# Systematic Reviews: Evidence Regarding Effectiveness of Placing Large Wood in Streams

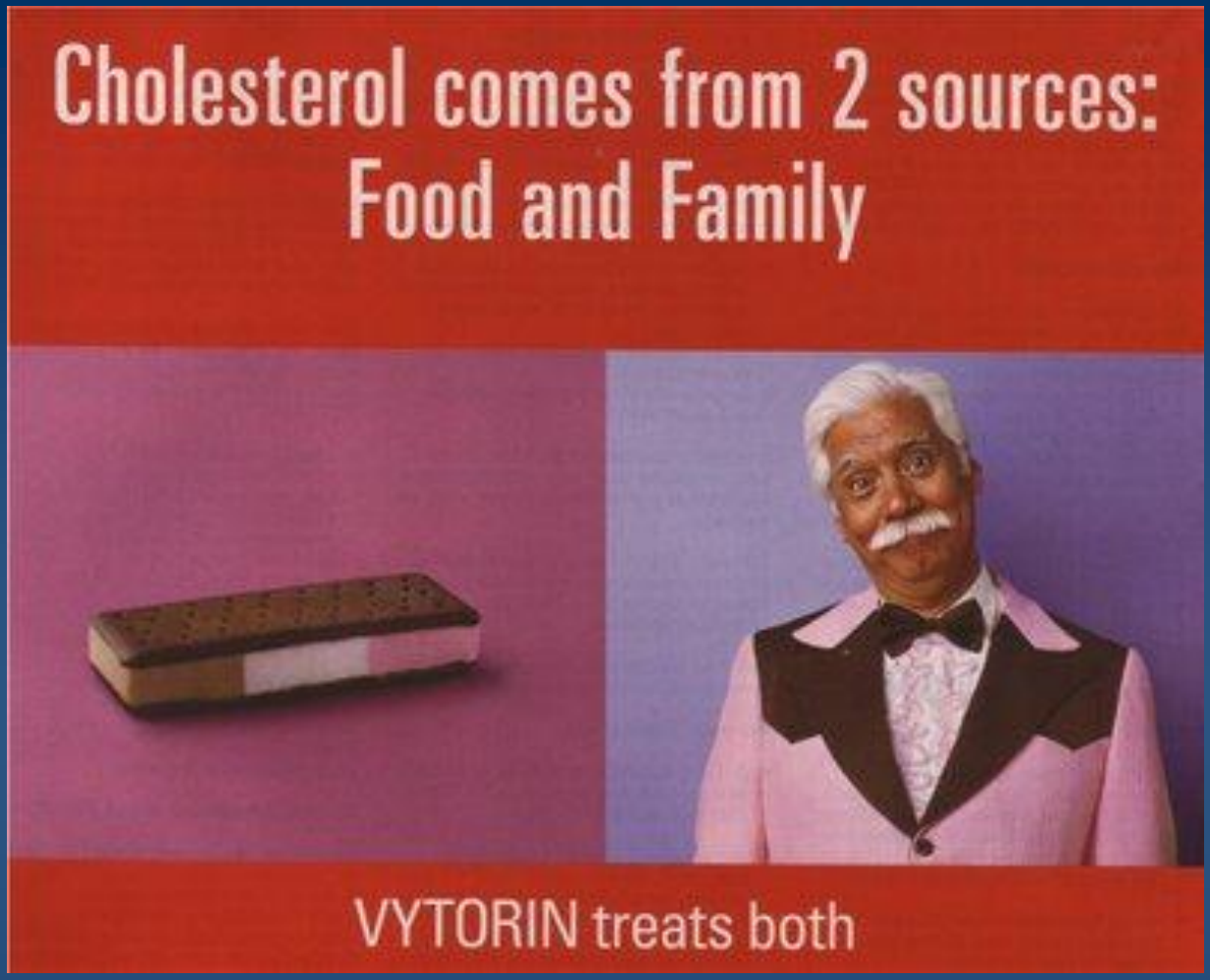
Kelly Burnett, Guillermo Giannico, & Jeff Behan

# What, if anything, can Clinical Medicine

# teach Natural Resources Management?

# Systematic Reviews

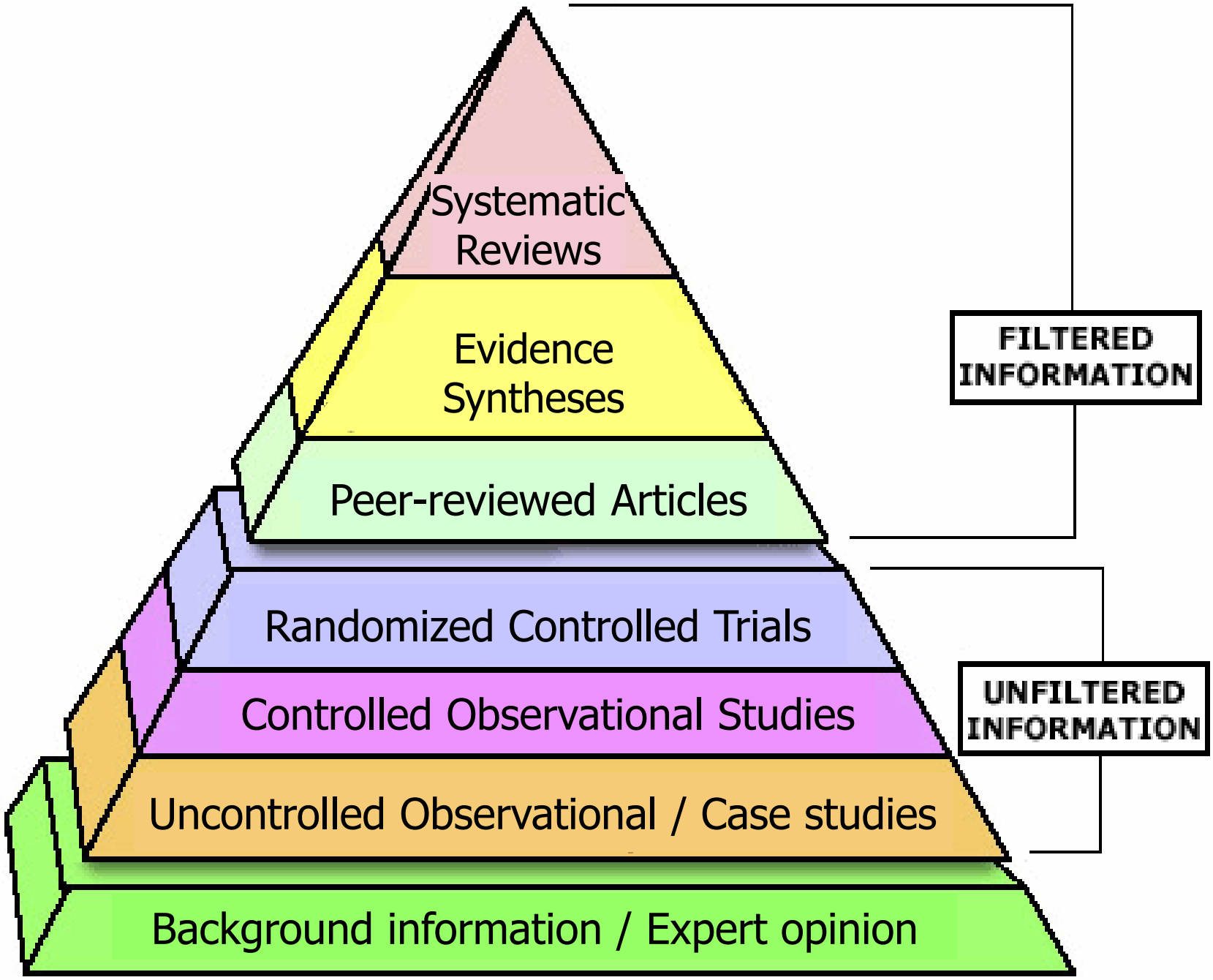
- Identify, evaluate, and synthesize available scientific evidence
- Specific clinical intervention
- Transparent and objective methods to gather, assess, and summarize evidence
  - Established in advance
  - Reported




