Tristan RH **Goodbody**

Remote Sensing of Forests Specialist

University of British Columbia, Vancouver

+604 992 1327 | goodbody.t@gmail.com | 0000-0002-6894-7925 | tgoodbody | GoodbodyT

About me

I have 7 years of experience working with remote sensing data in the context of forest resources management and inventory. During that time I have successfully defended my PhD, collaborated with multiple levels of government, private industry, and academia, acted as a mentor for students of all levels of post-secondary education, and produced high impact science that continues to be operationalized. My work in developing a robust open-source tool for structurally guided sampling has received international and interdisciplinary acclaim and is being actively developed to continue to enhance forest inventories.

Experience

Post-Doctoral Fellow

Vancouver, BC

Faculty of Forest Resources Management (UBC)

June 2019 - Present

- Assessment of wood attributes using remote sensing (AWARE) & Canadian Wood Fibre Center Forest Innovation Program.
  - Mentored graduate students on remote sensing practices and routines
  - Developed lidar processing and analysis frameworks to enhance forest inventory knowledge
  - Initialized international committee (academic, government, industry) on structurally guided sampling
  - Actively developing sgsR - Structurally guided sampling in R
  - Published in high impact journals with high rate of citations

Teaching assistant

Vancouver, BC

Faculty of Forest Resources Management (UBC)

May 2015 - March 2019

- Leading & supervising applied exercises to guide student knowledge of remote sensing concepts.
  - Guiding students to success in written and oral submissions
  - FRST 443 - Remote sensing for ecosystem management
  - FRST 521 - Advanced earth observation and image processing
  - Guest lectured on advanced remote sensing systems and data processing techniques
  - Developed graduate labs & assignments
  - Evaluated research proposals

Planning Forester Intern - Co-op

Chetwynd, BC

Chetwynd Forest Industries - West Fraser Mills LTD.

May 2014 - December 2014

- Working in a team and individually to implement West Fraser Management objectives.
  - Site plan preparation
  - Harvest planning & layout
  - Silviculture assessments and reforestation quality inspections
  - Post-fire salvage planning and management
  - GIS management
  - Forest appraisals

Planning Forester Intern - Co-op

Williams Lake, BC

Alex Fraser Research Forest (UBC)

May 2013 - September 2013

- Implemented planning and management perscriptions.
  - Road & timber layout
  - Timber cruising
  - Volume determination
  - Avian habitat assessments

Education

University of British Columbia *Vancouver, BC*

PhD Remote Sensing of Forests *May 2015 - March 2019*

- Assessing the role of digital aerial photogrammetry for characterizing forest structure and enhancing forest inventories

University of British Columbia *Vancouver, BC*

BSc Natural Resources Conservation (Hons.& Co-op) *September 2010 - January 2015*

- Science and Management Major.
  - Cons 330: Conservation Policy
  - FRST 443: Remote Sensing Of Ecosystem Management

Skills

Data Science	R (Advanced):, LAStools, lidR, ENVI, ARC/QGIS, ArcPy, Developed sgsR package
Research	Forest modelling, inventory analysis, lidar processing, digital aerial photogrammetry, raster & vector analysis
Collaboration	Extensive work with international academic, government, and industry representatives
Writing	Scientific publications, public reports, funding grants, reproducible reporting (Rmarkdown, bookdown)
Communication	Confident public speaker, effective graphic design (Illustrator/inDesign)
Languages	English/Spanish (bilingual)

