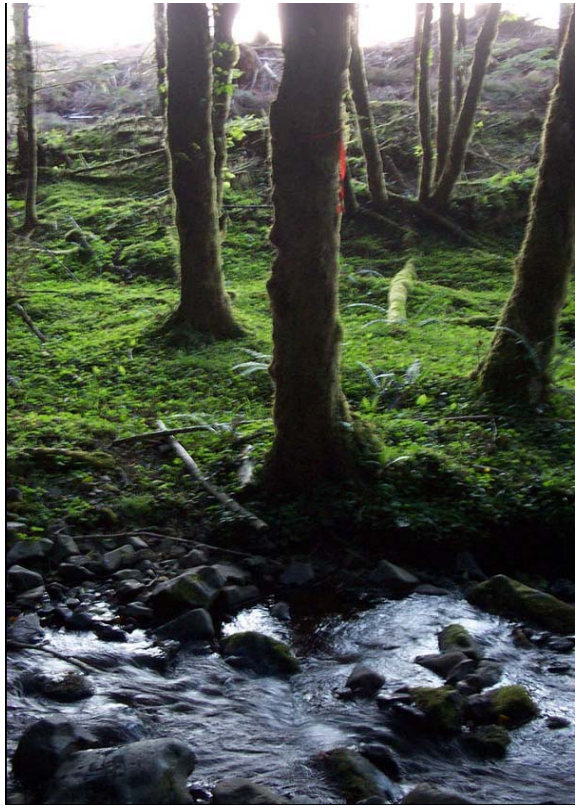
National Rivers and Streams Assessment: Application of the Tools and Lessons Learned from the National Assessments by Oregon DEQ



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Watershed Assessment Section

"How we perceive the quality of the environment depends on ***what*** we look for, ***how*** we look for it, and ***how hard*** we look"
Mike Mulvey

Overview

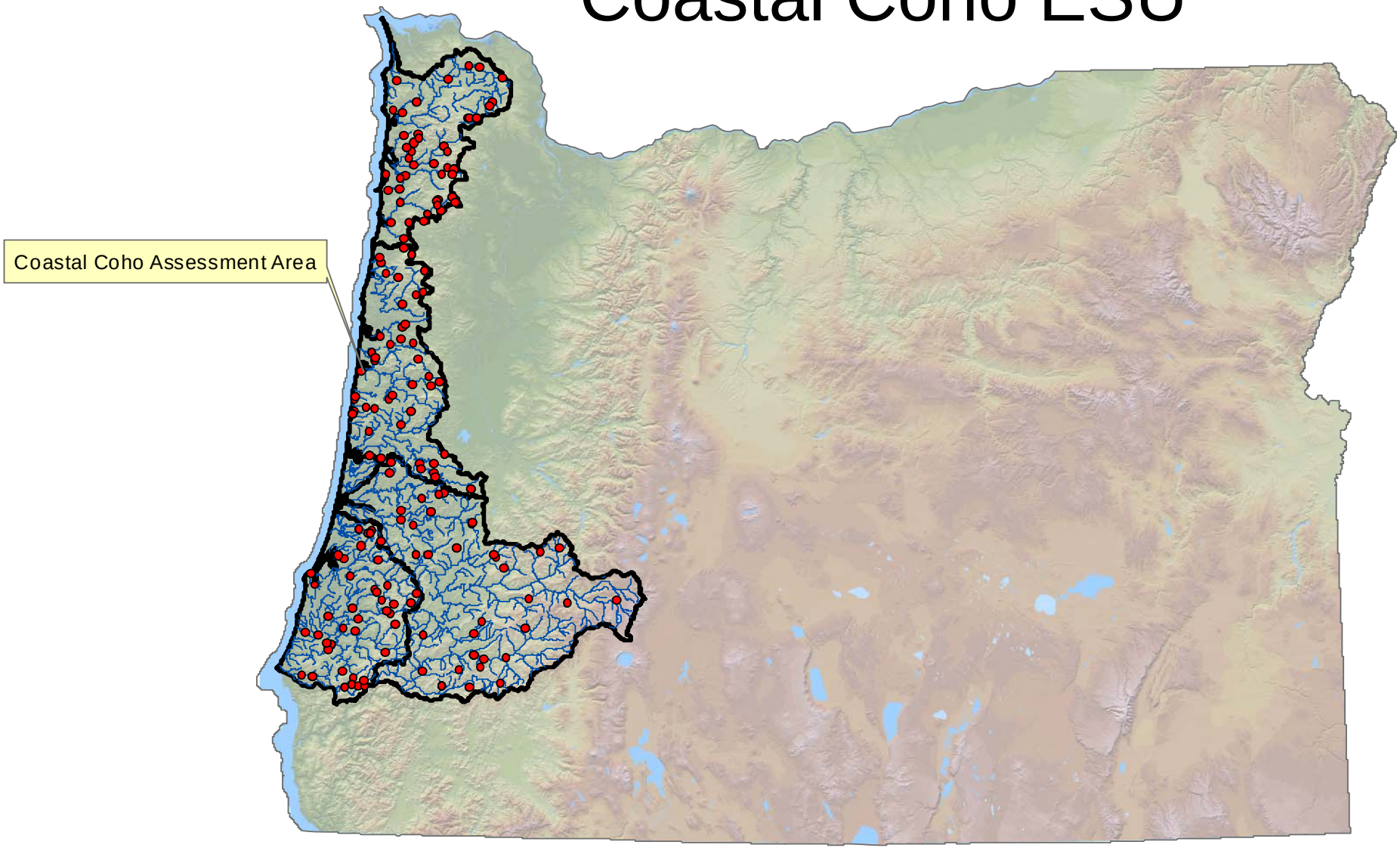
- Regional and National Survey Participation
- The Oregon Plan
- Data analysis approach
- Results
- Project challenges
- Future Applications: TMDL Effectiveness Monitoring

What is the Oregon Plan?

The Oregon Coastal Salmon Restoration Initiative laid the foundation for the Oregon Plan for Salmon and Watersheds. Its focus on coastal coho salmon populations listed under the federal Endangered Species Act later expanded to encompass the statewide watershed program that exists today.

- Investments in Local Solutions
- Private/Public Partnerships
- Science-Based Watershed Management
- Implementation of Existing Laws