Does VYTORIN (intervention)
reduce blood cholesterol (outcome)
in geriatric males (population)
compared to no treatment? (comparator)

# Systematic Review Protocol

- Define a question
- Search available literature
- Extract data
- Assess study quality

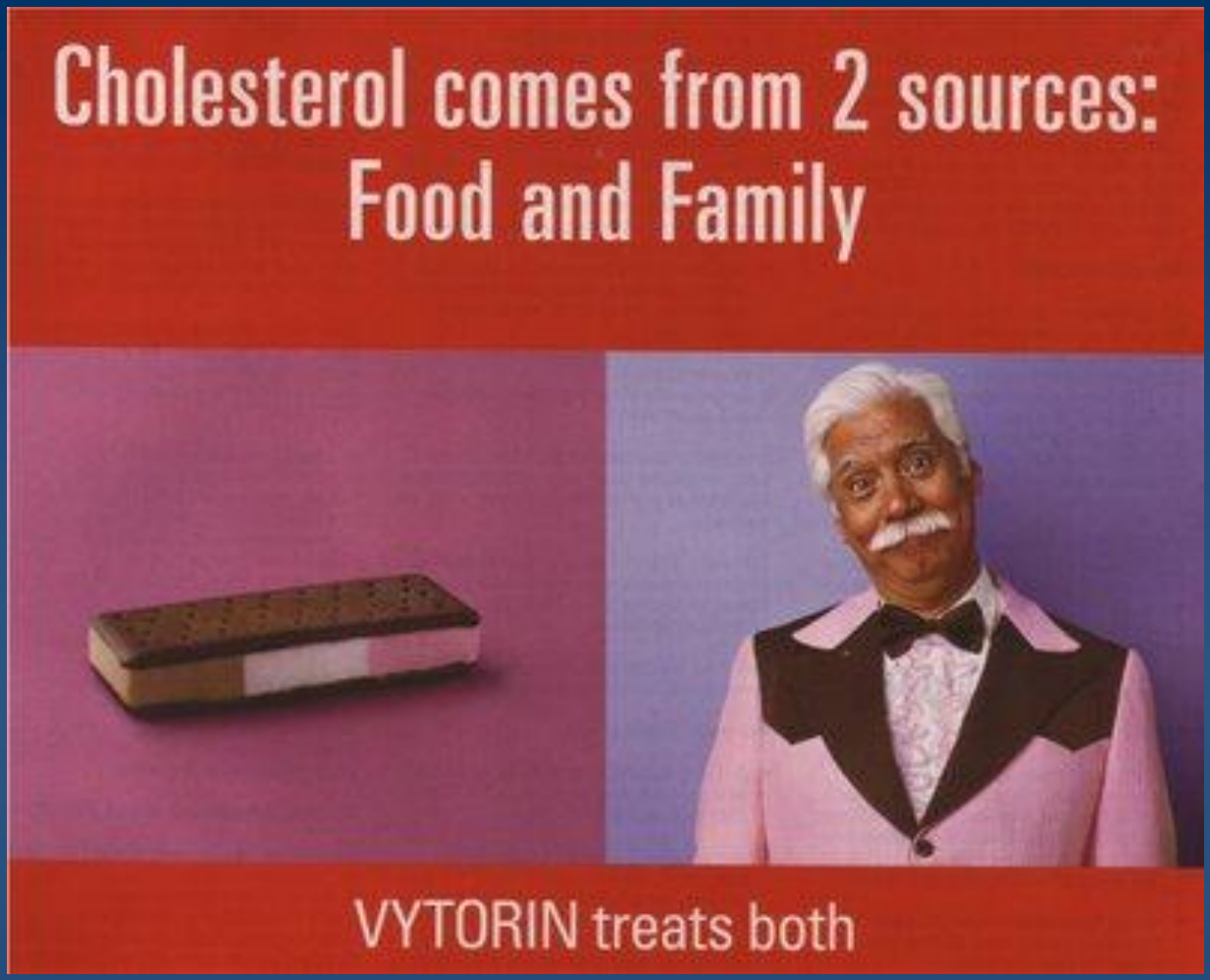

Systematic Reviews
Evidence Syntheses
Peer-reviewed Articles
Randomized Controlled Trials
Controlled Observational Studies
Uncontrolled Observational / Case studies
Background information / Expert opinion
FILTERED INFORMATION
UNFILTERED INFORMATION

# Systematic Review Protocol

- Define a question
- Search available literature
- Extract data
- Assess study quality
- Analyze data & synthesize evidence

# Analyzing and Synthesizing Evidence

- Approach
  - Quantitative meta analysis of original data
  - Narrative discussion comparing study parameters
- Criteria
  - Quality
  - Quantity
  - Consistency




Slick Marketing or Scientific Evidence?

