SUPPORTING TABLES

Table S1. Best lidar-based models as predictors of aboveground standing tree carbon.

Selected lidar metrics as predictor variables of FIA subplot carbon	R^2	ΔAIC
Mean height of 1m CHM	0.67	0
Proportion of 1m CHM at 15-20 m + proportion of 1m CHM at 20-25 m	0.66	4
Proportion of 1m lidar CHM at 20-25 m + product of mean height with cover	0.63	8
80^{th} percentile height + cover	0.62	9
Product of mean height with cover	0.60	11
80^{th} percentile height	0.59	12

CHM = canopy height model; n = 56 samples in all models

Table S2. General additive models of change in canopy carbon, ΔH, from 2002 to 2015.

General Additive Model	Adj-R^2	ΔAIC
$\Delta H \sim$ Elevation + 2002 Height + Elevation : 2002 Height	0.51	0
$\Delta H \sim$ Elevation + 2002 Height	0.35	2,240
$\Delta H \sim$ Elevation	0.27	3,223
$\Delta H \sim$ 2002 Height	0.08	5,093

Table S3. Correlations among independent variables used in logistic regression of 0.25 ha windthrow samples.

0.25 ha metrics	elev	95%ht
95%ht	0.33	
TPI	0.19	0.13

elev = m asl; 95%ht = 95% height; TPI = topographic position index gives height of a pixel relative to its neighbors.

Table S4. Model comparisons for logistic regression of 0.25 ha windthrow.

Model	ΔAIC
95%ht + elev + TPI	0
95%ht + elev	7
95%ht + TPI	50
elev + TPI	62
elev	81
95%ht	83
TPI	132

SUPPORTING FIGURES

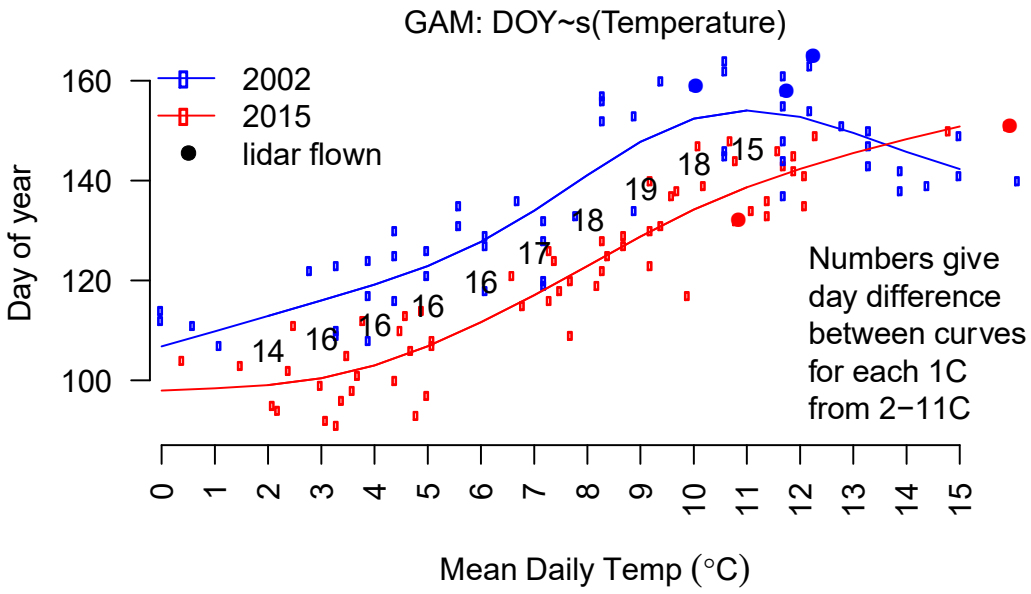

Figure S1. Phenology from 1 April (day of year = 91) to last lidar flight for 2002 (blue) and 2015 (red). Each point gives mean daily temperature for a given day of year (1 January = day of year 1). Curves are GAM fits of day of year against smoothed mean daily temperature. Distance in days between the curves for integer values of temperature are given as text above each temperature. For instance, at mean daily temperatures of 2°C came 14 days earlier in 2015 and 9°C came 19 days earlier than in 2002.

