

# FRPA Resource Evaluation Program: Evaluation Concepts and Terminology

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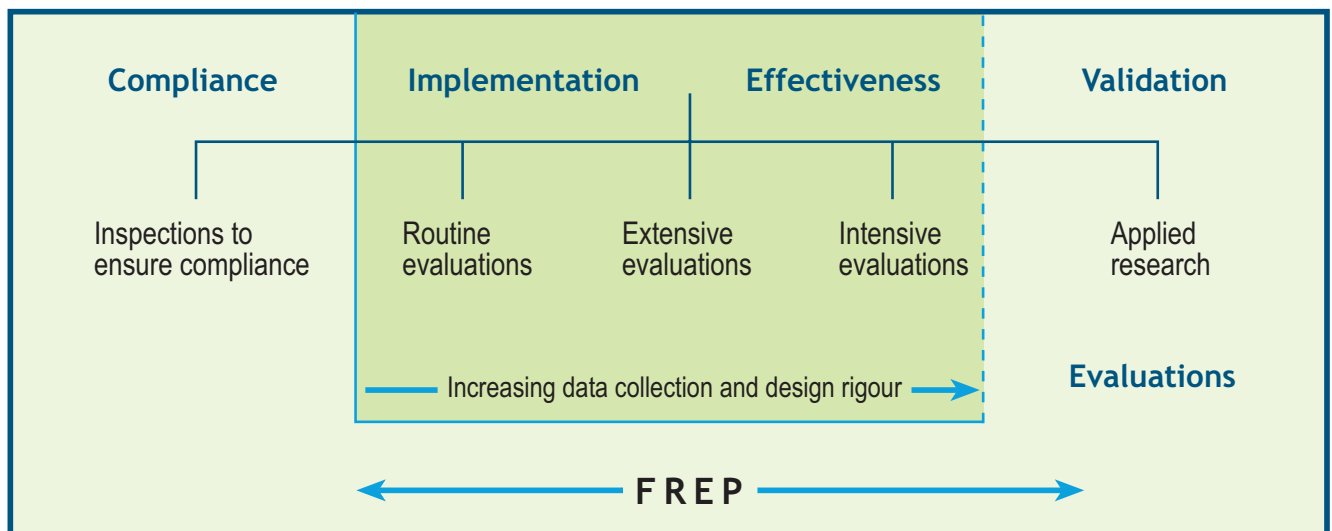
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## Introduction

The purpose of this document is to clarify some of the terminology commonly used in the resource evaluation field; and in particular the terms used in the FRPA Resource Evaluation program (FREP).

There is a range of types of evaluations that can be used to assess outcomes of forest management practices. The types of evaluations as illustrated in Figure 1, are: compliance, implementation, effectiveness and validation. Under the FRPA Resource Evaluation Program (FREP), the focus is primarily effectiveness evaluations. Implementation and effectiveness evaluations can be done at varying levels of intensity. The intensity level of implementation and effectiveness evaluations can be defined as routine, extensive and intensive.

In addition to types and intensities of evaluations, there is another important evaluation term – indicators. Various types of indicators are measured during evaluations in order to provide information on the state of the resource value being evaluated. These indicators can be classified as function-based, structure-based, species-based or pressure-state response indicators.



**Figure 1** *Types and Intensities of Evaluations.*

## Evaluation Types

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### Compliance Evaluation

**Definition** – *An assessment of compliance with legal requirements.*

Answers the question “have they done what they were legally required to?”

Compliance evaluations examine compliance with the legislation and standards. Compliance evaluations assume that legislation and standards are appropriate, they do not evaluate effectiveness. As a result this type of evaluation provides limited guidance for improvement. An example of a compliance evaluation is determining if a riparian reserve is the correct width.

### Implementation (Performance) Evaluation

**Definition** – *An assessment of progress towards a specific goal and whether practices were implemented as planned.*

Answers the question – “have we done what we said we would?”

Implementation evaluations are undertaken to determine rate of progress towards specific goals, including adoption of new practices, policies or guidelines and whether they were implemented as planned. This is a frequently used type of “internal” evaluation. An example of implementation monitoring is determining what percent of cutblocks over a specified area are implementing variable retention.

### Effectiveness Evaluation

**Definition** – *An assessment of whether policies or practices meet their desired objectives based on evidence of their outcome(s).*

Answers the questions – “Did our actions achieve our objectives?” “Are we headed in the right direction?” “Are our practices, plans and standards effective?”

Effectiveness evaluations are used to determine whether the plans or practices being implemented are actually meeting the anticipated outcomes; that is, are they effective? Effectiveness evaluations assess common operational activities, often using some comparison with a target that helps define effectiveness. An effectiveness evaluation example is determining if a specific species (or group of species) are utilising wildlife tree reserves.

### Validation Evaluation (a component of refinement or improvement evaluation)

**Definition** – *An assessment or verification of the basic assumptions under which a specific management direction was developed.*

Answers the question – Are we doing the right thing?

Validation evaluations are primarily a research tool with which to examine the basic scientific understanding of the cause and effect relationship between an ecological system and

management actions. It refers to testing of hypotheses that pertain to our level of understanding of how or why a system responds to a disturbance or treatment. The purpose of validation evaluations is to verify the basic assumptions upon which forest management activities are based. For example, up to 20 years ago, large woody debris was considered only an impediment to fish movement and was removed from streams. Research has now shown that woody debris is important in structuring stream communities, providing a link between the physical and biological functions in streams. Another example of validation evaluation is answering the question “Are wildlife tree patches an appropriate method for maintaining the required habitat for wildlife tree users?”

## Evaluation Intensities

**Routine Evaluations** – A relatively low intensity level or routine evaluation calling for typically inexpensive and rapid routine data collection.

Routine evaluations are low cost overview evaluations. It is typically a low intensity, less rigorous form of effectiveness evaluation that often involves visual estimates and “yes/no” checklists. Rating levels are described prior to the field assessment to ensure consistency in the grading of observations and measurements by the evaluator. An example is the MoF riparian checklist for Proper Functioning Condition used for range management.

**Extensive Evaluations** – The collection of categorical data often by visual estimates

Extensive evaluations involve the collection of categorical data by visual estimation of specified indicators. The indicators may be proxies for difficult to obtain variables. Scores or rankings are assigned to the indicator categories, which are combined to determine the overall “health” of the feature. Qualitative assessments use indices of response rather than more expensive and time-consuming direct measures. For example, erosion of the road surface is indicated by a category of surface rutting rather than by detailed measurements of sediment generation. All qualitative and quantitative variables should have a standardized sampling protocol to ensure consistency between evaluators. An example is the system used in the Board report “Effect of Cattle Grazing on Riparian Areas.”

**Intensive Evaluations** – An evaluation involving quantitative data collection and analysis, with comparison to controls.

Intensive evaluations involve, at specified sample sites, the collection of quantitative data and comparisons are with nearby controls and/or benchmark data. In intensive evaluations, the data are quantitative nature and are generally more time consuming and expensive to collect than routine or extensive data. In addition, comparisons can be made to established standards (e.g., guidelines, established thresholds or ranges), to provide a measure of effectiveness. Intensive evaluation sites can also used for monitoring sites, measuring trends over a number of years.

## Indicators

As described in the introduction, several different types of indicators can be used in an evaluation. An indicator is a measurable attribute or component (often an environmental component) of a resource value that can provide reliable information on the sustainability (or state) of that value. Indicators are simply what we will be measuring. There are several

types of commonly used indicators including: function-based, structure-based and species-based.

**Function-based indicators** – direct measures of processes and their rates (e.g., water flow or nutrient cycling).

**Structure-based indicators** – measure of ecosystem attributes (coarse filter) that predict broad-scale patterns (e.g., patch type distribution and abundance).

**Species-based indicators** – direct measures of some aspect of an individual species (fine filter) life history, behaviour, or demography (e.g., presence of Lewis’s woodpecker).

Another important concept related to indicators often discussed is “pressure-state-response.” Pressure (or stress) refers to the agent of change that operates through ecological processes that directly or indirectly cause a response (e.g., stream-side cattle grazing is a stress or pressure. The state may be decreased stream bank vegetation and reduced bank stability and the response bank erosion and sedimentation of the stream).

### Relating Criteria and Indicators to Evaluations

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The terms ‘criteria’ and ‘indicators’ are used in many ways in the natural resource sector. For example, the Montreal Process includes seven criteria and 67 indicators (C&I) for conservation and sustainable management of forests at the national/international level. Frequently they are used interchangeably with other terms such as goals and objectives. Criteria are equivalent to the FRPA resource values:

Each FRPA value (criteria) should have one or more goal/objective supported by one or more indicators and corresponding targets. A goal (objective) is a broad statement describing a desired outcome or future condition. An indicator is a quantitative or qualitative variable used to measure or describe the state or condition of a specific value for which targets are set. A target is used for each indicator to specify the desired condition, state or range for the indicator.

Figure 2 illustrates the relationship between international sustainable forest management terms and definitions and the terms/definitions used in the *Forest and Range Practices Act*.

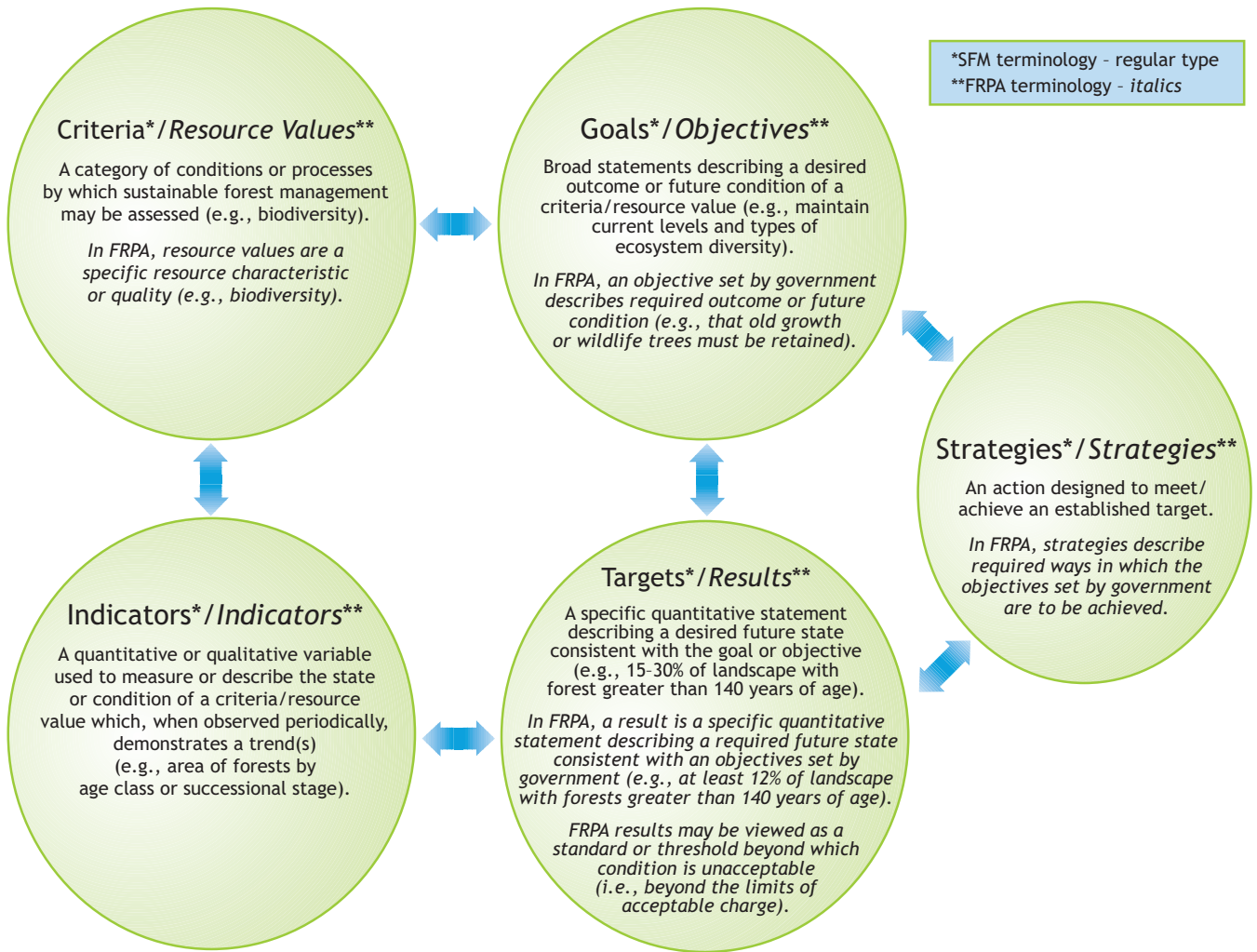


Figure 2 Relationships between Resource Values, Objectives, Indicators and Targets

**Government objectives** – refer to land use objectives, objectives enabled by regulation and objectives in regulation (see definitions below).

**Land use objectives** – refer to higher level plan objectives grandfathered under sections 3–5 of the *Forest Practices Code of BC Act* and objectives established under provisions of the *Land Amendment Act* (Bill 46).

**Land use plans** – are government approved strategic land use plans such as Land and Resource Management Plans (LRMPs) and regional plans undertaken for the Cariboo, Kootenays and Vancouver Island.

**Objectives enabled by regulation** – under *Forest and Range Practices Act*, include objectives for ungulate winter ranges, lakeshore management zones, scenic areas, wildlife habitat areas, community watersheds, identified fisheries sensitive watersheds, and recreation sites and trails (i.e., recreation sites, recreation trails and interpretive forest sites).

**Objectives in regulation** – objectives provided in *Forest and Range Practices Act* regulations including the Forest Planning and Practices Regulation, Range Planning and Practices Regulation, and Woodlot License Planning and Practices Regulation.

