

## Woodam Chung

Associate Professor and Stewart Professor of Forest Operations  
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### EDUCATION

BS, Forestry, Seoul National University, Korea 1993 (graduated *cum laude*)  
MS, Forestry, Seoul National University, Korea 1995  
PhD, Forest Engineering, Oregon State University, Oregon 2002

### FIELD OF INTEREST

Forest operations, timber harvest scheduling, transportation planning, woody biomass utilization, and decision support system development for natural resource management and planning

### PROFESSIONAL APPOINTMENTS

2014 – present: Stewart Endowed Professor and Associate Professor, Oregon State University, Oregon  
2015 – 2017: Adjunct Professor at Seoul National University, Seoul, South Korea  
2009 – 2014: Associate Professor, University of Montana, Montana  
2002 – 2009: Assistant Professor, University of Montana, Montana  
1998 – 2002: Graduate Research Assistant, Oregon State University, Oregon  
1993 – 1995: Graduate Research Assistant, Seoul National University, Seoul, Korea

### TEACHING EXPERIENCE

- Oregon State University (2014 – present): forest operations analysis, senior forestry capstone, supply chain optimization
- University of Montana (2002 – 2014): forest planning, forest roads and resource transportation, heuristic optimizations for forest management planning, Introduction to GIS, GIS applications in natural resources

### OTHER EXPERIENCE

Overseas volunteer for Korea International Cooperation Agency (KOICA), Northern Sulawesi Agriculture Training Center, Manado, Indonesia 1995-1997

### AWARDS AND HONORS

- OnPoint Faculty of the Game Award, Oregon State University, 2016
- Certificate of Appreciation, 6<sup>th</sup> International Wildland Fire Conference Scientific Committee, Pyeongchang, Korea, 2015
- Certificate of Appreciation, IUFRO Task Force on Forest Science Education, Warsaw, Poland, 2012
- Certificate of Appreciation, Korean Association of Montana, 2010
- Druid's Outstanding Professor Award, College of Forestry and Conservation, University of Montana, 2009
- Faculty Appreciation Award, the Division of Students Affairs, University of Montana, 2007
- Faculty Merit, University of Montana, 2007, 2011
- Winner, the 2001 Council on Forest Engineering (COFE) Student Paper Award

## PROFESSIONAL SOCIETIES AND SERVICE

- IUFRO Division 3 Coordinator and IUFRO Board Member (2014 – present)
- Croatian Journal of Forest Engineering International Editorial Board member (2008 – present)
- Forest Science and Technology Journal Associate Editor (2012 – present)
- Journal of Tropical Forest Management Editorial Board member (2013 – present)
- European Journal of Forest Engineering Editorial Board member (2015 – present)
- Forestry: An International Journal of Forest Research Editorial Board member (2016 – present)
- Council on Forest Engineering member (2001 – present)
- Society of American Foresters member (2005 – present)
- Institute For Operations Research and the Management Sciences (INFORMS, 2008 – present)
- INFORMS ENRE Best Publication Award Committee member (2014 – present)
- IUFRO Division 3 Deputy Coordinator (2010 – 2014)
- IUFRO Working Group 3.04 Coordinator (2010 – 2014)
- Council on Forest Engineering (COFE) Award Committee member (2007 – 2014)
- IUFRO Working Group 3.06 Deputy Coordinator (2005 – 2010)
- Council on Forest Engineering (Co-chairperson, 2006)
- American Society of Agricultural and Biological Engineers (ASABE, 2007 – 2010)
- Society of American Foresters (Management Science and Operations Research Working Group (E4) communication chair (web), 2002 – 2008)

## FUNDED RESEARCH PROJECTS (Since 2003)

- Operational feasibility analysis for cable-assisted logging systems: Equipment stability and soil disturbance, *USDA Forest Service Technology and Development Program* (2016-2018) - **\$214,490** (PI)
- Forest Operations and Logistics Research, *USDA Forest Service Rocky Mountain Research Station* (2016-2018) - **\$26,033** (PI)
- A machine vision system for forest harvesting equipment: Individual tree detection, measurement, and localization using stereoscopy and digital image processing, *USDA Forest Service Technology and Development Program* (2016-2018) - **\$90,717** (PI)
- STANDFIRE Platform Development and Documentation, *USDA Forest Service Fire Sciences Lab* (2016) - **\$23,000** (PI)
- Eye-tracking system for human behavioral responses, *Oregon State University* (2016) - **\$16,475** (Co-PI with 2 others)
- Protecting the Logging Workforce: Development of Innovative Logging Techniques for a Safer Working Environment, *National Institute for Occupational Safety and Health* (2015-2018) - **\$824,631** (Co-PI with 4 others)
- Developing an User Interface for the Existing Fire and Vegetation Growth Models, a User's Guide, and Training Workshops, *Montana Department of Natural Resources and Conservation* (2015-2016) - **\$45,000** (PI)
- Reduced Forest Soil Damage by Advanced Machine Routing and Motion Planning, *Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning* (2015-2018) – SEK4,457,000 (≈ **\$500,000**) (Co-PI; OSU provides in-kind contributions)
- Sustainable biofuel feedstocks from beetle-killed wood: Bioenergy Alliance Network of the Rockies, *USDA AFRI Sustainable Bioenergy Competitive Grants Program* (2013-2018) - **\$10,000,000** (Co-PI with 14 other Co-PIs; OSU allocation: **\$565,493**)

- Developing Optimization Algorithms for Timber Harvest Scheduling and Transportation Planning, *Korea Forest Research Institute (2013)* - **\$46,000** (PI)
- Incorporating project-level analysis and enhanced decision support into the OptFuels fuel treatment planning system for the Lake Tahoe Basin, *SNPLMA Tahoe Science Program (2012-2014)* - **\$121,890** (Co-PI; UM allocation: **\$31,484**)
- Estimating Expected Loss Value of Landscapes in Korea Due to Forest Fires, *Korea Forest Research Institute (2012-2013)* - **\$88,000** (PI)
- Integration of Biofuels and Bioproducts Production into Forest Products Supply Chains using Modular Biomass Gasification and Carbon Activation, *USDA/DOE Biomass Research and Development Initiative (2011-2015)* - **\$5,300,000** (Co-PI; UM allocation: **\$1,000,000**)
- Integrating modular pyrolysis processing into forest operations to improve the sustainability and efficiency of treatment residue utilization, *USDA Forest Service (2011-2013)* - **\$197,223** (Co-PI)
- Biochar from Biomass: A Process for Utilizing Forest Treatment & Mill Residues, *USDA Forest Service RMRS (2010-2013)* - **\$300,000** (Co-PI)
- Uncompahgre Plateau Restoration: Assessing the Economic Feasibility, Energy Balance and Net Greenhouse Gas Emissions of Producing Bioenergy from Forest and Range Treatment Residues, *USDA Forest Service RMRS (2010-2013)* - **\$256,503** (Co-PI)
- Cost and Productivity Analysis of In-Woods Fast Pyrolysis, *USDA Forest Service RMRS (2009-2010)* - **\$200,000** (PI)
- Integrated Decision Support for Cost Effective Fuel Treatments Under Multiple Resource Goals, *SNPLMA Tahoe Science Program (2009-2012)* - **\$300,500** (PI)
- Sustainable forest bioenergy production using in-woods fast-pyrolysis conversion including bio-oil production and bio-char incorporation, *USDA Forest Service Research and Development (2008-2012)* - **\$271,796** (Co-PI)
- Forest biomass utilization: Economics, availability, energy returns and emissions, *USDA Forest Service RMRS (2009-2011)* - **\$124,149** (PI)
- Improving the existing decision support model (WTP 1.0) for invasive weeds management, *USDA Nez Perce National Forest (2009-2011)* - **\$10,000** (PI)
- Decision-support Tool Utilizing Improved Dispersal Modeling to Develop Socio-economically Efficient Invasive Species Management Programs, *USDA National Research Initiative (NRI) Competitive Grants Program (2008-2012)* - **\$500,000** (Co-PI)
- Assessing Costs and Benefits of Alternative Methods for Handling and Transporting Forest Residues for Bioenergy, *USDA Forest Service RMRS Agenda2020 Project (2008-2012)* - **\$284,148** (PI)
- A Review of Available Economic and Financial Biomass Information and Tools for Federal Land Managers in the West, *USDA/DOI Joint Fire Science Program (2007-2009)* - **\$186,326** (Co-PI)
- Upgrading SNAP (Scheduling and Network Analysis Program), *USDA Forest Service PNW Station (2007-2010)* - **\$75,000** (PI)
- Improving Road Erosion Modeling for the Lake Tahoe Basin and Evaluating BMP Strategies for Fine Sediment Reduction at Watershed Scales, *SNPLMA Tahoe Science Program (2007-2009)* - **\$201,705** (Co-PI)
- Landscape-level Decision Support for Invasive Species Management, *USDA Economic Research Service (2006-2009)* - **\$209,000** (PI)
- Analysis of sort yards to increase value recovery and utilization of small-diameter trees and forest biomass for landscape scale forest health treatments, *USDA Forest Service Research and Development (2007-2009)* - **\$125,298** (Co-PI)

- Optimizing spatial and temporal treatments to maintain effective fire and non-fire fuels treatments at landscape scales, *USDA/DOI Joint Fire Science Program (2006-2009)* - **\$300,000** (Co-PI)
- Integrating WEPP Output into MAGIS, *USDA Forest Service RMRS (2007-2008)* - **\$20,348** (PI)
- Applying MAGIS to Fuel Treatment Restoration Analyses, *USDA Forest Service RMRS (2007-2008)* - **\$12,300** (PI)
- MAGIS Documentation and GIS Support, *USDA Forest Service RMRS (2007-2008)* - **\$27,900** (PI)
- Species Identification of Individual Trees in Mixed Conifer Forests Using Laser Altimetry, *McIntire-Stennis Funding Program (2007-2009)* - **\$49,771** (Co-PI)
- Economics of Alternative Harvest Practices and Road Systems, *USDA Forest Service (2004-2008)* - **\$76,656** (PI)
- Developing a Heuristic Solver for MAGIS, *USDA Forest Service RMRS (2003)* - **\$30,000** (PI)
- Developing a computer program for determining the feasibility of cable logging operations, *University of Montana (2003)* - **\$4,000** (PI)

## LANGUAGES

English, Korean, Indonesian (Malaysian)

## PUBLICATIONS

### Publications in Refereed Journals:

Kim, Y., **W. Chung**, H. Han, and N. Anderson. 2017. The Effect of Downed Trees on Harvesting Productivity and Costs in Beetle-killed Stands. *Forest Science*. <https://doi.org/10.5849/FS-2016-100>.

