

SUSTAINABLE FORESTRY
WATERSHED ANALYSIS-LAND MANGEMENT IMPACTS ON
WATERSHE PROCESSES

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I. Geographic variability and influences on watershed processes

- A. Geology
 - 1. Soils
 - 2. Erosion
 - 3. Stream morphology
- B. Precipitation
 - 1. Runoff and streamflow
 - 2. Vegetation

II Management influences on watershed processes

- A. Vegetation management
- B. Roads
- C. Urban development
- D. Riparian Zone

III Watershed analysis

- A. Systematic inventory of conditions and resources
 - 1. Critical habitat zones
 - 2. Sensitive landscape elements
 - 3. Historic and potential impacts of management
- B. Development of management prescriptions to avoid and Mitigate significant impacts.
- C. Identify streams with highest restoration potential And streams in good condition.

HISTORY OF WASHINGTON WATERSHED ANALYSIS

- Negotiated procedure for scientifically-based, watershed-specific forestry rules to protect salmon
- Scientific/technical methods; decision-making process
- Adversarial and cooperative
- Implemented in 1992; now under review/renegotiation
- Other uses-USFS, FERC

WHY WATERSHED ANALYSIS

- Management of aquatic ecosystem requires that we learn how it works under natural and managed conditions
- Specific land-stream interactions (processes)
- Spatial distribution of streams, their condition and potential (inventory and map)

WHAT IS WATERSHED ANALYSIS?

- Data-driven planning and decision-making tool
- Collate, collect and analyze data to describe the system
- Define specific aquatic habitat problems and causative impacts of specific activities
- Develop solutions for carefully-defined problems
- Monitor outcomes and adjust activities.

