

Designing a Monitoring Program

Ed Krumpe
CSS 496

*"When we try to pick out anything by itself,
we find it hitched to everything else in the Universe" J. Muir*

Reminder—Why Monitor?

- To detect differences in a resource value across an area at a given moment (i.e., status)
- To detect changes in values over time at a given location (i.e., trend)
- To provide information to assess whether mandated environmental standards are being met
- To provide an early warning system of ecological change, before unacceptable environmental losses occur
- ◆ To determine whether management action are having the desired effects

Designing a Monitoring Program: Keys to Monitoring

- ◆ Clearly defined goals & objectives
- ◆ Address long-term & short-term concerns
- ◆ Specific statements about how data will be used
- ◆ Explicit sampling/measurement protocols
- ◆ Explicit, multi-stage sampling plan
- ◆ Clearly defined responsibilities (partnerships, shared expertise . . .)

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Two Basic Approaches

- ◆ Focus monitoring in areas where human use tends to concentrate
 - Intent is early detection
 - Focus management or treatment efforts
- ◆ Randomly sample across the entire area
 - Intent is to characterize overall area conditions
 - Determine extent of human impacts
 - Detect more widespread, subtle changes

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First Steps

◆ First step: INVENTORY

- Air photos & maps
- Trail system & camp areas
- Fire history & role
- History of disturbance (mining, grazing, livestock)
- Visitor use history
- Limnology studies
- Wildlife inventories, distribution, abundance ...

"We found an overlooked wealth of information!"

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Choosing a sampling design

◆ Sampling frequency highest where:

- Conditions already close to standards
- Rate of change is highest
- Quality of data base is poorest
- Management effectiveness is questionable
- Unanticipated change has occurred
(disturbance, changes in adjacent land uses,
changes in regs.)

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Random or Purposive Sampling

- ◆ Why a random sample?
 - Strata, block, cluster sampling
 - Sample size (>variation req. >sample size)
- ◆ Why a purposive or non-random sample?
 - Concentrate efforts where there are problems
 - Efficiency & special problems
 - Avoid missing "small" but significant changes

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Monitoring Protocols

Specific instructions for every indicator

- Statement of Purpose
 - "Explain your logic is key to success."*
- ◆ Equipment needed
- ◆ Training needed
- ◆ Sampling Method & measurements
 - Treatment & control site? Fixed site?

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Monitoring Protocols

Specific instructions for every indicator

- ◆ Sampling schedule
- ◆ Data Forms
- ◆ Data Management
- ◆ Standards (explain, how to modify?)
"Red light or Orange light?"
- ◆ Management Actions
Tiered? Appropriate? Feasible?

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Monitoring Program Evaluation

- ◆ 4 Types
 - Program Planning (Clear goals? Info adequate?)
 - Program Execution (Was program implemented as planned?)
 - Efficiency (What are actual costs? Is it worth it?)
 - Impact Assessment (Does the program produce the intended benefits? Are there unintended benefits/costs? Are data used?)

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