**Chung, W.**, P. Evangelista, N. Anderson, T. Vorster, H. Han, K. Poudel, and B. Sturtevant. 2017. Estimating Aboveground Tree Biomass for Beetle-Killed Lodgepole Pine in the Rocky Mountains of Northern Colorado. *Forest Science*. <https://doi.org/10.5849/FS.2016-065>.

Leshchinsky, B., J. Sessions, **W. Chung**, K. Boston, and J. Wimer. 2017. Theoretical Stability and Traction of Steep Slope Tethered Feller-Bunchers. *Forest Science*. <http://dx.doi.org/10.5849/forsci.16-069>.

Kamarudin, N., M.H. Ismail, H. Sungib, and **W. Chung**. 2016. Log hauling productivity in timber harvesting operation in Peninsular Malaysia Forest. *Journal of Tropical Forest Science* 28(3): 207-216.

Wells, L., **W. Chung**, N. Anderson, and J. Hogland. 2016. Spatial and temporal quantification of forest residue volumes and delivered costs. *Canadian Journal of Forest Research* 46: 832-843.

Han, H., **W. Chung**, and J. Chung. 2016. Carbon Balance of Forest Stands, Wood Products and Utilization in South Korea. *Journal of Forest Research* 21: 199-210.

Han, H., **W. Chung**, J. Song, A. Seol, and J. Chung. 2016. A terrain-based method for selecting potential mountain ridge protection areas in South Korea. *Landscape Research*. DOI: 10.1080/01426397.2016.1173657.

Kim, D-W, **W. Chung**, and B. Lee. 2016. Exploring tree crown spacing and slope interaction effects on fire behavior with a physics-based fire model. *Forest Science and Technology* 12 (4): 167-175. <http://dx.doi.org/10.1080/21580103.2016.1144541>.

Contreras, M.A., D.L. Parrott, and **W. Chung**. 2016. Designing Skid-Trail Networks to Reduce Skidding Cost and Soil Disturbance for Ground-Based Timber Harvesting Operations. *Forest Science* 62(1): 48-58.

**Chung, W.** 2015. Optimizing Fuel Treatments to Reduce Wildland Fire Risk. *Current Forestry Report* 1: 44-51. <doi:10.1007/s40725-015-0005-9>.

Kim, D., N. Anderson, and **W. Chung**. 2015. Financial performance of a mobile pyrolysis system used to produce biochar from sawmill residues. *Forest Products Journal* 65(5/6): 189-197.

Efta, J.A. and **W. Chung**. 2014. Planning best management practices to reduce sediment delivery from forest roads using WEPP:Road erosion modeling and simulated annealing optimization. *Croatian Journal of Forest Engineering* 35 (2): 167-178.

Aracena, P., **W. Chung**, and J.G. Jones. 2014. Landscape-level simulation of weed treatments to evaluate treatment plan options. *Invasive Plant Science and Management* 7(2): 278-290. <http://dx.doi.org/10.1614/IPSM-D-13-00043.1>

**Chung, W.**, G. Jones, K. Krueger, J. Bramel, and M. Contreras. 2013. Optimizing fuel treatments over time and space. *International Journal of Wildland Fire* 22(8): 1118-1133. <http://dx.doi.org/10.1071/WF12138>

Jourgholami M, E., Abdi, **W. Chung**. 2013. Decision making in forest road planning considering both skidding and road costs: a case study in the Hyrcanian Forest in Iran. *iForest: Biogeosciences and Forestry* 6: 59-64. doi:10.3832/ifor0640-005

Contreras, M. and **W. Chung**. 2013. Developing a computerized approach for optimizing individual tree removal to efficiently reduce crown fire potential. *Forest Ecology and Management* 289: 219-233.

Anderson, N., J. Greg Jones, D. Page-Dumroese, D. McCollum, S. Baker, D. Loeffler, and **W. Chung**. 2013. A comparison of producer gas, biochar, and activated carbon from two distributed scale thermochemical conversion systems used to process forest biomass. *Energies* 6: 164-183. doi:10.3390/en6010164

Jones, G., D. Loeffler, E. Butler, S. Hummel, and **W. Chung**. 2013. The financial feasibility of delivering forest treatment residues to bioenergy facilities over a range of diesel fuel and delivered biomass prices. *Biomass and Bioenergy* 48: 171-180.

**Chung, W.**, T. Venn, D. Loeffler, G. Jones, H. Han, and D. Calkin. 2012. Assessing the Potential for Log Sort Yards to Improve Financial Viability of Forest Restoration Treatments. *Forest Science* 58(6): 641-651.

Anderson, N., **W. Chung**, D. Loeffler, and G. Jones. 2012. A productivity and cost comparison of two systems for producing biomass fuel from roadside forest treatment residues. *Forest Products Journal* 62(3): 222-233.

Contreras, M., P. Aracena, **W. Chung**. 2012. Improving accuracy in earthwork volume estimation for proposed forest roads using a high-resolution digital elevation model. *Croatian Journal of Forest Engineering* 33(1):125-142.

Contreras, M., R. Parsons, **W. Chung**. 2012. Modeling tree-level fuel connectivity to evaluate the effectiveness of thinning treatments for reducing crown fire potential. *Forest Ecology and Management* 264: 134-149. doi:10.1016/j.foreco.2011.10.001

Song, J., K. Jang, H. Han, A. Seol, **W. Chung**, J. Chung. 2012. A case study of spatial allocation of cut blocks using a timber harvest simulator HARVEST. *Journal of Korean Forest Society* 101(1): 96-103.

**Chung, W.**, D.P. Dykstra, F. Bower, S.A. O'Brien, R.M. Abt, and J. Sessions. 2012. User's Guide to SNAP for ArcGIS®: ArcGIS Interface for Scheduling and Network Analysis Program. *USDA Forest Service PNW-GTR-847*. 34p.

Contreras, M., D. Affleck, **W. Chung**. 2011. Evaluating tree competition indices as predictors of basal area increment in western Montana forests. *Forest Ecology and Management* 262: 1939-1949. doi:10.1016/j.foreco.2011.08.031

Bruce, J. C., H. Han, A.E. Akay, and **W. Chung**. 2011. ACCEL: Spreadsheet-based Cost Estimation for Forest Road Construction. *Western Journal of Applied Forestry* 26(4): 189-197.

Contreras, M. and **W. Chung**. 2011. A modeling approach to estimating skidding costs of individual trees for thinning operations. *Western Journal of Applied Forestry* 26(3): 133-146.

Han, H., K. Jang, J. Song, A. Seol, **W. Chung**, and J. Chung. 2011. The effects of site factors on herb species diversity in Kwangneung forest stands. *Forest Science and Technology* 7(1): 1-7.

Jones, G., D. Loeffler, D. Calkin, and **W. Chung**. 2010. Forest treatment residues for thermal energy compared with disposal by onsite burning: Emissions and energy return. *Biomass and Bioenergy* 34(5): 737-746. doi:10.1016/j.biombioe.2010.01.016

Contreras, M., **W. Chung**, and G. Jones. 2008. Applying ant colony optimization (ACO) metaheuristic to solve forest transportation planning problems with side constraints. *Canadian Journal of Forest Research* 38: 2896-2910.

**Chung, W.**, J. Stükelberger, K. Aruga, and T. Cundy. 2008. Forest Road Network Design Using a Trade-off Analysis between Skidding and Road Construction Costs. *Canadian Journal of Forest Research* 38(3): 439-448.

Rackely, J. and **W. Chung**. 2008. Incorporating forest road erosion into forest resource transportation planning; a case study in the Mica Creek Watershed in Northern Idaho, U.S.A. *Transactions of ASABE* 51(1): 115-127.

Dodson, E., **W. Chung**, K. Mills, R. Nall, J. Sessions, and G. Zartman. 2007. Transportation planning to determine low volume road standards, long term needs, and environmental risks and tradeoffs. *Journal of the Transportation Research Board* 1989: 11–19.

Stükelberger, J., H. Heinimann, and **W. Chung**. 2007. Improved road network design models with the consideration of various link patterns and road design elements. *Canadian Journal of Forest Research* 37(11): 2281-2298.

Contreras, M. and **W. Chung**. 2007. A computer approach to finding an optimal log landing location and analyzing influencing factors for ground-based timber harvesting. *Canadian Journal of Forest Research* 37: 276-292 (doi:10.1139/X06-219).