Awards

PhD Funding *Vancouver, BC*

NSERC PGSD *2018*

PhD Funding *Vancouver, BC*

Harry G. Smith Scholarship *2018*

Peer-Reviewed Publications

1. Achim, A., Moreau, G., Coops, N. C., Axelson, J. N., Barrette, J., Bédard, S., Byrne, K. E., Caspersen, J., Dick, A. R., D'Orangeville, L.others. (2022). The changing culture of silviculture. *Forestry*, *95*(2), 143–152.
2. Coops, N. C., Tompalski, P., Goodbody, T. R., Achim, A., & Mulverhill, C. (2022). Framework for near real-time forest inventory using multi source remote sensing data. *Forestry: An International Journal of Forest Research*.
3. Goodbody, T. R., Coops, N. C., Srivastava, V., Parsons, B., Kearney, S. P., Rickbeil, G. J., & Stenhouse, G. B. (2021). Mapping recreation and tourism use across grizzly bear recovery areas using social network data and maximum entropy modelling. *Ecological Modelling*, *440*, 109377.
4. Toit, F. du, Coops, N. C., Goodbody, T. R., Stoehr, M., & El-Kassaby, Y. A. (2021). Deriving internal crown geometric features of douglas-fir from airborne laser scanning in a realized-gain trial. *Forestry: An International Journal of Forest Research*, *94*(3), 442–454.
5. Fu, X., Zhang, Z., Cao, L., Coops, N. C., Goodbody, T. R., Liu, H., Shen, X., & Wu, X. (2021). Assessment of approaches for monitoring forest structure dynamics using bi-temporal digital aerial photogrammetry point clouds. *Remote Sensing of Environment*, *255*, 112300.
6. Tompalski, P., Coops, N. C., White, J. C., Goodbody, T. R., Hennigar, C. R., Wulder, M. A., Socha, J., & Woods, M. E. (2021). Estimating changes in forest attributes and enhancing growth projections: A review of existing approaches and future directions using airborne 3D point cloud data (feb, 10.1007/s40725-021-00135-w, 2021). *Current Forestry Reports*, *7*(1), 25–30.
7. Tompalski, P., Coops, N. C., White, J. C., Goodbody, T. R., Hennigar, C. R., Wulder, M. A., Socha, J., & Woods, M. E. (2021). Publisher correction: Estimating changes in forest attributes and enhancing growth projections: A review of existing approaches and future directions using airborne 3D point cloud data. *Current Forestry Reports*, *7*(1), 25–30.
8. Coops, N. C., Tompalski, P., Goodbody, T. R., Queinnec, M., Luther, J. E., Bolton, D. K., White, J. C., Wulder, M. A., Lier, O. R. van, & Hermosilla, T. (2021). Modelling lidar-derived estimates of forest attributes over space and time: A review of approaches and future trends. *Remote Sensing of Environment*, *260*, 112477.

9. Kearney, S. P., Larsen, T. A., Goodbody, T. R., Coops, N. C., & Stenhouse, G. B. (2021). Characterizing off-highway road use with remote-sensing, social media and crowd-sourced data: An application to grizzly bear (ursus arctos) habitat. *Remote Sensing*, *13*(13), 2547.

10. Goodbody, T. R., Coops, N. C., Luther, J. E., Tompalski, P., Mulverhill, C., Frizzle, C., Fournier, R., Furze, S., & Herniman, S. (2021). Airborne laser scanning for quantifying criteria and indicators of sustainable forest management in canada. *Canadian Journal of Forest Research*, *51*(7), 972–985.

11. Coops, N. C., Achim, A., Arp, P., Bater, C. W., Caspersen, J. P., Cote, J.-F., Dech, J. P., Dick, A. R., Ewijk, K. van, Fournier, R.others. (2021). Advances in the application of remote sensing for forest information needs in canada: Lessons learned from a national collaboration of academic, industry, and government stakeholders. *Forestry Chronicle*, *97*(2), 127–147.

12. Goodbody, T. R., White, J. C., Coops, N. C., & LeBoeuf, A. (2021). Benchmarking acquisition parameters for digital aerial photogrammetric data for forest inventory applications: Impacts of image overlap and resolution. *Remote Sensing of Environment*, *265*, 112677.

13. Czekajlo, A., Coops, N. C., & Goodbody, T. R. (2021). Untangling the effect of urban vegetation type and structure on spectrally unmixed greenness. *Remote Sensing Letters*, *12*(12), 1216–1226.

