Supplementary Information

A century of high elevation ecosystem change in the Canadian Rocky Mountains
Andrew Trant, Eric Higgs, and Brian M. Starzomski
Supplementary Information
A century of high elevation ecosystem change in the Canadian Rocky Mountains

SITE LOCATIONS

| PhotoPairID | HistoricYear | RepeatYear | Location_SurveyStation                                                                 | Latitude      | Longitude     |
|-------------|--------------|------------|-----------------------------------------------------------------------------------------|---------------|---------------|
| 1           | 1913         | 2008       | Stn. 27 Dutch Creek Head No. 1; Crowsnest Forest Reserve and Waterton Lakes National Park | 49.945886     | -114.682723  |
| 2           | 1913         | 2008       | Stn. 27 Dutch Creek Head No. 1; Crowsnest Forest Reserve and Waterton Lakes National Park | 49.940655     | -114.663105  |
| 3           | 1913         | 2008       | Stn. 27 Dutch Creek Head No. 1; Crowsnest Forest Reserve and Waterton Lakes National Park | 49.925053     | -114.649325  |
| 4           | 1913         | 2008       | Stn. 27 Dutch Creek Head No. 1; Crowsnest Forest Reserve and Waterton Lakes National Park | 49.914612     | -114.639623  |
| 8           | 1913         | 2008       | Stn. 43 Grassy Ridge; Crowsnest Forest Reserve and Waterton Lakes National Park           | 49.927874     | -114.621568  |
| 8           | 1913         | 2008       | Stn. 43 Grassy Ridge; Crowsnest Forest Reserve and Waterton Lakes National Park           | 49.927874     | -114.621568  |
| 9           | 1913         | 2008       | Stn. 43 Grassy Ridge; Crowsnest Forest Reserve and Waterton Lakes National Park           | 49.941069     | -114.605155  |
| 11          | 1913         | 2008       | Stn. 54 Sentinel Pass West No. 2; Crowsnest Forest Reserve and Waterton Lakes National Park | 50.217702     | -114.468354  |
| 11          | 1913         | 2008       | Stn. 54 Sentinel Pass West No. 2; Crowsnest Forest Reserve and Waterton Lakes National Park | 50.217702     | -114.468354  |
| 12          | 1913         | 2008       | Stn. 54 Sentinel Pass West No. 2; Crowsnest Forest Reserve and Waterton Lakes National Park | 50.248445     | -114.481374  |
| 13          | 1913         | 2008       | Stn. 54 Sentinel Pass West No. 2; Crowsnest Forest Reserve and Waterton Lakes National Park | 50.232963     | -114.468565  |
| 14          | 1913         | 2008       | Stn. 58 Willow Creek No. 2; Crowsnest Forest Reserve and Waterton Lakes National Park     | 50.197743     | -114.419133  |
| 19          | 1913         | 2008       | Stn. 12 Boundary No. 2A; Crowsnest Forest Reserve and Waterton Lakes National Park        | 50.129344     | -114.713131  |
| 24          | 1919         | 2009       | Stn. 235; Bow-Clearwater Forest Reserve                                                  | 51.788269     | -115.686667  |
| 25          | 1919         | 2009       | Stn. 235; Bow-Clearwater Forest Reserve                                                  | 51.804733     | -115.728716  |
| 25          | 1919         | 2009       | Stn. 235; Bow-Clearwater Forest Reserve                                                  | 51.804733     | -115.728716  |
| 28          | 1927         | 2011       | Stn. 443; Brazeau Forest Reserve and Jasper National Park                                | 52.092321     | -116.628981  |
| 29          | 1927         | 2011       | Stn. 443; Brazeau Forest Reserve and Jasper National Park                                | 52.051207     | -116.560260  |
| 30          | 1927         | 2011       | Stn. 443; Brazeau Forest Reserve and Jasper National Park                                | 51.988157     | -116.616317  |
| 36          | 1927         | 2011       | Stn. 444; Brazeau Forest Reserve and Jasper National Park                                | 52.016475     | -116.751307  |
| 36          | 1927         | 2011       | Stn. 444; Brazeau Forest Reserve and Jasper National Park                                | 52.024700     | -116.733976  |
| 36          | 1927         | 2011       | Stn. 444; Brazeau Forest Reserve and Jasper National Park                                | 52.024700     | -116.733976  |
| 37          | 1927         | 2011       | Stn. 446; Brazeau Forest Reserve and Jasper National Park                                | 51.947946     | -116.842435  |
| 37          | 1927         | 2011       | Stn. 446; Brazeau Forest Reserve and Jasper National Park                                | 51.961592     | -116.830190  |
| 38          | 1927         | 2011       | Stn. 446; Brazeau Forest Reserve and Jasper National Park                                | 52.028255     | -116.705458  |
| 39          | 1927         | 2011       | Stn. 446; Brazeau Forest Reserve and Jasper National Park                                | 52.025924     | -116.736925  |
| 39          | 1927         | 2011       | Stn. 446; Brazeau Forest Reserve and Jasper National Park                                | 52.031785     | -116.716131  |
| 42          | 1927         | 2011       | Stn. 445; Brazeau Forest Reserve and Jasper National Park                                | 52.002345     | -116.717093  |
|   |   |   |   |   |
|---|---|---|---|---|
| 42 | 1927 | 2011 | Stn. 445; Brazeau Forest Reserve and Jasper National Park | 52.010462 -116.716632 |
| 43 | 1896 | 2008 | Moose Mt Centre; Canadian Irrigation Survey | 50.937584 -114.849015 |
| 56 | 1924 | 2011 | Stn. 289 - Casket : Coffin Mtn; Willmore-Kakwa | 53.843804 -119.940133 |
| 56 | 1924 | 2011 | Stn. 289 - Casket : Coffin Mtn; Willmore-Kakwa | 53.853207 -119.918229 |
| 57 | 1924 | 2011 | Stn. 289 - Casket : Coffin Mtn; Willmore-Kakwa | 53.803578 -119.862915 |
| 57 | 1924 | 2011 | Stn. 289 - Casket : Coffin Mtn; Willmore-Kakwa | 53.803578 -119.862915 |
| 58 | 1924 | 2011 | Stn. 289 - Casket : Coffin Mtn; Willmore-Kakwa | 53.769996 -119.897697 |
| 59 | 1924 | 2011 | Stn. 289 - Casket : Coffin Mtn; Willmore-Kakwa | 53.735404 -119.969696 |
| 61 | 1919 | 2009 | Stn. 258 | 51.785254 -115.871490 |
| 61 | 1919 | 2009 | Stn. 258 | 51.796400 -115.884421 |
| 62 | 1919 | 2009 | Stn. 258 | 51.784429 -115.975408 |
| 63 | 1919 | 2009 | Stn. 258 | 51.797541 -115.989037 |
| 64 | 1919 | 2009 | Clearwater County, AB | 51.804733 -115.883387 |
| 65 | 1919 | 2009 | Stn. 265 | 51.864444 -116.005556 |
| 66 | 1919 | 2009 | Stn. 265 | 51.858168 -116.061820 |
| 67 | 1919 | 2009 | Stn. 265 | 51.866371 -115.974464 |
| 68 | 1919 | 2009 | Stn. 265 | 51.866371 -115.974464 |
| 68 | 1919 | 2009 | Stn. 265 | 51.866371 -115.974464 |
| 69 | 1927 | 2009 | Stn. 428 | 51.938597 -116.507876 |
| 70 | 1927 | 2009 | Stn. 428 | 51.916754 -116.562553 |
| 71 | 1927 | 2009 | Stn. 428 | 51.935420 -116.557237 |
| 72 | 1927 | 2007 | Stn. 8 | 53.377304 -118.62959 |
| 73 | 1927 | 2007 | Stn. 8 | 53.427320 -118.598834 |
| 74 | 1927 | 2007 | Stn. 8 | 53.439883 -118.652896 |
| 75 | 1927 | 2007 | Stn. 8 | 53.392178 -118.672215 |
| 75 | 1927 | 2007 | Stn. 8 | 53.404551 -118.683887 |
| 77 | 1944 | 2012 | Stn. 13 | 53.590183 -118.393848 |
| 78 | 1914 | 2004 | Stn. 90 Cameron South | 49.063819 -114.046051 |
| 79 | 1914 | 2004 | Stn. 90 Cameron South | 49.081105 -114.029731 |
| 80 | 1914 | 2004 | Stn. 90 Cameron South | 49.055561 -113.973927 |
| 80 | 1914 | 2004 | Stn. 90 Cameron South | 49.061594 -113.963479 |
| 81 | 1914 | 2004 | Stn. 90 Cameron South | 49.045724 -113.960387 |
| 82 | 1914 | 2004 | Stn. 110 Ruby Ridge No. 2 | 49.063237 -113.980970 |
| No. | Year | Date  | Station Name                          | Latitude   | Longitude  |
|-----|------|-------|--------------------------------------|------------|------------|
| 83  | 1914 | 2004  | Stn. 110 Ruby Ridge No. 2            | 49.086892  | -113.988238|
| 84  | 1914 | 2004  | Stn. 110 Ruby Ridge No. 2            | 49.128657  | -113.996964|
| 85  | 1915 | 2008  | Alexander Summit East                | 49.879422  | -114.692894|
| 86  | 1915 | 2008  | Alexander Summit East                | 49.873510  | -114.679549|
| 87  | 1915 | 2008  | Alexander Summit East                | 49.845072  | -114.661380|
| 88  | 1915 | 2008  | Alexander Summit East                | 49.840211  | -114.684529|
| 89  | 1927 | 2007  | Stn. 36                              | 53.481115  | -119.140001|
| 90  | 1927 | 2007  | Stn. 36                              | 53.484360  | -119.111352|
| 91  | 1927 | 2007  | Stn. 36                              | 53.474990  | -119.090875|
| 92  | 1927 | 2007  | Stn. 51                              | 53.517091  | -119.191161|
| 93  | 1924 | 2011  | Stn. 292 - Sheep Creek South         | 53.795669  | -119.823088|
| 94  | 1924 | 2006  | Stn. 19 Mount Coulthard No. 1        | 49.546333  | -114.589593|
| 95  | 1924 | 2006  | Stn. 19 Mount Coulthard No. 1        | 49.577597  | -114.571155|
| 96  | 1924 | 2006  | Stn. 19 Mount Coulthard No. 1        | 49.544344  | -114.568363|
| 97  | 1924 | 2006  | Stn. 19 Mount Coulthard No. 1        | 49.535375  | -114.564790|
| 98  | 1924 | 2006  | Stn. 21 Link Creek West No.1         | 49.550912  | -114.553627|
| 99  | 1924 | 2006  | Stn. 21 Link Creek West No.1         | 49.541226  | -114.568234|
| 100 | 1924 | 2005  | Province South Divide                | 49.189898  | -114.300060|
| 101 | 1924 | 2005  | Province South Divide                | 49.183044  | -114.342175|
| 102 | 1924 | 2011  | Stn. 292 - Sheep Creek South         | 53.910283  | -119.884418|
| 103 | 1924 | 2011  | Stn. 292 - Sheep Creek South         | 53.817069  | -119.807081|
| 104 | 1888 | 2009  | Mt. Alymer East                      | 51.283037  | -115.327238|
| 105 | 1888 | 2009  | Mt. Alymer East                      | 51.283037  | -115.327238|
| 106 | 1888 | 2009  | Mt. Alymer East                      | 51.249888  | -115.393149|
| 107 | 1888 | 2009  | Mt. Alymer East                      | 51.258251  | -115.427875|
| 108 | 1888 | 2009  | Mt. Alymer East                      | 51.325073  | -115.348701|
| 109 | 1888 | 2009  | Mt. Alymer East                      | 51.325073  | -115.348701|
| 110 | 1888 | 2009  | Mt. Alymer East                      | 51.299754  | -115.348798|
| 111 | 1888 | 2009  | Mt. Alymer East                      | 51.321806  | -115.334327|
| 112 | 1888 | 2009  | Mt. Costigan West                    | 51.269620  | -115.283515|
| 113 | 1889 | 2014  | Grotto Mt.                           | 51.119018  | -115.278583|
| 114 | 1889 | 2014  | Grotto Mt.                           | 51.131639  | -115.294564|
|   | Year1 | Year2 | Location                      | Latitude  | Longitude  |
|---|-------|-------|-------------------------------|-----------|-----------|
| 119| 1890  | 2001  | Grotto Mt.                    | 51.115143 | -115.312800 |
| 119| 1890  | 2001  | Grotto Mt.                    | 51.115143 | -115.312800 |
| 119| 1890  | 2001  | Grotto Mt.                    | 51.123089 | -115.310771 |
| 120| 1905  | 2009  | Wedge Mt East (C4)            | 50.847294 | -115.132013 |
| 120| 1905  | 2009  | Wedge Mt East (C4)            | 50.851380 | -115.132298 |
| 121| 1905  | 2009  | Wedge Mt East (C4)            | 50.854379 | -115.133358 |
| 122| 1905  | 2009  | Wedge Mt East (C4)            | 50.814294 | -115.109829 |
| 123| 1905  | 2009  | Wedge Mt East (C4)            | 50.846652 | -115.109743 |
| 127| 1914  | 2004  | Stn. 103 Sheep Mountain (Vimy)| 49.037224 | -113.868118 |
A century of high elevation ecosystem change in the Canadian Rocky Mountains

SITE VARIABLES

| PhotoPairID | Elev  | Slope | AspectWC | TreelineForm | DisturbanceRH | TreelineAdvanceConsistency | DensityConsistency | KrummholzConsistency |
|-------------|-------|-------|----------|--------------|---------------|----------------------------|-------------------|---------------------|
| 1           | 2087  | 20.78 | C        | A            | 0             | 1                          | 1                 | 1                   |
| 2           | 2262  | 18.73 | W        | A            | 0             | 0.5                        | 0.75              | 1                   |
| 3           | 2203  | 20.01 | W        | A            | 0             | 1                          | 1                 | 1                   |
| 4           | 2190  | 20.09 | W        | A            | 0             | 0.75                       | 0.75              | 0.5                 |
| 8           | 2200  | 18.91 | W        | A            | 0             | 1                          | 1                 | 1                   |
| 8           | 2263  | 21.49 | C        | A            | 0             | 0.66                       | 1                 | 1                   |
| 9           | 2271  | 14.93 | W        | A            | 0             | 1                          | 1                 | 1                   |
| 11          | 2253  | 34.80 | W        | D            | 0             | 1                          | 1                 | 0.75                |
| 11          | 2253  | 26.09 | W        | D            | 0             | 1                          | 1                 | 1                   |
| 12          | 2231  | 18.13 | W        | D            | 0             | 1                          | 1                 | 1                   |
| 13          | 2002  | 24.55 | C        | D            | 0             | 1                          | 1                 | 0.75                |
| 14          | 2027  | 28.82 | C        | D            | H             | 0                          | 1                 | 1                   |
| 19          | 2189  | 11.34 | C        | D            | 0             | 0                          | 1                 | 1                   |
| 24          | 2245  | 19.37 | C        | D            | 0             | 1                          | 1                 | 1                   |
| 25          | 2270  | 23.69 | W        | D            | 0             | 1                          | 1                 | 1                   |
| 25          | 2270  | 12.28 | C        | D            | 0             | 1                          | 1                 | 1                   |
| 28          | 2292  | 39.77 | C        | D            | 0             | 0                          | 1                 | 1                   |
| 29          | 2279  | 34.68 | W        | D            | R             | 0                          | 0                 | 1                   |
| 30          | 1744  | 46.53 | C        | A            | R             | 0.25                       | 0.25              | 1                   |
| 36          | 2127  | 15.49 | C        | D            | 0             | 1                          | 1                 | 1                   |
| 36          | 2194  | 31.19 | W        | D            | H             | 1                          | 1                 | 0.33                |
| 36          | 2194  | 13.34 | C        | D            | 0             | 1                          | 1                 | 1                   |
| 37          | 2268  | 25.89 | W        | D            | 0             | 1                          | 1                 | 1                   |
| 37          | 2018  | 29.32 | C        | D            | H             | 0                          | 1                 | NA                  |
| 38          | 2271  | 33.24 | W        | D            | H             | 1                          | 1                 | 1                   |
| 39          | 2200  | 32.32 | W        | D            | H             | 1                          | 1                 | 1                   |
| 39          | 2230  | 20.65 | W        | D            | H             | 1                          | 1                 | 1                   |
| 42          | 2171  | 35.09 | W        | D            | H             | 0.75                       | 1                 | 1                   |
|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| 42| 2108| 27.96| C | D | H | 0.25 | 0 | 0.25 |
| 43| 2172| 20.18| C | D | 0 | 1 | 1 | 1 |
| 56| 1869| 12.36| W | D | R | 1 | 1 | 1 |
| 56| 2003| 19.84| W | A | 0 | 0.25 | 1 | 1 |
| 57| 1917| 24.72| C | A | 0 | 1 | 1 | 1 |
| 57| 1917| 28.73| C | A | 0 | 0.75 | 1 | 1 |
| 58| 1918| 19.02| C | D | 0 | 1 | 1 | 1 |
| 59| 1834| 14.51| C | A | 0 | 0.25 | 1 | 1 |
| 61| 2207| 25.81| C | D | 0 | 0.5 | 1 | 0 |
| 61| 2309| 20.10| W | D | 0 | 1 | 1 | 0 |
| 62| 2325| 30.77| W | D | 0 | 1 | 1 | 1 |
| 63| 2317| 15.20| C | D | 0 | 1 | 1 | 1 |
| 64| 2412| 26.95| W | D | 0 | 1 | 1 | 1 |
| 65| 2046| 38.54| C | A | 0 | 0.25 | 0 | 0.5 |
| 66| 2319| 18.95| C | D | 0 | 1 | 1 | 1 |
| 67| 2288| 30.69| C | D | 0 | 1 | 0 | 0 |
| 68| 2089| 34.60| C | D | 0 | 0 | 1 | 0 |
| 68| 2089| 25.53| W | D | 0 | 1 | 1 | 1 |
| 69| 2279| 25.98| W | D | 0 | 0.5 | 1 | 1 |
| 70| 2205| 33.77| W | D | 0 | 0.75 | 1 | 1 |
| 71| 2285| 39.36| W | D | 0 | 1 | 1 | 0.5 |
| 72| 1990| 14.42| W | D | 0 | 0.25 | 1 | 1 |
| 73| 2164| 25.24| W | D | 0 | 1 | 1 | 1 |
| 74| 2186| 40.55| W | D | 0 | 1 | 1 | 1 |
| 75| 1951| 12.58| C | D | 0 | 1 | 1 | 0.66 |
| 75| 2183| 7.16 | W | D | 0 | 1 | 1 | 1 |
| 77| 2006| 17.87| W | A | 0 | 0.75 | 0.5 | 0.5 |
| 78| 2341| 40.00| W | D | 0 | 0.25 | 0.5 | 0.33 |
| 79| 2058| 35.29| W | D | 0 | 1 | 1 | 0.66 |
| 80| 2119| 31.57| W | D | 0 | 0 | -0.5 | 0 |
| 80| 2280| 35.23| W | D | 0 | 0 | 0 | 0 |
| 81| 1914| 27.47| C | D | 0 | 0 | 0 | NA |
| 82| 1915| 42.15| C | D | 0 | -1 | -1 | 0 |
|   |     |     |   |   |   |   |
|---|-----|-----|---|---|---|---|
| 83 | 2226 | 17.86 | W | A | 0 | 0 | 1 | 0 |
| 84 | 1797 | 27.94 | W | D | 0 | 1 | 1 | NA |
| 84 | 2020 | 21.09 | W | D | 0 | 1 | 0.25 | 1 |
| 85 | 2248 | 35.79 | W | D | 0 | 1 | 1 | 0.25 |
| 86 | 2265 | 22.27 | W | D | 0 | 1 | 1 | 0.25 |
| 87 | 2211 | 26.79 | W | D | 0 | 1 | 1 | 0.5 |
| 88 | 2160 | 32.39 | C | A | 0 | 0.5 | 1 | 0.5 |
| 89 | 2200 | 28.64 | W | A | 0 | 0.5 | 1 | 0.5 |
| 90 | 2227 | 33.50 | W | A | 0 | 0.75 | 0.75 | 0.75 |
| 91 | 2136 | 39.16 | W | A | 0 | 1 | 1 | NA |
| 93 | 2013 | 23.73 | W | A | 0 | 0.75 | 0.75 | NA |
| 95 | 1996 | 31.31 | C | D | 0 | 1 | 1 | 1 |
| 96 | 2228 | 32.68 | W | D | 0 | 1 | 1 | 0 |
| 97 | 2109 | 26.08 | W | D | 0 | 0 | -0.75 | 0 |
| 98 | 2098 | 32.44 | C | D | 0 | 1 | 0.25 | NA |
| 99 | 2221 | 19.85 | C | D | R | 0.5 | -0.75 | 0.5 |
| 100 | 1896 | 23.51 | W | D | R | -0.5 | -1 | 0.5 |
| 101 | 2087 | 27.54 | C | D | 0 | 0.75 | -0.25 | 1 |
| 102 | 2275 | 17.60 | W | D | 0 | 0.25 | 0.5 | 0.25 |
| 103 | 2094 | 17.54 | W | D | 0 | 0.25 | 1 | 0 |
| 104 | 2064 | 18.52 | W | D | R | 1 | 1 | 0 |
| 105 | 1952 | 23.15 | W | A | R | 0.75 | 0.75 | 0.25 |
| 106 | 2224 | 27.04 | C | D | H | 1 | 1 | 0 |
| 106 | 2147 | 24.97 | W | D | H | 1 | 1 | 1 |
| 108 | 2093 | 32.41 | C | D | 0 | 1 | 1 | NA |
| 108 | 1979 | 36.93 | C | A | 0 | 1 | 1 | NA |
| 110 | 2252 | 22.40 | W | D | 0 | 1 | 1 | 1 |
| 110 | 1789 | 21.13 | W | D | 0 | 0 | 1 | NA |
| 111 | 2222 | 25.37 | W | D | 0 | 1 | 1 | 1 |
| 111 | 2210 | 22.39 | W | D | H | 1 | 1 | 1 |
| 113 | 2111 | 25.38 | C | D | 0 | 0.5 | 1 | 0.75 |
| 118 | 2104 | 29.40 | W | D | 0 | 0.75 | 0.5 | 0.5 |
| 118 | 2295 | 27.37 | W | D | 0 | 0.75 | 1 | 0 |
|   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|
|119| 2216| 26.06| W | D | 0 | 1 | 1 | 0.25 |
|119| 2215| 18.41| W | D | 0 | 1 | 1 | 1    |
|119| 2341| 23.05| C | D | 0 | 0.75 | 1 | 0.25 |
|120| 2448| 26.40| C | D | 0 | 1 | 1 | 1    |
|120| 2430| 24.13| C | D | 0 | 1 | 1 | 0    |
|121| 2375| 25.13| C | D | 0 | 1 | 1 | 0.75 |
|122| 2235| 16.45| C | D | H | 1 | 1 | 0    |
|123| 2309| 22.27| W | D | H | 1 | 1 | 0.5  |
|123| 2255| 20.42| C | D | 0 | 1 | 1 | 0.75 |
|127| 2165| 25.84| W | D | 0 | 0.5 | 1 | 0.75 |
## CLIMATE VARIABLES

| PhotoPairID | MATdiff | MAPdiff | SHMdiff | DDSdiff | NFFDdiff | PASdiff | Tmin_sm_diff | Tave_wt_diff | Tave_sm_diff | PPT_wt_diff | PPT_sm_diff |
|-------------|---------|---------|---------|---------|----------|---------|--------------|--------------|--------------|-------------|-------------|
| 1           | 0.9     | -40     | 0.7     | 52      | 9        | -52     | 0.7          | 2            | 0.3          | -34         | -3          |
| 2           | 0.9     | -43     | 0.6     | 50      | 10       | -56     | 0.7          | 2.1          | 0.3          | -38         | -3          |
| 3           | 1       | -36     | 0.6     | 54      | 10       | -51     | 0.7          | 2.1          | 0.3          | -33         | -2          |
| 4           | 0.9     | -33     | 0.5     | 56      | 10       | -51     | 0.7          | 2.1          | 0.3          | -32         | -1          |
| 8           | 0.9     | -31     | 0.5     | 55      | 9        | -49     | 0.7          | 2.1          | 0.4          | -30         | -1          |
| 8           | 0.3     | -33     | 0.4     | 54      | 9        | -51     | 0.7          | 2.1          | 0.3          | -31         | -1          |
| 9           | 0.9     | -31     | 0.3     | 53      | 10       | -49     | 0.6          | 2.1          | 0.3          | -30         | 0           |
| 11          | 0.9     | -46     | 0.7     | 33      | 8        | -54     | 0.6          | 2.1          | 0.1          | -28         | -5          |
| 11          | 0.9     | -46     | 0.7     | 33      | 8        | -54     | 0.6          | 2.1          | 0.1          | -28         | -5          |
| 12          | 0.8     | -49     | 0.8     | 31      | 8        | -55     | 0.6          | 2.1          | 0.1          | -29         | -4          |
| 13          | 0.8     | -40     | 0.6     | 36      | 8        | -49     | 0.6          | 2.1          | 0.1          | -24         | -4          |
| 14          | 0.9     | -35     | 0.4     | 37      | 8        | -46     | 0.6          | 2.1          | 0.2          | -22         | -3          |
| 19          | 0.9     | -59     | 1.1     | 36      | 10       | -61     | 0.6          | 2            | 0.2          | -41         | -9          |
| 24          | 0.8     | -194    | 2.5     | 12      | 12       | -122    | 0.8          | 2.2          | 0            | -50         | -60         |
| 25          | 0.8     | -199    | 2.4     | 12      | 13       | -126    | 0.8          | 2.2          | -0.1         | -53         | -60         |
| 25          | 0.8     | -199    | 2.4     | 12      | 13       | -126    | 0.8          | 2.2          | -0.1         | -53         | -60         |
| 28          | 0.9     | -152    | 1.8     | 22      | 14       | -133    | 0.9          | 2.3          | 0.1          | -68         | -25         |
| 29          | 0.8     | -152    | 2.1     | 23      | 14       | -128    | 0.9          | 2.3          | 0.1          | -65         | -27         |
| 30          | 0.9     | -109    | 3.1     | 29      | 13       | -89     | 0.9          | 2.3          | 0.1          | -46         | -20         |
