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Abstract for:

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This statistical summary reports data from the Environmental Monitoring and Assessment Program (EMAP) Western Pilot (EMAP-W). EMAP-W was a sample survey (or probability survey, often simply called 'random') of streams and rivers in 12 states of the western U.S. (Arizona, California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming), comprising the conterminous portions of EPA Regions 8, 9 and 10.

The eventual objective of EMAP-W is to assess the ecological condition of, and relative importance of stressors in, streams and rivers of the West at multiple scales. This Statistical Summary is the first step in making that assessment, in that it reports on the validated and verified, but largely uninterpreted, data collected by EMAP-W.

Field sampling was conducted from 2000 through 2004, using a combination of State, Regional and contract crews. All crews were trained in the EMAP-W sampling protocols described in detail in (Peck et al. 2005a, Peck et al. 2005b). Identical sampling methods were used in all wadeable streams, and complementary methods were used in large rivers.

The purpose of this report is to provide the reader with sufficient information to understand how EMAP-W was conducted, and how the information can be interpreted. The statistical distribution(s) of measured variables and calculated metrics are included as appendices to each report section. Details of design, sampling and data analysis are given in each of the following sections of the report:

- Design – how were the sites chosen, and what do they represent
- Quality Assurance – how did we evaluate and document the quality of the data, during data collection, database development, and data analysis
- Reference Condition – several indicators require some estimate of reference condition, or expected condition; how were these estimates made?
- Extent of Resource – what have we learned about the total length of streams and rivers (and their size categories) in the West?
- Ecological Condition – we use biological indicators to measure ecological condition:
 - Benthic Macroinvertebrates – how we constructed metrics, a Multi-Metric Index, and a Predictive Model to interpret macroinvertebrate assemblage data

- Aquatic Vertebrates – how we constructed metrics and a Multi-Metric Index to interpret aquatic vertebrate (fish and amphibians) assemblage data
- Environmental Stressors – we use chemical, physical and biological indicators to measure the stress to which streams and rivers are exposed:
 - Water Chemistry – which variables might be considered measures of stress and why
 - Physical Habitat – indicators of 8 dimensions of stream and river habitat, and how they indicate levels of stress on aquatic organisms
 - Fish Tissue Contaminants – levels of toxic contaminants that accumulate in fish tissue and are considered contributions to stress
 - Invasive Riparian Plants – information on the presence/absence of selected invasive alien plants that are commonly found in riparian areas of streams and rivers, and can be considered indicators of stress to riparian areas
 - Other alien species – information on the presence/absence of selected invasive fish, amphibian and macroinvertebrate species that are potential stressors to biotic integrity.

Results are presented at three different levels of geographic resolution (illustrated in Figure 1):

- West-wide (12 states)
- Three major climatic/topographic regions – Mountains, Plains and Xeric (see Table 1)
- Ten ecological regions – aggregated from Omernik Level III (Omernik 1987) ecoregions (see Table 1)
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References Cited

- Omernik, J. M. 1987. Ecoregions of the conterminous United States. *Annals of the Association of American Geographers* **77**:118-125.
- Peck, D. V., D. K. Averill, A. T. Herlihy, R. M. Hughes, P. R. Kaufmann, D. J. Klemm, J. M. Lazorchak, F. H. McCormick, S. A. Peterson, M. R. Cappaert, T. Magee, and P. A. Monaco. 2005a. Environmental Monitoring and Assessment Program - Surface Waters Western Pilot Study: Field Operations Manual for Non-Wadeable Rivers and Streams. EPA 600/R-05/xxx, U.S. Environmental Protection Agency, Washington, DC.
- Peck, D. V., A. T. Herlihy, B. H. Hill, R. M. Hughes, P. R. Kaufmann, D. J. Klemm, J. M. Lazorchak, F. H. McCormick, S. A. Peterson, P. L. Ringold, T. Magee, and M. R. Cappaert. 2005b. Environmental Monitoring and Assessment Program - Surface Waters Western Pilot Study: Field Operations Manual for Wadeable Streams. EPA 600/R-05/xxx, U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC.