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DOCUMENT 4

Literature Search Strategy – Roads (DRAFT)

For 4 September 2024 IRST meeting

Comments from 21 August 2024 meeting:

- We need to first determine what it is we are looking for in the literature – which will better focus the lit search and generate better information.
- Did the papers look at trends, and if so, how did they look at trends? Going back to same locations may not be the best approach to do what we need to accomplish.

The roads and hydrologic connectivity literature compilation conducted by the Institute for Natural Resources is intended to serve, not as a comprehensive literature review, but rather as a means to facilitate the development of requests for proposals (RFPs) to address the Adaptive Management Program Committee's (AMPC) final roads research questions. Requests for further review of the literature may be included in the RFPs, depending on the needs determined by the Independent Research and Science Team (IRST).

This literature search strategy outlines how literature will be sought. It is a living document.

AMPC's Final Roads Research Questions

Baseline Report

1. What is the baseline status of hydrologic connectivity of roads prior to the implementation of the OFPA road rules effective Jan 1, 2024?
2. How does the status of hydrologic connectivity differ based on landowner type and East/West region?

3a. How does road surface type, geology, soils and other factors affect the status of hydrologic connectivity?

3b. How do particular elements, such as undersized culverts or road location, in the regulatory framework contribute to hydrologic connectivity?

Trend Monitoring

1. What are the trends in the status of hydrologic connectivity of roads over 5-year intervals? These trends should be assessed for the same variables in question 1.

Determination of Rule Effectiveness

1. Within 25 years, to what extent are road rules associated with hydrologic disconnection effective at achieving biological goals and objectives?

Search Strategy

Focus

The primary purposes of this review are to inform the request for and review of proposals received, thus the focus will be on monitoring methods rather than the effects of road-stream connectivity. More specifically, we will look for monitoring strategies that can be applied to small and large private landowners in the eastern and western regions of Oregon.

Time period to conduct literature search

- Start date
- End date

Electronic databases

- Forest Science: CAB Direct
- Treesearch: USDA Forest Service Research
- Web of Science: Science Citation Index

Meta search engine

- Google Scholar
- SciSpace (AI tool - can extract methods)

Unique library collections

- Example: Oregon State University's Scholars Archive
- Unique collections at universities (Oregon's public universities, Washington State University, University of Washington)
- Unique collections at State Libraries (Oregon State Library, Washington State Library)

Selected bibliographies

- Dubé, K., A. Shelly, J. Black, and K. Kuzis. 2010. Washington road sub-basin scale effectiveness monitoring first sampling event (2006-2008) report. Cooperative Monitoring, Evaluation and Research Report CMER 08-801. Washington Department of Natural Resources. Olympia, Washington. https://www.dnr.wa.gov/publications/fp_cmer_08_801.pdf
- Dube-2004-Washington Road Surface Erosion Model (WARSEM) Manual.pdf (Appendix A)
- Trees to Tap (2020) literature spreadsheet
- NW Forest Plan Aquatic & Riparian Effectiveness Monitoring Program literature database
- WA Cooperative Monitoring, Evaluation, and Research Committee (CMER)
- California Board of Forestry, Effectiveness Monitoring Committee

IRST Recommendations

- Reiter, M., Heffner, J.T., Beech, S., Turner, T., Bilby, R.E., 2009. Temporal and Spatial Turbidity Patterns Over 30 Years in a Managed Forest of Western Washington. JAWRA Journal of the American Water Resources Association 45, 793–808. https://doi.org/10.1111/j.1752-1688.2009.00323.x
- Kastridis, A., 2020. Impact of Forest Roads on Hydrological Processes. Forests 11, 1201. https://doi.org/10.3390/f11111201
- Arismendi, I., Groom, J.D., Reiter, M., Johnson, S.L., Dent, L., Meleason, M., Argerich, A., Skaugset, A.E., 2017. Suspended sediment and turbidity after road construction/improvement and forest harvest in streams of the Trask River Watershed Study, Oregon. Water Resources Research 53, 6763–6783. https://doi.org/10.1002/2016WR020198

- Rachels, A.A., Bladon, K.D., Bywater-Reyes, S., Hatten, J.A., 2020. Quantifying effects of forest harvesting on sources of suspended sediment to an Oregon Coast Range headwater stream. Forest Ecology and Management 466, 118123. https://doi.org/10.1016/j.foreco.2020.118123

Literature dates

- 2004-2024 (since the Dubé et al literature review was published)

Type of literature

- Peer review
- Technical reports
- Dissertations and theses
- Conference proceedings

Literature Geographies

- Oregon
- Washington
- Pacific Northwest

Keywords for searching

- ***hydrologic connectivity and disconnection***
  - Sediment delivery
  - Drainage
  - Run off
  - Erosion
  - Sediment delivery; forest roads; hydrologic connectivity; road surface erosion; road network; runoff
  - Forest roads, hydrologic connectivity, storm events, road/stream sampling, road/sediment models
- ***Roads***
  - Forest + road
  - Drainage structures (e.g., culverts, ditches)
- ***Methods***
  - Monitoring
  - Effectiveness monitoring
  - Networks - sample selection and design

Review Strategy

Categories of information documented for each publication

- Publication citation (principal investigators, date, title, etc.)
- Study dates and study duration
- Study location
- Research question(s), hypotheses
- Sample sizes and results
- Methods: empirical vs modeled (for empirical data, see notes below)

Subjects of Interest for article reviews

- ***Road characteristics***
  - Surfacing (asphalt, gravel, native)
  - Geometry (crowned, insloped, and outsloped)

- Road location
- Status: active, inactive, abandoned, vacated

- ***Environment***
  - East/West regions
  - Geology
  - Soil characteristics
  - Climate
  - Vegetation
  - Topography
- ***Landowner type***
  - small private landowners
  - small private landowners
  - state/local
  - federal
- **Empirical sample design**
  - Point based – terrestrial grid or reaches in a river network
  - Statistical analysis of point-based date – to avoid correlation
  - Spatially balanced sampling design (not just a random or stratified random design)
- **Modeled data**
  - Type of model
    - Road surface erosion/sediment
    - Hydrologic model for seasonal variability in connectivity
  - Datasets used for model
  - Resolution of model