| 36          | 0.8     | -138    | 2.5     | 24      | 14       | -124    | 0.8          | 2.3          | 0.2          | -67         | -19         |
| 36          | 0.9     | -149    | 2.4     | 22      | 14       | -134    | 0.9          | 2.2          | 0.1          | -72         | -21         |
| 36          | 0.9     | -149    | 2.4     | 22      | 14       | -134    | 0.9          | 2.2          | 0.1          | -72         | -21         |
| 37          | 0.9     | -143    | 2       | 33      | 12       | -134    | 0.9          | 2.3          | 0.1          | -74         | -15         |
| 37          | 0.9     | -124    | 2.2     | 34      | 12       | -115    | 0.9          | 2.3          | 0.1          | -64         | -14         |
| 38          | 0.8     | -164    | 2.2     | 22      | 13       | -146    | 0.9          | 2.3          | 0.1          | -78         | -23         |
| 39          | 0.9     | -149    | 2.3     | 22      | 14       | -134    | 0.9          | 2.3          | 0.2          | -72         | -20         |
| 39          | 0.9     | -158    | 2.3     | 22      | 13       | -142    | 0.9          | 2.3          | 0.1          | -76         | -22         |
| 42          | 0.9     | -149    | 2.4     | 23      | 14       | -133    | 0.9          | 2.2          | 0.2          | -71         | -21         |
|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| 42| 0.9| -145| 2.3| 23| 13| -128| 0.9| 2.3| 0.2| -69| -21|
| 43| 0.7| -87| 1.9| 13| 7| -64| 0.6| 2.1| 0| -29| -17|
| 56| 0.8| 42| -1| 39| 13| -40| 0.9| 2.2| 0.2| -26| 53|
| 56| 0.8| 35| -1.1| 36| 13| -33| 0.9| 2.2| 0.2| -23| 47|
| 57| 0.8| 44| -1| 39| 12| -42| 0.8| 2.2| 0.3| -27| 57|
| 57| 0.8| 44| -1| 39| 12| -42| 0.8| 2.2| 0.3| -27| 57|
| 58| 0.8| 57| -1| 38| 12| -35| 0.9| 2.1| 0.2| -25| 62|
| 59| 0.8| 70| -1.2| 41| 12| -25| 0.9| 2.2| 0.3| -19| 62|
| 61| -0.2| -54| 0.2| -17| -2| -31| -0.1| -0.1| -0.2| -18| -15|
| 61| 0.8| -213| 2.3| 9| 13| -147| 0.8| 2.2| 0| -61| -60|
| 62| 0.7| -228| 2.3| 10| 12| -162| 0.9| 2.1| 0| -70| -60|
| 63| 0.8| -225| 2.4| 10| 12| -160| 0.8| 2.2| 0.1| -70| -58|
| 64| 0.7| -223| 2.2| 10| 12| -155| 0.9| 2.1| 0| -66| -61|
| 65| 0.7| -171| 2.8| 14| 13| -120| 0.9| 2.2| 0.1| -53| -45|
| 66| 0.8| -201| 2.5| 13| 12| -145| 0.9| 2.2| 0| -68| -50|
| 67| 0.8| -194| 2.3| 14| 13| -136| 0.9| 2.2| 0| -61| -51|
| 68| 0.8| -178| 2.6| 14| 12| -126| 0.9| 2.2| 0| -56| -46|
| 68| 0.8| -178| 2.6| 14| 12| -126| 0.9| 2.2| 0| -56| -46|
| 69| 0.9| -175| 2.2| 19| 14| -144| 0.9| 2.2| 0.1| -72| -31|
| 70| 0.9| -166| 2.1| 18| 13| -141| 0.8| 2.2| 0.1| -70| -28|
| 71| 0.9| -169| 2.1| 19| 13| -143| 0.8| 2.2| 0.1| -71| -29|
| 72| 0.8| 22| -1.4| 48| 11| -36| 0.8| 2.1| 0.3| -25| 46|
| 73| 0.8| 23| -1| 43| 12| -37| 0.8| 2.1| 0.3| -25| 48|
| 74| 0.8| 18| -1.1| 39| 12| -38| 0.8| 2| 0.3| -26| 46|
| 75| 0.8| 21| -1.3| 43| 12| -34| 0.8| 2| 0.4| -24| 45|
| 75| 0.8| 20| -1| 40| 12| -38| 0.8| 2| 0.3| -26| 48|
| 77| 0.8| 9| -1.1| 41| 12| -37| 0.8| 2| 0.3| -21| 38|
| 78| 1| 28| 0.3| 97| 11| -53| 1| 2| 0.7| -45| 9|
| 79| 0.9| 25| 0.3| 98| 11| -49| 1| 2| 0.7| -38| 8|
