
Robert W. Plotnikoff, MS

Senior Aquatic Ecologist/Water Quality Specialist

Education:	M.S. 1989, Aquatic Biology (Eastern Washington University); B.S. Biology (Eastern Washington University); Graduate Research Fellowship 1989, Ecology (The Pennsylvania State University)
Additional Training:	Biocriteria Development Workshop, U.S. EPA HQ (2003); EMAP (Environmental Monitoring and Assessment Program) Data Analysis Workshop, U.S. EPA National Health Environmental Research Laboratory (2005); R-Statistical Applications NHERL, Corvallis, OR (2006); Employment Law Training: Corrective Actions, Human Resources, Hiring Process (2001)
Affiliations:	Society for Freshwater Science; formerly North American Benthological Society (1988-present); North American Lake Management Society (2007-present); Washington Lakes Protection Association (2007-present); Sigma Xi Professional Research Society (1986-present); Atlantic Salmon Federation (2006-present); American Entomological Society (1996-2001); Alberta Society of Professional Biologists (1989-1991); Canadian Water Resources Association (1989-1991)
Years Experience:	25
Years with Tt:	8

Mr. Plotnikoff has more than 25 years of experience managing projects and staff conducting aquatic environmental studies including: evaluating effectiveness of NPDES wastewater and stormwater permits, design of stormwater quality monitoring programs, toxicological impacts to receiving water biota, numerical and conceptual biological modeling, and environmental resource assessment of lakes and rivers. His technical abilities include statistical design and analysis, design of large-scale (multi-stakeholder) monitoring programs, integrated assessments of aquatic ecosystems, contaminants pathways analysis, permitting under the Endangered Species Act, evaluating environmental regulatory policy and regulation, determining effectiveness of TMDL's using water quality and biological information, and evaluation of BMP effectiveness for abating stormwater pollution. He has also designed monitoring evaluation programs for determining effectiveness of permitted point- and non-point discharges that include: stormwater, thermally-heated effluent, nutrient management operations, hydropower operations, and mining activities. He has directed multidisciplinary investigations and monitoring programs at the statewide scale (e.g., U.S. EPA EMAP/REMAP) and has contributed technical expertise assessing freshwater aquatic ecosystem conditions and prioritizing regulatory actions. Mr. Plotnikoff maintains expert skills in applied research in aquatic ecology, and design and analysis of environmental monitoring programs.

SUMMARY OF PROJECT EXPERIENCE

Lake Sawyer Stormwater Monitoring: The Villages Master Planned Development. Robert Plotnikoff is Project Manager for a focused effort to describe pre-construction water quality conditions in streams of the Lake Sawyer watershed. The Villages MPD is in pre-construction phase and is required to achieve a no-net phosphorus input to Rock Creek (a tributary to Lake Sawyer). Stormwater monitoring involved characterizing water quality during multiple storm events and gaging water level fluctuations that reflect a rise and fall in the hydrograph. Loading estimates were made by combining water quality and flow monitoring data.

Bioassessment Monitoring and Analysis to Support TMDL Development: Squalicum Creek (WRIA 1) and Soos Creek (WRIA 9). Robert Plotnikoff was Project Manager and technical lead in monitoring and interpretation of biological information at sites in Soos Creek and Squalicum Creek for the purpose of determining stormwater impacts to the biological community. Benthic Macroinvertebrate and periphyton response were examined with respect to identifiable relationships with stressors from stormwater input to reaches within each of these streams. Stressors were identified as physical factors (e.g., suspended sediment introduction and channel conditions) and chemical conditions (toxics in



sediments like metals, PCBs, and PAHs). Relationships between the biological community and stressors were incorporated into a stormwater TMDL for Squaticum Creek.

Soos Creek (WRIA 9) Stormwater Monitoring Quality Assurance Project Plan: Robert Plotnikoff recently prepared a Quality Assurance Project Plan (QAPP) for the Muckleshoot Tribe that describes how to implement a water quality monitoring program addressing how and where stormwater pollutants enter Soos Creek, White River, and the Green River. The Tribe has invested a tremendous amount of resources in maintaining a viable salmon fishery that return to these drainages providing a food base and that have cultural significance. The QAPP is a standard document required by both the State of Washington Department of Ecology and the U.S. Environmental Protection Agency prior to conducting any water quality monitoring program. Preparation of a QAPP ensures that data quality and methods used to generate water quality data meet or exceed those requirements of regulatory programs like NPDES permitting.

