



USDA Forest Service Air Quality Portal for Land Management Planning: The application and use of critical loads for management and policy decisions

<http://www.srs.fs.usda.gov/airqualityportal/index.php>

Background

A new Forest Service Planning Rule was released in 2012 to guide land management planning. For the first time, this new rule requires that National Forests and Grasslands consider air quality during land management planning, specifically requiring an assessment of critical load exceedances. If critical loads have been exceeded, forests and grasslands must develop strategies to protect or restore key ecosystem characteristics.

What Is In The Air Quality Portal?

The Forest Service developed the Air Quality Portal to serve as a decision support system for the implementation of critical loads into land management. The Air Quality Portal provides the following information to guide users through forest plan revisions related to air quality:

Background: Briefing papers and communications materials about the effects of atmospheric deposition on ecosystems are provided.

Spatial Data: Critical Load exceedances are calculated by comparing critical loads from the NADP Critical Loads of Atmospheric Deposition Science Committee with deposition estimates from the NADP Total Deposition Science Committee. Critical load and critical load exceedance information is available for assessment.

Guidance Documents: Decision trees guide users through the following processes:

1. Assessing the extent/severity of critical load exceedances and understanding anticipated effects on soils, waters, and vegetation,
2. Developing targets,
3. Refining and improving monitoring protocols,
4. Selecting and implementing management options to reduce critical load exceedances and mitigate ecosystem effects.

Protocols: Additional guidance is provided for those seeking detailed instructions.

Other: Training tools, a glossary, and FAQs are provided.



Management Options

The Air Quality Portal presents a series of management options that can be implemented to reduce critical load exceedances and/or mitigate the effects of air pollution on National Forests and Grasslands.

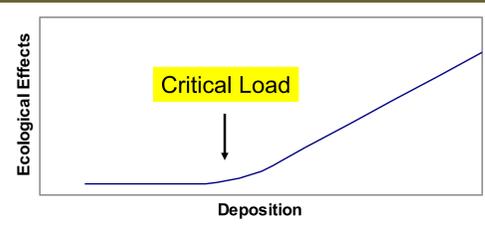
Management options include:

1. Working with air quality regulators to reduce sulfur and nitrogen emissions at the source,
2. Mitigating acidification impacts through aquatic and/or terrestrial liming,
3. Adjusting harvesting practices in areas of terrestrial acidification to maximize base cation nutrient retention on-site,
4. Prescribed burning to volatilize excess nitrogen,
5. Stand thinning and mechanical/herbicidal treatments to control the spread of invasive species resulting from excess nitrogen, and
6. Adjusting restoration initiatives to ensure improvement and sustainability.

References

1. We acknowledge Critical Load Atmospheric Deposition (CLAD) Science Committee of National Atmospheric Deposition Program (NADP) for their role in making available CLAD_CL_ACID_v2.accdb and CLAD_CL_N_v2.accdb datasets.
2. McNulty, SG, EC Cohen, JA Moore Myers, TJ Sullivan, and H Li. 2007. Estimates of critical acid loads and exceedances for forest soils across the conterminous United States. *Environmental Pollution* 149: 281-292.
3. Pardo, LH, MJ Robin-Abbott, and CT Driscoll. 2011. Assessment of nitrogen deposition effect and empirical critical loads of nitrogen for ecoregions of the United States. Gen. Tech. Rep. NRS-80. U.S. Department of Agriculture, Forest Service Northern Research Station. 291 pp.
4. Geiser, LH, SE Jovan, DA Glavich, and MK Porter. 2010. Lichen-based critical loads for atmospheric nitrogen deposition in Western Oregon and Washington Forests U.S.A. *Environmental Pollution* 158: 2412-2421.
5. Schwede, DB, and GG Lear. 2014. A novel hybrid approach for estimating total deposition in the United States. *Atmospheric Environment* 92:207-220.