Aruga, K., **W. Chung**, A. Akay, J. Sessions, and E. Miyata. 2007. Incorporating soil surface erosion prediction into forest road alignment optimization. *International Journal of Forest Engineering* 18 (1): 24-32.

Aruga, K, J. Sessions, A. Akay, and **W. Chung**. 2005. Simultaneous optimization of horizontal and vertical alignments of forest roads using Tabu Search. *International Journal of Forest Engineering* 16 (2): 137-151.

**Chung, W.**, J. Sessions, and H.R. Heinimann. 2004. An application of a heuristic network algorithm to cable logging layout design. *International Journal of Forest Engineering* 15(1): 11-24.

Bettinger, P. and **W. Chung**. 2004. The key literature of, and trends in, forest-level management planning in North America, 1950-2001. *The International Forestry Review* 6(1): 40-50.

**Chung, W.** and J. Sessions. 2004. Uphill and downhill gradeability of log trucks with short log trailers. *Western Journal of Applied Forestry* 19(2): 88-94.

Bettinger, P., D. Graetz, K. Boston, J. Sessions, and **W. Chung**. 2002. Eight heuristic planning techniques applied to three increasingly difficult wildlife planning problems. *Silva Fennica* 36(2): 561-584.

Chung, J. and **W. Chung**. 1995. Developing a computer model for forest road design. *Journal of Korean Forestry Society* 84(3): 333-342 (in Korean).

Chung, J. and **W. Chung**. 1995. A study on ground vehicle mechanics for steep slope forest operations: rubber-tired log skidding tractor operations. *Journal of Korean Forestry Society* 84(2): 218-225 (in Korean).

Chung, J. and **W. Chung**. 1994. A study on analyzing the live skyline cable logging mechanics. *Journal of Korean Forestry Society* 83(3): 357-364 (in Korean).

#### **Books and Book Chapters:**

**Chung, W.** and M. Contreras. 2011. Forest Transportation Planning Under Multiple Goals Using Ant Colony Optimization. *In* Ant Colony Optimization: Methods and Applications, Avi Ostfeld (Ed.), pp. 221-236. Rijeka, Croatia: InTech. ISBN: 978-953-307-157-2.

**Chung, W.** and H-S Han (Eds.). 2006. Proceedings of the 29<sup>th</sup> Council on Forest Engineering Conference. July 30-August 2. Couer d'Alene, ID. Council on Forest Engineering. Corvallis, OR. 570 p.

Sessions, J., A. Akay, G. Murphy, **W. Chung**, and K. Aruga. 2006. Road and Harvesting Planning and Operations *in* Computer Applications in Sustainable Forest Management: Including Perspectives on Collaboration and Integration. Series: Managing Forest Ecosystems, Vol 11. G. Shao and K. Reynolds (Eds.). Springer. ISBN: 1-4020-4305-8. 300 p.

Sessions, J. and **W. Chung** (Eds.). 1999. Proceedings of the International Mountain Logging and 10th Pacific Northwest Skyline Symposium. March 28-April 1. Corvallis, OR. Published by Department of Forest Engineering, Oregon State University, 372 p.

#### **Papers Published in Conference Proceedings:**

**Chung, W.** and E. Marchi. 2017. Sustainable forest operations: A key tool to achieve sustainable forest management and restoration. Abstract published in Proceedings of IUFRO Symposium on Sustainable Restoration of Mediterranean Forests. Palermo International Congress, April 19-21, 2017, Palermo, Italy.

Marchi, E., **W. Chung**, M. Brink, A. McEwan, P. Mederski, T. Nordfjell and R. Visser. 2016. Sustainable forest harvesting – climate change adaptation and mitigation practices. Abstract published in Proceedings of IUFRO Regional Congress for Asia and Oceania, October 24-27, 2016, Beijing, China.

Anderson, N., J. Hogland, **W. Chung**. 2016. Methods to prioritize and coordinate forest restoration treatments with sustainable biomass recovery over large landscapes at high resolution. Abstract published in Proceedings of IUFRO Regional Congress for Asia and Oceania, October 24-27, 2016, Beijing, China.

She, J., H. Han, **W. Chung**. 2016. Integrating economic and environmental values into forest supply chain management for timber and bioenergy production from beetle-killed biomass in Colorado. *In* Proceedings of IEA Bioenergy-BioFuelNet Joint Workshop, September 21-22, 2016, Vancouver, BC, Canada.



Han, H., **W. Chung**, N. Anderson. 2016. Comparing productivity and costs of two beetle-killed stand harvesting methods in northern Colorado. In Proceedings of the DEMO/COFE International Conference: Canada's Forest Sector-Adapting to a New Reality, Technology and Innovations as a Catalyst for Success. September 19-21, 2016, Vancouver, BC, Canada.

Kim, Y., **W. Chung**, N. Anderson. 2016. Modeling Equipment Cycle Times for Beetle-killed Stand Harvesting. In Proceedings of the DEMO/COFE International Conference: Canada's Forest Sector-Adapting to a New Reality, Technology and Innovations as a Catalyst for Success. September 19-21, 2016, Vancouver, BC, Canada.

She, J., **W. Chung**, D. Kim. 2016. Stochastic simulation of harvesting system alternatives. In Proceedings of the DEMO/COFE International Conference: Canada's Forest Sector-Adapting to a New Reality, Technology and Innovations as a Catalyst for Success. September 19-21, 2016, Vancouver, BC, Canada.

**Chung, W.**, H. Han, and N. Anderson. 2016. Turning Uncertainty into Opportunity: Integrated Supply Chain Models for Beetle-killed Biomass. Abstract published in Proceedings of the 8th International Conference of IUFRO Working Parties 5.01.04 and 3.04.00: Modelling Wood Quality, Supply and Value Chain Networks (WoodQC 2016), June 12-17, 2016, Quebec, Canada.

Parsons, R. F. Pimont, L. Wells., G. Cohn, M. Jolly, R. Linn, W. Mell, and **W. Chung**. 2015. STANDFIRE: A Collaborative research fuel and fire modeling platform in support of fuel management efforts. Abstract published In Proceedings of the 6<sup>th</sup> International Wildland Fire Conference, October 11-16, 2015, Pyeongchang, South Korea.

Wells, L., G. Cohn, R. Parsons, and **W. Chung**. 2015. Simulation-based Analysis of Fuel Treatment Effectiveness. Abstract published In Proceedings of the 6<sup>th</sup> International Wildland Fire Conference, October 11-16, 2015, Pyeongchang, South Korea.

Wells, L., J.D. Burnet, **W. Chung**, and M.G. Wing. 2015. Photogrammetric-based Volume Models for Piled Slash Using Small Unmanned Aircraft Systems. In Proceedings of the 2015 Council on Forest Engineering, July 19-22, 2015, Lexington, KY.

Wells, L., **W. Chung**, N. Anderson, and J. Hogland. 2015. Estimating Bioenergy Feedstock Supply and Delivered Costs. In Proceedings of the 2015 Council on Forest Engineering, July 19-22, 2015, Lexington, KY.

Han, H., **W. Chung**, and L. Wells. 2015. A Mathematical Approach to Biomass Feedstock Logistics Problems. In Proceedings of the 2015 Council on Forest Engineering, July 19-22, 2015, Lexington, KY.

**W. Chung**. 2015. IUFRO Division 3 Forest Operations Engineering and Management: Challenges in the Future. Abstract published in Proceedings of the 2015 CROJFE Forest Engineering Conference: Current Situation and Future Challenges, March 18-20, 2015, Zagreb, Croatia.

Hogland J., N. Anderson, **W. Chung**, and L. Wells. 2014. Estimating forest characteristics using NAIP imagery and ArcObjects. In Proceedings of the 2014 ESRI User Conference, July 14-18, 2014, San Diego, CA.

Kamarudin, N. and **W. Chung**. 2014. Timber harvest area planning in Malaysia using a network algorithm. In Proceedings of the 2014 Council on Forest Engineering, June 22-25, 2014, Moline, IL.

Contreras, M. and **W. Chung**. 2014. Optimizing the selection of individual tree in thinning treatments to reduce crown fire potential. *The International Forestry Review* 16(5): 296.

**Chung, W.**, F. Bower, O. O'Brien, and J. Sessions. 2013. SNAP for ArcGIS: a planning and educational tool for forest engineers. In Proceedings of the 36th Annual Meeting of the Council on Forest Engineering: Forest Operations for a Changing Landscape. Compiled by Elizabeth Dodson. July 7-10, 2013, Missoula, MT.

Anderson, N., **W. Chung**, W. Perez, D. Page-Dumroese and Z. Gu. 2013. An assessment of fuel, soil and industrial sorbent applications of biochar produced from forest biomass using distributed scale thermochemical conversion. In Proceedings of the 36th Annual Meeting of the Council on Forest Engineering: Forest Operations for a Changing Landscape. Compiled by Elizabeth Dodson. July 7-10, 2013, Missoula, MT.

Kim, D-W, **W. Chung**, R. Parsons, and B. Lee. 2013. Impact assessment of tree spacing on crown fire spread distance for Korean pine stands using a fire simulator. In Proceedings of the 36th Annual Meeting of the Council on Forest Engineering: Forest Operations for a Changing Landscape. Compiled by Elizabeth Dodson. July 7-10, 2013, Missoula, MT.

Lin, P., M. Contreras, J. Zhang, and **W. Chung**. 2013. Applying ant colony optimization to solve constrained forest transportation planning problems. In Proceedings of the 36th Annual Meeting of the Council on Forest Engineering: Forest Operations for a Changing Landscape. Compiled by Elizabeth Dodson. July 7-10, 2013, Missoula, MT.

