United States Department of Agriculture
Forest Service

Zigzag Integrated Resource Project

Climate Change Report

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for:
Zigzag Ranger District
Mt. Hood National Forest

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1.0 Introduction

1.1 Summary

The proposed action would result in some carbon emissions and some carbon sequestration. The benefits to forest health and resiliency would allow stands to adapt to the future climate. The Forest Plan, as amended, does not contain direction related to climate change.

This report qualitatively addresses aspects of the project that may affect carbon emission or sequestration and how the project may help or hinder the forest's ability to deal with climate change. This analysis does not attempt to quantify carbon emission or sequestration. Public comments received suggested a project-specific quantitative carbon analysis. A quantitative carbon analysis was not conducted for this project because it would not likely lead to changes to the proposed actions or to the creation of other alternatives that achieve the purpose and need.

2.0 Existing Condition

The Intergovernmental Panel on Climate Change has summarized the contributions to climate change of global human activity sectors in its Fifth Assessment Report (IPCC 2014). In 2010, anthropogenic (human-caused) contributors to greenhouse gas (GHG) emissions came from several sectors:

- Industry, transportation, and building – 41%
- Energy production – 35%
- Agriculture – 12%.
- Forestry and other land uses – 12%

There is agreement that the forestry sector contribution has declined over the last decade (IPCC 2014; Smith 2014; FAOSTAT 2013). The main activity in this sector associated with GHG emissions is deforestation, which is defined as removal of all trees for the conversion of forest into agricultural land or developed landscapes (IPCC 2000).

Climate change is a global phenomenon because major greenhouse gasses mix well throughout the planet's lower atmosphere (IPCC 2013). In 2010, GHG emissions were estimated at 49 ± 4.5 gigatonnes globally (IPCC 2014) and 6.9 gigatonnes nationally (US EPA 2015).

Climate change may affect the health and growth of stands and may change the intensity and magnitude of wildfires. While there are no specific projections for the project area, the situation would likely be one where the summers are drier and the snow melts earlier in the spring (Bare 2005) (Mote 2003) (Mote 2005) **(**Dale 2001).

The project area has been affected by wildfires and logging.

3.0 Direct, Indirect and Cumulative Effects

3.1 No Action

With no action, the stands in the project area would continue to grow. In the absence of a large-scale wildfire, the trees would continue to sequester carbon. As stands grow and become overcrowded, their growth rates and health would gradually decline. Individual trees and stands would become susceptible to stressors of insects and disease that may be exacerbated by climate change.

3.2 Proposed Action

This project involves the thinning of second-growth stands and other vegetation management treatments that are designed to enhance health, diversity and productivity. It also involves removing logs for utilization as wood products. Rapidly growing forests are recognized as a means of carbon sequestration (FAO 2007).

This project is not likely to have direct localized effects on climate. By its very nature, the discussion of a project's effect on climate change is indirect and cumulative because the effects occur at a different time and place, and because the scale of the discussion is global.

For this proposal, the following actions have the potential to affect carbon emissions or sequestration:

- Thinning and other treatments to enhance the health of the residual stand would result in trees that are better able to withstand stresses such as dry summer conditions (Millar 2007) (Spittlehouse 2003).

- Variable-density thinning with skips and gaps and the retention of minor species would result in stands that are resilient and better able to respond to whatever changes come in the future (Millar 2007).

- Fossil fuel is used by equipment such as saws, tractors, skyline yarders, helicopters and log trucks. Helicopters would use more fuel than other yarding options.

- Some debris and other wood from tree tops and braches would be burned, releasing carbon into the atmosphere. Some debris would be piled at landings and other locations. Some wood may be removed as firewood for burning in residences. Some debris at landings would not be burned but would be used to block roads. In some units, tree tops and branches of cut trees would be left on the ground to decay.

- Woody debris retained on the ground increases soil carbon sequestration (Millar 2007). The project would retain some existing debris and logs on the ground and would add more in the form of logging slash such as branches and tree tops.