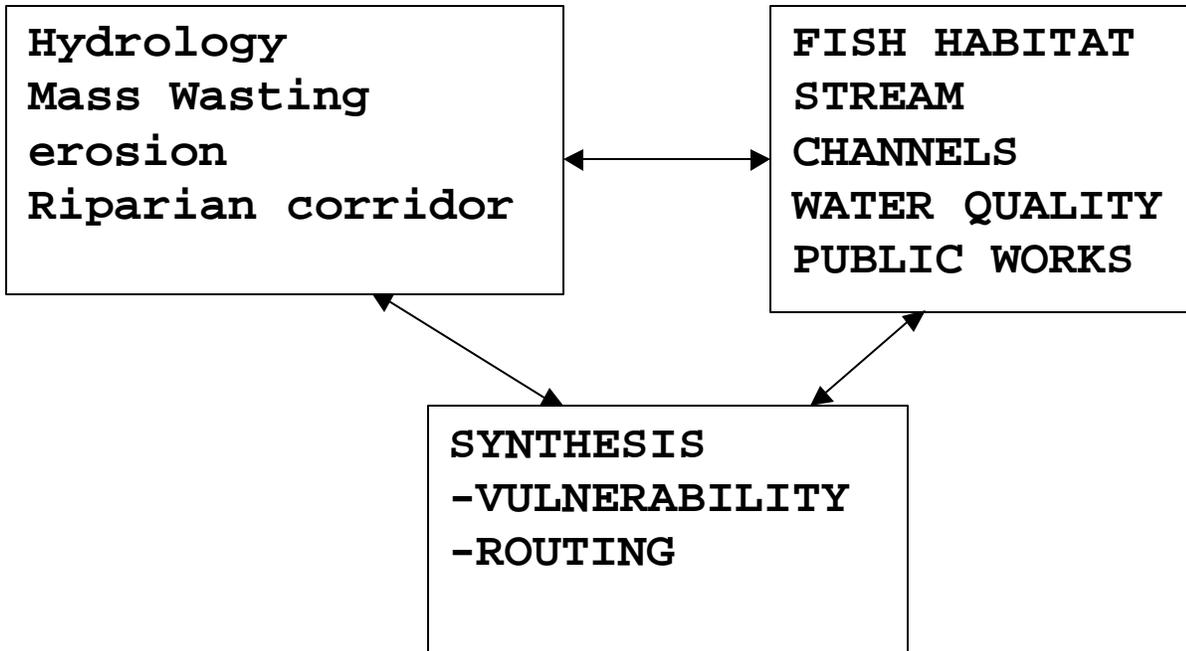
WHY WATERSHED ANALYSIS WORK

- Objective, systematic and focused assessment
- Rigorously defines the scope and magnitude of problems from a scientific perspective
- Uncertainties regarding scientific conclusions issues are acknowledged
- Judgement calls based on best available data

OVERVIEW OF WASHINGTON W.A. PROCESS

WATERSHED
PROCESS
MODULES

RESOURCE
MODULES



CAUSAL MECHANISM REPORTS

PRESCRIPTIONS

**WASHINGTON DNR WATERSHED ANALYSIS-CORE
ASSUMPTIONS REGARDING EFFECTS OF
FORESTRY ON FISH HABITAT**

WATERSHED PROCESS	INPUT VARIABLE	FISH HABITAT
Mass wasting	Coarse sediment	Summer rearing
Mass wasting & surface erosion	Fine sediment	Spawning & incubation
Hydrology	Streamflow	Spawning & incubation
Riparian Function	Large woody debris	Summer & winter rearing
Riparian Function	Stream temperature	Summering rearing

SYNTHESIS

- **MODULE FINDINGS REPORTED**

- **MAPS OVERLAYED**
 - **DETERMINED WHETHER HAZARDS ARE DELIVERED AND TO WHAT STREAM CLASSES**

- **SYNTHESIS OF DATA**
 - **CONSIDER PRESUMED IMPACTS IN LIGHT OF DATA/OBSERVATIONS AND SCIENTIFIC PREDICTIONS**
 - **IDENTIFY UNCERTAINTY**

- **CAUSAL MECHANISM REPORTS**

CAUSAL MECHANISM REPORTS

Detailed problem statement describing the linkages between specific actions and specific effects on habitat (type and location)

Input	Coarse sediment
Time frame	From past
Watershed process	Mass wasting
Hillslope locator (map)	In map unit x
Activity	Side cast road construction
Conditions and modifiers	On slopes > 65% in convergent topography
Channel effects	Reduced pool volume
Channel locator (map)	In stream unit y
Habitat effects	Degrading summer rearing habitat

Prescriptions

- Separate team
 - Weighted toward resource managers (not scientists)
 - May or may not invite analysis
- Rule matrix
- Develops plans/procedures to minimize or avoid impacts
- Effectiveness of prescriptions
 - 5 year review (Washington)
 - assessment team review
 - monitoring/adaptive management

Monitoring and Adaptive Management

- Proposed solutions are framed by hypotheses regarding how the system works - monitoring to test hypotheses allows evaluation of success
- Uncertainty can be accommodated because of monitoring, and land/water use can be fine-tuned as experience grows.

Expectations: What Will Watershed Analysis Provide

- Cost (\$ and personnel)
- Basis for prioritizing conservation efforts
 - Prevent further harm
 - Systematic identification of enhancement/restoration opportunities and values
- Habitat improvements may not improve fish population
- Mechanism for tracking conditions & progress
- Hypotheses and data to assess trends/causes

Modifications for Use on Russian River

- Impacts of dams, agricultural and urban land use on hydrology
 - Streamflow
 - Water quality
 - groundwater
- Surface erosion
 - Agriculture
 - Urban
- Gravel mining (stream channel module)

Implementation on Russian River

- Level 1 v. level 2

- Select 3 tributary watersheds for analysis that represent a range of conditions
 - Santa Rosa Plain
 - Coast Range
 - Inland Tribs to Ukiah or Alexander Valleys.

- Consider separate analysis of regulated mainstem
 - Russian River below Lake Mendocino
 - Dry Creek