

# **Standards for Best Available Science**

Independent Research and Science Team

Presenters:

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***Science is both a structured, systematic way to learn about the world and the body of information and knowledge that results. Science can be either basic or applied and includes both research and monitoring.***

# Goal:

- Distinguish between research and monitoring.
- Describe what a researchable question is.
- Refine the set of principles that define the quality of scientific work.
- Define the types and sources of available science.
- Describe a process for peer review.



# What is Research?

- Develops NEW knowledge to answer questions not well understood in the broader scientific literature.
- Is designed to answer “why”, “what”, and “how” questions.
- May include development of new tools, methods, or approaches to answer questions as well as new insights.
- Requires development of a clear hypothesis (e.g., researchable question) that is explored with transparent methods, often using a null hypothesis framework.
- All aspects of research must be clearly described and communicated to allow others to evaluate the robustness of the design and the relevance of the findings through peer review.

# What is Research?

- Basic Research:
  - Explores fundamental relationships to understand how systems work.
  - Example: How do amphibians use habitat patches along corridors?
- Applied Research:
  - Generally has a direct application.
  - Example: How does amphibian movement respond to habitat patches created by land use (e.g. timber harvest)?

# What is Monitoring?

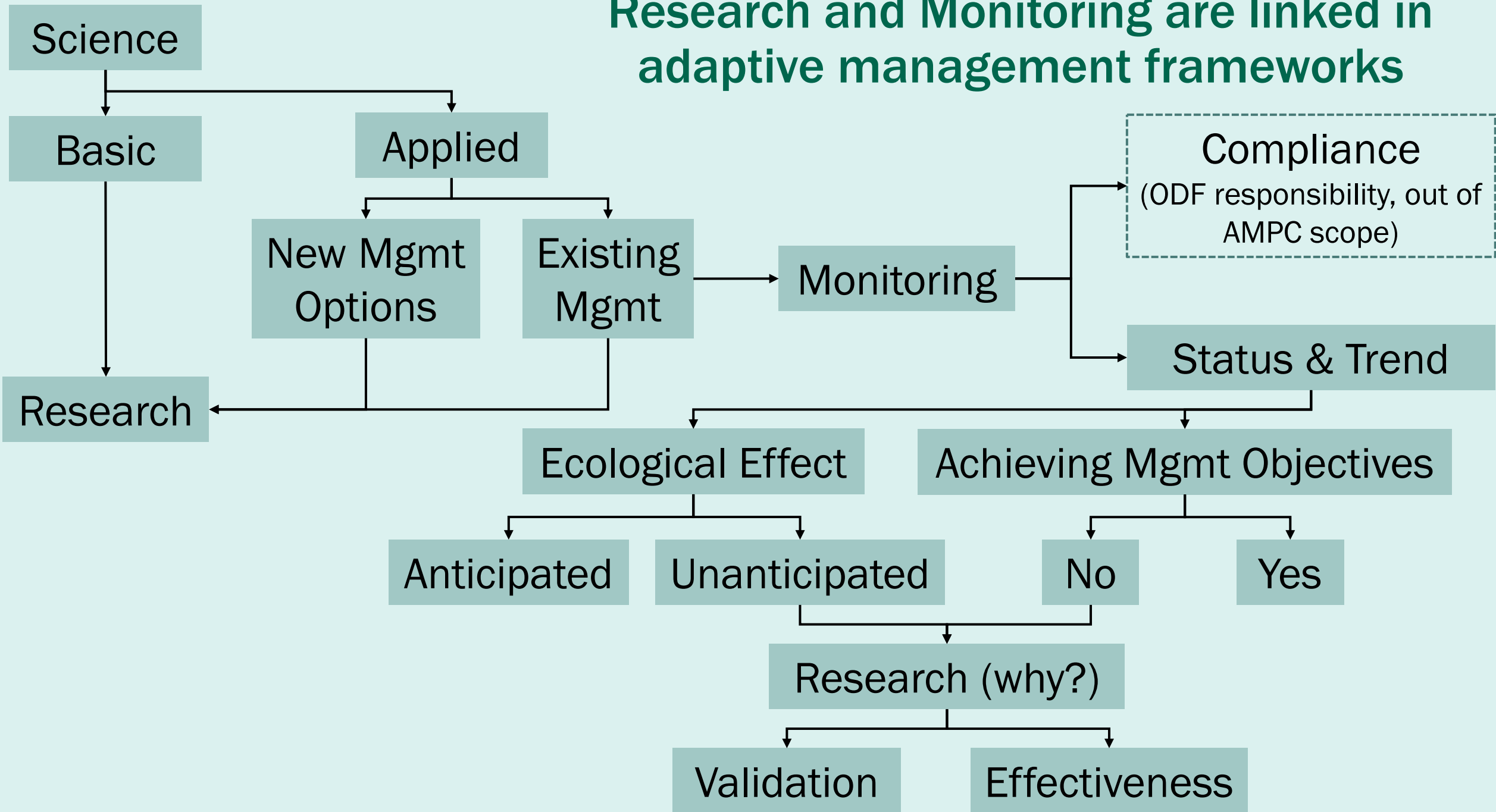
- Key to adaptive management.
- Provides empirical understanding of the effects of management over time.
- Relies on insights from basic and applied research.
- Does not generally develop new knowledge by asking “why” questions.
- Can solve a variety of other questions such as current status or trend over time.