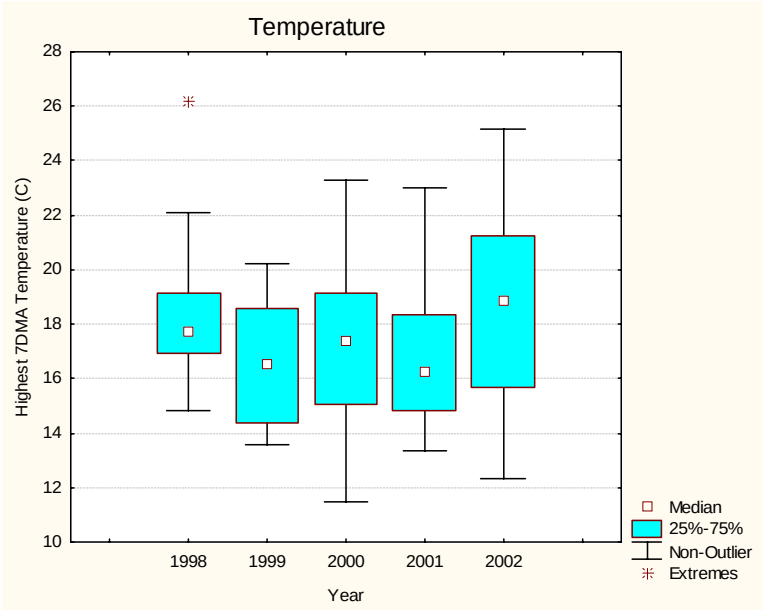
Coastal Coho ESU

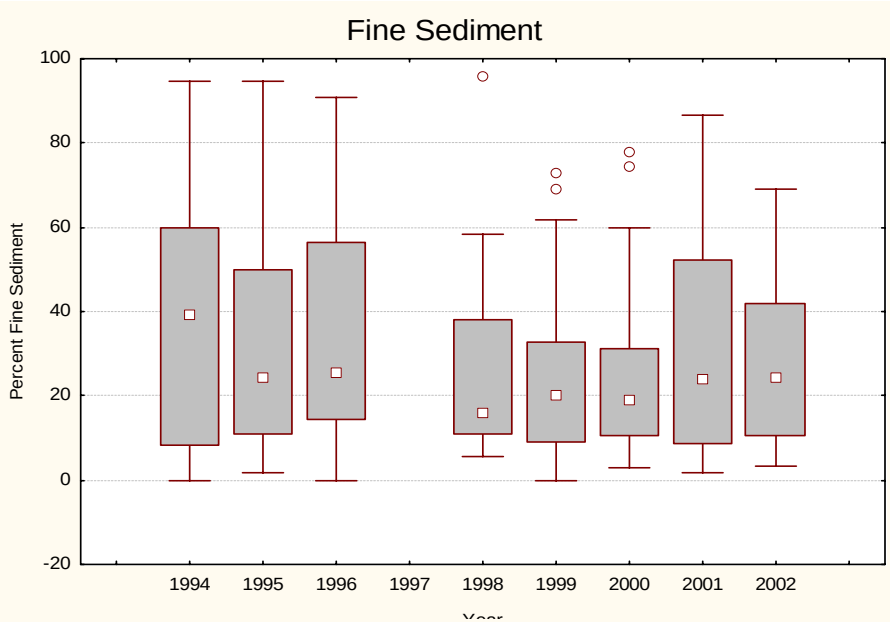


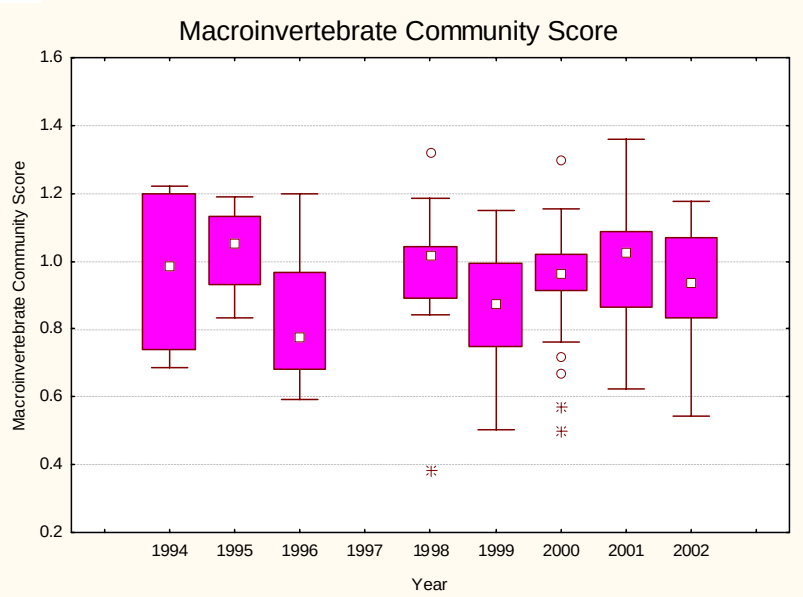
Regression analysis

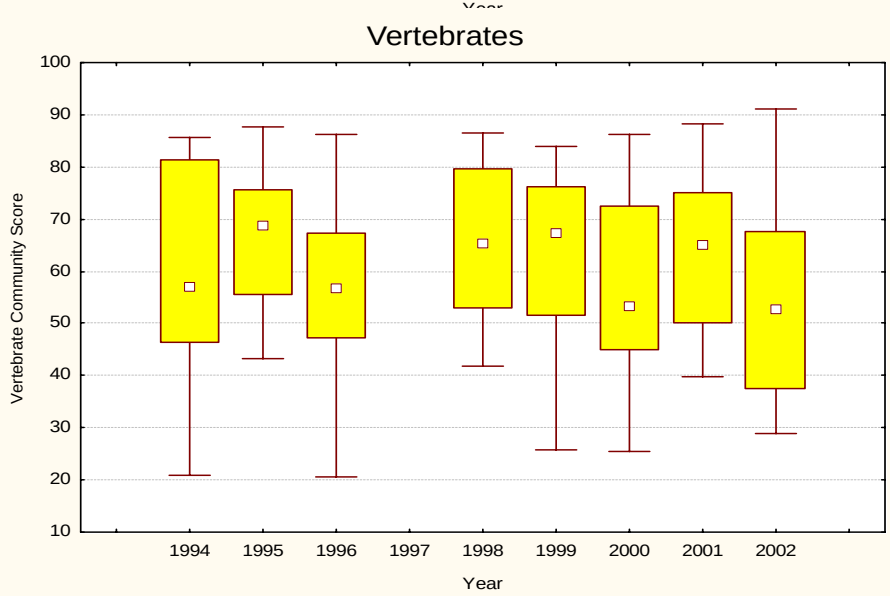
var	IBI04	n	p	sig	PCT_COHO	n	p	sig	COHO_ABU	n	p	sig	RIVPAC04	n	p	sig
SAM7DMAX	-0.5399	N=80	p=.000	x	-0.3071	N=40	p=.054		-0.3758	N=40	p=.017	x	-0.1756	N=69	p=.149	
S7DMAXDT	-0.4704	N=88	p=.000	x	-0.2791	N=42	p=.073		-0.2102	N=42	p=.181		-0.0738	N=81	p=.513	
TEMP	-0.4766	N=145	p=.000	x	-0.1492	N=74	p=.204		-0.0758	N=74	p=.521		-0.0403	N=106	p=.682	
XWXD	-0.1839	N=134	p=.033	x	-0.3898	N=69	p=.001	x	-0.2488	N=69	p=.039	x	-0.1589	N=106	p=.104	
REACHLEN	-0.1636	N=133	p=.060		-0.1126	N=69	p=.357		0.008	N=69	p=.948		-0.0603	N=105	p=.541	
AREA_HA	-0.3117	N=136	p=.000	x	-0.3252	N=67	p=.007	x	-0.2212	N=67	p=.072		-0.1878	N=105	p=.055	
XWIDTH	-0.1381	N=134	p=.112		-0.4935	N=69	p=.000	x	-0.253	N=69	p=.036	x	-0.0609	N=106	p=.535	
RPXAREA	-0.2818	N=97	p=.005	x	-0.1891	N=53	p=.175		-0.1767	N=53	p=.205		-0.2161	N=70	p=.072	
PCT_COOL	-0.7427	N=145	p=.000	x	-0.378	N=70	p=.001	x	-0.3464	N=70	p=.003	x	-0.1151	N=92	p=.275	
SMAXDTTE	-0.3538	N=88	p=.001	x	0.2253	N=42	p=.151		0.1338	N=42	p=.398		-0.1432	N=81	p=.202	
XBKF_W	-0.1011	N=134	p=.245		-0.4189	N=69	p=.000	x	-0.1936	N=69	p=.111		-0.0623	N=106	p=.526	
XDEPTH	-0.2272	N=134	p=.008	x	-0.3938	N=69	p=.001	x	-0.231	N=69	p=.056		-0.0681	N=106	p=.488	
PCT_SLOW	-0.4776	N=101	p=.000	x	-0.0412	N=55	p=.765		-0.1469	N=55	p=.284		-0.147	N=72	p=.218	
SDWXD	-0.0583	N=134	p=.503		-0.3437	N=69	p=.004	x	-0.2018	N=69	p=.096		-0.067	N=106	p=.495	
PCT_BDRK	0.019	N=134	p=.828		-0.207	N=69	p=.088		0.1009	N=69	p=.409		-0.0327	N=106	p=.739	
RP100	-0.2101	N=97	p=.039	x	-0.1289	N=53	p=.358		-0.0806	N=53	p=.566		-0.0903	N=70	p=.457	
LRBS_BW5	0.3516	N=97	p=.000	x	-0.2225	N=53	p=.109		-0.002	N=53	p=.988		0.1373	N=70	p=.257	
PCT_AG	-0.2607	N=136	p=.002	x	0.064	N=67	p=.607		0.0863	N=67	p=.487		-0.2306	N=105	p=.018	x
PCT_HUMA	-0.2613	N=136	p=.002	x	0.0586	N=67	p=.638		0.0813	N=67	p=.513		-0.234	N=105	p=.016	x
XFC_ALG	-0.3009	N=134	p=.000	x	-0.2084	N=69	p=.086		-0.1833	N=69	p=.132		-0.1017	N=106	p=.300	
XINC_H	-0.2013	N=101	p=.044	x	-0.0389	N=55	p=.778		-0.0362	N=55	p=.793		-0.2855	N=72	p=.015	x
NO_TOLIN	-0.3104	N=145	p=.000	x	0.0566	N=70	p=.642		0.0016	N=70	p=.990		-0.3315	N=92	p=.001	x
SDDEPTH	-0.042	N=134	p=.630		-0.2309	N=69	p=.056		-0.0542	N=69	p=.658		-0.0106	N=106	p=.914	
XFC_OHV	-0.2046	N=134	p=.018	x	0.1842	N=69	p=.130		0.019	N=69	p=.877		0.0171	N=106	p=.862	