**Operational plans** – in FRPA this refers to Forest Stewardship Plans, Range Stewardship Plans or Range Use Plans, and Woodlot License Plans. (Note: operational plans under the FPC during a two-year transition to FRPA also includes other plans such as Forest Development Plans.)

**Policy material (in land use plans)** – non-legal material including goals, non-legal objectives (i.e., not land use objectives or higher level plan objectives), strategies, and implementation recommendations found within the land use plan that provide policy advice to government agencies and licensees but are not legally binding. They may be considered by forest and range licensees on a voluntary basis.

**Results and strategies** – measurable or verifiable outcome, process steps or practices specified in an operational plan that must address and be consistent with government objectives, and which are subject to compliance and enforcement.

**Sustainable Forest Management Plans** – optional plans that may be prepared by forest licensees, for example, in pursuit of forest certification and/or to address issues that are not required under a FRPA Forest Stewardship Plan. These plans are eligible for funding under the Forest Investment Account (FIA).

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CSA SFM Standards

National Research Council. 2000. *Ecological Indicators For The Nation*. National Academy Press. 180 pp.

The Program Evaluation Standards – Second Edition. *How to Assess Evaluations of Educational Programs*. 1994. The Joint Committee on Standards for Educational Evaluation. Sage Publications. 222 pp.

### Web Sites

EE Course, Province of B.C. – FRPA Resource Evaluation Program  
web site <http://www.for.gov.bc.ca/hfp/frep>

FREP Charter – The FRPA Resource Evaluation Program Charter can be found at the program  
web site <http://www.for.gov.bc.ca/hfp/frep>

*FRP Act* and Regulations – The *FRP Act* and Regulations can be found at the following  
web site <http://www.for.gov.bc.ca/ftp/HCP/external/!publish/FRPA/>

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## Glossary

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**Adaptive ecosystem management** – a process for testing hypotheses through management experiments in natural systems, collecting and interpreting new information, and making changes based on monitoring information to improve the management of ecosystems.

**Adaptive monitoring** – similar to and integrated with the concept of adaptive management, the idea that monitoring programs should themselves be adaptable because of changes in ecosystem management goals, better knowledge about targets, or more efficient means for collecting monitoring information. The challenge for those designing and operating long-term monitoring programs is to make such programs adaptable while preserving the validity of the information collected through the use of effective data management and the use of core indicators to make status and trend detection valid through periods of change.