Colorado-Big Thompson Project West Slope Collection System Appraisal Study Grand County, Colorado, 2011-2012 – Mr. Plotnikoff is the Senior Aquatic Ecologist for an Appraisal Study evaluating existing data for the purpose of projecting potential outcomes for water management actions. The project purpose was to develop and analyze alternatives to improve water clarity in Grand Lake without adversely affecting the C-BT project, and without diminishing water quality in Grand Lake, Shadow Mountain Reservoir and Granby Reservoir. Alternatives were evaluated for benefits and cost; ability to solve the identified problems, meet water supply needs, and optimize opportunities; completeness in achieving project goals; and environmental and social acceptability.

Lake Tahoe Basin Aquatic Invasive Species Plan, Sacramento District USACE, California and Nevada, 2007-2010 – Mr. Plotnikoff is Senior Aquatic Ecologist for development of Aquatic Invasive Species (AIS) Management Plan for invasive Molluscs that is part of a multi-stakeholder collaborative effort supported by an interagency agreement between the U.S. Army Corps of Engineers (USACE) (Sacramento District) and the California Tahoe Conservancy. The purpose of the Plan is to minimize the deleterious effects of AIS in the Lake Tahoe Basin by 1) preventing new introductions of AIS to the Tahoe Basin, 2) limiting the spread of existing AIS populations in the Tahoe Basin, and 3) abating harmful ecological, economic, social and public health impacts resulting from AIS. Plan elements include: 1) summaries of existing and potential AIS, current and potential management strategies, introduction pathways, and existing programs and regulations, 2) an analysis of economic impacts, 3) facilitation of stakeholder discussions to identify lead entities for implementing management actions, and 4) coordinating with the Aquatic Nuisance Species Task Force (ANSTF) to facilitate Plan approval. The ANSTF is an intergovernmental organization responsible for implementing mandates under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA).

Water Quality Program Review: Draft Conceptual Monitoring Program Framework. Project Manager and principal scientist that reviewed existing monitoring programs throughout the Province of British Columbia administered by the Ministry of Environment. Mr. Plotnikoff developed an evaluation strategy that quantified the effectiveness of current monitoring programs in meeting regulatory goals and that satisfied objectives. He identified several types of monitoring networks and projects that were interrelated and that could be combined to improve efficiency and to roll-up results at the provincial level for periodic reporting. Rob advised on environmental documentation that would make monitoring efforts more uniform among networks and that would enable whole-province reporting. The strategy used for examination of current programs began with identification of regulatory directives and expected outcomes for these efforts. A workshop including headquarters staff and regional managers was convened to discuss results and to acquire input in order to finalize the recommendations.

Cochiti Water Quality Baseline Monitoring Study. Served as Technical Lead in developing environmental documentation (Sampling and Analysis Plan and Quality Assurance Project Plan) for characterization of toxics and conventional parameters in the Cochiti Reservoir drainage north of Albuquerque, NM. Mr. Plotnikoff organized laboratory services and field work routines through environmental documentation and in planning with field staff. He served in evaluating water column profile data and in tracing potential for toxics bioaccumulation in resident biota of lentic and lotic environments throughout this drainage. The parameter list in this water quality characterization was extensive and included: conventional, metals, pesticides, PCBs, dioxins/furans, and radionuclides. Sources for contamination of this drainage included historic releases of radionuclides from Los Alamos National Laboratory and from continuing development and stormwater input during monsoon season.

Watana Hydro Project Water Quality Data Gaps Analysis. Water quality data was aggregated and examined for the purpose of characterizing past and current conditions in the Susitna River (Alaska). This drainage extends north from Cook Inlet and is scheduled for hydropower project development. The FERC process requires a description of current water quality conditions and the expected changes that might occur in pre-defined reaches of the drainage downstream of the hydropower project. The influence of high background metals concentrations was examined for effects on life



stages of the five salmon species and steelhead population that inhabits most portions of the drainage downstream of the proposed project site.