14. Coops, N. C., Achim, A., Arp, P., Bater, C. W., Caspersen, J. P., Côté, J.-F., Dech, J. P., Dick, A. R., Ewijk, K. van, Fournier, R.others. (2021). Advancing the application of remote sensing for forest information needs in canada: Lessons learned from a national collaboration of university, industrial and government stakeholders. *The Forestry Chronicle*, *97*(2), 109–126.

15. Toit, F. du, Coops, N. C., Tompalski, P., Goodbody, T. R., El-Kassaby, Y. A., Stoehr, M., Turner, D., & Lucieer, A. (2020). Characterizing variations in growth characteristics between douglas-fir with different genetic gain levels using airborne laser scanning. *Trees*, *34*(3), 649–664.

16. Goodbody, T. R., Tompalski, P., Coops, N. C., White, J. C., Wulder, M. A., & Sanelli, M. (2020). Uncovering spatial and ecological variability in gap size frequency distributions in the canadian boreal forest. *Scientific Reports*, *10*(1), 1–12.

17. Xu, Z., Shen, X., Cao, L., Coops, N. C., Goodbody, T. R., Zhong, T., Zhao, W., Sun, Q., Ba, S., Zhang, Z.others. (2020). Tree species classification using UAS-based digital aerial photogrammetry point clouds and multispectral imageries in subtropical natural forests. *International Journal of Applied Earth Observation and Geoinformation*, *92*, 102173.

18. Goodbody, T. R., Tompalski, P., Coops, N. C., Hopkinson, C., Treitz, P., & Ewijk, K. van. (2020). Forest inventory and diversity attribute modelling using structural and intensity metrics from multi-spectral airborne laser scanning data. *Remote Sensing*, *12*(13), 2109.

19. Roussel, J.-R., Auty, D., Coops, N. C., Tompalski, P., Goodbody, T. R., Meador, A. S., Bourdon, J.-F., Boissieu, F. de, & Achim, A. (2020). lidR: An r package for analysis of airborne laser scanning (ALS) data. *Remote Sensing of Environment*, *251*, 112061.

20. Chadwick, A. J., Goodbody, T. R., Coops, N. C., Hervieux, A., Bater, C. W., Martens, L. A., White, B., & Röeser, D. (2020). Automatic delineation and height measurement of regenerating conifer crowns under leaf-off conditions using UAV imagery. *Remote Sensing*, *12*(24), 4104.

21. Gómez, C., Goodbody, T. R., Coops, N. C., Álvarez-Taboada, F., & Sanz-Ablanedo, E. (2020). Forest ecosystem monitoring using unmanned aerial systems. In *Unmanned aerial remote sensing* (pp. 173–196). CRC Press.

22. Goodbody, T. R., Coops, N. C., & White, J. C. (2019). Digital aerial photogrammetry for updating area-based forest inventories: A review of opportunities, challenges, and future directions. *Current Forestry Reports*, *5*(2), 55–75.

23. Goodbody, T. R. H. (2019). *Assessing the role of digital aerial photogrammetry for characterizing forest structure and enhancing forest inventories* [PhD thesis]. University of British Columbia.

24. Nuijten, R. J., Coops, N. C., Goodbody, T. R., & Pelletier, G. (2019). Examining the multi-seasonal consistency of individual tree segmentation on deciduous stands using digital aerial photogrammetry (DAP) and unmanned aerial systems (UAS). *Remote Sensing*, *11*(7), 739.

25. Coops, N. C., Goodbody, T. R., & Cao, L. (2019). *Four steps to extend drone use in research*. Nature Publishing Group.

26. Yancho, J. M. M., Coops, N. C., Tompalski, P., Goodbody, T. R., & Plowright, A. (2019). Fine-scale spatial and spectral clustering of UAV-acquired digital aerial photogrammetric (DAP) point clouds for individual tree crown detection and segmentation. *Ieee Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, *12*(10), 4131–4148.

27. Goodbody, T. R., Coops, N. C., Hermosilla, T., Tompalski, P., & Crawford, P. (2018). Assessing the status of forest regeneration using digital aerial photogrammetry and unmanned aerial systems. *International Journal of Remote Sensing*, *39*(15-16), 5246–5264.