**Assessment** – the process whereby monitoring data are interpreted in the context of questions and issues pertaining to ecosystem management targets. Assessment also includes the development of statistical relationships from monitoring data, other forms of data analysis and interpretations, and modelling linked to the objectives of the initiative.

**Attribute** – a component of a natural system or conceptual model of such a system. A subset of the potential biological elements or components of natural systems, which is representative of overall ecological conditions or important human values. Attributes can be used to select indicators to monitor the known or hypothesized effects of ecosystem stressors.

**Audit** – as used in this document is an independent, objective activity with a focus on compliance. Auditing is assessing and promoting compliance with directions and statutory obligations and averting or addressing non-compliance.

For example, audits may inspect government operations (e.g., road construction, maintenance or deactivation, silviculture, etc.) to assess compliance with statutory obligations

**Baseline** – condition of a system at time zero to which system changes may be referenced and compared. Choosing a point in time as a baseline is generally a subjective and arbitrary process resulting in choices for baselines from among temporal phases such as (1) upon the initiation of a new management regime, (2) prior to European settlement, or (3) upon the acquisition of the first adequate or complete set of monitoring data.

**Compliance Audits** – assess compliance with legislated requirements (e.g., FRPA regulations). Conformance with strategies for achieving the desired results is also subject to compliance inspections.

**Compliance evaluation** – an assessment of compliance with legal requirements.

**Compliance monitoring** – tracking and verifying implementation of regulations or management plans; synonymous with implementation monitoring.

**Conceptual ecological model** – a graphical representation of a set of relationships among factors important to the function of an ecosystem or its subsystems. Conceptual models generally link stressors, which may be natural or representative of anthropogenic perturbation, with ecosystem attributes, which are often the source for monitoring indicators.

**Core indicators** – a subset of the overall suite of potential indicators that is represented at all times and places in a monitoring data collection program. Core indicators are important for comparing subregions within ecoregional monitoring areas and to the applicability of monitoring information across projects conducted at different spatial and temporal scales.

**Critical pathway** – a component of a conceptual model. The known or hypothesized linkage(s) connecting stressor(s), ecological effects, and attributes, which appears to explain a high proportion of the ecological response shown in the model (i.e., the ecologically most important response pathways resulting from a stressor).

**Critical success factors** – factors deemed necessary in order for FREP to be successful in meeting its objectives.

**Ecoregion** – ecosystems of regional geographic extent

**Ecoregional initiative** – programs that seek to alter land and water management to conserve and restore species and environments, as well as social and economic systems, across regional landscapes.

**Effectiveness evaluation** – an assessment of whether policies and practices meet their desired objectives based on evidence of their outcome(s).

**Effectiveness monitoring** – evaluating system status and trends resulting from the implementation of a management plan; evaluating whether the management plan achieves the desired outcomes or predicted targets.

**Effects-oriented monitoring** – monitoring indicators of ecosystem response to management actions using response-oriented indicators.

**Extensive evaluations** – the collection of categorical data often by visual estimates.

**Forest policy evaluation** – assessing forest practices to determine the level to which they meet the intent of the policies that guide them or assessing the policies for their ecological, social or operational appropriateness, or evaluating the effectiveness of the statutory framework, field practices, and the ministry policies and procedures

**FREWG** – FRPA Resource Evaluation Working Group – the main working group that oversees the development and implementation of the FRPA Resource Evaluation Program.

**FRPA** – *Forest and Range Practices Act*.

**FSP** – Forest Stewardship Plan.

**Function-based indicators** – direct measures of processes and their rates (e.g., water flow or nutrient cycling).

**Health** – term used to indicate ecosystem status relative to targets or ideals. Because targets and ideals are usually subjective, this term is often ambiguous.

**Implementation (performance) evaluation** – an assessment of progress towards a specific goal and whether practices were implemented as planned.