# Systematic Reviews in Medicine

1980s

Developed in U.K. to address poor transfer of medical *science* to medical *practice.*

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| 1995 | Cochrane Online Database - 36 reviews |

# Hyperbaric oxygen therapy for acute coronary syndrome (Review)

THE COCHRANE COLLABORATION®

**M. Bennett, N. Jepson, & JP. Lehm**

*Cochrane Database of Systematic Reviews*
2007, Issue 3. Art. No.: CD004818. DOI: 10.1002/14651858.CD004818.pub2

# Systematic Review Components

- Background - context for question, why important
- Objective - review question(s)
- Methods
  - Searching literature (databases, journals, keywords)
  - Criteria for study inclusion
  - Extracting data
  - Assessing quality
  - Analyzing and synthesizing evidence
- Results
- Author's conclusions on the State of the Science
- Funding sources and potential conflicts of interest

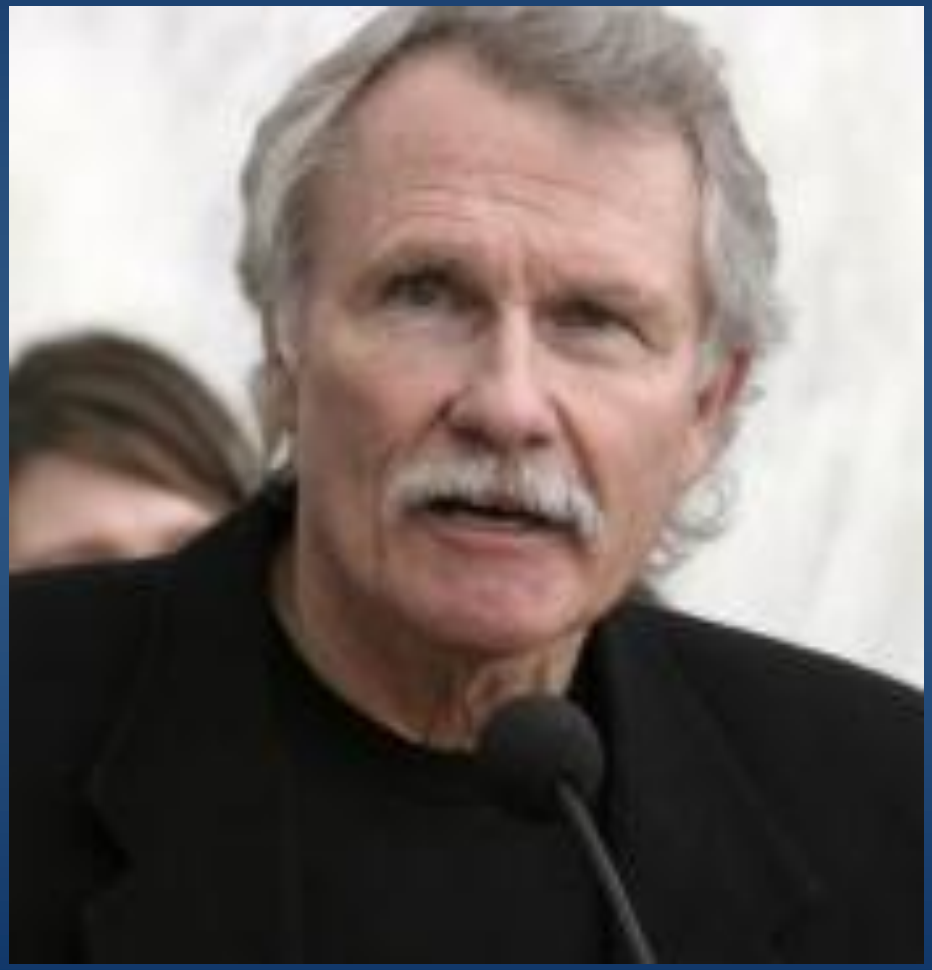
# Systematic Reviews in Medicine

| | |
|---|---|
| 1980s | Developed in U.K. to address poor transfer of medical *science* to medical *practice.* |
| 1993 | Cochrane Collaboration founded |
| 1995 | Cochrane Online Database - 36 reviews |
| 2000 | 100s of reviews completed & available to clinical practitioners |
| 2011 | Evidence-based medicine accepted worldwide - "gold standard" |

Evidence-based **medicine** is the explicit and judicious use of current, best-available science to make decisions about the care of individual **patients**.

*Sackett et al. (1996) British Medical Journal 312: 71-2*

# Link Between Clinical Medicine & Natural Resources Management in Oregon



John Kitzhaber

- Physician
- Director - Center for Evidence Based Policy at OHSU
- 3-term Governor

Evidence-based **management** is the explicit and judicious use of current, best-available science to make decisions about the care of **natural resources**.

# Potential Benefits of Systematic Reviews to Natural Resources Management

- Help define "Best Available Science"
- Address the problem of dueling science
- Identify effective management interventions

# Systematic Review In Oregon

- Oregon Board of Forestry integrated Systematic Review into their 2004 work plan
- Oregon State Forests Program and the Institute of Natural Resources at OSU develop background report
- Board of Forestry requested a Pilot Project

