Systematic Evidence Review (SER)

- What is SER?
- History
- Pilot Project Overview
- Lessons Learned
- Next Steps

SER: What is SER?

SER is a review of scientific evidence characterized by:

- Carefully selected, focused question;
- Comprehensive, systematic lit. search;
- Study evaluation and *quality assessment;*
- Narrative synthesis
- Transparent, objective process
- Not a decision making system in itself

SER: History

- Gov. Kitzhaber introduced concepts to BOF and others in 2004 -BOF interest, integration into work plan
- State Forests program agency lead, worked with INR to develop background report – Board requested SER Pilot Project to assess ***methods and process.***

SER: Work To Date

- SER Pilot Question:

"Does wood placement in Pacific northwestern North American streams affect salmonid abundance, growth, survival, or habitat complexity?"

SER – Pilot Project

- Pilot Project Overview
- Key Lessons about the SER *process*
- Pilot Project
  - Jeff Behan-Project Manager (INR)
  - Kelly Burnett, Science Reviewer (USFS PNW)
  - Guillermo Giannico – Science Reviewer (OSU F&W Dept)
  - Janet Webster – Reference Librarian (OSU Hatfield MSC)
  - Jeff Light, stakeholder contact (Plum Creek Timber Co.)
  - Brent Davies, stakeholder contact (Ecotrust) (1st meeting only)
  - Rosemary Mannix, ODF project lead
  - Liz Dent, ODF Riparian and Aquatic specialist

INR Report overview

- Rather than a general topic, a systematic review starts with a focused question- specifies *population* or *species*, *intervention* or *management action*, and *outcomes of interest.*
- Tightly focused review question makes it easier to decide which studies are relevant to the review, and which ones are not.
- Question is vetted with stakeholders to ensure that it is *about science* and *relevant to policy and practice.*
- Review *protocol* spells out in advance how evidence will be gathered, assessed and summarized.
- Documentation of all steps helps ensure that the review is transparent and can be easily updated.

Pilot Project – Major steps

- Question ID and refinement*
- Reviewer recruitment
- Development of protocol and search strategy*
- Finding, filtering, organizing, evaluating evidence
- Collating evidence & writing the review
- "Lessons learned" workshop*
- Final reports (2 documents)
- * indicates stakeholder rep. involvement

Lessons learned

- Power of a systematic review lies in asking a *very specific question* of the literature
- The body of scientific evidence to be evaluated is *objectively* and *transparently* predetermined – i.e. not "cherry-picked"
- This evidence is then evaluated through the lens of the specific, focused question

Lessons learned...

- Single greatest challenge to getting systematic reviews accomplished: *recruiting and supporting qualified reviewers*
- Systematic review is synthesis work- time consuming and labor intensive
- Not much professional recognition in academia for this kind of work

Lessons learned

- Despite some challenges in adapting systematic review techniques to the available evidence base, a relatively robust review was produced.
- An expert *reference librarian* improved the review by effectively aligning the question and search strategy with available reference database resources.
- A reference librarian should be closely involved with the *protocol development* and *literature search* phases of the systematic review process.

Lessons learned

- Study designs, locations and outcome measures differed, making it harder to compare and rank study quality than is normally the case for reviews in clinical medicine.
- Instead, reviewers assessed the "relevance" of each study to the review question
- Study relevance depended on the research question addressed, and the type of experimental design and statistical analyses used.

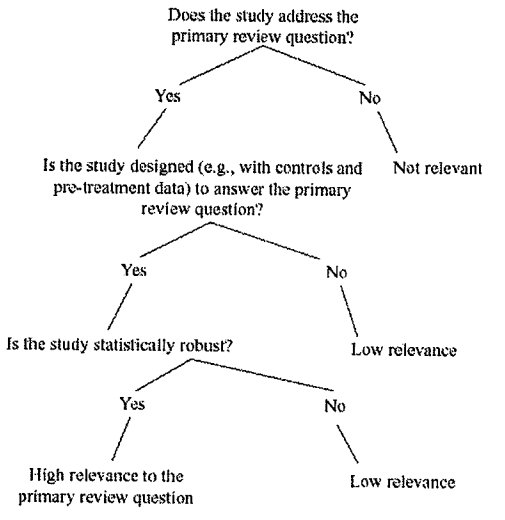

Figure 1 - Decision tree used to evaluate the relevance of publications to the primary review question.