Clarks Creek Stormwater Characterization and Sediment Oxygen Demand Monitoring and Characterization. Project Manager for development of environmental documents and sampling and analysis plan that characterizes any of the oxygen-demanding sources entering this sub-urban stream in the Puyallup River drainage of Washington State. The Clarks Creek drainage is an important resource for the Puyallup Tribe of Indians for its salmon rearing habitat and has been inundated with stormwater pollutants and aquatic macrophyte growth that has promoted oxygen depletion. The monitoring plan and characterization of oxygen-demanding substances was used to supplement oxygen demand rates in the existing TMDL DO model.

Bacterial TMDLs and Implementation of the Elements of a Stormwater Permit (WSDOT). Technical Lead that examined how bacterial TMDL implementation requirements were translated into the existing Stormwater Permit issued to the Washington Department of Transportation (WSDOT). Review of existing literature from select state DOTs throughout the United States were completed and interviews with DOT Coordinators and TMDL Implementation staff supplemented knowledge about current stormwater permit implementation efforts. CalTrans, NCDOT, SCDOT, FDOT, ADOT, MNDOT, and ODOT were consulted for current progress and approach to reducing bacterial contamination from DOT facilities and surfaces into nearby regulated receiving water. A strategy for how to identify WSDOT facilities that were potential sources for bacterial contaminants was developed and mapping products were constructed that were used to explore occurrence of these locations from all state facilities.

Landscape Analysis of Aquatic Resources in the Sacramento Area, Central Valley, California, U.S. Army Corps of Engineers-Sacramento District, 2010. Technical Lead and Senior Aquatic Ecologist for development of a landscape analysis of approximately 6 million acres in the Six Counties area of Sacramento, CA (Central Valley). This USACE-Sacramento project required a uniform assessment of aquatic resources (e.g., lentic and lotic waterbodies) for use in guiding decision-making for the 404 Permitting process. This project required development of a landscape assessment strategy using metrics that described statistical relationships between landscape variables and characteristics used for determining quality of individual waterbodies.

Modeling Biological Conditions in Boundary Reservoir (Lower Pend Oreille River), Metaline Falls, Washington, Seattle City Light, 2006-2008. Senior scientist that developed habitat suitability curves (HSI) for aquatic macrophytes, periphyton, and benthic macroinvertebrate communities that were used to predict weighted usable area under a variety of operational scenarios. Results were interpreted for each biological group from modeling results and combined to identify how overall biological conditions might be affected under distinct operational scenarios. Reservoir conditions under which biological conditions would be optimized were suggested as part of the interpretive process of modeling results.

Analysis of Coast Range and Western Cordillera Stream Ecosystem Conditions using an EMAP Statistical Design, Olympia, Washington, Washington Department of Ecology, 2006. Principal scientist that developed a strategy for statistically re-combining and re-describing physical habitat, water quality, and biological information from separate projects conducted in each of two major ecoregions of the Pacific Northwest. The EMAP (Environmental Monitoring and Assessment Design; U.S. EPA) requires location of sites using a randomized selection procedure and by using specialized statistical procedures that describe relative condition of river miles in condition categories and stressors responsible for relative condition categories. The results are useful for identifying specific problems and the order in which to remediate for restoration of ecosystem condition.

Cumulative Effects of Stranding and Trapping on Fisheries in Boundary Reservoir, Metaline Falls, Washington, Seattle City Light, 2008. Principal statistical analyst that determined the cumulative effect that raising and lowering of a regulated reservoir pool surface on fingerlings and juveniles. Cumulative Distribution Frequency Curves (CDFs) were constructed and compared among three pool management scenarios. Statistical differences between pairs of CDFs were analyzed in order to determine reservoir management scenarios that would minimize mortality effects on fisheries in side channels of the reservoir.

Development of a Multi-Metric Index for Evaluation of Community Tolerance in Stream Benthic Communities, Olympia, Washington, Washington Department of Ecology, 2005. Principal scientist that developed a statistical strategy for identifying relative tolerance levels of individual benthic macroinvertebrate species to common water quality and physical environmental gradients. The tolerance values used a combination of an optimal preference range and a measure of variance within this range to determine the sensitivity of each species to environmental gradients like water temperature, pH, dissolved oxygen concentrations, and conductivity. This tool was an effective quantitative approach for identifying the presence of stressors affecting a biological community.



