

Climb-it Change:

Climate change in the mountains is happening now! Unlike sea level rise which may strike a century from now, global warming is already impacting high elevation ecosystems as we climb. Glaciers are melting, wildfires are becoming more frequent, and many species are migrating up or north in search of cooler climates, losing habitat by the day. As an alpinist and a scientist I created the Climb-it Change campaign and upcoming documentary (www.climbitchange.com) to raise awareness on issues of climate in the mountains, and to showcase my research in the Rocky Mountains. I was raised in the shadow of the Tetons in Jackson, WY. From a young age, I became fascinated with the natural world, utilizing the mountains, rivers, valleys, forests and meadows as my playground and school. When I travelled from Jackson, I was astonished to discover that the majority of the world lacked the wildlife and wilderness of my home town. At that moment I understood the value of conservation, and vowed to devote my life to biology. In my short career I have worked as an arachnologist (fancy term for Spider-hunter) in the Caribbean for three years, where our team discovered two new species in an unexplored cave of Dominican Republic (NBCnews), a wildlife naturalist in Yellowstone and Grand Teton National Park for two years, basically a safari guide for wolves, bears, and other amazing animals in the Greater Yellowstone Ecosystem, and now an alpine/arctic botanist.

As a graduate student at Western Washington University, I collaborated with the brilliant botanist and accomplished mountaineer, Dr. Eric DeChaine to research the impacts of climate change and wildfire on high elevation ecosystems. With the generous help of the AAC, I combined my passions of climbing and science to study the high elevation wildflower species, *Saxifraga austromontana* (the Spotted Saxifrage). The questions I sought to answer were: 1) Will the range of the Spotted Saxifrage be reduced over the next century under climate change 2) how does this species respond to wildfire and ultimately 3) How will the species fare under the synergistic impacts of direct climate change and increased fire frequency.

In the summer of 2015, my research assistant, Matt Kneipp, and I traversed the spine of the Rocky Mountain chain from New Mexico north to Jasper, Alberta, Canada revisiting historical records of the species, half of which were burned in recent wildfires. Our journey included mountaineering in 6 states and 2 Canadian provinces, ultimately surveying 76 alpine sites. Back in the lab, I used technical computer models to forecast the impact of climate change and future wildfire behavior on the distribution of the plant. We discovered that historical populations have an increased likelihood of local extinction after a fire, and that the suitable habitat of the species will decrease by over 50% by 2050 as climate change continues to shrink the alpine. Simply put: the direct effects of climate change, in conjunction with changes in disturbances like fire, will negatively impact cold-adapted plant species over the next century.

My work adds to a body of knowledge unravelling the complex response of alpine ecosystems to changes in climate, and reveals that increased frequencies of ecological disturbances such as wildfire may further endanger species already at risk. Mountain ecosystems, similar to oceanic archipelagos can be thought of as islands: patches of habitat, at or above tree-line, separated from the next nearest mountain top by miles or hundreds of miles. These Sky-Islands are home to species that exist nowhere else on earth, and as temperatures warm, cold-adapted species are forced up in elevation, eventually at risk of being squeezed off the summit! The plants that live in the alpine are highly specialized to that environment, existing in a cushion growth form low to the ground to conserve heat and moisture in the windy and harsh environment. These plants are often perennials and can live hundreds of years. As scientists, it is imperative that we continue to monitor changes in high elevation ecosystems, in order to forecast and limit anthropogenic impacts. As climbers, we must do our part to protect the fragile alpine environment; follow Leave No Trace ethics, monitor our use of fires, stay on maintained trails through meadow ecosystems, and watch our step while scrambling off piste. Next time you are halfway up a granite dome, forearms shaking from fatigue, think twice before grabbing or stepping on an alpine wildflower clinging precariously to a cliff face, for it may also be creeping towards that summit and is likely much older than you.

Links

Climb-it Change: www.climbitchange.com

DeChaine Lab: <http://myweb.facstaff.wvu.edu/dechaie/index.html>

Recent published article: <http://fireecologyjournal.org/docs/Journal/pdf/Volume12/Issue01/041.pdf>

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