Meeting Summary
Climate Change, Hydrology, and Road Management on the Olympic Peninsula

Date:
January 13, 2008

Sponsors:
Olympic National Forest (ONF): Natural Resources and Engineering Staff
Olympic National Park (ONP): Natural Resources and Engineering Staff
Pacific Northwest Research Station (PNW): Dave Peterson and Jessica Halofsky
University of Washington Climate Impacts Group (CIG): Alan Hamlet

Location:
Olympic National Forest Headquarters, Olympia, WA

Meeting objectives:
1) Learn about the latest climate projections from CIG
2) Through an interactive dialogue between scientists and managers, determine how to incorporate the latest climate change information into action plans for resource management, specifically road management.

Meeting overview:
The meeting began with an overview and introduction from Kathy O'Halloran and Dave Peterson. Alan Hamlet (CIG) followed with a presentation on the expected hydrological implications of climate change on the Olympic Peninsula. Bill Shelmerdine (Geologist/Engineer, ONF) then gave a presentation outlining the prioritization of road work on the ONF. A discussion on adaption options for road management with climate change followed and is outlined below. The discussion was focused on:
1) How can climate change be incorporated into road management on the Olympic Peninsula; and
2) What are challenges and barriers to incorporating climate change into road management? Ideas from this meeting will be incorporated into a chapter of a larger report on 'Understanding and Planning for Potential Climate Change Impacts on Natural Resources on the Olympic Peninsula' (expected completion date: 1/2010).

1) **How can climate change be incorporated into road management on the Olympic Peninsula?**
    - Incorporate climate change as a risk factor in the ONF road management strategy. Changes in fish habitat distribution in particular may influence prioritization of road work.
    - Incorporate measures of uncertainty in aiding decisions on NEPA alternatives.
    - Rethink the design life guidelines (usually <50 years) for roads and other structures.

- Redo culvert size analysis using peak flow data/regression analysis from only the last 30 years (as opposed to the entire period of record). The last 30 years is a good analog for climate change.
- Use 'What if it fails?' scenarios to address risk and uncertainty in evaluating road management alternatives. Failures that will result in severe impacts are the ones to be avoided.
- Use selectivity in allocating resources.
- Manage for process and function rather than species.
- Foster science-management partnerships.
- Identify no regrets strategies that do not require an accurate design standard and meet a number of criteria (e.g. for fish and stream flow). For example, with culvert design, bigger culverts could be put in every location to accommodate higher flows and fish passage, thus avoiding the development of new engineering design standards every decade. A standard design that works most of the time does not require constant updating and the large cost associated with the updating process.
- Develop strategies and actions that are adaptable over time. For example, to deal with uncertainties in sea level rise, build a sea wall that can be built higher over time.
- Communicate new science for management.
- Conduct more up-front analysis and have plans in place for the most at-risk resources.
- Focus on management actions that are robust to multiple future scenarios.
- Expect that there will be some failure and risk. For example, failure can be expected in debris-prone areas. The expected failure rate under current management may be appropriate for the future.
- Combine standard approaches with creativity (resource risk versus organization risk).
- Use expert knowledge when reliable quantitative data is not available. For example, instead of using quantitative calculations of expected peak flow based on historical data, look at actual channel size on the ground and base culvert size on expert judgment.
- Increase understanding of the ecosystem, and instead of trying to resist the forces at work, try to work with them.
- Consider broad goals versus specific strategies/options.
- Consider whether a new design or increased maintenance is more prudent in terms of time and cost.
- Use empirical data first and models second in analysis and planning. Assess vulnerabilities and trends in failures over the last 30 years and determine whether the vulnerabilities/failures were due to increased precipitation intensity or snowpack. Use the causes and consequences of past failures to determine where future failures will be and where actions should be focused. Consider new information and model predictions for the future only after that analysis.
- Conduct management experiments on national forests to learn valuable lessons and contribute to the broader interest of the agency.
- Some roads are both high risk and high value, and those will be kept no matter what.

- Consider whether existing roads are in the right locations (e.g. valley bottom roads).
- Consider sediment problems in glacier-fed rivers that can make some valley bottom roads unsafe (such as in Mt. Rainier National Park).
- Use the timber sale planning program to help pay for upgrades to make roads more stable with climate change. Incorporate roads in the timber sale strategic plan.
- Communicate with the Federal Highway Administration about climate change.
- Work under a new climate change paradigm that is less prescriptive and more flexible.
- Consider potential alterations to desired future conditions and alternative management pathways to achieve those conditions.

2) What are challenges and barriers to incorporating climate change into road management?

- Planning for NEPA is a big institutional challenge.
- Policy and budget are also challenges.
- Lack of consensus on best available science to avoid challenges.
- Managing for 'natural' conditions in the park.
- Lack of clear links between specific science and specific road issues.
- Lack of information coupling impacts of increasing temperature with that of increasing precipitation intensity.

Meeting Participants:

Name	Title	Affiliation
Carol Aubry	Forest Geneticist	Forest Service, Olympic National Forest
Mary Burgess	Civil Engineer	Forest Service, Olympic National Forest
Dick Carlson	Forest Silviculturist	Forest Service, Olympic National Forest
Guadalupe Cisneros	Engineer - Operation	Forest Service, Olympic National Forest
Tim Davis	Forest Planner	Forest Service, Olympic National Forest
Phil DeCillis	Fish Biologist	Forest Service, Olympic National Forest
Katherine Gibbon	Intern	National Park Service, Olympic National Park
Scott Hagerty	Soil Scientist	Forest Service, Olympic National Forest
Jessica Halofsky	Research Ecologist	Forest Service/University of Washington
Alan Hamlet	Research Assistant Professor	Climate Impacts Group, UW
Cat Hawkins Hoffman	Chief Natural Resources	National Park Service, Olympic National Park
Nancy Hendricks	Park Planner	National Park Service, Olympic National Park
Karen Holtrop	Wildlife Biologist	Forest Service, Olympic National Forest
Dale Hom	Forest Supervisor	Forest Service, Olympic National Forest
Paul Kennard	Region Geomorphologist	National Park Service
Deb McConnell	Bio Tech	Forest Service, Olympic National Forest
Marc McHenry	Fish Biologist	Forest Service, Olympic National Forest
Steve McNealy	Timber	Forest Service, Olympic National Forest
Bob Metzger	Aquatic Program Manager	Forest Service, Olympic National Forest
Kathy O'Halloran	Natural Resources Staff Officer	Forest Service, Olympic National Forest
Robert Perry	Harvest Inspector	Forest Service, Olympic National Forest
Dave Peterson	Research Biologist	Forest Service, PNW Research Station
Susan Piper	Wildlife Program Manager	Forest Service, Olympic National Forest
Luis Santoyo	Forest Engineer	Forest Service, Olympic National Forest
Mark Senger	Forester	Forest Service, Olympic National Forest
Bill Shelmerdine	Geology-Engineering	Forest Service, Olympic National Forest
Robin Shoal	Ecologist	Forest Service, Olympic National Forest
Robin Stoddard	Forest Hydrologist	Forest Service, Olympic National Forest
Ken Vaughn	Regional Assistant Deputy for Engineering	Forest Service, Region 10