Wells, L., N. Anderson, and **W. Chung**. 2013. A remote sensing approach to estimating forest treatment residue for alternative operational configurations on the Uncompahgre Plateau, Colorado, USA. In Proceedings of the 36th Annual Meeting of the Council on Forest Engineering: Forest Operations for a Changing Landscape. Compiled by Elizabeth Dodson. July 7-10, 2013, Missoula, MT.

**Chung, W.** and N.M. Anderson. 2012. Spatial modeling of potential woody biomass flow. In Proceedings of the 35th Annual Meeting of the Council on Forest Engineering: Engineering New Solutions for Energy Supply and Demand. Compiled by Joe Roise. September 9-12, 2012. New Bern, NC.

**Chung, W.** D. Kim, and N.M. Anderson. 2012. Productivity and cost analysis of a mobile pyrolysis system deployed to convert mill residues into biochar. In Proceedings of the 35th Annual Meeting of the Council on Forest Engineering: Engineering New Solutions for Energy Supply and Demand. Compiled by Joe Roise. September 9-12, 2012. New Bern, NC.

**Chung, W.**, N. Anderson, and J. Chung. 2011. Estimating the volume and transportation cost of forest residue available for utilization in a large forestland in Oregon. In Proceedings of the 52<sup>nd</sup> Korean Forest Society Annual Meeting, February 16 – 17, 2011. Kyungju, South Korea.

Jones, G., and **W. Chung**. 2011. Optimizing the location of fuel treatments over time at landscape scales. Fire Science Brief 138. [http://www.firescience.gov/projects/briefs/06-3-3-14\\_FSBrief138.pdf](http://www.firescience.gov/projects/briefs/06-3-3-14_FSBrief138.pdf)

Anderson, N., **Chung, W.**, Jones, G., Venn, T., Sorenson, C., Loeffler, D., Butler, E. 2010. Outcomes of a multi-scale, integrated research program to assess the feasibility of using pyrolysis to produce biochar and liquid fuels from forest biomass in Oregon, USA. The International Forestry Review 12(5): 11.

Stückelberger, J.A., Heinemann, H.R., **Chung, W.** 2010. Pareto-optimality between road construction costs, forest harvesting costs and negative ecological impacts. The International Forestry Review 12(5): 17.

Contreras, M., **Chung, W.** 2010. Optimizing tree-removal to efficiently minimize crown fire hazard. The International Forestry Review 12(5): 312.

Aracena, P., Contreras, M., **Chung, W.** 2010. Optimizing multiple log landing locations for ground-based timber harvesting. The International Forestry Review 12(5): 346.

Jones, Greg; Loeffler, Dan; Butler, Edward; **Chung, Woodam**; Hummel, Susan. 2010. Emissions, energy return and economics from utilizing forest residues for thermal energy compared to onsite pile burning. In Proceedings of the 2009 National Silvicultural Workshop, June 15-18, Boise, ID, USDA Forest Service Proceedings RMRS-P-61, pp. 145-158.

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**Chung, W.**, G. Jones, J. Sullivan, P. Aracena. 2009. Developing a Decision Support System to Optimize Spatial and Temporal Fuel Treatments at a Landscape Scale. In Proceedings of the 2009 Council on Forest Engineering, June 15 – 18, Kings Beach, CA. 6pp.

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**Chung, W.**, C. Seielstad, and J. Sessions. 2008. SlopeRunner2.0: A Harvest Area Planning Tool for Cable Logging Using LIDAR-derived DEM and Stem Map. In Proceedings of IUFRO All-D3-Conference: Pathways to Environmentally Sound Technologies for Natural Resource Use, June 15-20, 2008, Sapporo, Japan

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**Chung, W.**, J. Stückelberger, K. Aruga, and T. W. Cundy. 2008. Designing Forest Road Networks to Minimize Timber Harvesting and Road Construction Costs. In Proceedings of IUFRO All-D3-Conference: Pathways to Environmentally Sound Technologies for Natural Resource Use, June 15-20, 2008, Sapporo, Japan

**Chung, W.**, J. Sessions, and J. Holub. 2007. SlopeRunner 1.0: A program to evaluate the effectiveness of landing and road locations for cable logging. In Proceedings of the 13th Pacific Northwest Skyline Symposium, April 1-6, Corvallis, OR.

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Rackely, J. and **W. Chung**. 2006. Forest resource transportation planning with consideration of forest road erosion. In Proceedings of the 2006 Council on Forest Engineering, July 30-Aug. 2, Coeur d'Alene, ID. pp. 221-232.

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**Chung, W.**, G. Jones, J. Sullivan, and J. Sessions. 2005. Developing a heuristic solver for MAGIS: a planning tool to integrate resource management and transportation planning on large forest lands. In Proceedings of the 2005 Council on Forest Engineering, July 11-14, Fortuna, CA. 13pp.

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**Chung, W.** and J. Sessions. 2003. A Computerized Method for Determining Cable Logging Feasibility Using a DEM. In 2003 Proceedings of the Council of Forest Engineering, September 7-10, Bar Harbor, Maine. 6pp.

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**Chung, W.**, J. Sessions, and H.R. Heinimann. 2003. Optimizing of cable harvesting equipment placement and road locations using digital terrain models. *In*: U. Arzberger and M. Grimoldi (eds.) Proceedings of the FAO/ECE/ILO/IUFRO workshop on new trends in wood harvesting with cable systems for sustainable forest management in mountain forests, June 18-24, 2001, Ossiach, Austria. pp. 247-252.

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**Chung, W.** and J. Sessions, 2003. NETWORK 2000: A Program for Optimizing Large Fixed and Variable Cost Transportation Problems. *In*: G.J. Arthaud and T.M. Barrett (eds.) Systems Analysis in Forest Resources, Kluwer Academic Publishers. pp. 109-120.

**Chung, W.** and J. Sessions, 2003. An Application of Combinatorial Heuristics to Timber Sale Scheduling Considering Distance Dependent Costs and Equipment Balancing Requirements. *In*: G.J. Arthaud and T.M. Barrett (eds.) Systems Analysis in Forest Resources, Kluwer Academic Publishers. pp. 91-103.

Sessions, J. and **W. Chung**. 2003. An Approach to Optimizing Helicopter Logging Operations. *In*: G.J. Arthaud and T.M. Barrett (eds.) Systems Analysis in Forest Resources, Kluwer Academic Publishers. pp. 81-86.

Bettinger, P. and J. Sessions, **W. Chung**, D. Graetz, and K. Boston. 2003. Eight Heuristic Planning Techniques Applied to three Increasingly Difficult Wildlife Planning Problems: A Summary. *In*: G.J. Arthaud and T.M. Barrett (eds.) Systems Analysis in Forest Resources, Kluwer Academic Publishers. pp. 249-257.

**Chung, W.** and J. Sessions. 2002. Optimization of Cable Logging Layout using a Heuristic Algorithm for Network Programming. In 2002 Proceedings of the Council of Forest Engineering, June 16-20, Auburn, AL. 4pp.

Coulter, E., **W. Chung**, A. Akay, and J. Sessions. 2001. Forest road earthwork calculations for linear road segments using a high resolution digital terrain model generated from LIDAR data. In proceedings of the First International Precision Forestry Symposium", June, 2001, University of Washington, Seattle. pp125-129.

**Chung, W.** and J. Sessions, 2001. Designing a forest road network using heuristic optimization techniques. In Proceedings of the 24th Meeting of the Council of Forest Engineering, July 15-19, Snowshoe, West Virginia.

Sessions, J. and **W. Chung**. 2001. Effect of load distribution and trailer geometry on the gradeability of short log tractor-trailer combinations. In Proceedings of the 24th Meeting of the Council of Forest Engineering, July 15-19, Snowshoe, West Virginia.

**Chung, W.** and J. Sessions. 2001. Optimizing cable logging harvest design and road systems simultaneously on a digital terrain model. In Proceedings of the SAF 2001 national convention, September 13-17, Denver, CO. pp154-160.

Sessions, J., **W. Chung**, and H.R. Heinimann. 2001. New Algorithms for Solving Large Transportation Planning and Harvest Scheduling Problems. Prepared for the 5th Brazilian Harvesting Symposium, Oct 2-5, Porto Seguro, Bahia, Brazil.

**Chung, W.** and J. Sessions. 2001. NETWORK 2001 - Transportation planning under multiple objectives. *In*: P. Schiess and F. Krogstad (eds.) Proceedings of the International Mountain Logging and 11th Pacific Northwest Skyline Symposium, December 10-12, Seattle, WA.

Sessions, J. and **W. Chung**. 1999. Optimizing Helicopter Landing Locations. In Proceedings of the International Mountain Logging and 10th Pacific Northwest Skyline Symposium, March 28-April 1, 1999, Dept. of Forest Engineering, Oregon State Univ., Corvallis. pp 337-340.

Chung, J. and **W. Chung**. 1995. Developing a computer model for steep-slope forest road design. In Proceedings of the Technical Sessions of Subject Group 3.06: Current Practices, Trends and Research Needs for Forest Operations under Mountainous Conditions. IUFRO XX World Congress. Tampere, Finland. pp.40-45.

## **PROFESSIONAL PRESENTATIONS (SINCE 2003)**

### **Oral Presentations:**

**Chung, W.** and E. Marchi. 2017. Sustainable forest operations: A key tool to achieve sustainable forest management and restoration. Invited keynote presentation at the IUFRO Symposium on Sustainable Restoration of Mediterranean Forests. Palermo International Congress, April 19-21, 2017, Palermo, Italy.