- Utilizing trees to create long-lived wood products sequesters carbon (IPCC 2007) (FAO 2007) (Stavins 2005) (Upton 2007). Some have shown that using wood to build houses

has a more favorable carbon balance when compared to other building materials such as steel, concrete or plastic (Wilson 2006).

The proposed action includes thinning, group selection harvest, shelterwood harvest, and slash pile burning. While these treatments are important at the stand level to achieve desired conditions, at the broader landscape scale, the scope and degree of change would be minor relative to the Forest as a whole at 1.1 million acres or the Zigzag Ranger District encompassing about 235,900 acres of the Forest. This equates to approximately 0.2% of the Forest and 1% of the Ranger District.

A project of this magnitude makes an infinitesimal contribution to overall emissions. Therefore, at the global and national scales, the direct and indirect contribution to greenhouse gasses and climate change would be negligible. Because the direct and indirect effects would be negligible, the contribution to cumulative effects on global greenhouse gasses and climate change would also be negligible.

This project does not fall within any of the main contributors of greenhouse gas emissions: forested land will not be converted to agriculture or be converted to other non-forest uses. In fact, forest stands are being treated to maintain a vigorous condition that would continue to support trees, and sequester carbon in the long term. US forests sequestered 757.1 megatonnes of carbon dioxide after accounting for emissions from fires and soils in 2010 (US EPA 2015). However there is growing concern over the impacts of climate change on US forests and their current status as a carbon sink. There is strong evidence of a relationship between increasing temperatures and large tree mortality events in forests of the western US. There is widespread recognition that climate change is increasing the size and frequency of droughts, fires, and insect/disease outbreaks, which will have major effect on these forests' role in the carbon cycle (Joyce 2014).

The project is in line with the suggested practice of reducing forest disturbance effects found in the National Climate Assessment for public and private forests (Joyce 2014). Here specifically, some elements of the project would reduce stand densities to increase resistance to drought and insect mortality. The release of carbon associated with this project is justified given the overall change in condition, increases forest resistance to release of much greater quantities of carbon from wildfire, drought, insects/disease, or a combination of these disturbance types (Millar 2007). This project falls within the types of options presented by the IPCC for minimizing the impacts of climate change on forest carbon, and represents a potential synergy between adaptation measures and mitigation. Actions aimed at enhancing forest resilience to climate change by reducing the potential for large-scale, catastrophic disturbances such as wildfire also prevents release of GHG and enhances carbon stocks (Smith 2014). The project reflects the rationale behind these recommendations because it would increase health and the stands' ability to adapt to climate change.

Timber management projects can influence carbon dioxide sequestration in four main ways: (1) by increasing new forests (afforestation), (2) by avoiding their damage or destruction (avoided deforestation), (3) by manipulating existing forest cover (managed forests), and (4) through transferring carbon from the live biomass to the harvested wood product carbon pool. Land-use changes, specifically deforestation and regrowth, are by far the biggest factors on a global scale in forests' role as sources or sinks of carbon dioxide, respectively (IPCC 2000).

Projects like this that create forests or improve forest conditions and capacity to grow trees are positive factors in carbon sequestration.

The proposed action would result in some carbon emissions and some carbon sequestration. The benefits to forest health and resiliency would allow stands to adapt to the future climate.

4.0 Consideration of Comments

There is a great wealth of scientific literature on the subject of climate change. Some commenters have cited some science and suggested that the No-Action Alternative be selected as the best means to store the most carbon on-site in the forest. The cited science has been considered along with that science cited in this report. That consideration is documented in the administrative record.

