Developing Monitoring Questions
Management questions relate to management actions.

- Is the stocking rate on this allotment compatible with sage grouse habitat?
- Is this road-crossing causing sedimentation in the stream?
- Did the post-fire seeding reduce cheatgrass establishment?
- Is solar energy development affecting air quality?

Monitoring objectives explain specifically how we propose to answer management questions.
Importance of developing clear monitoring objectives

• Can you answer the basic question for all monitoring projects: why am I collecting data?

• Monitoring objectives dictate:
  o Sampling design (where, when, how often you sample)
  o Sampling methodologies (e.g., whether you include supplemental indicators)
  o Data analysis and reporting

• Vague or ambiguous questions confound decisions regarding adaptive management, monitoring directions and program outcomes—how do you interpret your results?
Importance of developing clear monitoring objectives

- Cornerstone of adaptive management
  - Describe desired outcomes
  - Management actions to achieve outcomes
  - Benchmark for measuring success
Tips for developing sound monitoring questions

1. Strive for clear, concise, quantifiable statements

2. Minimize bias and maximize objectivity

3. Be specific: specify what you are measuring and the expected magnitude and direction of change

4. Specify the monitoring target population or scope of inference

5. Develop individual questions for each monitoring objective within a region
Monitoring questions—examples of poor questions

**Condition** *(baseline sampling for determinations of biological condition)*:
Poor: What is the composition of vegetation within the Home Camp PHMA?

**Trend** *(repeat baseline sampling for biological condition)*:
Poor: Are vegetation complexes within the Home Camp PHMA changing through time?

**Treatment effectiveness** *(willow planting)*:
Poor: How did Mill Creek respond to a willow planting?

**Impact assessment** *(lawsuit: perceived grazing induced habitat degradation)*:
Poor: Does grazing impact pygmy rabbit habitat?
Example:

Condition (baseline sampling for determinations of biological condition):

Poor: What is the condition of BLM freshwater resources?

Good: Nationally, what proportion of BLM freshwater resources are in good, fair, or poor biological condition as determined by the national BLM O/E macroinvertebrate index?
Monitoring questions examples

**Condition** *(baseline sampling for determinations of biological condition):*

Poor: What is the composition of vegetation within the Salt Creek watershed?

Good: Is total sagebrush cover between 25% and 65% on 70% of the Salt Creek allotment with 80% confidence?

**Trend** *(repeat baseline sampling for biological condition):*

Poor: Are vegetative attributes within the Salt Creek allotment changing through time?

Good: Did perennial grass cover in the Salt Creek allotment increase by at least 25% over the last three years with 90% confidence?