Identifying Healthy Watersheds in California

Draft List of Indicators

Prepared by The Cadmus Group, Inc. for U.S. EPA and California State Water Resources Control Board

Progress to Date

- Planning calls with core project team (Laura Gabanski, Jon Marshack, Karen Larsen, and Terrence Fleming)
- Submitted draft Technical Approach
  - Input provided by HSP and WQMC
- Spoke with members of the HSP about available datasets for potential use in the California Healthy Watersheds Integrated Assessment
- Submitted draft List of Indicators
  - Input provided by HSP (last week)
- Looking ahead - working meeting planned for summer
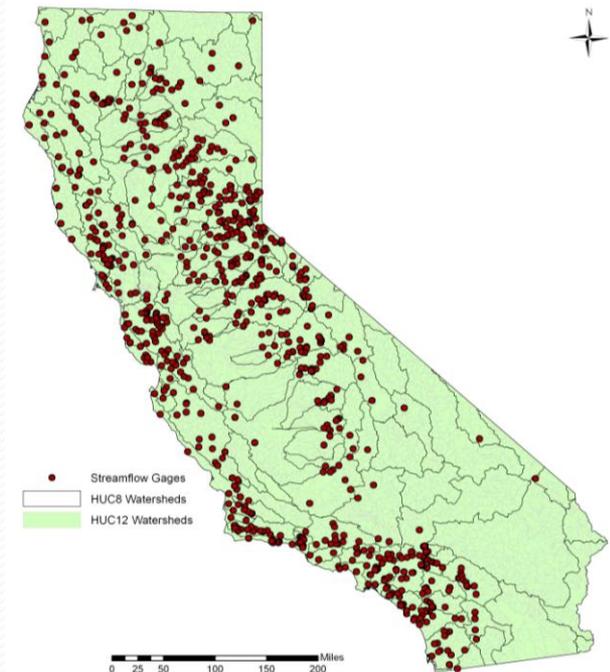
Six Healthy Watersheds Attributes

1. Landscape Condition
2. Habitat Condition
3. Hydrologic Condition
4. Geomorphic Condition
5. Water Quality
6. Biological Condition

Identifying and Protecting
Healthy Watersheds
Concepts, Assessments, and Management Approaches
February 2012
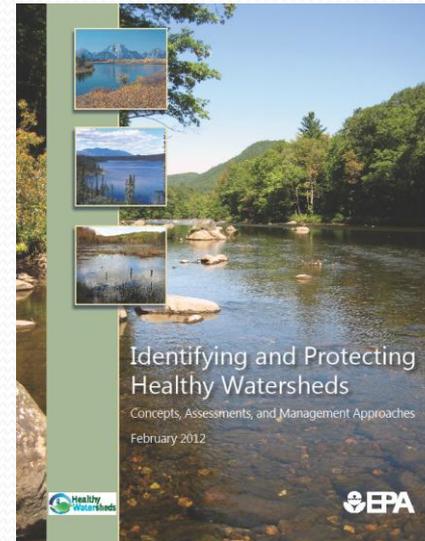
www.epa.gov/healthywatersheds

Scale

- California's landscape is large and diverse
- PSA, EMAP, CMAP, and RCMP have characterized ecological conditions at broad scales
- California Healthy Watersheds Integrated Assessment focuses on smaller HUC12 watershed scale
  - Results can be rolled up into larger watersheds for reporting purposes

Selection of Indicators

- Need one or more indicators for each healthy watersheds attribute

- Field data, even those collected under probabilistic designs, are not sufficient for characterizing individual watershed scale

- Need to estimate indicator values for unmonitored watersheds

Statistical Models

- Build multiple linear regression models for estimating indicator values at unmonitored watersheds

- Example: Percent Sands and Fines = Percent Agricultural Land Use in Watershed + Stream Channel Slope + Mean Annual Precipitation

Ecoregional Differences

- Ecoregional patterns in the response of the indicator values will be investigated

- Different regression models may be built for each ecoregion

- Different subsets of indicators may be chosen for each ecoregion

Proposed Indicators

Landscape Condition	Habitat Condition	Hydrologic Condition	Geomorphic Condition	Water Quality	Biological Condition
% Natural Land Cover in Watershed (N-Index)	Riparian Vegetation*	Indicators of Hydrologic Alteration*	% Sands and Fines*	Predicted Total Nitrogen*	O/E Macroinvertebrate Scores*
Landscape Connectivity	Stream Habitat Complexity*	Groundwater Stress		Predicted Total Phosphorus*	Wetland Biotic Structure*
Landscape Natural Disturbance Regime (% FRCC 1)	Stream Habitat Fragmentation				

*Indicators marked with an asterisk will be estimated with multiple linear regression models

Index of Watershed Health

- All indicators will be normalized and scaled
- Input on weighting will be sought from Healthy Streams Partnership
- Sub-indices for each Healthy Watersheds Attribute will also be calculated

Input from HSP (2/22/2012)

- Ensure consistency with bio-objectives process
  - Working with Pete Ode to compare analysis methods and indicators
- Coordinate with Fraser Shilling to ensure no duplication of effort with his work
  - Made contact and have another call planned for next week

Input from HSP (2/22/2012)

- Include an additional indicator for geomorphic condition
  - Currently working with Eric Stein to incorporate "relative risk of geomorphic alteration" indicator through GIS-based modeling
- Include an additional indicator of high flows for hydrologic condition
  - Currently evaluating high flow metrics
- Validate the regression models using a couple of regional datasets
  - Great idea. Evaluating potential regional datasets for use