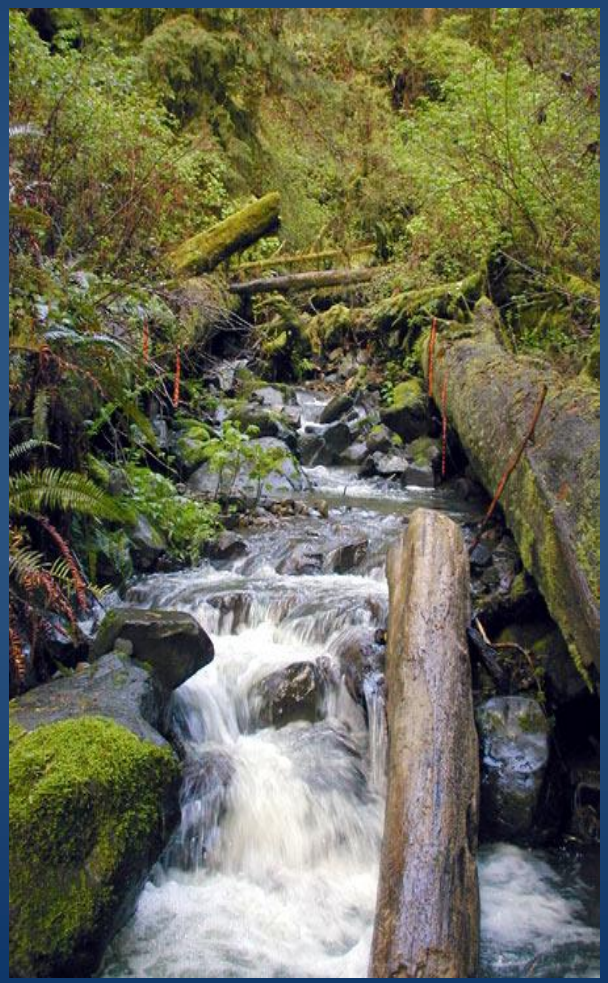
# Pilot Project Major steps

- Define question
- Recruit reviewers
- Develop systematic review protocol
- Find, filter, organize, and evaluate evidence
- Synthesize evidence & write review
- "Lessons learned" workshop
- Final reports on process and product

# Does instream wood placement affect salmonid abundance, growth, survival, or habitat complexity?

# Pilot Systematic Review: Protocol

- Define a question
- Search available literature
- Extract data
- Assess study quality
- Analyze data & synthesize evidence



# Documented Literature Search

- Reference librarian
  - 10 electronic databases & 8 library collections
  - 3 sets of key words
    - 23 salmon or trout
    - 3 environments
    - 8 interventions
- Returned 80 articles
- Refined search criteria
  - Peer-reviewed articles
  - Pacific Northwestern North America
- Returned 22 articles
- Randomly selected 11 peer-reviewed articles from other regions

## *Publication title and principal investigators*

- Study dates and study duration
- Study location
- Eco-region
- Drainage area

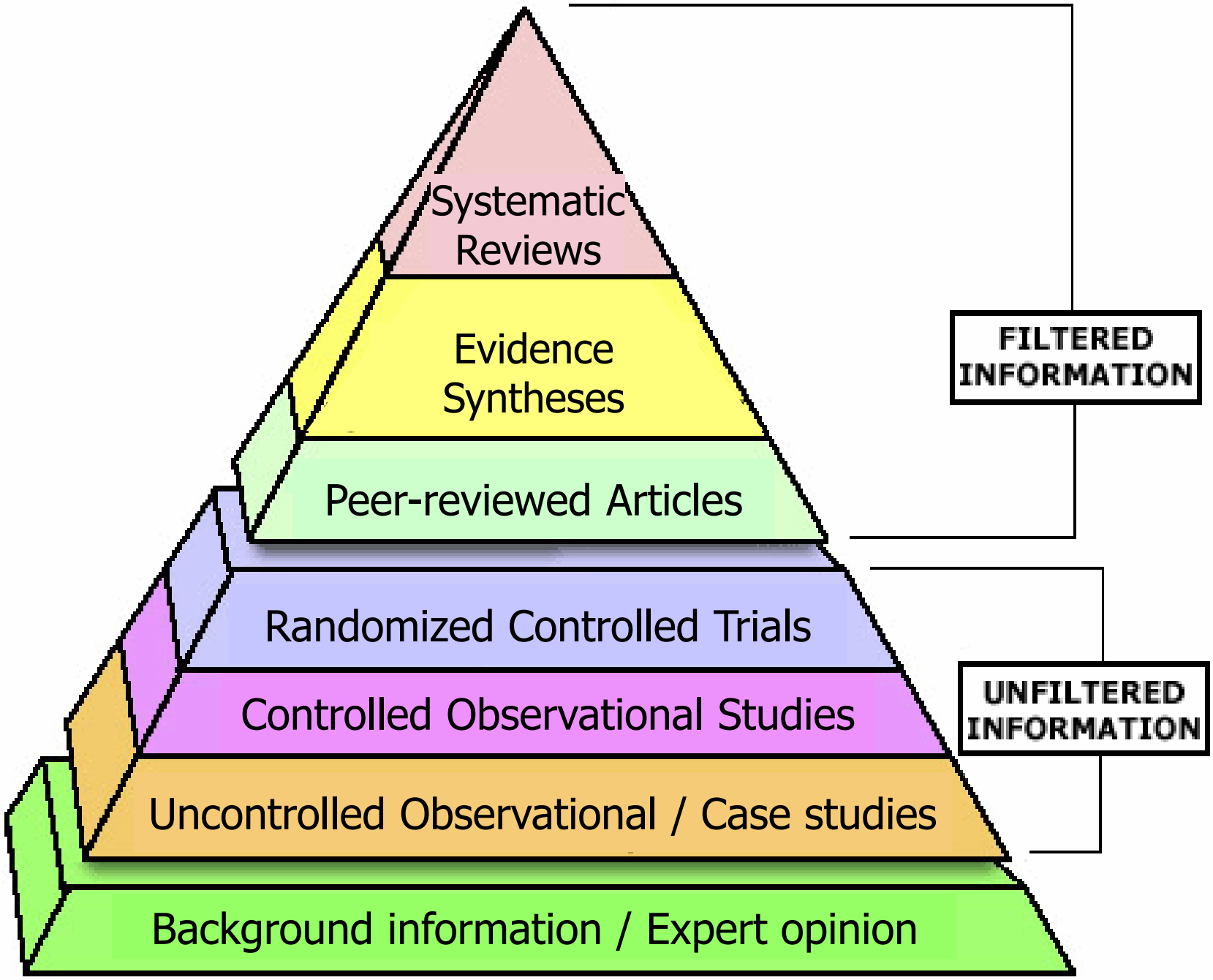
**Study Context**

- Research question(s), hypotheses
- Intervention or management action
- Species studied (if applicable)
- Study design, experimental controls
- Pretreatment data (yes/no)
- Replications & sample sizes