Box Plots Comparing Annual Trends





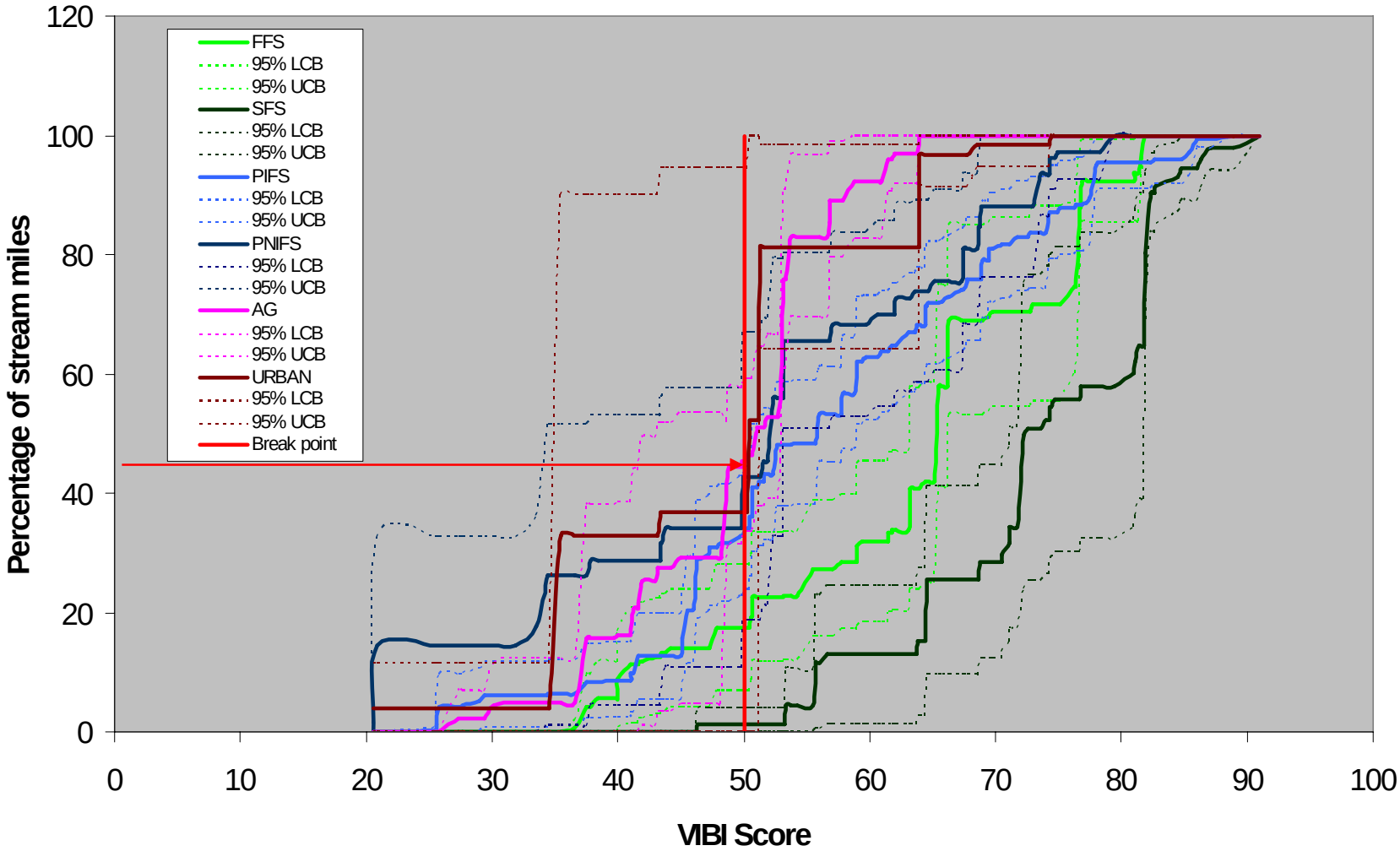




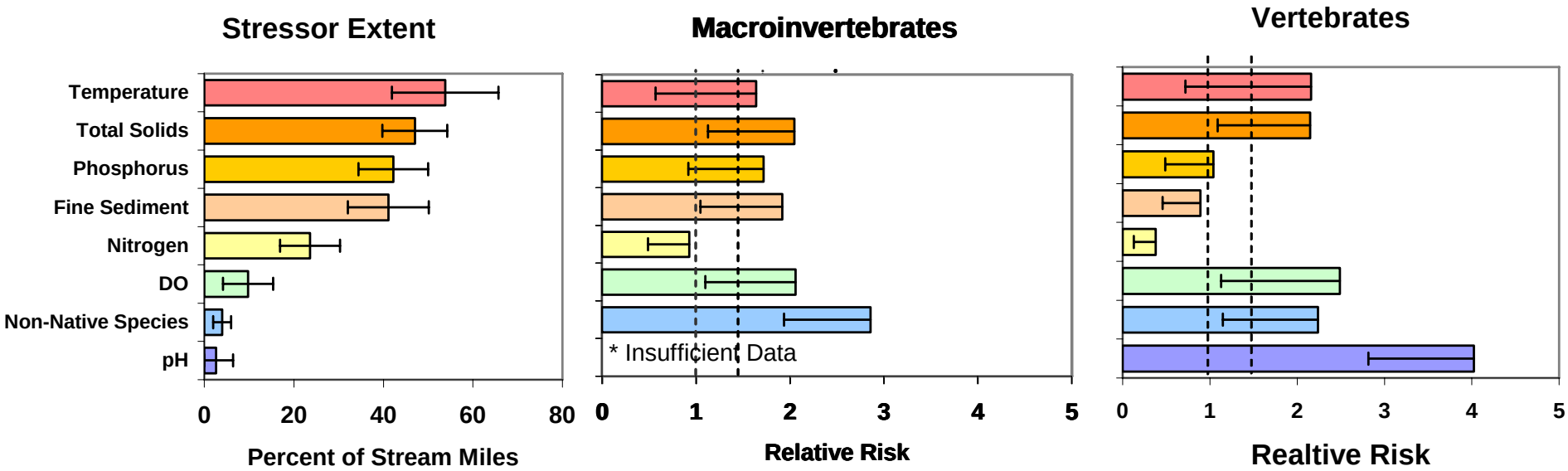
Standards and Benchmarks

Parameter	Poor	Basis for benchmark
Vertebrate Community Score	< 50	25th percentile of reference sites.
Macroinvertebrate Community Score	< 0.9	25th percentile of reference sites.
Fine Sediment	> 30 %	Aquatic life use protection (Drake 2004).
Water Temperature	> 16 C	Core cold water habitat. Numeric standard
	> 18 C	Salmon and trout rearing and migration habitat. Numeric standard
Dissolved Oxygen Concentration	< 8.0 mg/L	Numeric standard
Dissolved Oxygen Percent of Saturation	< 90 %	Numeric standard
Total Inorganic Nitrogen	> 0.3 mg/L	25th percentile of reference sites.
Total Phosphorus	>0.03 mg/L	25th percentile of reference sites.
Oregon Water Quality Index	<85	Water Quality for contact recreation and aquatic life use protection (Cude 2001)
Biochemical Oxygen Demand	> 0.8 mg/L	25th percentile of reference sites.
Total Solids	> 66 mg/L	25th percentile of reference sites.
pH	< 6.5 or > 8.5	Numeric standard

