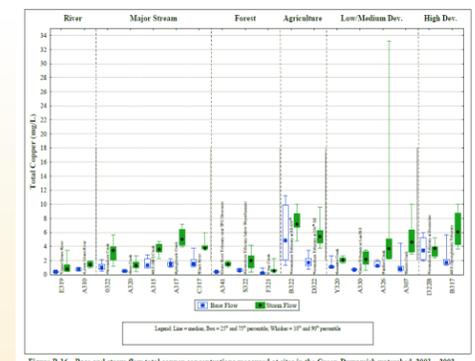


Figure B-16. Base and storm flow total copper concentrations measured at sites in the Green-Duwamish watershed, 2001 - 2003.

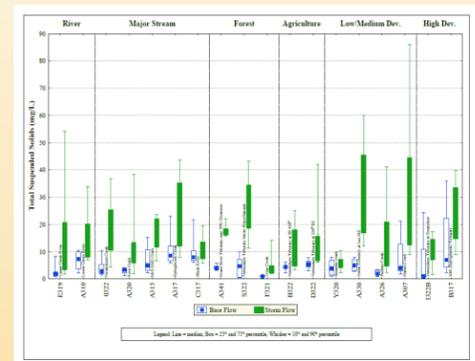


Figure B-7. Base and storm flow total suspended solids concentrations measured at sites in the Green-Duwamish watershed, 2001 - 2003.

MONITORING SITES & LAND USE/COVER Green-Duwamish Watershed

Adapted from a map prepared for King County by Herrera Environmental Consultants

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