**Design**

- Nature of outcomes, importance, & robustness
- Effects modifiers (confounding factors)
- Level of relevance

**Results**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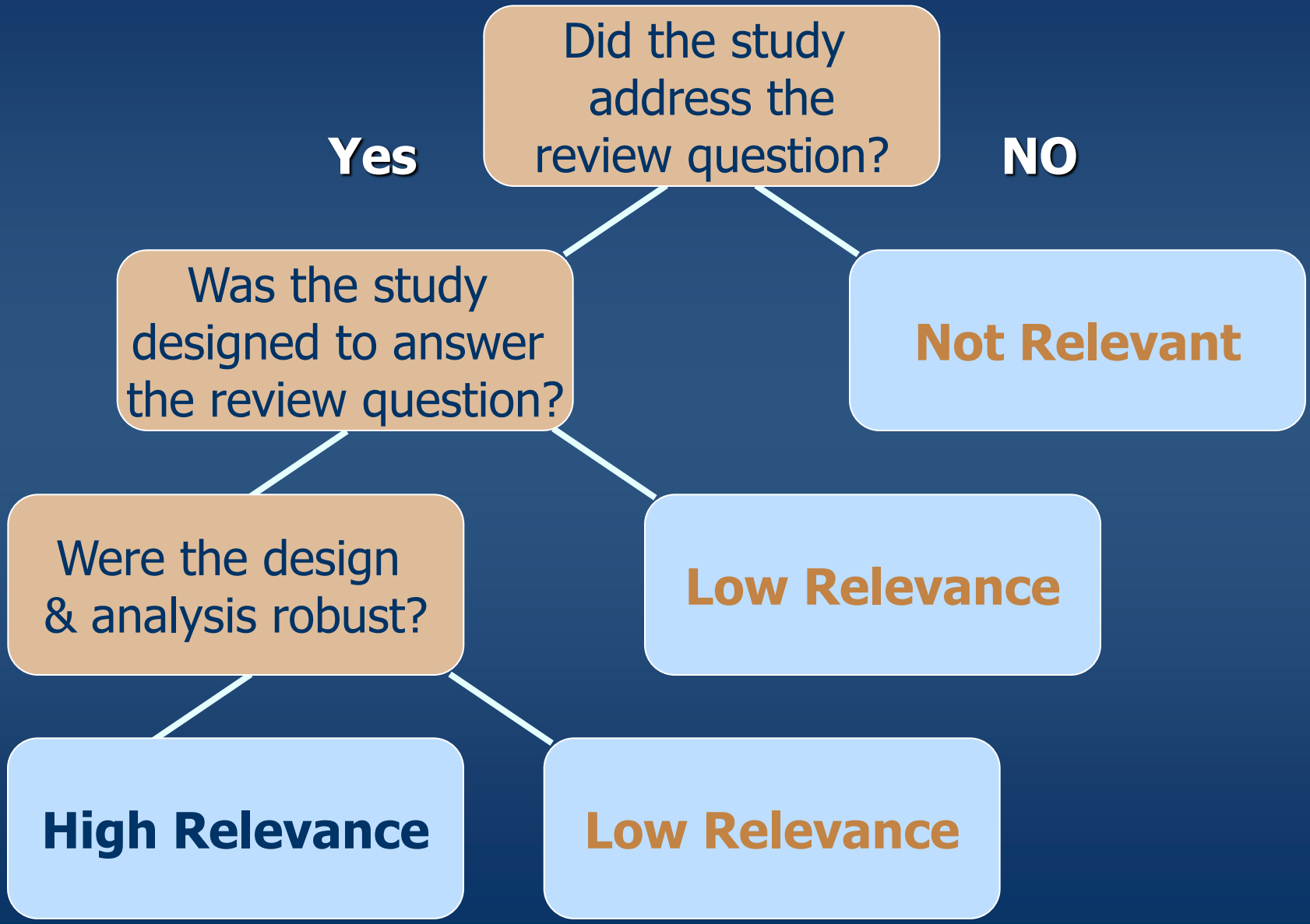
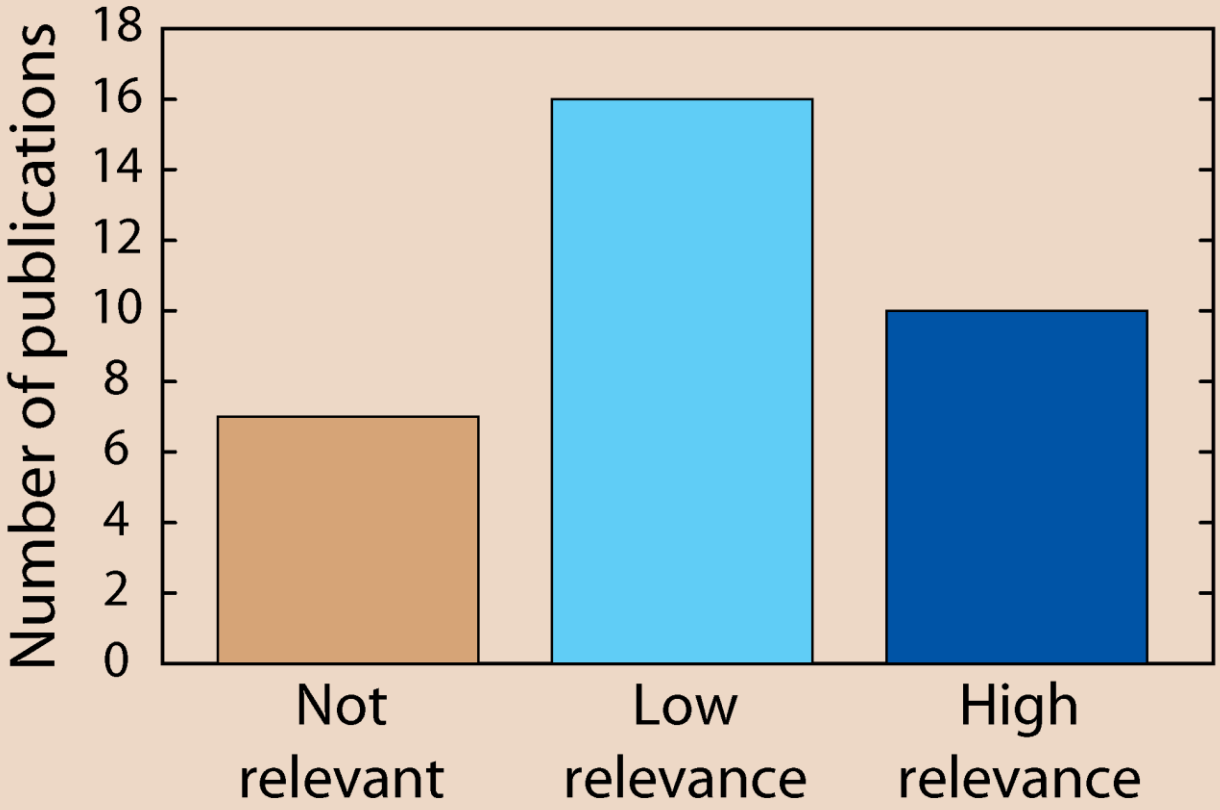
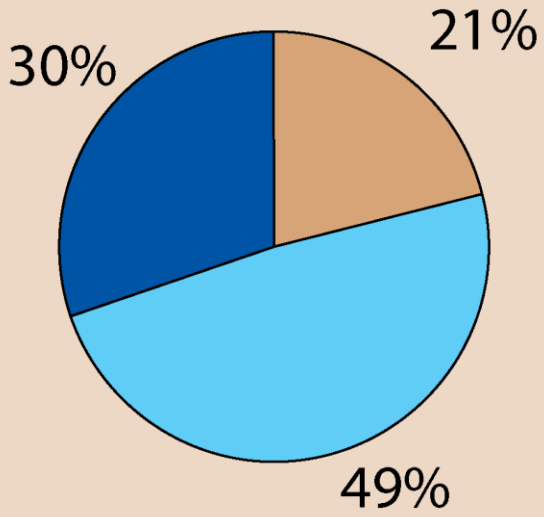
# Assessing Level of Relevance