Coal Creek Sediment Reduction and Temperature Impact Study, Bellevue, Washington, City of Bellevue, 2007. Principal scientist conducting statistical evaluation of sediment transport and continuous temperature data using an upstream/downstream design. Results for sediment accrual and temperature patterns were analyzed for significant differences before and after pool maintenance in the creek. The purpose of the analysis was to determine if sediment removal in Coal Creek pools influenced surface water temperature for the benefit of early life stages of resident salmon populations. Repeated comparisons were made in multiple pools for changes in sediment deposition rates and related to temperature patterns.

Chamokane Creek PHABSIM Modeling: Fish and Benthic Macroinvertebrates, Welpinit, Washington, Upper Columbia United Tribes, 1987. Completed field data collection for fish and benthic macroinvertebrates on Chamokane Creek (Spokane Reservation, WA) for the purpose of developing Habitat Simulation Index curves and then prediction of habitat loss (by species) at several water level scenarios in the drainage. The operation of the PHABSIM model indicated location and extent of habitat loss for the major fish species (Brown Trout; *Salmo trutta*) in Chamokane Creek. As well, modeling predictions used *Hydropsyche* spp. (net-spinning caddis) for determining habitat loss or gain at water level scenarios. The Spokane Tribe required a planning tool that would enable decisions for current and future residential development and corresponding water needs.

TMDL Effectiveness Monitoring Design and Analysis in the Yakima River Basin: Sediment Deposition Impacts, Yakima Valley, Washington, Washington Department of Ecology, 2006. Project Manager directing monitoring design and implementation in order to statistically evaluate the effectiveness of TMDL water quality cleanup goals. This complex project required large-river transect sampling with depth-integrated suspended-sediment sample collection. Original TMDL recommendations and Detailed Implementation Plan goals were examined for eventual determination of sediment input reduction. Comparison of before/after monitoring data using measures of variance revealed effectiveness of upstream control of turbidity in return drains to the mainstem of the river.

Analysis of Aquatic Macrophyte Management Strategies in Eloika Lake, WA, Deer Park, Washington, Spokane County, 1987. Technical lead in analyzing and developing strategy and cost for implementing a variety of aquatic macrophyte control techniques. Eloika Lake was infested with non-native aquatic macrophytes that limited recreational opportunities. The lake was described using bathymetric maps, habitat types (for recreational and endemic fisheries), water quality conditions, and sources of pollution. Planning for macrophyte control and eradication examined feasibility for use of physical, chemical, and biological control techniques.

Aquatic Invasive Species Management Plans, Lake Tahoe, California, Tahoe Regional Planning Agency, 2008. Senior Scientist that described ecological information for the zebra mussel (*Dreissena polymorpha*), quagga mussel (*Dreissena bugensis*), and the New Zealand mudsnail (*Potamopyrgus antipodarum*) and how tolerances to environmental gradients compared with ambient water quality and physical habitat conditions in Lake Tahoe, California (USA). Prepared discussions on effectiveness of current treatments for eradication of infestation from these aquatic invasive species. Investigated strategies for prevention and control of invasive macrophytes, bivalves, and snails in the Lake Tahoe, CA Basin.

Effects of Aquatic Macrophytes on DO and pH In Pend Oreille River Surface Water, Metaline Falls, Washington, Seattle City Light, 2006-2008. Lead statistical analyst for determining how aquatic macrophyte beds of varying densities affected the downstream surface water chemistry in the Pend Oreille River. Continuous monitoring data collected by HydroLab Datasondes were used to determine significant difference in macrophyte bed and downstream dissolved oxygen and pH water quality conditions. Other factors like macrophyte bed density were examined for influence on surface water chemistry conditions.

Boundary Dam Toxics Pathways Analysis and Evaluation (Pend Oreille River), Metaline Falls, Washington, Seattle City Light, 2006-2008. Study Lead for development and implementation of a detailed Sampling and Analysis Plan (SAP) that evaluated the potential for toxics bioavailability in surface water, sediment, and pore water media throughout the reservoir. Pathways models were constructed for divalent metals (lead, zinc, and cadmium), organometals (arsenic and mercury), and PCBs in order to develop relevant sampling plans that would inform how the load-following Boundary Dam Project might influence the cycling of contaminants. Several monitoring plans were developed and implemented that provided background information for addressing concerns about metals bioavailability and the potential for effects during different operational scenarios. Responses to Stakeholder comments on final reports were prepared in conjunction with the client in order to provide clarity and resolution to critical technical issues.