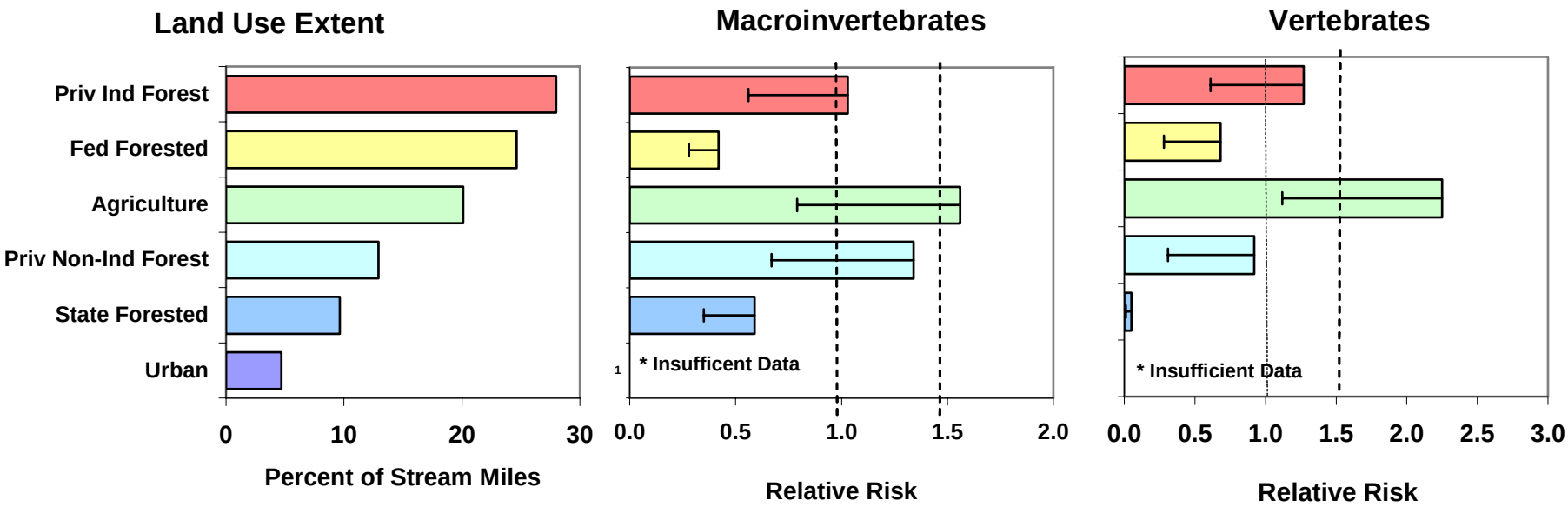
Vertebrate Index of Biological Integrity (VIBI) Across Landuse



Stressor Extent and Relative Risk for Macroinvertebrates and Vertebrates

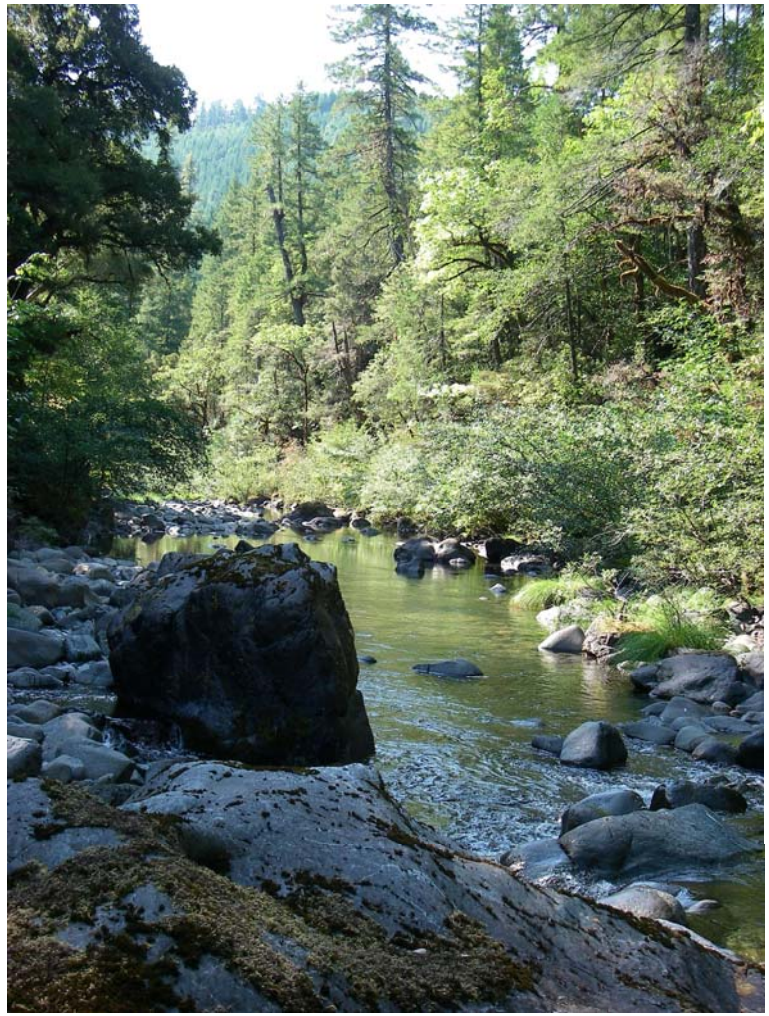


Land Use Extent and Relative Risk for Macroinvertebrates and Vertebrates



Project challenges

- Criteria did not exist for many of the parameters of interest.
- Aggregating data from several projects was a technical challenge.
- Many individual site weights had to be calculated based on the samples size.
- Sample size for some strata was limited.
- The report was suppose to be a synthesis of data collected by multiple agencies. It ended up being multiple reports compiled together.