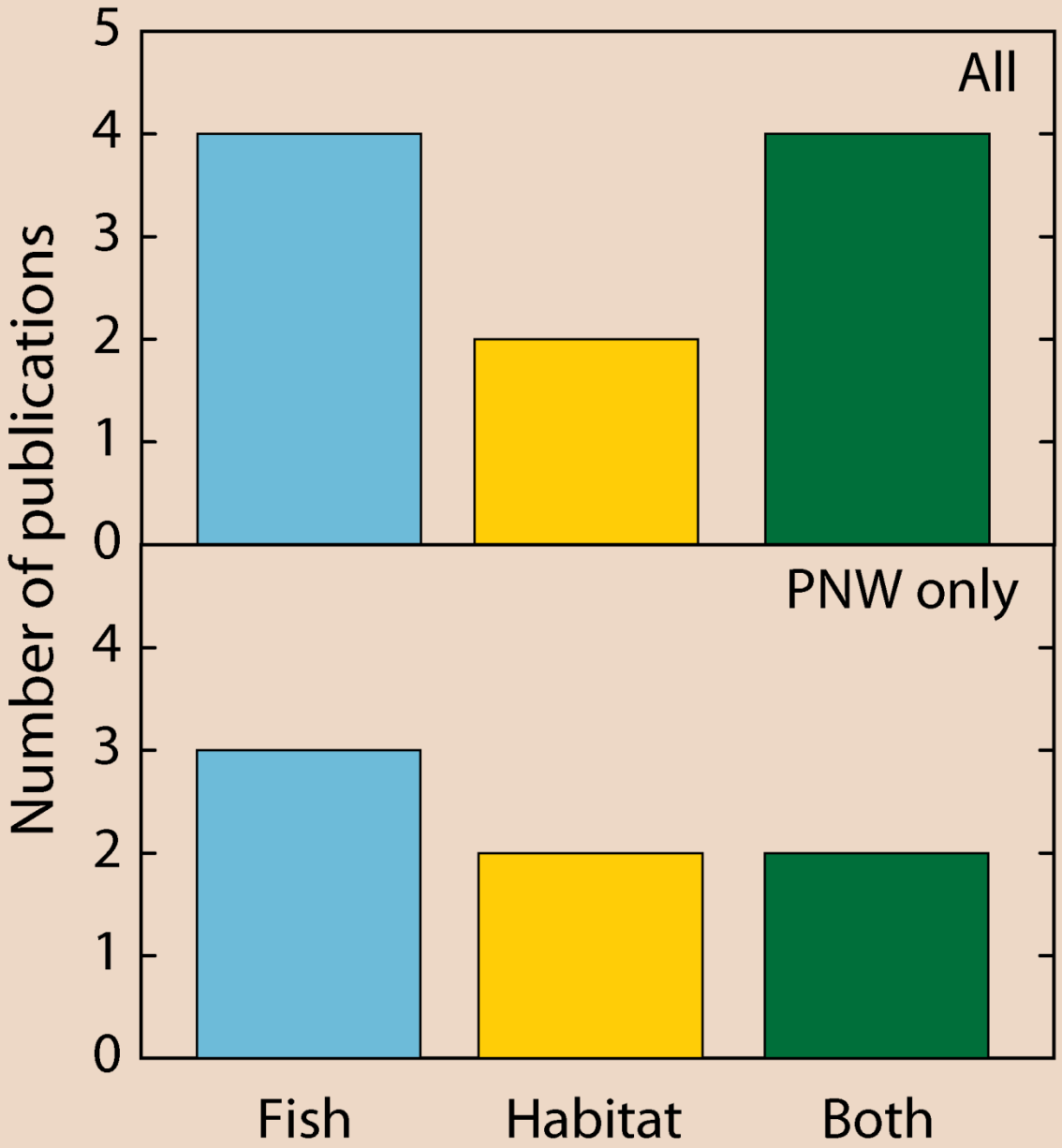
# Relevance of Reviewed Articles

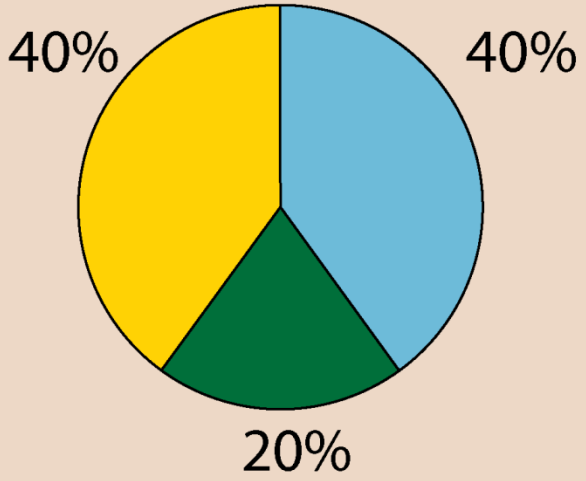
Does instream wood placement affect salmonid abundance, growth, survival or habitat complexity?