| 80| 1| 22| 0.4| 102| 11| -62| 1.1| 1.9| 0.7| -43| 6|
| 80| 0.9| 22| 0.4| 102| 11| -72| 1| 2| 0.7| -48| 6|
| 81| 1| 21| 0.5| 107| 11| -66| 1.1| 2| 0.7| -37| 5|
| 82| 1| 23| 0.5| 103| 12| -55| 1.1| 2| 0.7| -37| 6|
|    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|
| 83 | 0.9 | 23 | 0.3 | 102 | 11 | -67 | 1  | 2  | 0.7 | -45 |
| 84 | 1   | 16 | 0.4 | 103 | 11 | -51 | 1  | 2.1| 0.7 | -31 |
| 84 | 1   | 16 | 0.4 | 101 | 12 | -58 | 1  | 2  | 0.7 | -38 |
| 85 | 0.9 | -41| 0.6 | 59  | 10 | -58 | 0.7| 2  | 0.3 | -39 |
| 86 | 1   | -41| 0.6 | 60  | 10 | -59 | 0.7| 2.1| 0.4 | -38 |
| 87 | 1   | -38| 0.6 | 62  | 10 | -58 | 0.8| 2  | 0.3 | -38 |
| 88 | 1   | -37| 0.6 | 63  | 10 | -58 | 0.8| 2.1| 0.4 | -37 |
| 89 | 0.7 | 27 | -1.2| 39  | 12 | -34 | 0.8| 2  | 0.4 | -25 |
| 90 | 0.8 | 27 | -1.1| 37  | 12 | -34 | 0.8| 2.1| 0.4 | -24 |
| 91 | 0.8 | 24 | -1.1| 37  | 12 | -34 | 0.8| 2  | 0.3 | -24 |
| 93 | 0.8 | 26 | -1.3| 40  | 11 | -33 | 0.8| 2  | 0.3 | -23 |
| 95 | 0.8 | 42 | -1  | 38  | 12 | -46 | 0.9| 2.1| 0.2 | -30 |
| 96 | 1   | -21| 0.1 | 81  | 13 | -62 | 0.9| 2  | 0.6 | -39 |
| 97 | 1   | -16| 0.1 | 83  | 12 | -55 | 0.8| 2  | 0.5 | -33 |
| 98 | 1   | -16| 0.2 | 85  | 12 | -56 | 0.9| 2.1| 0.5 | -34 |
| 99 | 1   | -19| 0.1 | 82  | 12 | -60 | 0.9| 2.1| 0.5 | -38 |
| 100| 1   | -10| 0.1 | 88  | 12 | -48 | 0.9| 2.1| 0.5 | -27 |
| 101| 1   | -16| 0.1 | 85  | 12 | -56 | 0.9| 2  | 0.5 | -33 |
| 102| 1   | 13 | 0   | 102 | 11 | -62 | 1.1| 2  | 0.7 | -40 |
| 103| 1   | 16 | 0   | 100 | 11 | -54 | 1  | 2  | 0.6 | -36 |
| 104| 0.8 | 23 | -1.1| 35  | 12 | -37 | 0.9| 2.2| 0.3 | -25 |
| 105| 0.8 | 34 | -1.1| 37  | 13 | -40 | 0.9| 2.2| 0.3 | -25 |
| 106| 0.7 | -142| 1.6| 8   | 9  | -92 | 0.8| 2.1| -0.1| -46 |
| 106| 0.6 | -136| 1.7| 9   | 9  | -87 | 0.7| 2.1| 0   | -44 |
| 108| 0.7 | -126| 2   | 10  | 9  | -77 | 0.7| 2.1| 0   | -42 |
| 108| 0.7 | -122| 2.2 | 11  | 8  | -76 | 0.8| 2  | 0   | -41 |
| 110| 0.7 | -146| 1.5 | 9   | 9  | -95 | 0.8| 2.1| 0   | -47 |
| 110| 0.7 | -105| 2.1 | 9   | 10 | -65 | 0.8| 2.1| -0.1| -29 |
| 111| 0.7 | -142| 1.6 | 10  | 10 | -92 | 0.8| 2.1| -0.1| -46 |
| 111| 0.7 | -141| 1.6 | 9   | 10 | -91 | 0.8| 2.1| -0.1| -44 |
| 113| 0.6 | -133| 1.7 | 9   | 9  | -84 | 0.8| 2.1| 0   | -43 |
| 118| 0.7 | -118| 1.6 | 9   | 9  | -80 | 0.7| 2.1| -0.1| -45 |
| 118| 0.7 | -134| 1.4 | 8   | 8  | -91 | 0.8| 2.1| 0   | -51 |
|   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|
| 119 | 0.6 | -123 | 1.6 | 11 | 9 | -83 | 0.8 | 2.1 | 0 | -47 |
| 119 | 0.6 | -123 | 1.6 | 11 | 9 | -82 | 0.8 | 2.1 | 0 | -48 |
| 119 | -0.3 | 67 | -2.4 | -43 | -3 | 45 | -0.1 | -0.3 | -0.3 | 13 |
| 120 | 0.7 | -107 | 1.2 | 13 | 8 | -78 | 0.6 | 2 | 0 | -46 |
| 120 | 0.7 | -105 | 1.2 | 13 | 8 | -76 | 0.6 | 2.1 | 0 | -45 |
| 121 | 0.7 | -103 | 1.2 | 12 | 8 | -74 | 0.6 | 2 | -0.1 | -44 |
| 122 | 0.7 | -92 | 1.2 | 12 | 8 | -66 | 0.7 | 2.1 | 0 | -38 |
| 123 | 0.7 | -99 | 1.2 | 12 | 8 | -71 | 0.6 | 2.1 | 0 | -41 |
| 123 | 0.7 | -96 | 1.2 | 12 | 8 | -70 | 0.6 | 2.1 | 0 | -40 |
| 127 | 1 | 13 | 0.5 | 108 | 11 | -85 | 1 | 2 | 0.7 | -46 |
**Supplementary Information**