**Chung, W.**, and N. Anderson. 2017. Beetle-killed Biomass Feedstock Logistics. BANR/Colorado State Forest Service Research Meeting, Steamboat, CO, April 10, 2017.

**Chung, W.** 2016. SNAP for ArcGIS 2.0 – Overview. **Invited** presentation at the 2016 USFS Tongass National Forest Ranger/Timber Management Staff Meeting, USDA Forest Service Region 10, December 8, 2016, Ketchikan, AK.

**Chung, W.**, H. Han and N. Anderson. 2016. Beetle-killed stand harvesting and biomass feedstock logistics. **Invited** Seminar, College of Agriculture and Life Sciences, Seoul National University, October 18, 2016, Seoul, South Korea.

**Chung, W.** 2016. Introduction to Timber Harvesting. **Invited** Special Lecture, College of Agriculture and Life Sciences, Seoul National University, October 18, 2016, Seoul, South Korea.

**Chung, W.** 2016. Biomass feedstock logistics. Presented at the 4<sup>th</sup> Annual Project Meeting of the USDA-NIFA Bioenergy Alliance Network of the Rockies (BANR). October 3-5, 2016, Laramie, WY.

**Chung, W.**, Yaejun Kim, Hee Han and Nate Anderson. 2016. Standing vs. Downed Trees: Costs and Productivity of Beetle-killed Stand Harvesting. Presented at the 2016 Annual Council on Forest Engineering Meeting, September 19 – 21, 2016, Vancouver, Canada.

**Chung, W.** 2016. IUFRO Division 3 – Current Challenges and Future Opportunities, **Keynote address** at the 1<sup>st</sup> IUFRO Division 3 Doctoral Student Conference, August 28 – September 2, 2016, Corvallis, OR.

**Chung, W.**, H. Han, and N. Anderson. 2016. Turning Uncertainty into Opportunity: Integrated Supply Chain Models for Beetle-killed Biomass. Presented at the 8th International Conference of IUFRO Working Parties 5.01.04 and 3.04.00: Modelling Wood Quality, Supply and Value Chain Networks (WoodQC 2016), June 12-17, 2016, Quebec, Canada.

**Chung, W.**, H. Han, and N. Anderson. 2016. Developing an Integrated Logistics Model for Beetle-killed Biomass. **Invited** presentation at the 2nd Northwest Wood-Based Biofuels + Co-Products Conference, May 3-4, 2016, Seattle, WA.

**Chung, W.** 2016. IUFRO – Forest Operations Engineering and Management (Division 3) – Current and Future Challenges, **Invited** presentation for the FORAC seminar, University of Laval, February 12, 2016, Quebec City, Canada.

**Chung, W.** 2015. Forest Engineering Challenges and Opportunities. Invited opening remark at the 48th International Symposium on Forestry Mechanization (FORMEC), October 4 – 8, 2015, Linz, Austria.

**Chung, W.** 2015. IUFRO Division 3 Forest Operations Engineering and Management: Challenges in the Future. **Invited keynote address** at the 2015 CROJFE Forest Engineering Conference, March 18-20, 2015, Zagreb, Croatia.

**Chung, W.** 2015. Woody Biomass Supply Chain. **Invited** Special Lecture Series, Faculty of Forestry, University of Zagreb, March 18, 2015, Zagreb, Croatia.

**Chung, W.** 2015. Decision Support Tools for Foresters. **Invited** Special Lecture Series, Faculty of Forestry, University of Zagreb, March 18, 2015, Zagreb, Croatia.

**Chung, W.** 2014. Council on Forest Engineering (COFE): Achievement and Challenges. **Invited** presentation at the XXIV IUFRO World Congress, October 5-11, 2014, Salt Lake City, Utah.



**Chung, W.** 2014. Forest Ecosystem Management Issues and Opportunities in the United States. **Invited keynote address** presented at the 5<sup>th</sup> Forest Engineering Conference, September 23-26, 2014, Gerardmer, France.

**Chung, W.,** N. Anderson, and R. Keefe. 2014. Task 2.1 – Feedstock logistics: Updates and Activities. Presented at the 2nd Annual Project Meeting of the USDA-NIFA Bioenergy Alliance Network of the Rockies (BANR), October 1-2, 2014, Moscow, ID.

**Chung, W.** and N. Anderson. 2013. UM and RMRS Woody Biomass Supply Chain Research. **Invited** presentation at Montana State DNRC Forest Products Retention Roundtable, October 11, 2013, Missoula, MT.

**Chung, W.** 2013. SNAP for ArcGIS: A Forest Planning and Educational Tool. **Invited** presentation at the 2013 Western Research Forest Managers Meeting, October 1, 2013, Lubrecht Experimental Forest, MT.

**Chung, W.** 2013. IUFRO Division 3: Promoting Global Collaboration for Global Challenges. **Invited keynote address** presented at the 2nd International Symposium on Tropical Forest Ecosystem Science and Management: Challenges and Solutions, September 11-13, 2013, Bintulu, Sarawak, Malaysia.

**Chung, W.** 2013. Improving the Efficiency of Woody Biomass Supply Chains in the Western United States. **Invited keynote address** presented at the 15<sup>th</sup> Symposium on Systems Analysis in Forest Resources, August 19-21, 2013, Quebec City, Quebec, Canada.

**Chung, W.,** F. Bower, O. O'Brien, and J. Sessions. 2013. SNAP for ArcGIS: a planning and educational tool for forest engineers. Presented at the 2013 Council on Forest Engineering Annual Meeting, July 7-10, 2013, Missoula, MT.

**Chung, W.,** Anderson, N., W. Perez, D. Page-Dumroese and Z. Gu. 2013. An assessment of fuel, soil and industrial sorbent applications of biochar produced from forest biomass using distributed scale thermochemical conversion. Presented at the 2013 Council on Forest Engineering Annual Meeting, July 7-10, 2013, Missoula, MT.

**Chung, W.** 2013. SlopeRunner: a program to evaluate the effectiveness of landing and road locations for cable logging. **Invited** seminar presentation at Idaho Department of Land Priest Lake Supervisory Area Office. April 29, 2013, Coolin, ID.

**Chung, W.** 2013. Forest Management Planning using SNAP for ArcGIS. Presented at the 2013 Research Project Seminar, Korea Forest Service Hongchun National Forest Office, March 5, 2013, Hongchun, South Korea.

**Chung, W.** 2013. Introduction to SNAP for ArcGIS. **Invited** presentation at Korea Forest Research Institute, January 7, 2013, Seoul, South Korea.

**Chung, W.** 2012. Spatial Modeling of Potential Woody Biomass Flow. Presented at the first BRDI project meeting, October 10, 2012 Spokane, WA.

**Chung, W.** and N.M. Anderson. 2012. Spatial modeling of potential woody biomass flow. Presented at the 35th Annual Meeting of the Council on Forest Engineering: Engineering New Solutions for Energy Supply and Demand. September 9-12, 2012. New Bern, NC.

**Chung, W.** D. Kim, and N.M. Anderson. 2012. Productivity and cost analysis of a mobile pyrolysis system deployed to convert mill residues into biochar. Presented at the 35th Annual Meeting of the Council on Forest Engineering: Engineering New Solutions for Energy Supply and Demand. September 9-12, 2012. New Bern, NC.

**Chung, W.** 2012. LiDAR applications in forest operations planning. **Invited** seminar presentation, Korea Forest Research Institute, June 12, 2012, Seoul, South Korea.

**Chung, W.,** N. Anderson, and G. Jones. 2012. Recent Research Projects in the Western United States to Improve the Efficiency of Woody Biomass Supply Chains. **Invited** seminar presentation, Center for Energy and Environmental Studies, Boston University, April 20, 2012, Boston, MA.

**Chung, W.,** N. Anderson, G. Jones, and D. Kim. 2012. Recent Research Projects in the United States to Improve the Efficiency of Woody Biomass Supply Chains. **Invited keynote address** presented at the International Symposium on Supply Chain Management for the Forest Sector and its Contribution to Local Economy, Utsunomiya University, March 29, 2012, Utsunomiya, Japan.

**Chung, W.** 2012. Introduction to SNAP for ArcGIS. **Invited** presentation at USDA Forest Service Region 1 Staff Meeting, March 9, 2012, Missoula, MT.

**Chung, W.** 2012. Introduction to SNAP for ArcGIS. **Invited** presentation at USDS Forest Service Region 1 Forest and Grasslands Engineering Leadership Meeting, March 20-21, 2012, Missoula, MT.

**Chung, W.,** N. Anderson, D-Y. Kim, and G. Jones. 2011. Recent Research Projects in the United States to Improve the Efficiency of Woody Biomass Supply Chains. **Invited keynote address** presented at the International Conference on “Forest Technologies for Mitigating Climate Change”, Seoul National University, October 4 – 6, 2011, Seoul, South Korea.

**Chung, W.** 2011. LiDAR applications in forest management and operations planning. **Invited** presentation at a special seminar at Kangwon National University, May 17, 2011, Chuncheon, South Korea.

**Chung, W.** and G. Jones. 2011. OptFuels: a decision support system to optimize spatial and temporal fuel treatments at a landscape level. **Invited** presentation at a special seminar at the University of Ryukyus, April 26, 2011, Okinawa, Japan.

**Chung, W.** and M. Contreras. 2011. An approach to optimize individual cut-tree selection to efficiently reduce crown fire potential within a stand. **Invited** presentation at a special seminar at the University of Ryukyus, April 26, 2011, Okinawa, Japan.