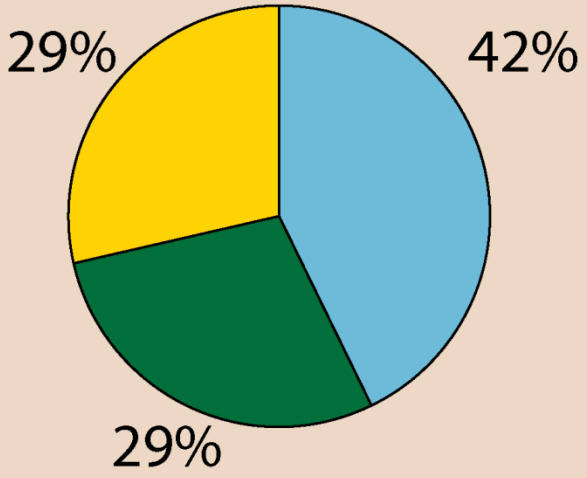


# High-relevance Articles



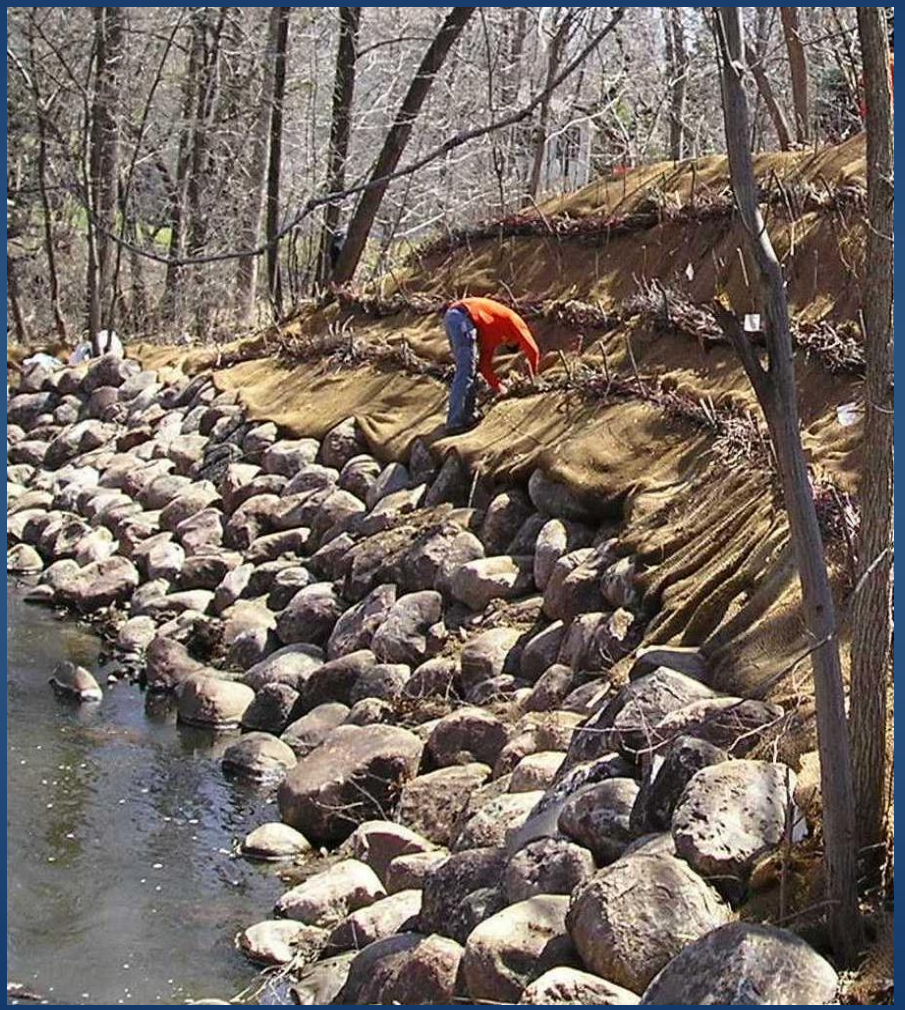



# Does instream wood placement affect salmonid abundance, growth, survival, or habitat complexity?

- Relatively few high-relevance studies
- Evidence suggests some short-term improvements in habitat consistent with objectives
- Little evidence to support efficacy for increasing abundance, growth, or survival of any salmonid
- Much less than definitive science is available to inform decisions about if, where, or how to design projects
- Knowledge gaps

# Wood placement: Knowledge gaps

- Distinguish effects from other types of treatments
- Effects for all species at all life stages
- Longer-term effects on salmon and habitat
- Watershed context



# Oregon Board of Forestry Report

A Pilot Test of Systematic Review Techniques: Evaluating Whether Wood Placement in Streams of the Pacific Northwest Affect Salmonid Abundance, Growth, Survival, or Habitat Complexity

*Burnett, Giannico, and Behan (2008)*

http://ir.library.oregonstate.edu/xmlui/handle/1957/13915

"Certainly -
a party of four at 7:30 pm
in the name of Dr. Jennings.
May I ask whether that is an
actual medical degree or merely a Ph.D.?"

