**Running Head**

*Functional traits and forest fire regimes*

**Title**

The biogeography of forest fire regimes: a trait-based approach

**Authors**

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**Abstract**

**Introduction**

Mapping of fire regimes has long been a useful tool to describe spatial variation in characteristic fire behavior across a landscape. Such descriptions are generally based on information regarding historical fire return intervals, climate, predominant vegetation, and biophysical models which link these parameters together (cite LANDFIRE). Implicit in these models is a recognition that there is variation in functional traits across species that confers different degrees of resistance to fire to different species.

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**Methods**

We assembled functional trait data on five fire-adaptive traits that contribute to fire resistance of a suite of conifer species. We compiled traits for 25 widespread conifer species of western North America. Our trait database included bark thickness, tree height, degree of self-pruning, flame length and flame duration. We estimated the bark thickness of a 25.4 cm (10 in) tree using the species-specific bark thickness multiplier provided in the Fire and Fuels Extension of the Forest Vegetation Simulator ([Reinhardt and Crookston 2003](#_ENREF_5)). Maximum tree height was derived from the TRY plant trait database ([Kattge et al. 2011](#_ENREF_4)). Degree of self-pruning was assigned on a qualitative 1-10 following the methods and data for genus *Pinus* from [Schwilk and Ackerly (2001)](#_ENREF_6), supplementing with data for other genera with the Fire Effects and Information System ([FEIS 2013](#_ENREF_1)). Flammability data on mean flame lengths and flame durations were obtained from [Fonda (2001)](#_ENREF_2), [Fonda et al. (1998)](#_ENREF_3), and Banwell and Varner (unpublished data).

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**Results**

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**Discussion**

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**Literature Cited**

FEIS. 2013. Fire Effects Information System. Plant species descriptions., USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, Missoula MT.

Fonda, R. W. 2001. Burning Characteristics of Needles from Eight Pine Species. Forest Science **47**:390-396.

Fonda, R. W., L. A. Belanger, and L. L. Burley. 1998. Burning characteristics of western conifer needles. Northwest Science **72**:1-9.

Kattge, J., S. Díaz, S. Lavorel, I. C. Prentice, P. Leadley, G. Bönisch, E. Garnier, M. Westoby, P. B. Reich, I. J. Wright, J. H. C. Cornelissen, C. Violle, S. P. Harrison, P. M. Van Bodegom, M. Reichstein, B. J. Enquist, N. A. Soudzilovskaia, D. D. Ackerly, M. Anand, O. Atkin, M. Bahn, T. R. Baker, D. Baldocchi, R. Bekker, C. C. Blanco, B. Blonder, W. J. Bond, R. Bradstock, D. E. Bunker, F. Casanoves, J. Cavender-Bares, J. Q. Chambers, F. S. Chapin, J. Chave, D. Coomes, W. K. Cornwell, J. M. Craine, B. H. Dobrin, L. Duarte, W. Durka, J. Elser, G. Esser, M. Estiarte, W. F. Fagan, J. Fang, F. Fernández-Méndez, A. Fidelis, B. Finegan, O. Flores, H. Ford, D. Frank, G. T. Freschet, N. M. Fyllas, R. V. Gallagher, W. A. Green, A. G. Gutierrez, T. Hickler, S. I. Higgins, J. G. Hodgson, A. Jalili, S. Jansen, C. A. Joly, A. J. Kerkhoff, D. Kirkup, K. Kitajima, M. Kleyer, S. Klotz, J. M. H. Knops, K. Kramer, I. Kühn, H. Kurokawa, D. Laughlin, T. D. Lee, M. Leishman, F. Lens, T. Lenz, S. L. Lewis, J. Lloyd, J. Llusià, F. Louault, S. Ma, M. D. Mahecha, P. Manning, T. Massad, B. E. Medlyn, J. Messier, A. T. Moles, S. C. Müller, K. Nadrowski, S. Naeem, Ü. Niinemets, S. Nöllert, A. Nüske, R. Ogaya, J. Oleksyn, V. G. Onipchenko, Y. Onoda, J. Ordoñez, G. Overbeck, W. A. Ozinga, S. Patiño, S. Paula, J. G. Pausas, J. Peñuelas, O. L. Phillips, V. Pillar, H. Poorter, L. Poorter, P. Poschlod, A. Prinzing, R. Proulx, A. Rammig, S. Reinsch, B. Reu, L. Sack, B. Salgado-Negret, J. Sardans, S. Shiodera, B. Shipley, A. Siefert, E. Sosinski, J. F. Soussana, E. Swaine, N. Swenson, K. Thompson, P. Thornton, M. Waldram, E. Weiher, M. White, S. White, S. J. Wright, B. Yguel, S. Zaehle, A. E. Zanne, and C. Wirth. 2011. TRY – a global database of plant traits. Global Change Biology **17**:2905-2935.

Reinhardt, E. D., and N. L. Crookston. 2003. The Fire and Fuels Extension to the Forest Vegetation Simulator. USDA Forest Service Gen. Tech. Rep. RMRS-GTR-116, Ogden, UT.

Schwilk, D. W., and D. D. Ackerly. 2001. Flammability and serotiny as strategies: correlated evolution in pines. Oikos **94**:326-336.