**Chung, W.**, P. Aracena, and G. Jones. 2011. WTP: a decision support system for invasive weed treatment planning. **Invited** presentation at a special seminar at the University of Ryukyus, April 26, 2011, Okinawa, Japan.

**Chung, W.** and G. Jones. 2011. OptFuels: A decision support system to optimize spatial and temporal fuel treatments at a landscape level. Paper presented at the 14<sup>th</sup> Symposium for Systems Analysis in Forest Resources. March 8 – 11, 2011, Maitencillo, Chile.

**Chung, W.**, N. Anderson, and J. Chung. 2011. Estimating the volume and transportation cost of forest residue available for utilization in a large forestland in Oregon. Paper presented at the 52<sup>nd</sup> Korean Forest Society Annual Meeting, February 16 – 17, 2011. Kyungju, South Korea.

**Chung, W.**, N. Anderson, and G. Jones. 2011. Up in smoke or in the black: quantifying the productivity and costs of forest biomass energy. **Invited** presentation at a special seminar at Korea Forest Research Institute, January 14, 2011, Seoul, South Korea.

**Chung, W.**, N. Anderson, and G. Jones. 2011. Up in smoke or in the black: quantifying the productivity and costs of forest biomass energy. Presented at a special seminar at Forest Practice Research Center, Korea Forest Research Institute, January 12, 2011, Pochun, South Korea.

**Chung, W.** 2011. LiDAR applications in forest management and operations planning. Presented at a special seminar at Forest Operations Research Center, Korea Forest Research Institute, January 12, 2011, Pochun, South Korea.

**Chung, W.** 2010. LiDAR applications in forest management and operations planning. **Invited** presentation at a special seminar at Kyungpook National University (Sanju Campus), November 25, 2010, Sangju, South Korea.

**Chung, W.** 2010. LiDAR applications in forest management and operations planning. **Invited** presentation at a special seminar at Chungnam National University, October 13, 2010, Daejeon, South Korea.

**Chung, W.** 2010. LiDAR applications in forest management and operations planning. **Invited** presentation at a special seminar at Kyunghee University, September 9, 2010, Seoul, South Korea.

**Chung, W.** 2010. LiDAR applications in forest management and operations planning. **Invited** presentation at a special seminar at Kyungpook National University, September 7, 2010, Taegu, South Korea.

**Chung, W.**, G. Jones, and K. Krueger. 2010. OptFuels: optimizing placement of fuel treatments over time at landscape scales. **Invited** presentation at a special seminar at Korea Forest Research Institute, September 1, 2010, Seoul, South Korea.

**Chung, W.** 2010. Introduction to ArcSNAP 1.0. **Invited** presentation at the US Forest Service R1 seminar, May 10, 2010. Missoula, MT.

**Chung, W.**, Jones, Greg, Sullivan, Janet, Krueger, Kurt and Aracena, Pablo. 2009. "OptFuels: Optimizing Placement of Fire and Non-fire Fuel Treatments over Time at Landscape Scales" Presented at the AFE 4th International Congress, 2009 Fire Ecology & Management, November 30 – December 4, 2009, Savannah, GA.

**Chung, W.** and G. Jones. 2009. Weed Treatment Planner (WTP) – A Spatial Decision Support System for Invasive Weed Management. Presented at the 2009 PREISM Workshop, USDA Economic Research Service, October 22-23, 2009, Washington DC.

**Chung, W.** and G. Jones. 2009. Overview of RMRS/UM Forest Biomass Research. Oral presentation at the US Forest Service Special Seminar, October 21, 2009. Washington DC.

**Chung, W.** 2009. Developing a Decision Support System to Optimize Spatial and Temporal Fuel Treatments at a Landscape Scale. Presented at the 2009 Council on Forest Engineering, June 15 – 18, Kings Beach, CA.

**Chung, W.** 2009. OptFuels: A decision support system to optimize spatial and temporal fuel treatments. Presented at the 13<sup>th</sup> Symposium on Systems Analysis in Forest Resources, May 26 – 29, 2009. Charleston, SC.

**Chung, W.** 2009. Weed Treatment Planner (WTP): A landscape-level decision support tool for weed management. Presented at the 13<sup>th</sup> Symposium on Systems Analysis in Forest Resources, May 26 – 29, 2009. Charleston, SC.

**Chung, W.** 2009. Weed Treatment Planner (WTP): A landscape-level decision support tool for weed management. Presented at Idaho Weed Conference, January 28-29, 2009, Nampa, ID.

**Chung, W.** 2008. Remote Sensing Applications in Forest Operations. **Invited** presentation at Forestal Arauco, December 18, 2008, Concepcion, Chile

**Chung, W.** 2008. Remote Sensing Applications in Forest Operations. **Invited** presentation at Forestal Celco, Constitucion, Chile, December 17, 2008

**Chung, W.** 2008. Remote Sensing Applications in Forest Operations. **Invited** presentation at CIREN (National Center of Natural Resources Conservation), December 16, 2008, Santiago, Chile

**Chung, W.** 2008. Remote Sensing Applications in Forest Operations. **Invited** lecture at the University of Talca, December 15, 2008, Talca, Chile

**Chung, W.** 2008. Forest Transportation Planning under Multiple Goals. **Invited** presentation at a graduate seminar at the University of Talca, December 13, 2008, Talca, Chile

**Chung, W.**, P. Aracena, M. Contreras. 2008. Optimization Techniques for Forest Transportation Planning under Multiple Goals. Abstract for the 2008 INFORMS (the Institute For Operations Research and the Management Sciences) annual meeting, October 12-15, 2008, Washington, DC

**Chung, W.**, J. Sessions, J. Stükelberger, and K. Aruga. 2008. Road Network Planning: State and Perspectives. **Invited** presentation for the IUFRO All-D3-Conference: Pathways to Environmentally Sound Technologies for Natural Resource Use, June 15-20, 2008, Sapporo, Japan

**Chung, W.**, C. Seielstad, and J. Sessions. 2008. SlopeRunner2.0: A Harvest Area Planning Tool for Cable Logging Using LIDAR-derived DEM and Stem Map. Paper presented at the IUFRO All-D3-Conference: Pathways to Environmentally Sound Technologies for Natural Resource Use, June 15-20, 2008, Sapporo, Japan

**Chung, W.** and M. A. Contreras. 2008. Techniques for Transportation Planning under Multiple Goals. Paper presented at IUFRO All-D3-Conference: Pathways to Environmentally Sound Technologies for Natural Resource Use, June 15-20, 2008, Sapporo, Japan

**Chung, W.**, J. Stükelberger, K. Aruga, and T. W. Cundy. 2008. Designing Forest Road Networks to Minimize Timber Harvesting and Road Construction Costs. Paper presented at IUFRO All-D3-Conference: Pathways to Environmentally Sound Technologies for Natural Resource Use, June 15-20, 2008, Sapporo, Japan

**Chung, W.**, J. Sessions, and J. Holub. 2007. SlopeRunner 1.0: A program to evaluate the effectiveness of landing and road locations for cable logging. Paper presented at the 13th Pacific Northwest Skyline Symposium, April 1-6, Corvallis, OR.

**Chung, W.** 2006. Landscape-level Decision Support for Invasive Species Management. Oral presentation at the PREISM 2006 Organizational Meeting, USDA Economic Research Service, October 18-20, 2006, Washington DC.

**Chung, W.** 2006. Decision Support Systems for Forest Management Planning. **Invited** presentation at the Computational Science Workshop sponsored by UM's ORSP, Computer Science and Mathematics, November 18, 2006, Missoula, MT.

**Chung, W.** CableAnalysis: a computer program to determine cable logging feasibility. **Invited** presentation at the 23rd Inland Empire Forest Engineering Conference. March 7-8, 2006. Moscow, ID.

**Chung, W.**, G. Jones, J. Sullivan, and J. Sessions. 2005. Developing a heuristic solver for MAGIS: a planning tool to integrate resource management and transportation planning on large forest lands. Paper presented at the 2005 Council on Forest Engineering, July 11-14, Fortuna, CA.

**Chung, W.** 2005. MAGIS Express: a planning tool for roads and harvesting. **Invited** presentation at the 22nd Inland Empire Forest Engineering Conference, March 8-9, Moscow, ID.

**Chung, W.** 2005. Decision support systems for forest operational planning. **Invited** presentation at the VIII Forest Production Workshop, November 10-11, 2005, Concepción, Chile

**Chung, W.** 2005. Decision support systems for forest operational planning. **Invited** presentation at the University of Talca, November 8, 2005, Talca, Chile.

**Chung, W.** 2005. Forest operations planning. **Invited** presentation at the Mininco Timber Company, November 7, 2005, Los Angeles, Chile

**Chung, W.** 2004. The Forest and Forestry in Korea. **Invited** Presentation at International Brown Bag Presentation Series, October 1, Office of International Programs, University of Montana, Missoula, MT.

**Chung, W.** 2004. Use of Network Algorithms in Forestry Applications. **Invited** presentation at the Colloquium Seminar, October 7, Dept. of Mathematical Sciences, University of Montana, Missoula, MT.

**Chung, W.** 2004. Use of Network Algorithms in Forestry Applications. **Invited** presentation at the Forest Products Department seminar, College of Natural Resources, University of Idaho, November 15, Moscow, ID.

**Chung, W.** 2004. Forest transportation planning under multiple goals. Presented at the 21st annual Inland Empire Forest Engineering Conference, March. 2-3, Moscow, ID.