Impact of Development and Stormwater to a Puget Sound Drainage (Quilceda/Allen Creek): Identification of Biological Indicators for Determining Salmon Habitat Quality, Marysville, Washington, Washington Department of Ecology, 1998. Principal scientist that evaluated and interpreted physical, chemical, and biological conditions altered



by stormwater pollutants associated with suburban development in Snohomish County. The characterizations throughout the drainage served as background information that was associated with salmon species presence and life stages that used specific locations. The relationship between physicochemical setting and salmon presence was used to predict potential impairments to stream reaches from future planned development.

Stream Biological Monitoring in Washington State, Statewide, Washington, Washington Department of Ecology, 1993-2006. Program manager and developer of the Stream Ambient Biological Monitoring Program in the State of Washington. Stream sites impaired from land use activities like forest practices, agriculture, and suburban development were sampled throughout a period of fifteen years. Biological and physical habitat evaluation included use of biometrics generated from fish and benthic macroinvertebrate data as well as relationships with habitat conditions. Biological information was established as an indicator for evaluating 303(d) TMDL listings and in measuring the effect of sedimentation.

Tribal Biological Monitoring Program Development (NWIFC Members), Seattle, Washington, U.S. Environmental Protection Agency, 2007. Assistance to tribes that belong to the Northwest Indian Fisheries Commission (NWIFC) organization in planning and developing biological monitoring programs. Biological monitoring programs include integrated environmental information collection including physical habitat and water quality characterization. Information collected from these programs is used to develop plans for Tribal lands and accustomed fishing and hunting areas along freshwater and marine waterbodies. Data collected by these programs are also used in implementing U.S. Environmental Protection Agency mandates for protection, preservation, and enhancement of aquatic resources. Work products are developed in consultation with the U.S. EPA Regional office and individual Tribal scientists.

Statewide Status and Trends Monitoring Framework: Water Quality, Habitat, and Biological Status, Olympia, Washington, Washington Department of Ecology, 2006. Project manager for compilation and creation of a monitoring plan with statewide application. The process for creating the Quality Assurance Project Plan (QAPP) included arrangement of four technical workshop sessions that generated stakeholder investment in the final product. Participants included: Dept. of Ecology, U.S. EPA, U.S. Forest Service, Fish Recovery Boards, Salmon Enhancement Groups, Tribes, County and City governments. This monitoring QAPP establishes a standardized method for describing status of environmental resources in WRIA's, Salmon Recovery Regions, and HUC 6 watersheds. Information generated from this program can be shared among any of the cooperators.

Biological Evaluation from Stormwater Contaminants in Federal Facilities of Puget Sound, Puget Sound, Washington, U.S. Environmental Protection Agency, 2009. Project manager of a biological evaluation for listed threatened/endangered species focusing on impacts from contaminants in municipal stormwater from federal facilities in Puget Sound. The evaluation included aggregating high-quality data from various sources that described stormwater conditions. Evaluations were conducted for each species potentially present or affected by aquatic resources at or adjacent each facility using current toxicological endpoints (e.g., NOELs and LOELs).

The Nature Conservancy Science Advisory Panel: Preservation of Outstanding Aquatic Habitat. Served as a scientific advisory expert for the Nature Conservancy's project in identifying and preserving outstanding river and stream habitat for aquatic life. The strategy included development of Ecoregional Planning Units for identification and preservation of outstanding aquatic resources throughout Washington State.

Washington DNR Aquatic Resources Habitat Conservation Plan: Science Review Panel. Served as a scientific advisory expert for the Washington Department of Natural Resources Habitat Conservation Planning Process (marine and freshwater). Duties included review of a species selection model and recommendations for improvement of managing for federally-protected species like salmon, invertebrates, and terrestrial on state forest lands.