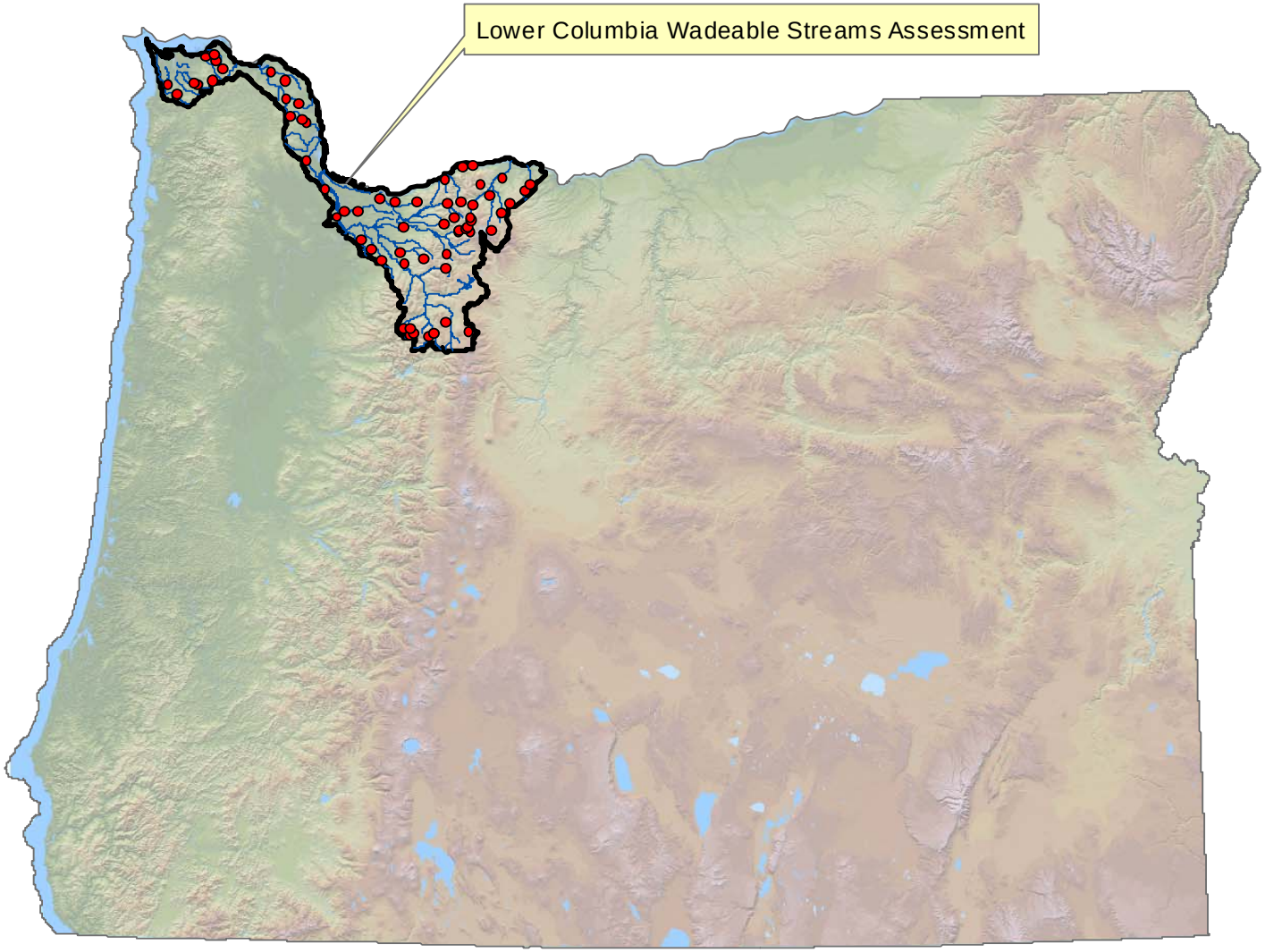
Future Applications

- TMDL Effectiveness Monitoring at the Basin Scale
  - By land use type: Forest, Agriculture, Urban
  - Report on effectiveness of the Forest Practices Act, Senate Bill 1010, and TMDL implementation Plans.
- Focus on High Level Indicators like:
  - IBI, Riparian condition, Water Quality Index, and TMDL parameters.

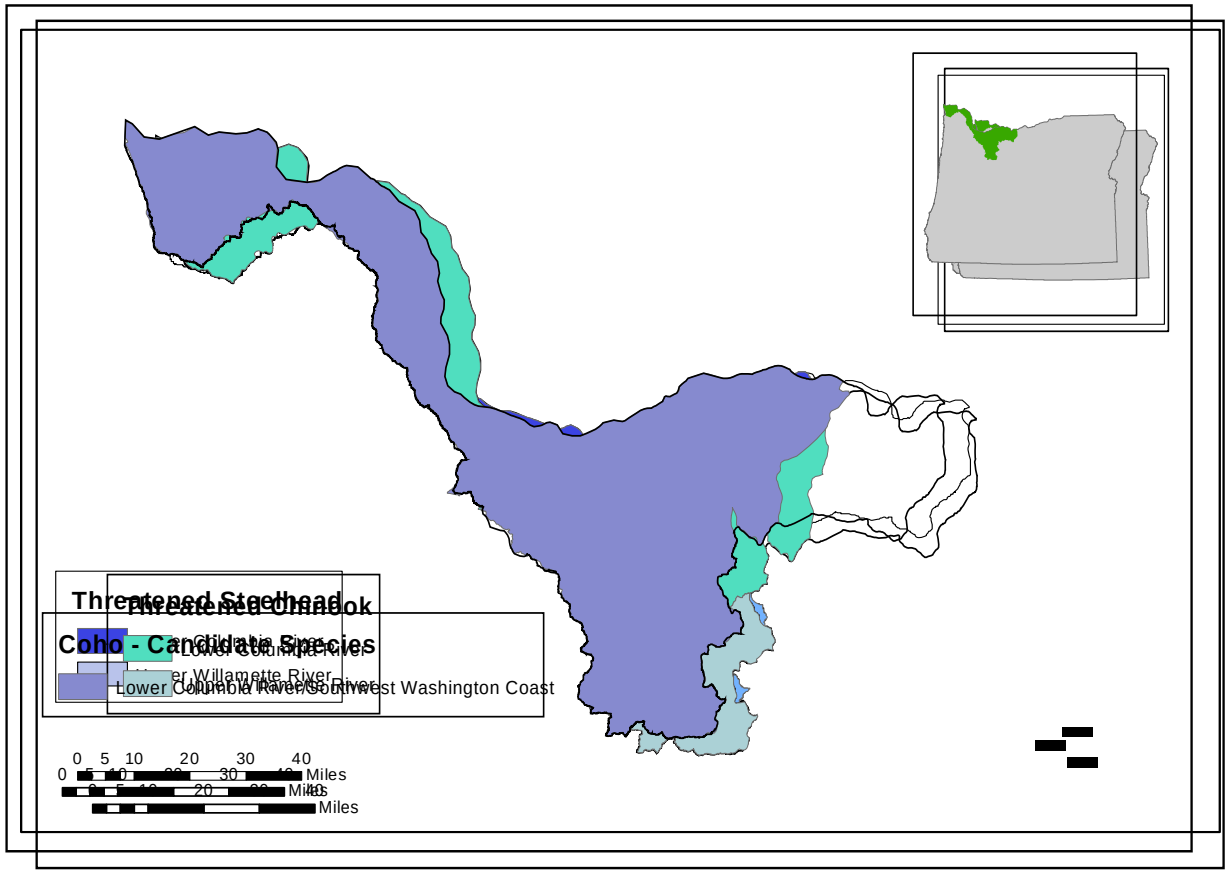
Acknowledgements

- Doug Drake (Reference site advice)
- Shannon Hubler and Dave Huff (Bug modeling)
- Won Kim (Database support)
- Tony Olsen (EPA) (Design considerations, R-coding)
- John Van Sickle (EPA) (Relative Risk)
- Bob Hughs (IBI)
- Field Crews: Chris Collins, Paul Gill, Lisa Hewlett, Robin Lefferink, Thomas Lossen, Tonya Mclean, Tsegaye Mengistu, Angie Schwab, Tyler Tappenbeck
- Reviewers: Mary Abrams, Doug Drake, Rick Hafele, Shannon Hubler, Larry Marxer, Greg Pettit, Andy Schaedel