**Chung, W.** 2004. New trends and techniques in forest-level management planning. **Invited** presentation at the Department of Forest Resources, Seoul National University, June 1, Seoul, Korea.

**Chung, W.** 2004. New trends and techniques in forest-level management planning. **Invited** presentation at Kookmin University, June 3, Seoul, Korea.

**Chung, W.** and J. Sessions. 2003. A Computerized Method for Determining Cable Logging Feasibility Using a DEM. Paper presented at the Council of Forest Engineering, September 7-10, Bar Harbor, Maine.

**Chung, W.** 2003. A Computer-aided Design Method for Cable Logging Layout. Presented at the 20th Annual Inland Empire Forest Engineering Conference, March. 4-5, Moscow, ID.

#### **Poster Presentations:**

She, J., **W. Chung**, D. Kim. 2016. Using a stochastic simulation approach to evaluate the productivity and cost of harvesting system alternatives. Poster presentation at the Annual Project Meeting of the USDA-NIFA Bioenergy Alliance Network of the Rockies (BANR). October 3-5, 2016, Laramie, WY, USA.

Han, H., **W. Chung**, J. She, Y. Kim, L. Wells, N. Anderson. 2016. Productivity and costs of two beetle-killed stand harvesting methods in northern Colorado. Poster presentation at the Annual Project Meeting of the USDA-NIFA Bioenergy Alliance Network of the Rockies (BANR). October 3-5, 2016, Laramie, WY, USA.

Han, H., **W. Chung**, L. Wells. 2016. Optimizing biomass feedstock logistics: slash forwarding vs. in-woods grinding? Poster presentation at the Annual Project Meeting of the USDA-NIFA Bioenergy Alliance Network of the Rockies (BANR). October 3-5, 2016, Laramie, WY, USA.

- She, J., **W. Chung**, and D. Kim. 2016. Using a stochastic simulation approach to evaluate the productivity and cost of harvesting system alternatives. Poster presented at the 1<sup>st</sup> IUFRO Division 3 Doctoral Student Conference, August 28 – September 2, 2016, Corvallis, OR.
- Wells, L., **W. Chung**, N. Anderson, and J. Hogland. 2016. Estimating Bioenergy Feedstock Supply and Delivered Costs. Poster presented at the 1<sup>st</sup> IUFRO Division 3 Doctoral Student Conference, August 28 – September 2, 2016, Corvallis, OR.
- Wells, L., **W. Chung**, N. Anderson, and J. Hogland. 2016. Estimating Bioenergy Feedstock Supply and Delivered Costs. Poster presented at the Final RMRS-BRDI Project Meeting, April 19-22, 2016, Missoula, MT.
- Han, H., **W. Chung**, and L. Wells. 2016. Optimizing Biomass Feedstock Logistics: Slash Forwarding vs. In-woods Grinding? Poster presented at the Final RMRS-BRDI Project Meeting, April 19-22, 2016, Missoula, MT.
- Hogland, J., N. Anderson, **W. Chung**, L. Wells, and H. Han. 2016. Spatially Explicit, Fine Grained, Rater-based Biomass Supply Chain Analysis. Poster presented at the Final RMRS-BRDI Project Meeting, April 19-22, 2016, Missoula, MT.
- Boston, K., J. Garland, B. Leshchinsky, **W. Chung**, J. Sessions, and J. Wimer. 2016. Innovative Logging Systems to Reduce Injuries in the Logging Workforce. Poster presented at the 2016 Western Region Council on Forest Engineering, January 14, 2016. Eugene, OR.
- Woo, H., **W. Chung**, B. Lee, and J.M. Graham. 2015. Forest Fire Risk Assessment using Point Process Modeling and Monte Carlo Simulation: A Case Study in Gyeongju, South Korea. Poster presented at the 2015 Montana Society of American Foresters Annual Meeting, April 9-11, 2015, Whitefish, MT.
- Anderson, N., **W. Chung**, R. Keefe, and J. Hogland. 2014. Task 2.1 – Feedstock logistics: Increasing productivity and reducing costs of logistics for sustainable biofuel feedstocks from beetle-killed wood. Poster presentation at the 2nd Annual BANR Project meeting, October 1-2, 2014, Moscow, ID.
- Wells, L.A., J.S. Hogland, N.M. Anderson, and **W. Chung**. 2013. Landscape Scale Estimation of Forest Treatment Residue for Bioenergy Production. Poster presented at the 3<sup>rd</sup> IUFRO Latin American Congress, June 12-15, 2013, San Jose, Costa Rica
- Anderson, N., **W. Chung**, W. Perez, D. Page-Dumroese, and Zhengrong Gu, 2013. An assessment of fuel, soil and industrial sorbent applications of biochar produced from woody biomass using distributed scale thermochemical conversion. Poster presented at the 3rd IUFRO Latin American Congress, June 12-15, 2013, San Jose, Costa Rica
- Chung, W.**, N. Anderson, and G. Jones. 2012. Improving the Cost-Efficiency of Woody Biomass Utilization for Energy. Poster presentation at the 1<sup>st</sup> IUFRO-FORNESSA Regional Congress & ITTO/AFF Forest Policy Day, June 25-29, 2012. Nairobi, Kenya.

Butler, E., W.J. Elliot, G. Jones, J. Bramel, K. Krueger, and **W. Chung**. 2012. Modeling sediment from wildland fire to assess tradeoffs between treated and untreated landscapes within the OptFuels System. Poster presentation at the 2012 Tahoe Science Conference, May 22-24, 2012. Incline Village, NV.

Han, H., J. Song, H. Chung, **W. Chung**, J. Chung, J. Sung. 2011. Extracting the Forest Areas Needed to Conserve the Ecosystem of the Major Mountain Ridges in Korea. Poster presentation at Korea Forest Research Institute International Workshop for Practice of Forest Ecosystem Management. July 25-27, 2011. Seoul, South Korea.

Lass, L., T. Prather, B. Shafii, S. Cook, S. Radosevich, **W. Chung**, T. Venn, C. Crabtree, and P. Green. 2011. Using a plant dispersal model on Yellow Starthistle for landscape level weed management planning. Poster presented at the 2011 Weed Science Society of America Annual Meeting, Feb. 7 – 10, 2011, Portland, OR.

Aracena, P., M. Contreras, and **W. Chung**. 2010. Optimizing multiple log landing locations for ground-based timber harvesting. Poster presented at the 23<sup>rd</sup> IUFRO World Congress, August 23 – 28, 2010. Seoul, South Korea.

Stückelberger, J., H. Heinemann, and **W. Chung**. 2010. Pareto-optimality between forest harvesting costs and negative ecological impacts. Poster presented at the 23<sup>rd</sup> IUFRO World Congress, August 23 – 28, 2010. Seoul, South Korea.

Jones, Greg, **W. Chung**, J. Sullivan, K. Krueger, and P. Aracena. 2010. OptFuels: Optimizing Placement of Fire and Non-fire Fuel Treatments over Time at Landscape Scales. Poster presented at the USDA FS RMRS All Scientists Meeting, March 23 – 25, 2010, Fort Collins, CO.

**Chung, W.**, G. Jones, J. Sullivan, K. Krueger, and P. Aracena. 2010. Spatial and Temporal Optimization of Fuel Treatments. Poster presented at the 5th Biennial Lake Tahoe Basin Science Conference, March 16 – 17, 2010, Incline Village, NV.

Prather, T., L. Lass, B. Shafii, S. Cook, S. Radosevich, **W. Chung**, T. Venn, C. Crabtree, and P. Green. 2010. Decision-support Tool Utilizing Improved Dispersal Modeling to Develop Socio-economically Efficient Invasive Species Management Programs. Poster presented at the 2010 Weed Science Society of America Annual Meeting, Feb. 7 – 11, 2010, Denver, CO.

Jones, G., **W. Chung**, J. Sullivan, K. Krueger, and P. Aracena. 2009. “OptFuels: Optimizing Placement of Fire and Non-fire Fuel Treatments over Time at Landscape Scales” Poster presented at the AFE 4th International Congress, 2009 Fire Ecology & Management, November 30 – December 4, 2009, Savannah, GA.

Page-Dumroese, D., Coleman, M., Jones, G., Dumroese, K., Venn, T., Anderson, N., **Chung, W.**, Sorenson, C., Loeffler, D., Kimsey, M., Shaw, T., McElligott, K., Archuleta, J., Englund, K. and Heiskanen, J. 2009. Portable in-woods fast pyrolysis: Using forest biomass to reduce fuels and improve soil quality. Poster presentation at the International workshop on Forests Under Pressure? Bioenergy – Forest Industry – The Public. International Energy Agency, Bioenergy Task 31. Wershofen, Germany, October 5–8, 2009.



**Chung, W.** G. Jones, J. Sullivan, K. Krueger, D. Loeffler, and P. Aracena. 2008. Fire-MAGIS: A Decision Support System to Optimize Spatial and Temporal Fuel Treatments at Landscape Scales. Poster presented at the IUFRO All-D3-Conference: Pathways to Environmentally Sound Technologies for Natural Resource Use, June 15-20, 2008, Sapporo, Japan

**Chung, W.**, J. Sessions, D. Dykstra. 2008. ArcSNAP: A Scheduling and Network Analysis Program for Tactical Harvest Planning. Poster presented at the IUFRO All-D3-Conference: Pathways to Environmentally Sound Technologies for Natural Resource Use, June 15-20, 2008, Sapporo, Japan

Bruce, J., H-S Han, A. Akay, and **W. Chung**. 2007. A computer application to estimate forest road construction cost. Poster presented at the 13th Pacific Northwest Skyline Symposium, April 1-6, Corvallis, OR.