Similkameen River Sediment Contaminant Characterization and Effects on Benthic Communities. Mr. Plotnikoff served as Co-Project Manager on a large-scale project that detailed sediment contamination patterns in the upper Similkameen River to Enloe Dam. Data collection was prompted by a 303(d) listing and in preparation for a TMDL modeling effort. The project entailed source tracing of As and Cd metals contaminants originating from mine waste piles located in British Columbia and Washington State. Benthic samples were collected in sand bars at key locations throughout the drainage to detect biological impairment through insect mouthpart deformity rates. Information was collected from sediments, water column, and biological community in order to assemble data using the weight-of-evidence approach for interpreting conditions.

Blue Creek (Spokane River Drainage) Acid Mine Discharge Impacts on Benthic Communities and Water Quality. Mr. Plotnikoff served as Project Manager responsible for designing, collecting, and analyzing data in a detailed characterization of mine drainage impacts and the extent of a contaminant plume emptying into Lake (F.D.) Roosevelt.



Completed a monthly water quality sampling program to track seasonal changes in conventional and metals concentrations and severity of impacts. Quarterly benthic biological characterizations were conducted in order to determine the mechanism for introduction of the most severe impacts to receiving water. The information was used to determine locations and effort necessary to abate pollution introduction from the uranium mine site to nearby receiving streams while Superfund Cleanup activities proceeded.

Sediment Impairments from Irrigation and Stormwater Runoff in the Groundhouse River, St. Croix Basin, Minnesota, Minnesota Pollution Control Agency, 2008. Principal Scientist investigating the relationships between biological impairments and the likely causes throughout the Groundhouse River drainage in Minnesota (St. Croix Basin). Sedimentation was the suspected cause of biological impairment and appeared as a pollutant on the State's 303(d) list. Examination of biological communities using CADDIS (Causal Analysis Diagnosis/Decision Information System; U.S. EPA tool) assisted with confirming mechanisms for biological impairment and stream reaches sensitive to riparian vegetation destruction and non-point source pollutant introduction.

Quality Assurance Project Plan for Nine Mile Nonpoint Source Water Quality Monitoring, Spokane, Washington, Spokane County, 2009. Mr. Plotnikoff served as Senior Project Manager and technical scientist that developed a monitoring plan for identifying primary sources of nutrient contributions to Lake Spokane. Several component monitoring programs were described that identified pollutants from upstream sources, stormwater, tributaries, adjacent development, and from internal loading to Lake Spokane. This plan is intended to unify efforts by local government, state government, and private companies in defining pollution abatement programs that would be effective in reducing nutrient load to the surface water. Higher technology using multi-spectral imaging is proposed for use in identifying existing sources of nutrient input to the lake and for planning methods of pollution abatement.

Coquille River TMDL Monitoring, Coquille, Oregon, Oregon Department of Environmental Quality, 2007. Project Manager for the Coquille River TMDL Monitoring Project and supported by the U.S. EPA and Oregon Department of Environmental Quality. A complex QAPP was prepared prior to monitoring and included both continuous data collection as well as grab sample collection. Monitoring included site location based on the original TMDL model, collection of data from continuous data monitoring instruments (e.g., HydroLab), and from grab samples that characterized conventional variables, nutrients, oxygen, temperature, conductivity/salinity, and pH. The ODEQ and EPA required additional data to revise the original TMDL and to determine contribution of pollutants from non-point sources, in part, to accommodate the planning for two new Wastewater Treatment Plants. Data collection from throughout the watershed resulted in development of multi-regressions curves that were used to separate non-point sources of impairment from point sources.

TMDL Effectiveness Monitoring Strategy Development. Principal author and technical lead that developed the TMDL Effectiveness Monitoring strategy for the Washington Department of Ecology. Used existing agency-sponsored programs like the Watershed Planning Process as a vehicle for mobilizing cleanup efforts at the local scale. Integrated the effectiveness monitoring strategy into the TMDL model and Implementation Plan process. Devise a method for identifying how to adapt (adaptive management) effectiveness monitoring conclusions into the on-going regulatory process (e.g., permitting).