# What is Monitoring?

- Compliance – are we doing what we said we would?
  - Example: Are riparian buffers being consistently implemented as described in rule?
- Status and trend – evaluates how conditions are changing from baseline.
  - Example: What are the range-wide habitat conditions for target amphibians over time?
- Validation – articulates and validates underlying assumptions and can become applied research.
  - Example: Are the assumed relationships between stream temperature and amphibian movement pathways that underlie riparian buffer prescriptions accurate?
- Effectiveness – links to specific management actions to evaluate if objectives have been achieved.
  - Example: Are riparian buffer prescriptions providing shade sufficient to maintain desired ranges of water temperatures in non-fish-bearing streams used by target amphibians?

# Research and Monitoring are linked in adaptive management frameworks





# What is a researchable question?

- An effective researchable question is specific enough not be quantified and tested through analysis.
- Guides the development of either research or monitoring efforts.
- Poor researchable questions use terms that cannot be quantified, or that can be interpreted differently by different individuals.
  - Avoid terms such as resilience, healthy, effective, or natural.



# What is a researchable question?

A non-specific researchable question:

*What is the health of riparian forests over time?*

A specific researchable question:

*How do canopy cover, air temperature, soil moisture, and downed wood change over time in managed compared with unmanaged riparian forests?*

# Types and sources of available science

- Peer-reviewed literature – scientific journals and books.
- Gray literature – reports of surveys, experimental or long-term historical data, theses or dissertations.
- Expert knowledge – supplied by professional experts.
- Anecdotal evidence – essentially a short narrative about personal experience; examples include public comment etc.

# Indigenous knowledge

- Indigenous knowledge (IK), or other forms of knowing, make essential contributions to answering research questions.
- The IRST does not currently have a formal approach to IK, but will continue to explore and develop such procedures.
- “Two-Eyed Seeing” is a relevant concept that brings together IK and Western Science perspectives to examine questions working in partnership with Tribal Nations.



# Uncertainty

- A key role of the IRST and AMP is to address scientific uncertainty.
- Evaluations by IRST and AMP of proposed research or monitoring efforts will include:
  - Evaluations of study plans and proposals.
  - Sample size to answer questions.
  - Sample design and links to research goals.





# Role of external experts and peer review

- External experts will be consulted for peer review of IRST-commissioned research reports.
- External experts may also engage in other aspects of IRST work such as in consultation to refine research questions, review of available literature, preparation of requests for proposals (RFP), and in selection of research to fund.
- Any entity participating in the IRST's internal development of and RFP is not eligible to respond to that RFP.