5.0 References Cited

Bare, B. B., Gustafson, R., Mote, P., Brubaker, L., Perez-Garcia, J. 2005. Effect of global climate change on northwest forests. University of Washington. Denman Forestry Issues. Retrieved December 15, 2007 from http://uwtv.org/programs/displayevent.aspx?rID=2797

Dale, V., L. Joyce, S. McNulty, R. Neilson, M. Ayres, M. Flannigan, P. Hanson, L. Irland, R. Lugo, C. Peterson, D. Simberloff, F. Swanson, B. Stocks, M. Wotton. 2001. Climate change and forest disturbances. BioScience 51: 723-734.

FAOSTAT 2013. FAOSTAT database. Food and Agriculture Organization of the United Nations. http://faostat.fao.org/

Intergovernmental Panel on Climate Change (IPCC), Special Report on Land Use, Land Use Change and Forestry, Summary for Policy Makers, 2000. IPCC, Geneva, Switzerland. 20 pp. http://www.ipcc.ch/ipccreports/sres/land_use/index.php?idp=0

Intergovernmental Panel on Climate Change [IPCC]. 2007. Climate Change 2007: the IPCC fourth assessment report. Synthesis Report, section 2, Causes of Change, IPCC, Geneva, Switzerland. 3 pp.

Intergovernmental Panel on Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp. http://www.ipcc.ch/report/ar5/wg1/

Intergovernmental Panel on Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.). IPCC, Geneva, Switzerland, 151 pp. http://www.ipcc.ch/report/ar5/syr/

Joyce, Linda A.; Running, Steven W.; Breshears, David D.; Dale, Virginia H.; Malmsheimer, Robert W.; Sampson, R. Neil; Sohngen, Brent; Woodall, Christopher W. 2014. Chapter 7:

Forests. In: Melillo, Jerry; Richmond, Terese (T.C.); Yohe, Gary, eds. Climate change impacts in the United States: The third national climate assessment. U.S. Global Change Research Program: 176–194. http://nca2014.globalchange.gov/report/sectors/forests

Millar 2007. Millar, Constance I; Stephenson, Nathan L.; Stephens, Scott L. 2007. Climate change and forests of the future: Managing in the face of uncertainty. Ecological Applications. 17(8): 2145-2151. http://www.nrs.fs.fed.us/pubs/31774

Mote, P.W. 2003. Trends in snow water equivalent in the Pacific Northwest and their climatic causes. Geophysical Research Letters. 30: 1601.

Mote, P.W.; Hamlet, A.F.; Clark, M.; Lettenmaier, D.P. 2005. Declining mountain snowpack in western North America. Bulletin of the American Meteorological Society. 86: 39-49.

Smith 2014. Smith P., M. Bustamante, H. Ahammad, H. Clark, H. Dong, E. A. Elsiddig, H. Haberl, R. Harper, J. House, M. Jafari, O. Masera, C. Mbow, N. H. Ravindranath, C. W. Rice, C. Robledo Abad, A. Romanovskaya, F. Sperling, and F. Tubiello, 2014. Agriculture, Forestry and Other Land Use (AFOLU). In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. 121 pp. http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf

Spittlehouse, D.L., and R.B. Stewart, 2003. Adaptation to climate change in forest management. BC Journal of Ecosystems and Management 4 (1): 1-11.

Stavins, R.N., Richards, K.R. 2005. The cost of U.S. forest-based carbon sequestration. Prepared for the Pew Center on Global Climate Change. *January 2005*

Upton, B.; Miner, R.; Spinney, M.; Heath, L.S. 2007. The greenhouse gas and energy impacts of using wood instead of alternatives in residential construction in the United States. Biomass and Bioenergy. 32:1-10

US EPA 2015. US Inventory of Greenhouse Gas Emissions and Sinks: 1990 – 2013. Executive Summary. EPA 430-R15-004 United States Environmental Protection Agency. Washington, D.C. 27 pp. http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html

Wilson, J., 2006. Using wood products to reduce global warming, In: *Forests, Carbon, and Climate: a Synthesis of Science Findings*, [Cloughesy, M. (ed.)]. Oregon Forest Resources Institute, pp. 114-129.