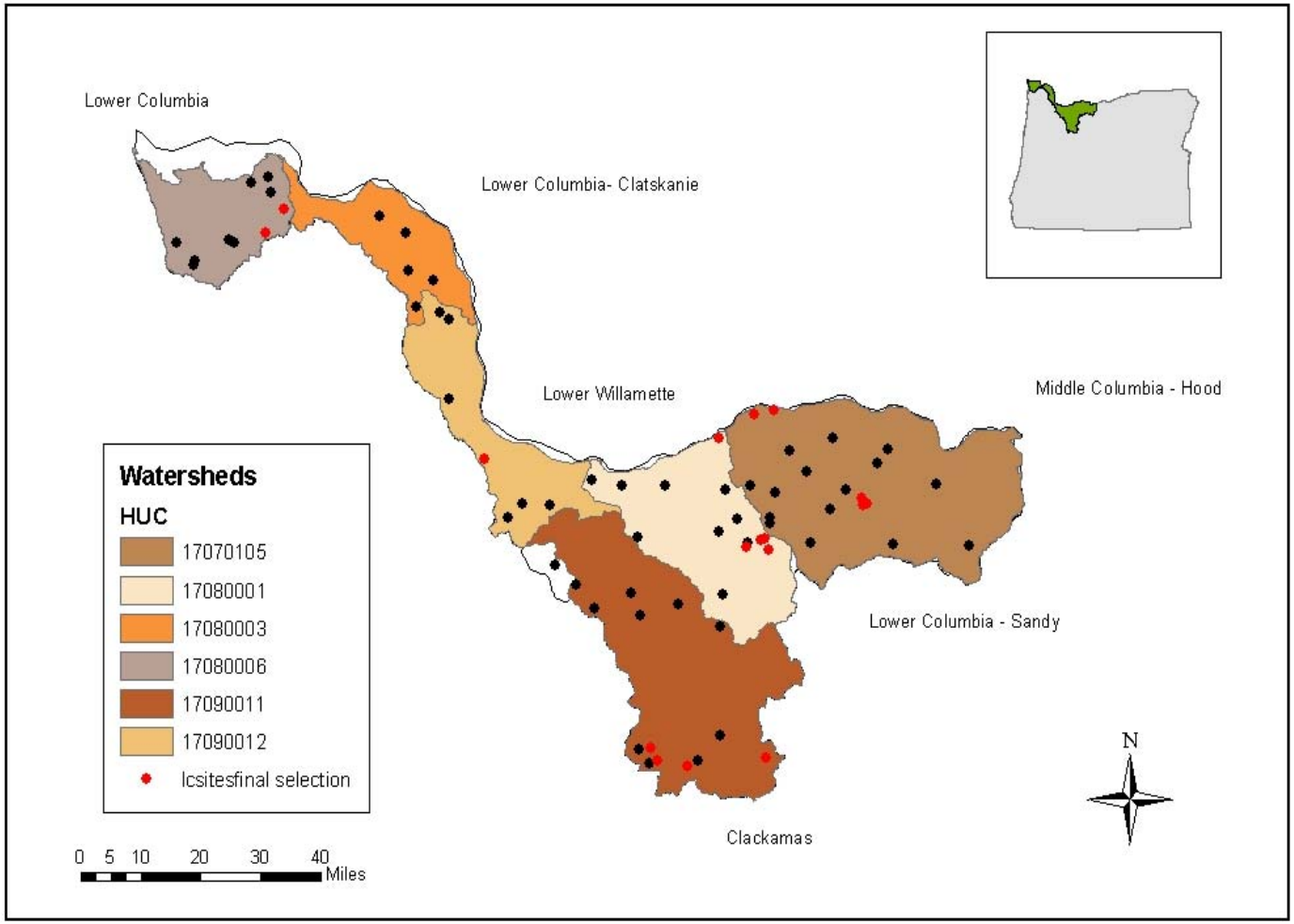
Lower Columbia Wadeable Stream Conditions Report 2003-04


Lower Columbia Wadeable Streams Assessment

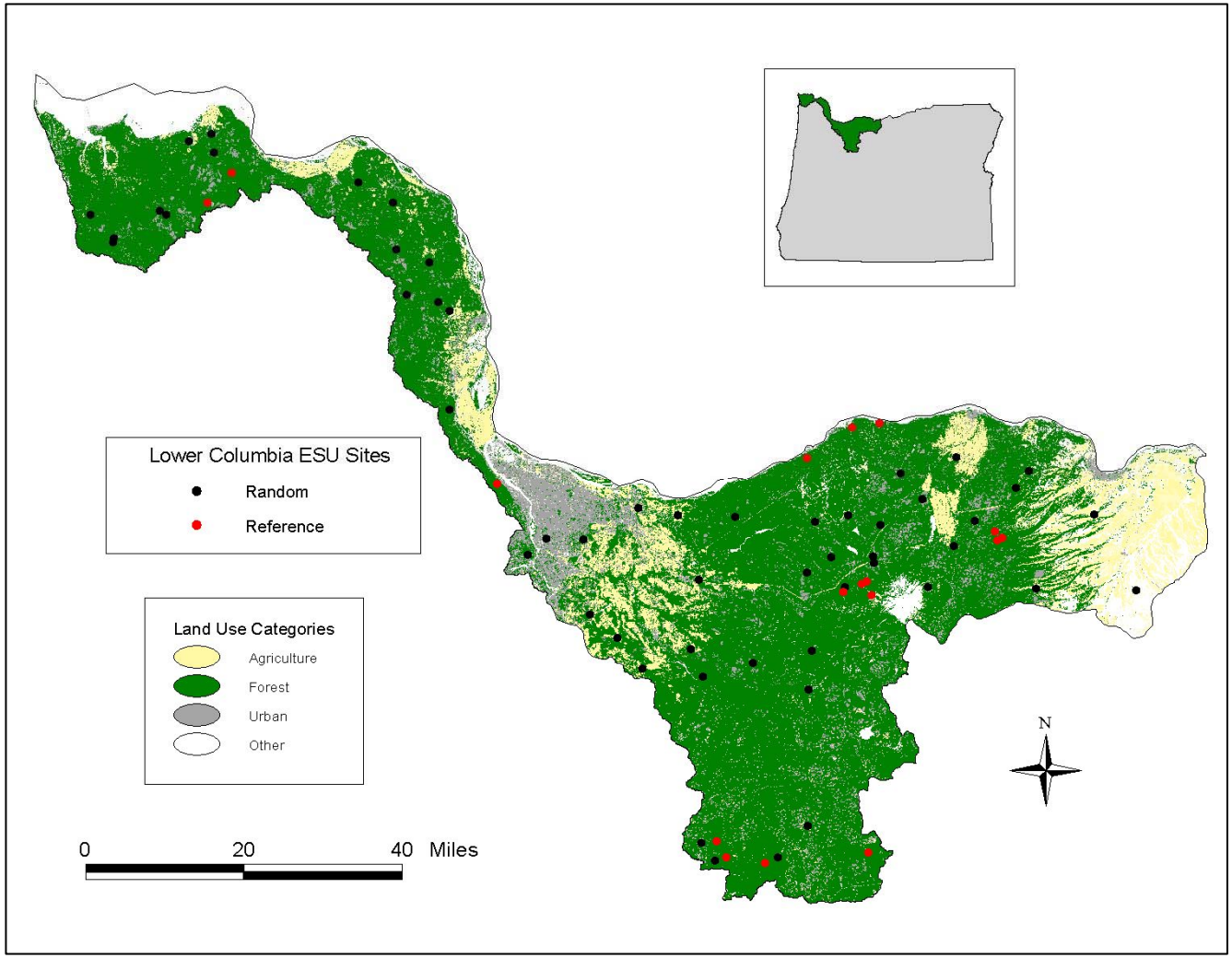
Evolutionarily Significant Units in the Lower Columbia