Critical Loads of Air Pollution



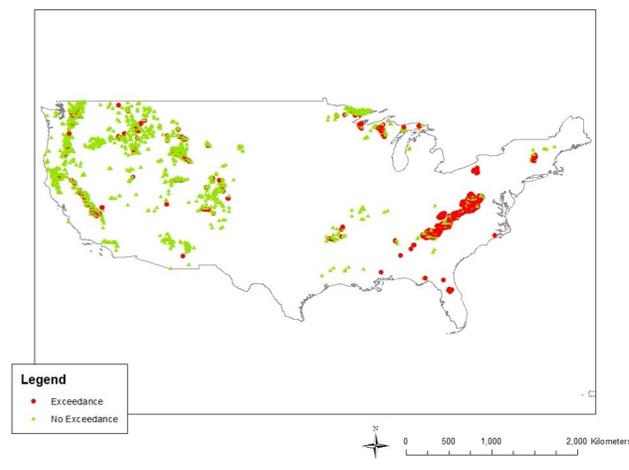
National Forests and Grasslands are negatively impacted by the atmospheric deposition of sulfur and nitrogen. Acidification impacts include decreased soil nutrient availability, decreased growth/increased mortality of certain tree species, and decreased presence of fish species and macroinvertebrates. Impacts of excess nitrogen include eutrophication, algal blooms, and species community shifts/biodiversity loss. The term "critical load" describes the quantitative estimate of exposure to one or more pollutants below which these harmful effects are not expected to occur. The USDA Forest Service uses critical loads to assess the extent and severity of these potential impacts across our nation's forests and grasslands, and to inform the land management planning and decision-making processes that serve to protect these lands.

Contact

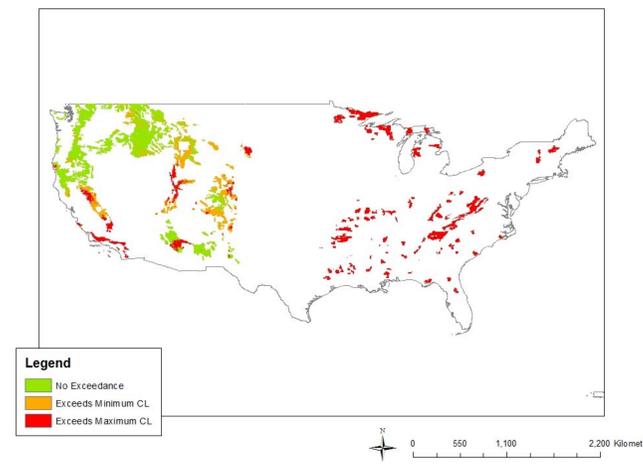
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Critical Load Exceedances Predict Acidification and Eutrophication Impacts

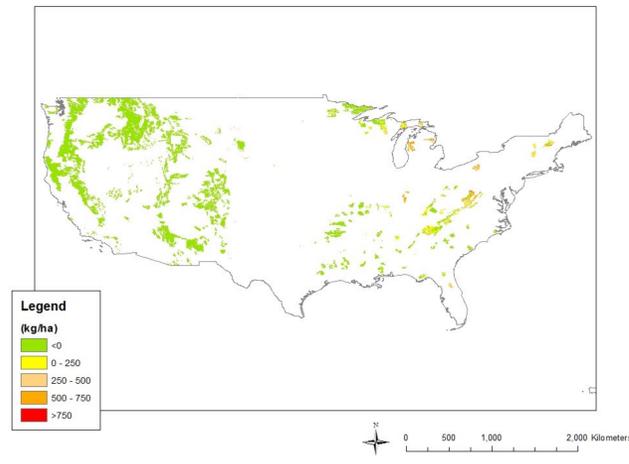
Exceedance of Critical Loads of Acidity for Surface Waters on Forest Service Lands



Exceedance of Nutrient Nitrogen Critical Loads for Lichens on Forest Service Lands



Exceedance of Terrestrial Critical Loads of Acidity for Forested Ecosystems on Forest Service Lands



Exceedance of Nutrient Nitrogen Critical Loads for Forests on Forest Service Lands