28. Goodbody, T. R., Coops, N. C., Hermosilla, T., Tompalski, P., McCartney, G., & MacLean, D. A. (2018). Digital aerial photogrammetry for assessing cumulative spruce budworm defoliation and enhancing forest inventories at a landscape-level. *Isprs Journal of Photogrammetry and Remote Sensing*, *142*, 1–11.

29. Goodbody, T. R., Coops, N. C., Hermosilla, T., Tompalski, P., & Pelletier, G. (2018). Vegetation phenology driving error variation in digital aerial photogrammetrically derived terrain models. *Remote Sensing*, *10*(10), 1554.

30. Goodbody, T. R., Coops, N. C., Tompalski, P., Crawford, P., & Day, K. J. (2017). Updating residual stem volume estimates using ALS-and UAV-acquired stereo-photogrammetric point clouds. *International Journal of Remote Sensing*, *38*(8-10), 2938–2953.

31. Goodbody, T. R., Coops, N. C., Marshall, P. L., Tompalski, P., & Crawford, P. (2017). Unmanned aerial systems for precision forest inventory purposes: A review and case study. *The Forestry Chronicle*, *93*(1), 71–81.

Presentations

UBC - UTAS Workshop — *Hobart, Australia*
sgsR: A structurally guided sampling toolbox for lidar-based forest inventories — *April 2022*

AWARE E-lecture Series — *Online*
Digital Photogrammetric Applications to Enhanced Forest Inventory — *October 2019*

Silvilaser — *Foz de Iguazu, Brazil*
Uncovering spatial and ecological variability in gap size frequency distributions in the Canadian boreal forest — *October 2019*

CIF-IFC Workshop — *Edmonton, AB*
Examining potential applications of UAS and digital photogrammetry for various forest management purposes — *April 2019*

FRI Forest Practitioners Conference — *Edmonton, AB*
Assessing the status of forest regeneration using digital aerial photogrammetry and unmanned aerial systems — *October 2018*

AWARE Instructional Sessions — *Kamloops, BC*
LiDAR theory, processing and implementation workshop — *February 2018*

AWARE Instructional Sessions — *Huntsville, ON*
LiDAR theory, processing and implementation workshop — *October 2017*

AWARE Instructional Sessions — *Kapuskasing, ON*
LiDAR theory, processing and implementation workshop — *October 2017*

AWARE Instructional Sessions — *Quesnel, BC*
LiDAR theory, processing and implementation workshop — *October 2017*

Silvilaser — *Blacksburg, USA*
Assessing the capacity of DAP to enhance inventory knowledge of Spruce Budworm affected forests — *November 2017*

Symposium on Systems and Analysis in Forest Resources — *Suquamish, USA*
Updating airborne laser scanning EFI metrics using UAV acquired DAP point clouds — *August 2017*

UAV and Remote Sensing Workshop — *Nanjing, China*
UAV and Digital Photogrammetry for forestry purposes — *July 2017*

Assessment of Wood Attributes for Remote Sensing AGM — *Edmunston, NB*
Assessing the capacity of DAP to enhance inventory knowledge of Spruce Budworm affected forests — *May 2017*

ForestSAT — *Santiago, Chile*
Modelling residual stand volume using unmanned aerial vehicles and digital aerial photogrammetry — *November 2016*

FP Innovations UAV Workshop — *Courtney, BC*
UAVs and the University of British Columbia — *October 2016*

Canadian Remote Sensing Symposium *Winnepeg, MB*

Modelling residual stand volume using unmanned aerial vehicles and digital aerial photogrammetry *June 2016*

Southern Interior Silviculture Committee *Kamloops, BC*

DAP point clouds acquired from Unmanned Aerial Systems (UAS) for enhancing forest inventories *February 2016*

Alex Fraser Research Forest Proof of Concept Workshop *Williams Lake, BC*

Research in use of drones to update LiDAR forest inventories. LiDAR High Resolution Inventory for the IDF *June 2015*