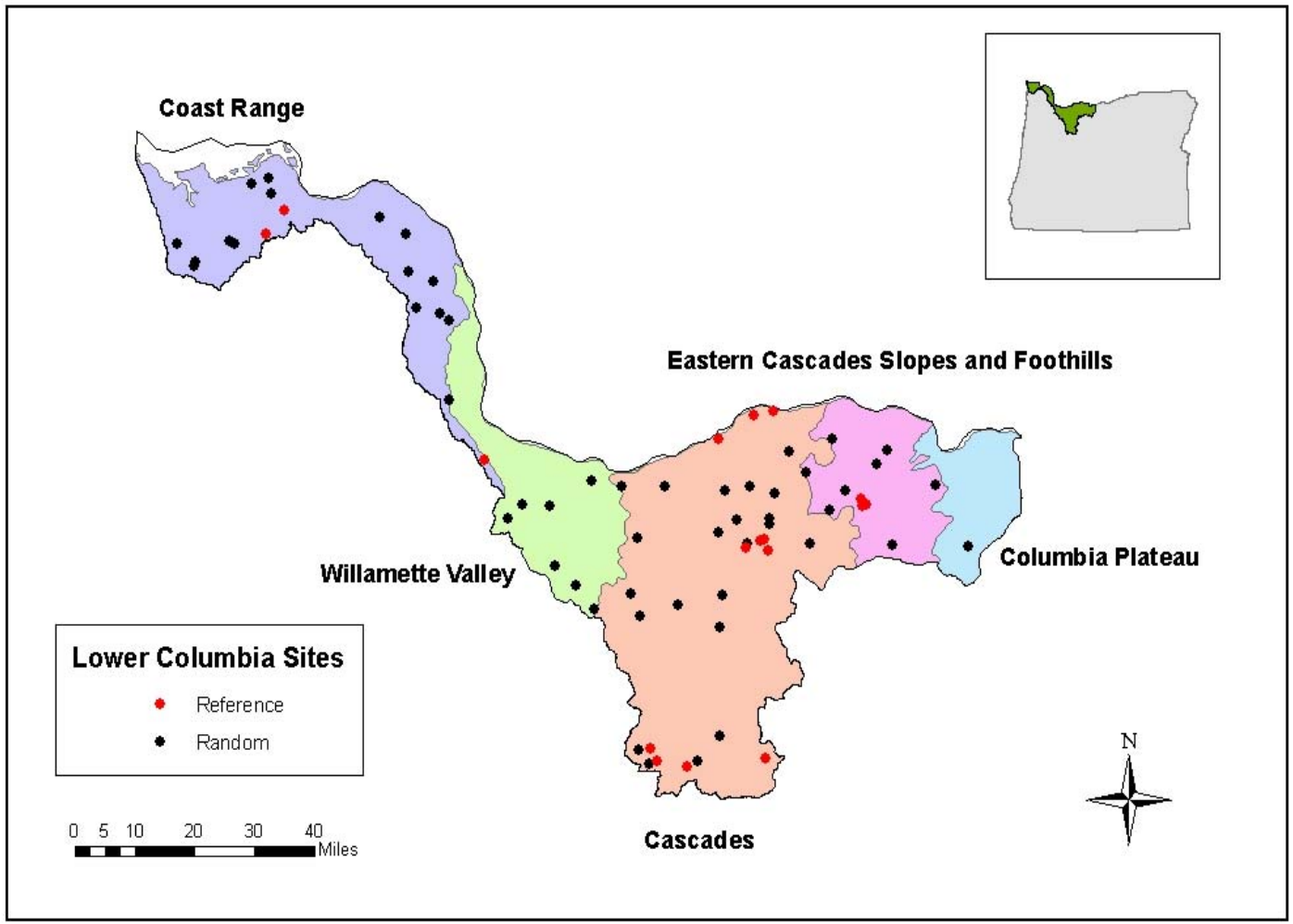
Watersheds


Lower Columbia
Lower Columbia- Clatskanie
Lower Willamette
Middle Columbia - Hood
Lower Columbia - Sandy
Clackamas
Watersheds
HUC
17070105
17080001
17080003
17080006
17090011
17090012
lcsitesfinal selection
0 5 10 20 30 40
Miles
N