Lessons learned

- All of the "high relevance" publications were located by the systematic search
- Systematic reviews may help reduce perceptions that scientific literature is being selectively or incompletely incorporated into natural resource management.
- Systematic review also provides greater transparency regarding "what the science says"

Publication title and principal investigator(s)	Keim, R. F., A. E. Skaugset, et al. 2002. Physical Aquatic Habitat II: Pools and Cover Affected by Large Woody Debris in Three Western Oregon Streams. N. Am. Journal of Fisheries Management 22(1): 151-164.
Study dates and ***study duration***	Treatment in Dec. 1992 – October 1994, specific dates depending on Creek; post-treatment surveys.
Study location, settings where the intervention was applied	Oregon Coast Range.Tyee formation. Bark (lowest gradient), Buttermilk, and Hudson (highest gradient) Creeks
Ecosystem type; plant association group	Western hemlock zone but riparian areas along all streams were alder dominated.
Watershed type (if applicable, e.g. 6th field)	Third order streams on 1:24,000 map, low gradient <1.2% pool-riffle
Research question(s), hypotheses	Investigate the effects of an integrated restoration of streams and riparian zones in the Oregon Coast Range. Expected that added LWD would (1) increase total amount of residual pool habitat during the summer low flow, (2) create deeper residual pools, and (3) increase cover for fish in pools.
Species studied (if applicable)	None.
Study design, experimental controls	Two treated reaches separated by an untreated reach in each of three streams. Data were collected pre-treatment, post-treatment and in 3 additional post-treatment years. Measured and mapped residual pool (>15cm deep) depth, width, and length then summarized volume at 15cm depth increments. Measured and mapped number and volume of all wood pieces (>2m long and 0.1 m diameter if any part fell in the wetted or active channel) then summarized data by size classes. Index of cover (m^3/m) as the sum of the products of the diameters and lengths of all pieces of wood in the boundaries of all pools, divided by the length of the surveyed reach.
Pretreatment data (yes/no)	Yes. Bark and Buttermilk Creeks in January 1993 and Hudson Creek in June 1994 for wood data. All streams were surveyed for pre-treatment morphology the fall after treatment.
Intervention or management action	Two small riparian clear-cuts (90-m long, separated by 140-290 m buffers ranging in width from 8 to > 25 m) were made along experimental reaches, which were each approximately 0.5km long. Wood placed into experimental reaches was primarily alder or de-limbed Douglas fir as key pieces (4-11 pieces) or logging slash (41-118 pieces). Logs were 0.9-4.2 times the active channel width. Alder had rootwads attached and were longer than Douglas fir.
Replications (if applicable)	Yes. Three streams.
Sample sizes and results	By year 3, much of the wood in the studied reaches originated from upstream and most wood added by the treatments moved downstream. Total residual pool volume increased in treated and untreated sections in Buttermilk, in only the treated section of Hudson because the untreated section was primarily bedrock, and was unchanged in the treated section and decreased slightly in the untreated section of Bark. Adding wood increased the amount of residual pool area covered by wood.
Nature of the outcome measures used, their relative importance and robustness	Authors considered the study as evaluating three trials of a treatment rather than the effects of relatively small wood on streams. Wood from the treatments moved into untreated reaches. Strongest evidence relative to question posed by the systematic review is that residual pool area covered by wood increased after treatment.
Effects Modifiers (confounding factors)	Authors identified several irregularities in the application of treatments that limited the scope of inferences. The large storm event in year three may have substantively influenced outcomes.

Lessons learned

- A systematic review can provide a tightly packaged set of "best available science" information in a form that is usable by policy makers.
- Systematic reviews may also identify *science knowledge gaps* that restrict the ability to reach strong conclusions.
- By clarifying knowledge gaps regarding policy-relevant science questions, systematic reviews can help focus and prioritize research agendas.
- Systematic review may be most useful for questions involving a *single species* or *single management action*

Lessons learned

Systematic review can help...

- Identify effective management interventions
  - Environmental restoration needs greatly exceed available resources - pressing need to know what works, what doesn't
- Achieve greater consensus on "state of science"
  - Address the "dueling science" problem
  - Integrate science into policy more effectively and objectively

ODF thoughts on SER

- Both INR report and technical review report note that SER shows promise for natural resource applications.
- ODF agrees – while noting the caveats in both reports.
- Reminder – SER is not a decision making system in itself.
- Reminder – SER will not "solve" value conflicts

SER: BOF work plan products

- The BOF and agency can act as a catalyst and proponent for developing SER-like approaches for natural resources (institutional framework)
- If the BOF is interested, staff will develop principles that will guide the development of a general but consistent agency process for synthesizing the "best available science" that comes before the BOF.

SER – recommended follow up (adjusted plan)

- Board direct staff to further explore SER concepts in internal ODF work, and in collaboration with other agencies/entities on subjects of mutual interest;
- Board consider integrating SER concepts into revised FPFO (2011) given lessons learned through agency work and any collaborative efforts.

Systematic Review

- Board Discussion

SER: Work To Date

- SER Pilot Question:

"Does wood placement in Pacific northwestern North American streams affect salmonid abundance, growth, survival, or habitat complexity?"

SER – Large Wood

- SER 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, Behan, Draft 2/08)

SER – Large Wood

- "Results from (these) high relevance publications generally suggest at least short term improvements in habitat consistent with objectives of placing large wood in streams. However, surprisingly little evidence was available to support the efficacy of LW placement for increasing the abundance, survival, or growth of any salmonid species.
- Thus, much less than definitive science is available to inform decisions about whether to implement and how to design in-stream wood placement projects.
- Systematic reviews show promise for forest management by synthesizing available technical information, helping define "best available science" and identifying knowledge gaps to guide future research."

(Burnett, Giannico, Behan, "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" Draft 2/08, extracted from Executive Summary)

SER in the adaptive management loop