Guidance for Writing Quality Assurance Project Plans in Evaluating Non-Point Sources of Pollution. Project manager selected by the Department of Ecology to prepare a standard monitoring plan (mandated by the Legislature) for evaluating non-point sources of pollution originating from dairies and animal feed lots. Purpose for the QAPP guidance was to provide local agencies with a tool to develop monitoring plans for source tracing and nutrient reduction mechanisms that meet WRIA Watershed Planning goals.

Baseline Characterization of Selected Water Quality Characteristics in Washington State Rivers. Project manager for establishing a survey of select water quality variables in Washington Rivers. This investigation established baseline information from which future NPDES permits were written allowing effluent discharge from regulated point sources and integrating the effect of nonpoint sources from major tributaries. Determined statistical trend analysis for individual conventional water quality parameters over five-year intervals and reported results in a several regional report summaries (e.g., State of Salmon Report, Puget Sound Update, and Freshwater Conditions in the State of Washington).

Critical Elements Review of State of Colorado Monitoring Programs. Mr. Plotnikoff has evaluated the surface water and biological monitoring programs in the State of Colorado for the Colorado Department of Public Health and Environment (CO DPHE). The review process included presentation by CO DPHE managers and staff describing regulatory programs like criteria and standards revisions, TMDL pollutant reduction programs, permitting programs regulating effluent discharge, and federal requirements to assess the status of freshwater throughout the state. He



examined information provided both in agency presentations and from published documents to score status of the program against a set of standards. The evaluation provided recommendations for improvement in components of the program so that regulatory information needs could be satisfied.

Critical Elements Review of State of California Monitoring Programs. Mr. Plotnikoff has evaluated the surface water and biological monitoring programs in the State of California for the California State Water Resources Control Board (CA WRCB). The review process included presentation by CA WRCB managers and staff describing regulatory programs like criteria and standards revisions, TMDL pollutant reduction programs, permitting programs regulating effluent discharge, and federal requirements to assess the status of freshwater throughout the state. He examined information provided both in agency presentations and from published documents to score status of the program against a set of standards. The evaluation provided recommendations for improvement in components of the program so that regulatory information needs could be satisfied. California has a multi-layered governmental process for regulating environmental resources and so the recommendations were more complex and needed to satisfy multiple needs of these many agencies.

Critical Elements Review of State of Montana Monitoring Programs. Mr. Plotnikoff has evaluated the surface water and biological monitoring programs in the State of Montana for the Montana Department of Environmental Quality (MT DEQ). The review process included presentation by MT DEQ managers and staff describing regulatory programs like criteria and standards revisions, TMDL pollutant reduction programs, permitting programs regulating effluent discharge, and federal requirements to assess the status of freshwater throughout the state. He examined information provided both in agency presentations and from published documents to score status of the program against a set of standards. The evaluation provided recommendations for improvement in components of the program so that regulatory information needs could be satisfied and significant effort in developing past programs could be continued with newer assessment techniques.

Critical Elements Review of Fort Peck Tribe of Indians Monitoring Programs. Mr. Plotnikoff has evaluated the surface water and biological monitoring programs of the Fort Peck Tribe Office of Environmental Assessment (Poplar, Montana). The review process included presentation by Fort Peck Tribe managers and staff describing regulatory programs like criteria and standards revisions, TMDL pollutant reduction programs, permitting programs regulating effluent discharge, and federal requirements to assess the status of freshwater throughout the state. He examined information provided both in agency presentations and from published documents from tribal and U.S EPA representatives in order to score status of the program against a set of standards. The evaluation provided recommendations for improvement in components of the program so that regulatory information needs could be satisfied and improvement of the monitoring program would be expedient.

OTHER EXPERIENCE

List here any other experience that doesn't qualify above

PEER-REVIEWED PUBLICATIONS

Plotnikoff, R.W., H.L. Gibbons, T. Pennington, and E.B. Welch. 2010. Ecologic Diversity in NW Lakes. LakeLine, Volume 30, No. 4 / Winter 2010. A Publication of the North American Lake Management Society. p.16-20.

Plotnikoff, R.W. and H.L. Gibbons. 2009. Characterizing the Effects of Metals and PCB (Polychlorinated Biphenyls) and Potential for Bioaccumulation from Project Operations in Boundary Reservoir, Pend Oreille River, Washington, USA. Proceedings of the Water and Hydropower XVI Conference. Spokane, WA. 12 p.