Lower Columbia Land Use

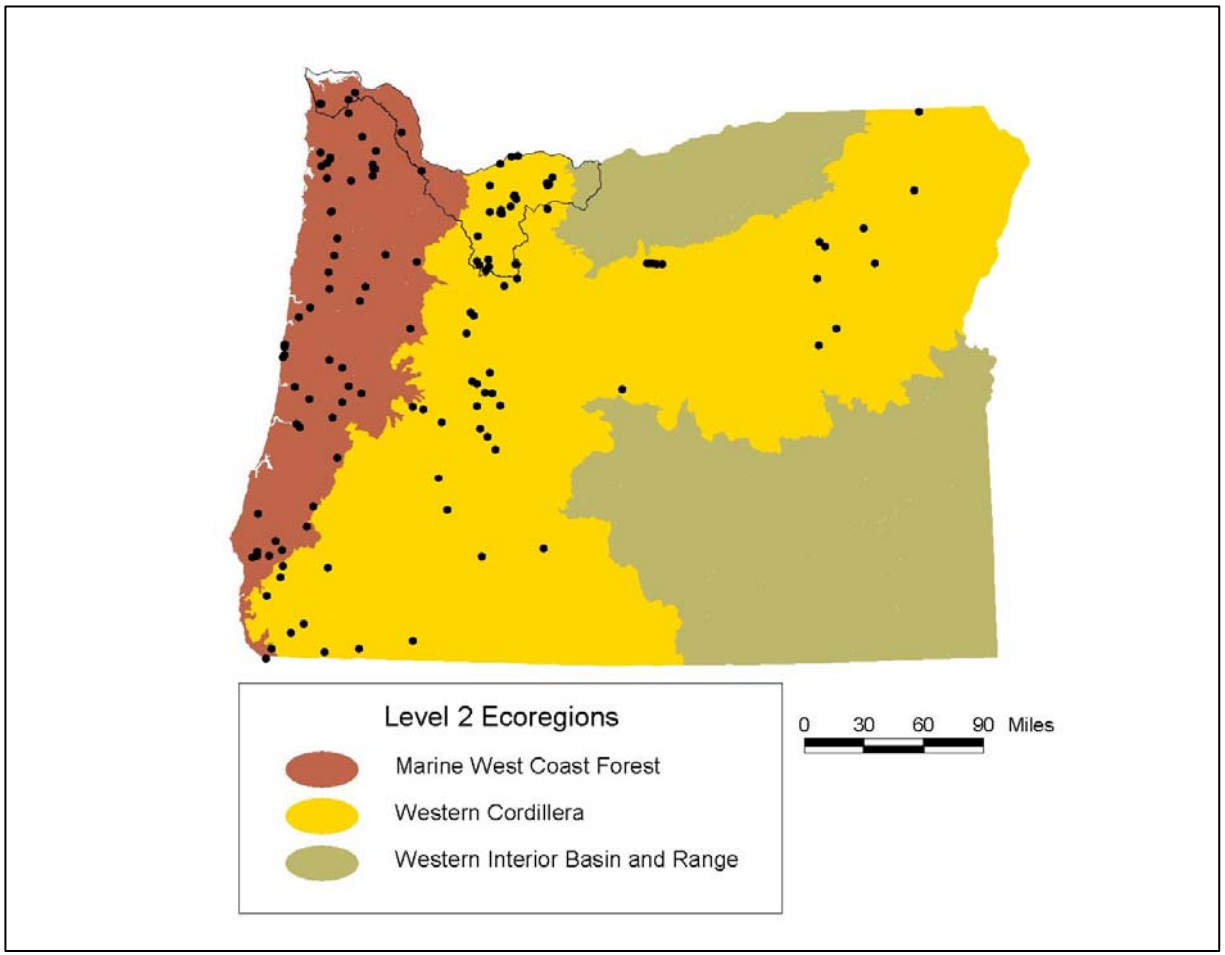


Lower Columbia Ecoregions

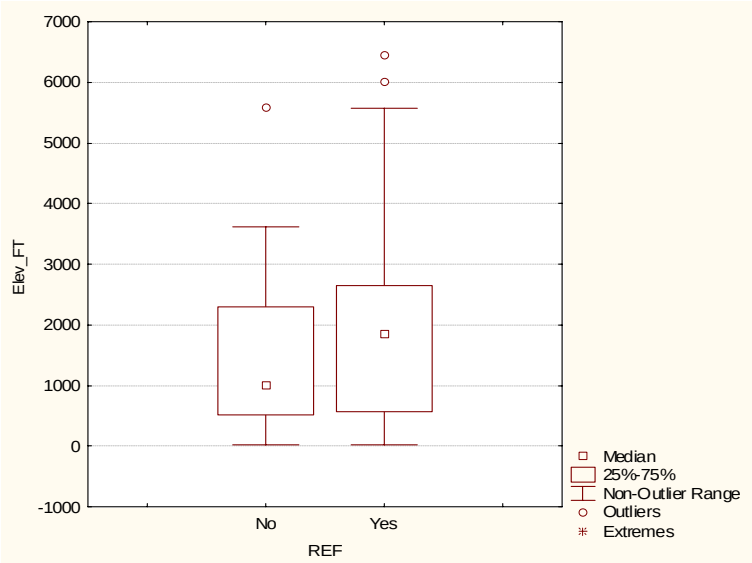


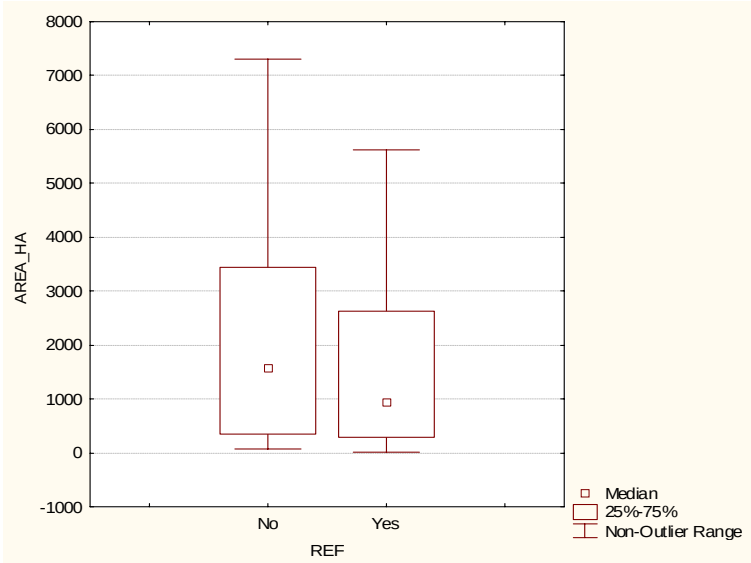
Reference Sites

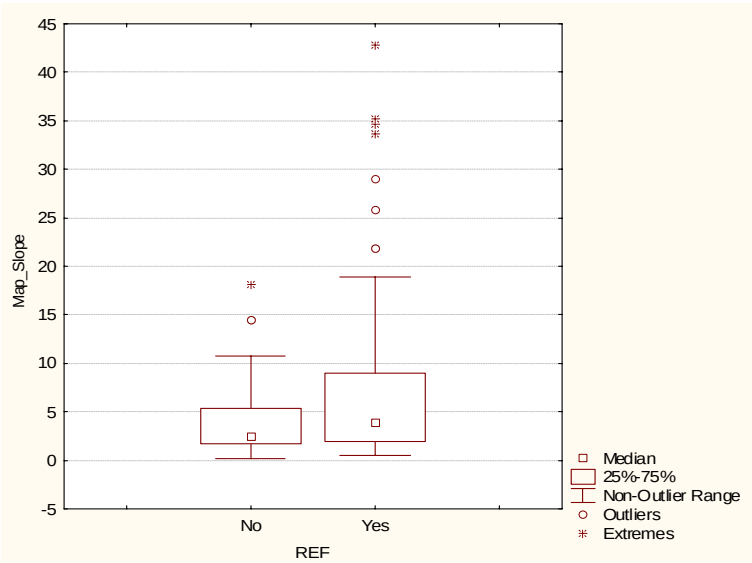
Level 2 Ecoregion

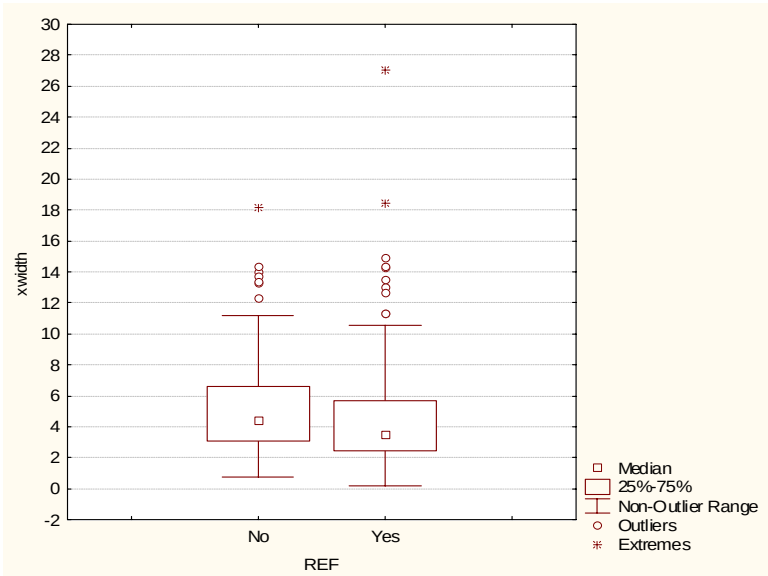


Random vs Reference Eco 2









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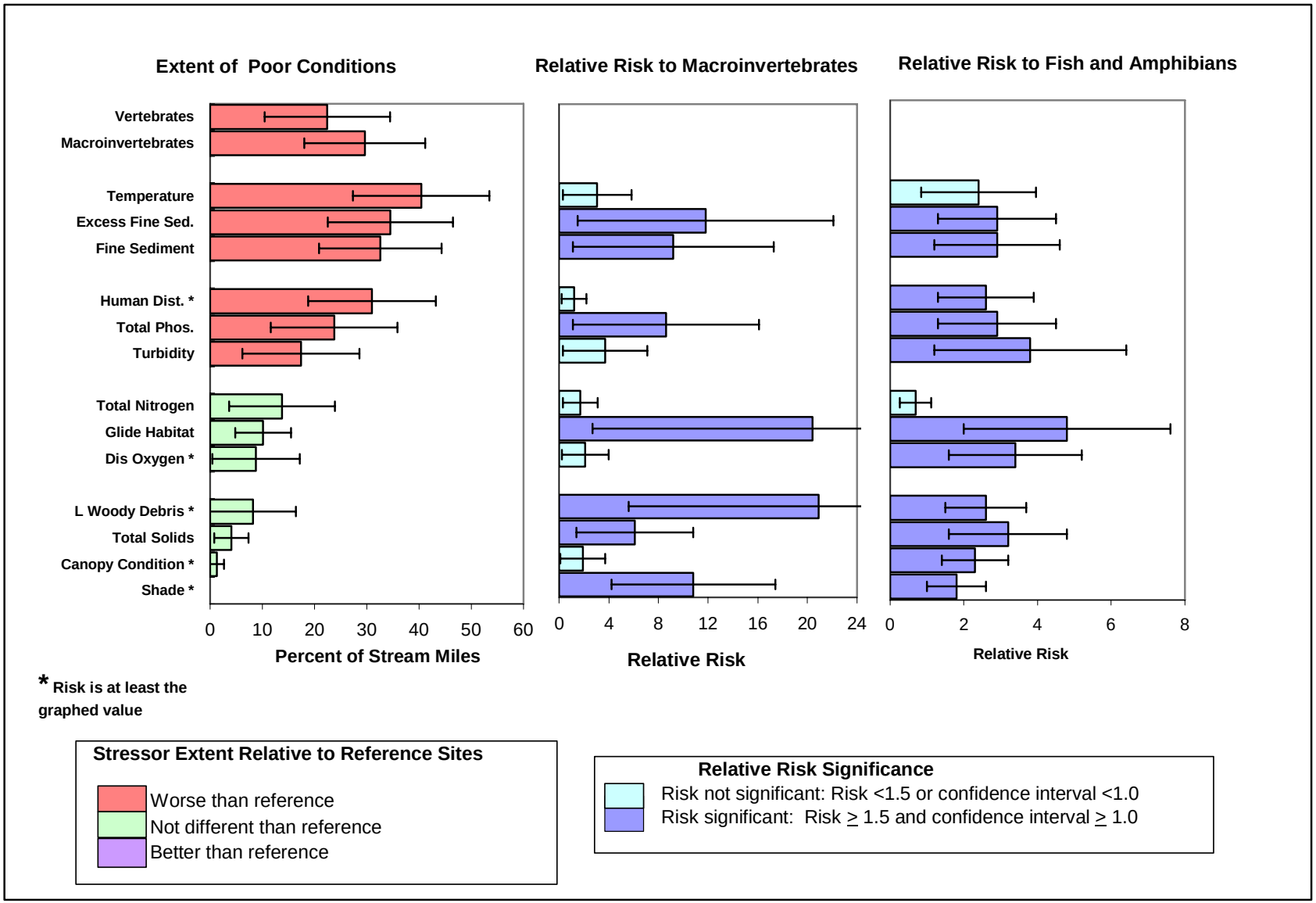

Project challenges

- Very diverse landscape west to east.
  - Political
  - Geographic
  - Landuse
- Relatively small sample size (54 randomly selected sites) for such a diverse region which did not allow us to look at land use or other strata.
- Reference sites taken from a large geographic region.