**Implementation monitoring** – undertaken to record progress towards a specific goal, including adoption of new practices, and whether the practices were implemented as planned.

**Indicator** – a parameter that characterizes an important aspect of a natural system's condition and which may be measured to provide direct or indirect information on the state of an ecological resource.

**Intensive evaluations** – an evaluation involving quantitative data collection and analysis, with comparisons to controls.

**Inventory** – a comprehensive determination of a system's status at a single point in time. An initial inventory of a system's status is often used as the baseline condition.

**JSC** – Joint Steering Committee.

**Monitoring** – observing, checking, or keeping a continuous record of a process or quantity over a period of time.

**MSRM** – Ministry of Sustainable Resource Management – responsible for planning, policies and resource information in support of the sustainable economic development of Crown land, water and resources.

**MWLAP** – Ministry of Water, Land and Air Protection – responsible for the management, protection and enhancement of British Columbia's environment.

**PAC** – The Minister of Forests' Public Advisory Council – a council of external stakeholders providing input into the *Forest and Range Practices Act* and regulations.

**Performance measure** – the specific measures for ecosystem initiative targets. Collectively, performance measures provide an index of ecosystem condition and the overall progress of a management plan toward achieving its targets.

**Predictive monitoring** – monitoring an indicator that is predictive of ecosystem response in the future (a leading indicator) and is linked to a critical stressor.

**Prospective monitoring** – an approach to monitoring that involves the determination of the status and trend of stressors that have demonstrated linkages to ecosystem effects. Also known as predictive monitoring because the cause and effect linkages are well-enough established to make reliable predictions about ecosystem effects in response to stressors.

**Protocol** – the standardized methodology employed to collect data about a monitoring indicator.

**Refinement monitoring** – also known as improvement monitoring, refinement monitoring evaluates a range of alternative practices to provide a range of comparisons.

**Response-oriented indicator** – an indicator that responds to ecosystem state change and reflects response to stressors. See effects-oriented monitoring.

- Retrospective monitoring** – an approach to determining ecosystem status and trend based on an evaluation of effects that can be linked via assumptions to causes. Retrospective monitoring is applied where information permits assumptions to be made about cause-and-effect linkages, but the accumulation of monitoring information, research hypothesis testing, or modeling does not support a prospective approach. See prospective monitoring.
- Routine evaluations** – a relatively low intensity level or routine evaluation calling for typically inexpensive and rapid routine data collection.
- Species-based indicators** – direct measures of some aspect of an individual species (fine filter) life history, behaviour, or demography (e.g., presence of Lewis' woodpecker).
- Status** – the condition of an indicator, or suite of indicators, demonstrating a system's condition at one point in time.
- Stressor** – a component of a conceptual model. A physical, chemical, or biological entity or process that induces effects on individuals, populations, communities, or ecosystems. Stressors include natural processes and structures, including forms of disturbance (e.g., naturally caused fire, native pathogens, or climate-driven hydrological change), and may also represent anthropogenic alterations of natural processes or structures (e.g., invasion of exotic species, stream diversion or impoundment, or vegetation manipulation).
- Stress-oriented indicator** – an indicator that is predictive of ecosystem response in the future (a leading indicator) linked to a critical stressor. See predictive monitoring.
- Structure-based indicators** – measure of ecosystem attributes (coarse filter) that predict broad-scale patterns (e.g., patch type distribution and abundance).
- Sustainability** – a state or process that can be maintained indefinitely. The principles of sustainability integrate three closely interlined elements – the environment, the economy and the social system – into a system that can be maintained in a healthy state indefinitely.
- Target** – the desired endpoint of an ecosystem management strategy or plan, often dynamic or expressed in terms bounded by a range of variability.
- Trend** – the change in a system's status between two or more points in time. Monitoring of indicators' status at multiple points in time is fundamental to the ability to detect trends.
- Validation evaluation** – an assessment or verification of the basic assumptions under which a specific management direction was developed.
- Validation monitoring** – monitoring that is specifically directed at the testing of assumptions about a system's cause-and-effect relationships, specifically at cause-and-effect relationships existing between management activities and monitoring indicators or the resources being managed.

