Predicting Time-Since-Fire Using Forest Inventory Data: A Case Study in the Boreal Forest of Saskatchewan, Canada

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Introduction

Time-since-fire (T-S-F) can be used to calculate fire disturbance parameters such as: area vs. age curves, fire frequency, and disturbance patch sizes.

Historic fire disturbance parameters are needed to provide a baseline for emulating natural disturbance regimes during forest management.

Predicting T-S-F information from existing forest inventory data may allow historic fire parameters to be estimated at a lower cost than approaches which require tree ages to be measured especially for this purpose.

Image: NASA and Canadian Forest Service

Data Description

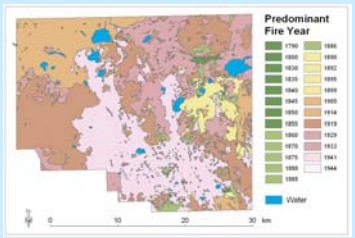
The 90 000 ha study area was located in northwest Saskatchewan, Canada.

The T-S-F data were recorded as the time since the last wildfire disturbance (to the nearest year) for all areas of the landscape.

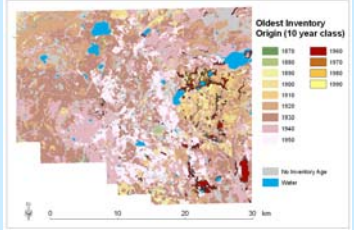
The forest inventory data included variables describing tree species and ages (recorded within 10 year classes).

Human-made features such as roads and harvests created “holes” in the forest inventory where no forest age attributes were recorded.

Data

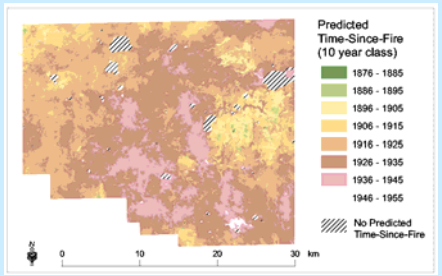


T-S-F polygons



Forest Inventory polygons

Modelling Results

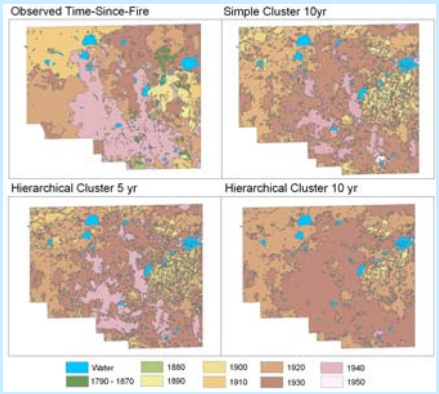


Predicted T-S-F for forest inventory polygons.

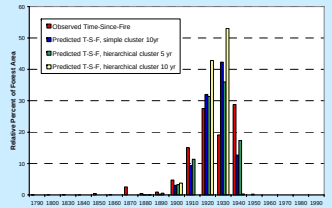
Significant regression variables were:

- Forest inventory age
- Inventory age from neighbouring polygons
- Tree species
- Forest modification type (harvest)

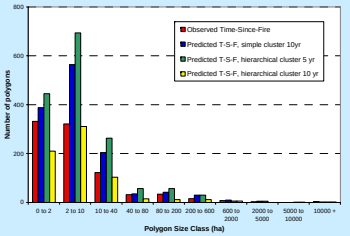
Clustering Results



Evaluation Results



Area vs. age class used to calculate fire frequency



Patch size used for forest planning guidelines

Modelling

- Regression was used to predict T-S-F from forest inventory variables.
- “Holes” were filled in with predicted T-S-F values from neighbouring polygons.

Clustering

- Forest inventory polygons with similar predicted T-S-F were grouped into fire events.
- Several approaches were evaluated.

Evaluation

- Fire disturbance parameters were compared for predicted and observed T-S-F.

Discussion

The methods used to derive predicted T-S-F were linked to the required uses of the output:

- Area by age class only required predicting T-S-F with regression models.
- Patch size distributions required removing “holes” and clustering forest polygons.

No strong relationship was found between T-S-F and forest inventory variables. This may be a result of different data collection methods and differing accuracy between the datasets.

Evaluation of the predicted T-S-F should focus on comparing fire disturbance parameters to those calculated from the observed T-S-F dataset.

Conclusion

A significant relationship existed between forest inventory variables and T-S-F; however, this relationship was not as strong as we had hoped.

Nevertheless, the predicted T-S-F were considerably better than those that could be derived simply using the ages provided by the forest inventory.

Acknowledgements

- Natural Sciences and Engineering Research Council of Canada
- Forest Development Fund of the Saskatchewan Forest Centre
- Sustainable Forest Management Network
- Forest Ecosystems Branch of Saskatchewan Environment and Resource Management
- Mistik Management Ltd.

References

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IUFRO World Congress, Brisbane, Australia. August 2005.