A century of high elevation ecosystem change in the Canadian Rocky Mountains

**METADATA**

| SITE LOCATIONS | DETAILS |
|----------------|---------|
| PhotoPairID    | Unique number given to image pair |
| HistoricYear   | Year that the historic image was taken |
| RepeatYear     | Year that the repeat image was taken |
| Location_SurveyStation | Place name or station name of photo location |
| Latitude       | Latitude of mountain (from Mountain Legacy Project website) |
| Longitude      | Latitude of mountain (from Mountain Legacy Project website) |

**SITE VARIABLES**

| ELEV | DETAILS |
|------|---------|
| Elev | Elevation (in m) of contemporary treeline |
| Slope| Slope (in m) of contemporary treeline |
| AspectWC | Aspect of treeline (W=warm, C=cold) |

| TREELINEADVANCECONSISTENCY | DETAILS |
|-----------------------------|---------|
| TreelineAdvanceConsistency  | Average consistency score of four segment (0=stable/retreat, 1=advance) |

| DENSITYCONSISTENCY | DETAILS |
|---------------------|---------|
| DensityConsistency  | Average consistency score of four segment (0=stable/retreat, 1=advance) |

| KRUMMHOZCONSISTENCY | DETAILS |
|---------------------|---------|
| KrummholzConsistency| Average consistency score of four segment (0=stable/decrease density, 1=increase in density) |

| TREELINEFORM | DETAILS |
|--------------|---------|
| TreelineForm | Average consistency score of four segment (0=stable/less trees, 1=more krummholz to trees) |

| DISTURBANCERH | DETAILS |
|---------------|---------|
| DisturbanceRH | Disturbance documents in R=repeat or H=historic treelines |

**CLIMATE VARIABLES**

| CLIMATE VARIABLES | DETAILS |
|-------------------|---------|
| MATdiff           | Difference in mean annual temperature |
| MAPdiff           | Difference in mean annual precipitation |
| SHMdiff           | Difference in summer heat moisture index |
| DD5diff           | Difference in growing degree days greater than 5C |
| NFFDDiff          | Difference in number of frost free days |
| PASdiff           | Difference in precipitation as snow |
| Tmin_sm_diff      | Difference in summer minimum temperature |
| Tave_wt_diff      | Difference in winter average temperature |
| Tave_sm_diff      | Difference in summer average temperature |
| PPT_wt_diff       | Difference in winter average precipitation |
| PPT_sm_diff       | Difference in summer average precipitation |