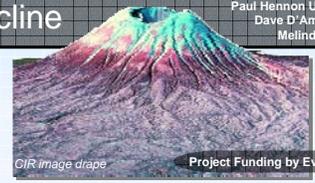




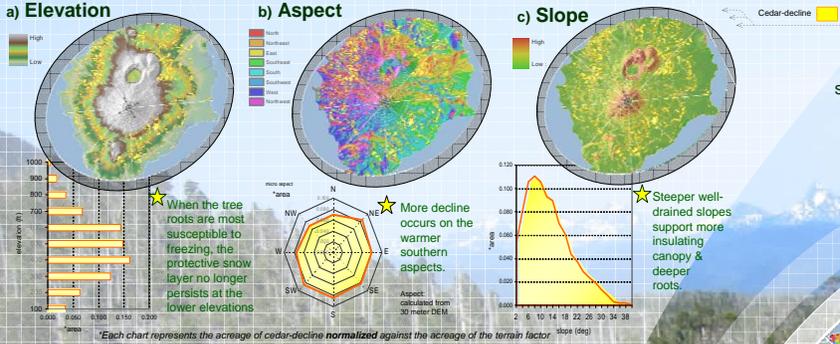
Yellow-Cedar Decline: Evaluating Key Landscape Features of a Climate-Induced Forest Decline

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2 Terrain Factors Characterize Decline Distribution and Hint of Climate Influence

Yellow-cedar, the most economically valuable tree in Alaska, has been subjected to widespread decline during the last century. Recent evidence suggests this decline is climate induced, related to a reduction of an insulating snow pack in winter and early spring. We chose Mt. Edgecumbe, an inactive volcano near Sitka, Alaska, to test the influence of various terrain factors. Unique radial symmetry, relatively even slope gradient, homogeneous soils and apparent presence of yellow-cedar forests from sea level to timberline presented an ideal place to study decline distribution.

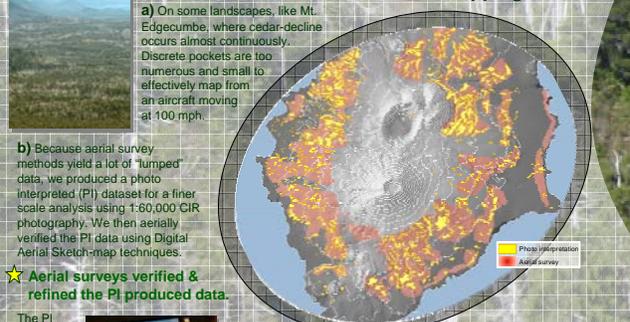


When the tree roots are most susceptible to freezing, the protective snow layer no longer persists at the lower elevations

More decline occurs on the warmer southern aspects.

Sleeper well-drained slopes support more insulating canopy & deeper roots.

Photo Interpretation & Aerial Survey Verification Improve Cedar Decline Mapping Resolution

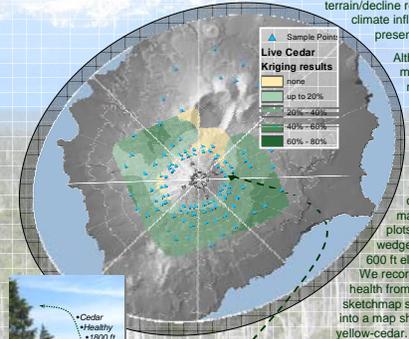


When comparing the data collected via photo interpretation (PI) to the data collected via aerial survey:
• PI yielded only 25% of the acreage
• PI produced 25 times more discrete polygons

These results are a compilation from both Mt. Edgecumbe and Pelti Strait

3 Decline Distribution is not Simply Defined by the Extent of Yellow-Cedar Forests

a) We needed to determine whether or not the observed terrain/decline relationships were a factor of recent climate influences or simply driven by the presence or absence of live cedar.

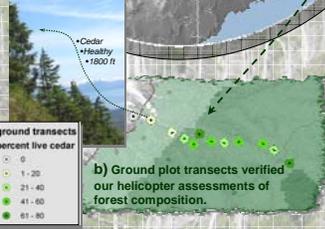


Although dead yellow-cedar can be mapped by air and detected on remotely sensed images, the presence and abundance of live yellow-cedar in healthy forests is not easily distinguishable from other species and not currently quantified or mapped on a broad scale.

To assess the extent of live yellow cedar at and above the limits of the mapped decline, we set up 96 virtual plots equally stratified in eight cardinal wedges and along four contours from 600 ft elevation to 1800 ft (timber line). We recorded relative species composition and health from a helicopter, using the digital aerial sketchmap system. Results were interpolated into a map showing percentage of live yellow-cedar.

Healthy yellow-cedar forests clearly extend beyond the elevation limits of the decline.

Ground evaluation verified healthy yellow-cedar on all aspects and a range of slopes.

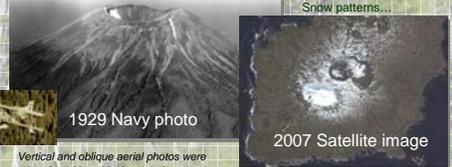


4 Remote Sensing Methodology Will Utilize UAVs and Historic Imagery

Through a cooperative effort with University of Alaska and Poker Flat Research Range, we plan to utilize an unmanned aerial vehicle (UAV) to collect remotely sensed data in precisely the same locations to contrast efficiency, capability and quality against our more traditional forms of survey.



coming 2008
Boeing's Scan Eagle has a 10-foot wingspan, can fly for 20 hours on about 1-gallon of gas and can be set up with multiple imaging systems.



1929 Navy photo
Vertical and oblique aerial photos were taken from Navy bi-wing seaplanes.

2007 Satellite image
Snow patterns...

The reduction of persistent snow pack is the primary driver in this forest decline. Snow can be also assessed through retrospective remote image analysis of both vertical and oblique imagery. We plan to compare temporal patterns of snow, climate and decline.

With the drone's low flying and multiple imaging capabilities, we hope to improve upon our live cedar map.

The overarching goals of the yellow-cedar decline program are to better understand the cause of the decline problem, and to use this knowledge and related information to develop a conservation strategy and improved risk maps for this valuable species.

For more visit: www.yellow-cedar.net



photos: Dan McEntee