Brattebo, Shannon, Plotnikoff, Robert, Harry Gibbons, Darlene Siegel, Kari Kimura, Bill Fullerton, and Al Solonsky. 2009. Development of periphyton and benthic macroinvertebrate habitat suitability indices for assessment of reservoir quality and production on the Pend Oreille River, Washington, USA. Proceedings of the Water and Hydropower XVI Conference. Spokane, WA. 15 p.

Black, R.W., M.D. Munn, and R.W. Plotnikoff. 2004. Using macroinvertebrates to identify biota-land cover optima at multiple scales in the Pacific Northwest, USA. Journal of the North American Benthological Society 23(2): 340-362.

Plotnikoff, R.W. 2005. Calculating environmental optima for riffle-dwelling invertebrates: a method for quantitatively defining species tolerance to chemical and physical conditions in streams. *In prep*



Onwumere, G.C. and R.W. Plotnikoff. January 2003. The Development of a Total Maximum Daily Load Effectiveness Monitoring Strategy for Washington State. American Water Resources Association, Proceedings of the Annual Conference. New York, NY.

Plotnikoff, R.W. 1993. Selected Region 10 Monitoring Entities: Washington Department of Ecology. *in* Region 10 In-Stream Biological Monitoring Handbook: for wadable streams in the Pacific Northwest, U.S. Environmental Protection Agency, Seattle, WA. EPA 910/9-92-013. pp. 35-39.

Plotnikoff, R.W. 1990. Unimpacted streams as referents in ecoregion bioassessment. *in* Pesticides in Natural Systems: how can their effects be monitored? M. Marsh (Ed.). United States Environmental Protection Agency, EPA-ERL, Corvallis, Oregon. Document no. EPA 910/9-91-011.

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Patrick, R. *In prep.* Rivers of the United States: Upper Columbia Basin. Biological communities in rivers and streams of Washington State (data contributor).

TECHNICAL PUBLICATIONS

Plotnikoff, R.W. J. Blizard, and S.K. Brattebo. 2012. Bioassessment Monitoring and Analysis to Support TMDL Development: Squalicum Creek (WRIA 1) and Soos Creek (WRIA 9). Prepared for the Washington Department of Ecology and U.S. Environmental Protection Agency (Region 10). Prepared by Tetra Tech, Inc., Surface Water Group. Seattle, WA. 79p. + Appendixes.

Plotnikoff, R.W. 2012. Stormwater Sampling in Clarks Creek, Puyallup River Drainage (WRIA 10): Measuring Oxygen Demanding Sources. Prepared for Puyallup Tribe of Indians and U.S. EPA Region 10. June 2012. 119 pages.

Plotnikoff, R.W. 2012. Quality Assurance Project Plan: Bioassessment Monitoring and Analysis to Support Stormwater TMDL Development. Tetra Tech Publication No. Tt DCN QAPP 334, Seattle, WA. Ecology Publication No. 12-03-112. 82 pages. <https://fortress.wa.gov/ecy/publications/publications/1203112.pdf>

Plotnikoff, R.W., S.K. Brattebo, H.L. Gibbons, and E. Roxas-Wilkenson. 2011. Phase II: Water Quality Monitoring Program Review, Volume I and Volume II. British Columbia Ministry of Environment, Environmental Sustainability Division, Victoria, B.C. 98p.

Bailey, P., R.W. Plotnikoff, H.L. Gibbons., and J. Lenzotti. 2012. Appraisal Report: Colorado-Big Thompson Project West Slope Collection System, Grand County, Colorado. Prepared for U.S. Bureau of Reclamation, Grand County, and Northern Water Conservancy District. Prepared by Tetra Tech, Inc. Breckenridge, CO. 183p.

Plotnikoff, R.W., H.L. Gibbons, S.K. Brattebo, T. Pennington, and D. Artho. 2010. Six Counties Aquatic Resources Inventory: development of a uniform classification system for waterbodies and a Level 1 assessment of ecological condition. Prepared for the U.S. Army Corps of Engineers, Sacramento District, Sacramento, CA. Prepared by Tetra Tech Surface Water Group, Seattle, WA . Contract no. W91238-09-D-0031. 110p.+Appendixes.

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