Jones, G., **W. Chung**, J. Sullivan, K. Krueger, and P. Aracena. 2007. Optimizing spatial and temporal treatments to maintain effective fire and non-fire fuels treatments at landscape scales. Poster presented at the 13th Pacific Northwest Skyline Symposium, April 1-6, Corvallis, OR.

Jones, J. Greg., **W. Chung**, J. Sullivan, and K. Krueger. 2007. Optimizing Spatial and Temporal Treatments to Maintain Effective Fire and Non-fire Fuels Treatments at Landscape Scales. Poster presented at the 2nd Fire Behavior and Fuels Conference, March 26-30, 2007, Destin, FL.

**Chung, W.** 2005. Spatial Decision Support Systems for Forest Operations Planning. Poster presentation at the 2005 Council of Forest Engineering, Fortuna, CA. July 11-14, 2005

Rackely, J. and **W. Chung**. 2005. Integrated Resource Transportation Planning with the Water Erosion Prediction Project (WEPP) Model. Poster presentation at the 2005 Council of Forest Engineering, Fortuna, CA. July 11-14, 2005

Contreras. M. and **W. Chung**. 2005. An Application of Ant Colony Optimization Metaheuristic to Solve Forest Transportation Planning Problems with Side Constraints. Poster presentation at the 2005 Council of Forest Engineering, Fortuna, CA. July 11-14, 2005

Kavanagh, Kathleen, T. Link, J. D. Marshall, Jeff Braatne, H-S Han, T. Cundy, S. Daley-Laursen, and **W. Chung**. 2005. Collaborative Watershed Studies of Ecosystem Responses to Current Forest Harvest Practices in the Rocky Mountains, USA. Poster presentation at the 5th National Conference on Science, Policy and the Environment: Forecasting Environmental Changes. February 3-4, Washington, DC.

**Chung, W.** 2003. CPLAN: a Computer Program for Cable Logging Layout Design. Poster presentation at the Second International Precision Forestry Symposium, Seattle, WA, June 15-17, 2003.

**Chung, W.** 2003. NETWORK2000: a Program for Forest Transportation Planning. Poster presentation at the Inland Empire & Montana Society SAF Meeting, Missoula, MT, March 14-15, 2003.

**Chung, W.** 2003. CPLAN: a Computer-aided Design Method for Cable Logging System. Poster presentation at the Inland Empire & Montana Society SAF Meeting, Missoula, MT, March 14-15, 2003.

#### **Workshops Conducted:**

**Chung, W.** 2016. SNAP for ArcGIS 2.0 Workshop. US Forest Service Tongass National Forest, December 6 – 8, 2016, Ketchikan, AK.

**Chung, W.** 2016. The First IUFRO Division 3 Doctoral Student Conference, Oregon State University, August 29 – September 2, 2016, Corvallis, OR.

**Chung, W.** and F. Maus. 2013. Hosting the 2013 USDA Forest Service Sale Area Layout and Harvesting Institute (SALHI), USDA Forest Service, MT, May 13 – 24, 2013, Missoula, MT.

**Chung, W.** 2013. SNAP for ArcGIS Workshop. US Forest Service Tongass National Forest, April 1–5, 2013, Ketchikan, AK.

**Chung, W.** 2012. SNAP for ArcGIS Workshop. US Forest Service Tongass National Forest, December 4–6, 2012, Missoula, MT.

**Chung, W.** 2012. Decision Support Systems in Forest Management Planning. IUFRO Task Force on Education 2012 Summer School, August 5-15, 2012, Warsaw, Poland

**Chung, W.,** G. Jones, K. Krueger, E. Butler, and R. Lankston. 2012. Fuels Treatment Planning: A Workshop on the Applications of the Tahoe Basin-Specific OptFuels Modeling System. May 25, 2012, Stateline, NV.

**Chung, W.** and F. Maus. 2012. Hosting the 2012 USDA Forest Service Sale Area Layout and Harvesting Institute (SALHI), USDA Forest Service, MT, May 14 – 19, 2012, Missoula, MT.

**Chung, W.,** S. O'Brien, and F. Bower. 2010. SNAP for ArcGIS Workshop. US Forest Service Region 1, December 6 – 9, 2010, Missoula, MT.

**Chung, W.** 2010. Spatial forest planning using heuristic optimization techniques. Workshop at Seoul National University, August 2 – 6, 2010. Seoul, South Korea.

**Chung, W.** and F. Maus. 2010. Hosting the 2010 USDA Forest Service Sale Area Layout and Harvesting Institute (SALHI), USDA Forest Service, MT, May 17 – 28, 2010, Missoula, MT.

**Chung, W.,** S. O'Brien, and F. Bower. 2010. SNAP for ArcGIS Workshop. US Forest Service Region 10, April 12 – 16, 2010. Ketchikan, AK.

**Chung, W.** and F. Maus. 2009. Hosting the 2009 USDA Forest Service Sale Area Layout and Harvesting Institute (SALHI), USDA Forest Service, MT, May 11 – 22, 2009, Missoula, MT.

**Chung, W.** and P. Aracena. 2009. Weed Treatment Planner (WTP): A landscape-level decision support tool for weed management. University of Idaho Weed Workshop, April 23 – 24, 2009. McCall, ID.

**Chung, W.** and F. Maus. 2008. Hosting the 2008 USDA Forest Service Sale Area Layout and Harvesting Institute (SALHI), USDA Forest Service, MT, May 12 – 23, 2008, Missoula, MT.

## **SCHOLARLY REVIEWS**

National Science Foundation (NSF) – grant proposal reviewer  
Austrian Science Fund (FWF) – grant proposal reviewer  
National Fund for Scientific & Technological Development (FONDECYT), Chile – grant proposal reviewer  
USDA Economic Research Service (ERS) – grant proposal reviewer  
US Department of Energy (DOE) – grant proposal reviewer  
NSF EPSCoR – grant proposal reviewer  
Natural Sciences and Engineering Research Council of Canada (NSERC) – grant proposal reviewer  
Forest Science – manuscript reviewer  
Canadian Journal of Forest Research – manuscript reviewer  
Forest Ecology and Management – manuscript reviewer  
Journal of Environmental Management – manuscript reviewer  
International Journal of Forest Engineering – manuscript reviewer  
Western Journal of Applied Forestry – manuscript reviewer  
Southern Journal of Applied Forestry – manuscript reviewer  
Applied Engineering in Agriculture – manuscript reviewer  
European Forestry Research Journal – manuscript reviewer  
New Zealand Journal of Forestry Science – manuscript reviewer  
Southern African Forestry Journal – manuscript reviewer  
Journal of Terramechanics – manuscript reviewer  
Precision Forestry Symposium – manuscript reviewer  
USDA Forest Service Technical Reports – manuscript reviewer  
Journal of Agriculture & Applied Economics – manuscript reviewer  
Journal of Agriculture Science and Technology – manuscript reviewer  
Croatian Journal of Forest Engineering – manuscript reviewer  
Journal of Forestry – manuscript reviewer  
International Journal of Forestry Research – manuscript reviewer  
Sensors – manuscript reviewer  
Applied Mathematics and Computation – manuscript reviewer  
Natural Hazards – manuscript reviewer  
Biomass and Bioenergy – manuscript reviewer  
Annals of Operations Research – manuscript reviewer  
Forest Science and Technology – manuscript reviewer  
Natural Resource Modeling – manuscript reviewer  
International Journal of Wildland Fire – manuscript reviewer  
Mathematical and Computational Forestry & Natural Resource Sciences – manuscript reviewer  
INFOR: Information Systems and Operational Research – manuscript reviewer

Southern Forests – manuscript reviewer  
Forestry: An International Journal of Forest Research – manuscript reviewer  
Forests – manuscript reviewer  
Scandinavian Journal of Forest Research – manuscript reviewer  
Resources, Conservation and Recycling – manuscript reviewer

## SOFTWARE DEVELOPMENT

Chung, W. **SNAP for ArcGIS**. 2010. A Scheduling and Network Analysis Program for Tactical Harvest Planning

Chung, W. **OptFuels Heuristic Solver**. 2010. A heuristic optimizer for scheduling fuel treatments to reduce wild fire risks.

Aracena, P. and W. Chung. **Weed Treatment Planner (WTP)**. 2010. A decision support system for scheduling invasive weed treatments.

Chung, W. and J. Sessions. 2008. **SlopeRunner 2.0**. A program for cable logging payload analysis.

Chung, W. and J. Sessions. 2007. **SlopeRunner 1.0**. A program for cable logging payload analysis.

Chung, W., G. Jones, and J. Sullivan. 2004. **MAGIS Heuristic Solver 1.0**. A program to schedule land management and road activities on both a geographic and temporal basis.

Chung, W. and J. Sessions. 2003. **CableAnalysis 1.0**. A program to determine cable logging feasibility using GIS produced data.

Chung, W. and J. Sessions. 2002. **CPLAN 1.0**. A program to optimize cable harvesting layout and road locations using digital terrain model.

Chung, W. and J. Sessions. 2001. **NETWORK 2001**. A program to optimize fixed and variable cost transportation problems under multiple objectives.

Chung, W. and J. Sessions. 2000. **NETWORK 2000**. A program to optimize fixed and variable cost transportation problems.

Chung, W. and J. Chung. 1995. **SANKIL**. A program for forest road design on steep terrain.