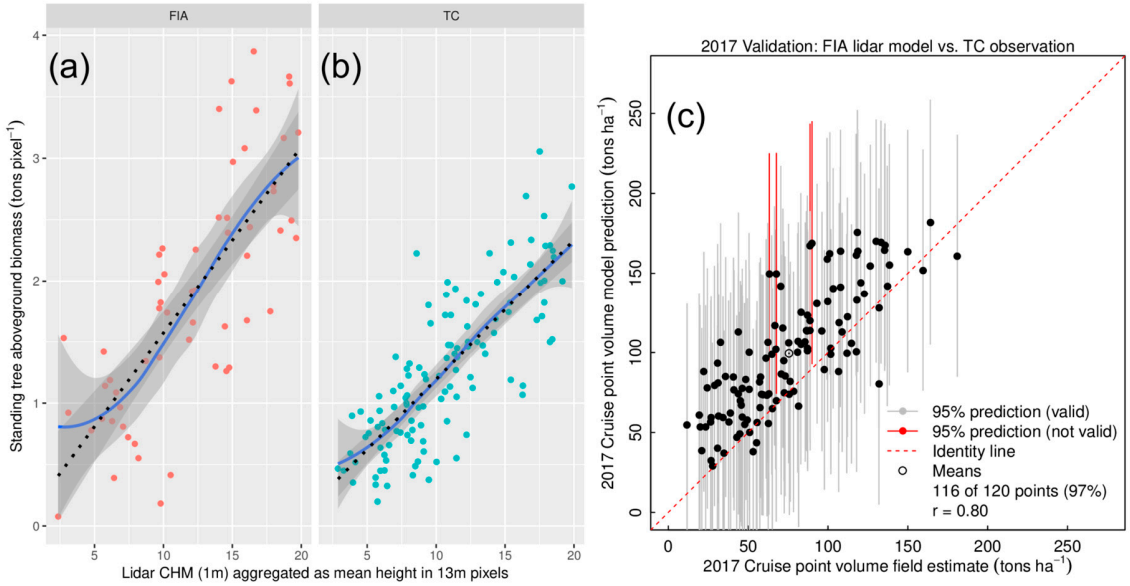

Figure S2. Lidar-assisted models of standing tree biomass equal to twice carbon. (a) FIA-subplot model. Standing tree aboveground biomass estimated from FIA-style tree census in subplots. (b) Variable-radius timber cruising plots (TC) plotted against a 1m canopy height model (CHM) aggregated as 13m pixels using mean height. Solid curves are lowess fits; dotted lines are least squares. Shaded areas are within 95% confidence bands. Each bullet represents field-sample biomass using height and DBH as predictors in published allometric equations for aboveground tree biomass. (c) Validation of FIA-model by comparing predicted TC biomass using FIA model for 120 variable-radius timber cruising locations from 2017.

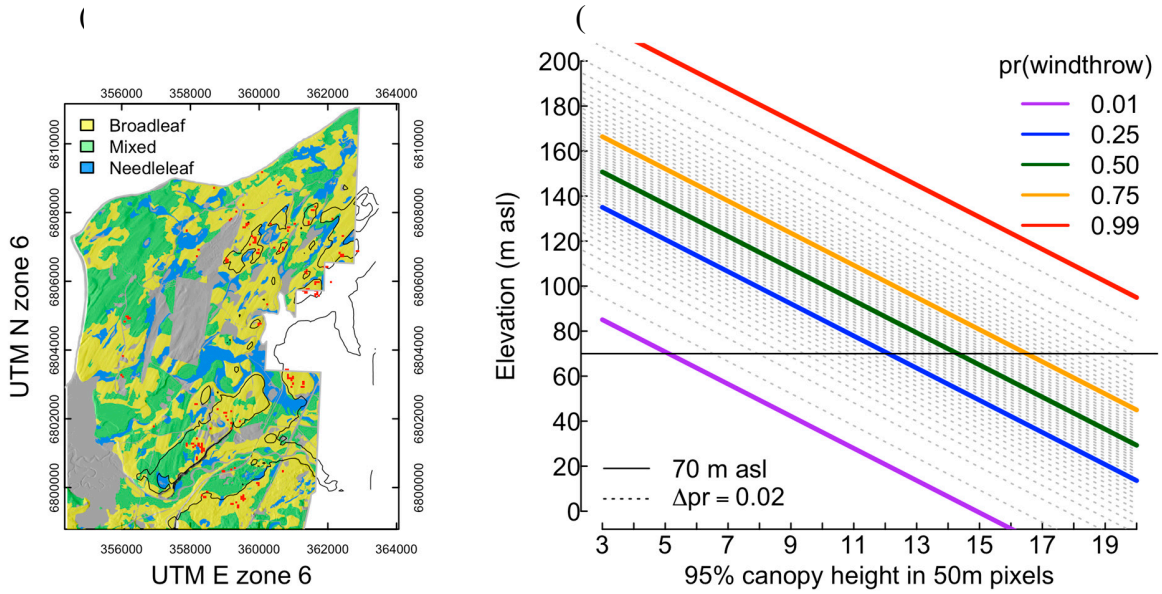

Figure S3. Windthrow following September 2012 wind event when the maximum sustained two minute wind speed at Ted Stevens Anchorage International Airport was recorded as 175 km h^{-1}. (a) Mapped severe windthrow in 50m pixels as red dots. Black contours at 70 m asl. (b) Probability contours of windthrow given canopy height and elevation. Gray dotted lines give probability at intervals of 0.05

Supporting Additional References

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