J.B. Handelsman
*New Yorker Magazine*

# Systematic Reviews for Natural Resources

| Benefits | Challenges |
| --- | --- |

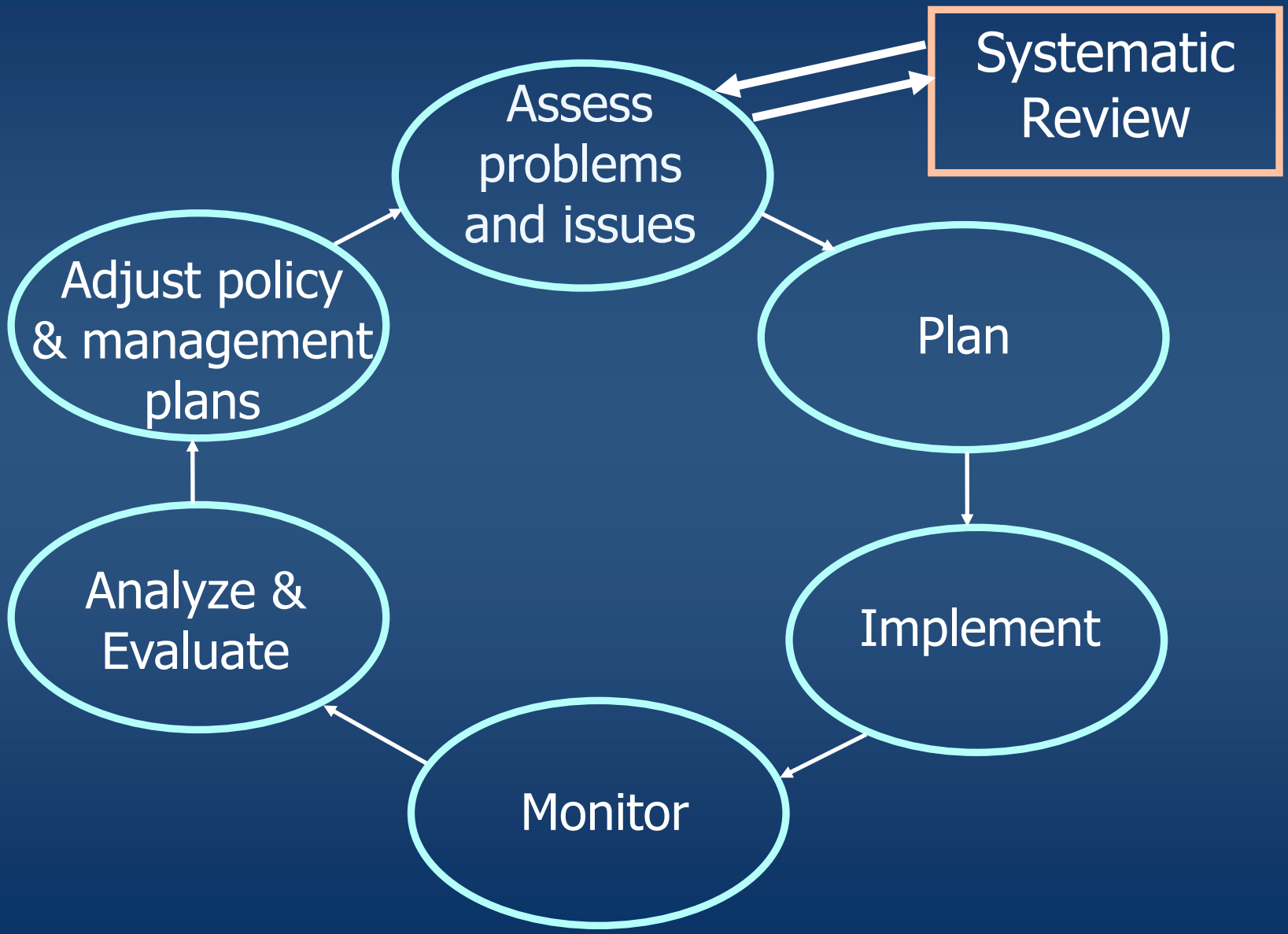
# Systematic Reviews for Natural Resources

| Benefits | Challenges |
| --- | --- |
| Achieve greater consensus on state of science | |
| Integrate "best available science" into decisions | |
| Reduce perceptions of selective or incomplete use of science | |
| Identify effective interventions & obtain better outcomes | |
| Identify knowledge gaps | |
| Focus & prioritize research | |

# Systematic Reviews for Natural Resources

| Benefits | Challenges |
| --- | --- |
| Achieve greater consensus on state of science | Evidence base limited, more methodologically diverse, with fewer controls |
| Integrate "best available science" into decisions | Time consuming & labor intensive |
| Reduce perceptions of selective or incomplete use of science | Limited infrastructure for conducting & distributing |
| Identify effective interventions & obtain better outcomes | Little recognition & few incentives for reviewers |
| Identify knowledge gaps | |
| Focus & prioritize research | |

# Systematic Reviews in Adaptive Management



# Some Parting Thoughts on Systematic Reviews for Natural Resource Management and Science

# Systematic Reviews: NOT!

- Cannot solve:
  - "Burden of proof" issue
  - How much evidence is enough?
  - Value conflicts
- May not be all inclusive
- Are not completely objective - but at least the process is transparent!
- Absence of evidence is not evidence of absence
- Synthesize science not make decisions

# A Systematic Review is Most Likely to be Useful in Natural Resources Science & Management

When there is a:

- Question about the effectiveness of an expensive or extensively applied intervention
- Controversy over "best available science" that inhibits decision making
- Broad agreement that an objective, transparent science synthesis is worth the investment

# Accomplishing Systematic Reviews

## Coordinate

Contractor

Agency technical staff

Interagency technical staff

Independent Multidisciplinary Science Team (IMST)

# Accomplishing Systematic Reviews

| Coordinate | Conduct |
| --- | --- |
| Contractor | Contractor |
| Agency technical staff | Academic or agency scientists |
| Interagency technical staff | Interagency technical staff |
| Independent Multidisciplinary Science Team (IMST) | Independent Multidisciplinary Science Team (IMST) |

# Resources:

Center for Evidence-based Conservation
http://www.cebc.bham.ac.uk/

Cochrane Collaboration
http://www.cochrane.org/

Systematic review pilot project: final report
http://ir.library.oregonstate.edu/xmlui/handle/1957/13915

# Acknowledgements:

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