

## Fall 2017 Research Highlights



### Studying Dall sheep habitat

*Scientists use satellite data to analyze shrub and snowline changes in Dall sheep range*

University of Alaska Fairbanks Professor Dave Verbyla is working with a team of scientists to find out why Dall sheep populations in some areas have declined by more than 20 percent rangewide since 1990.

The decline was most pronounced in the western Brooks Range, where the population has dropped 70 percent. Declining populations have led to emergency harvest closures and a contentious wildlife management issue for sport and subsistence hunters.

Verbyla is participating in a four-year study funded by NASA that will look at the changing habitat of Dall sheep in Alaska, the Northwest Territories, northern British Columbia and the Yukon Territory. The study will consider how vegetation and snow conditions are changing in alpine ecosystems and how those changes may affect Dall sheep.

Verbyla, a professor of Geographic Information Systems, and graduate student Mark Melham are using remote sensing to study the expansion of shrubs in the alpine area, which provide cover for the sheep's chief predators: bears, coyotes and wolves. If shrubs encroach on the alpine area or if the snowline is at a lower elevation during cold spring weather, sheep may be more susceptible to predators.

During the past year, Verbyla analyzed the dynamics of the snowpack from 2000 to 2016 during the spring

Found online at: [www.uaf.edu/snre/agroborealis](http://www.uaf.edu/snre/agroborealis)

Top photo: Dave Verbyla is pictured in Dall sheep habitat in the Alaska Range.

Bottom photo: A ewe and her lamb.



SCHOOL OF NATURAL  
RESOURCES AND EXTENSION

University of Alaska Fairbanks



lambing season in mid-May. He used MODIS satellite data to estimate snowline elevation in 28 mountain areas from British Columbia to the Canadian and Alaska Arctic.

Although the reason for the sheep decline is unknown, Verbyla said the species is thought to be sensitive to spring snow conditions. The elevation of snowline is important because forage above the snowline is lower quality and covered by snow. Below the snowline, new shoots provide higher quality forage, but sheep present an easier target for predators if they must feed far below the terrain to which they can escape.

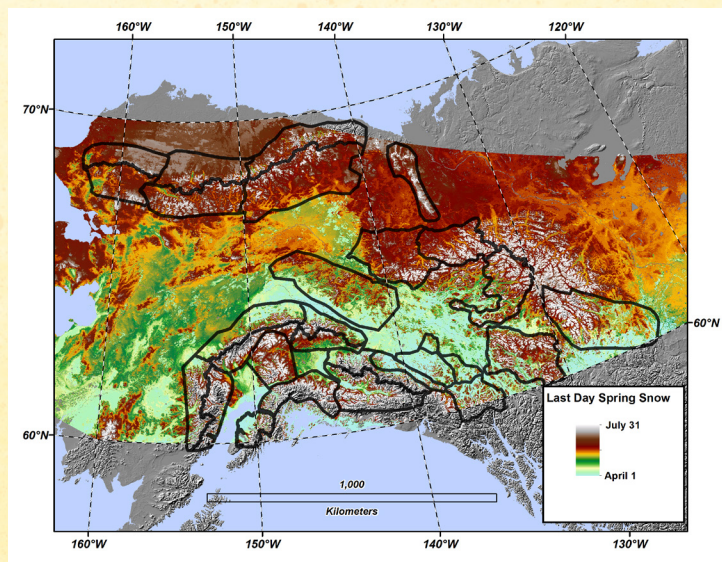
Verbyla is the lead author of a recently published journal article in Remote Sensing that detailed the results of the spring snow analysis. The article noted that this is the first study to examine the impact of spring snow conditions on Dall sheep across the species' entire range.

Verbyla said that was in part due to the development of a daily regional remote sensing snow product from MODIS that can capture important features of snow-covered landscapes, such as the elevation of the spring snowline. The product provided daily images of 500-meter grids that showed whether snow was present. The product provides more thorough information than is available through LANDSAT imagery, which captures smaller areas less frequently and does not work well in cloudy conditions.

"Instead of looking at one small area, we're looking at 28 areas simultaneously," he said.

In addition to determining the snowline, the researchers categorized each mountain area based on winter precipitation and May temperature. Interior mountain areas of Alaska and the Yukon Territory had the warmest, driest climate and the highest spring snowline elevations. Glacier mountain areas with high snowpack and cold arctic mountain areas had the lowest spring snowline elevations.

Verbyla said the information also showed a lot of variability between years, with the greatest



The last day of the 2016 spring snow is shown from satellite data. Mountain areas are outlined as black polygons.

variability in the central and western Brooks Range, areas where the population losses have been the greatest.

When researchers compared their data to information from aerial sheep surveys, they found lamb survival declined with lower snowline elevations — and the effect increased with latitude.

For instance, the journal article notes that in 2013, the May 15 elevation of snowline in the Chugach Mountains was above 500 meters. A survey that year showed that lamb survival was high in that area relative to an area in the Brooks Range where the May 15 snowline was at sea level and no lambs were observed.

Verbyla believes the techniques used in this study can be combined with survey data to quantitatively assess the effects of spring snow conditions on alpine wildlife populations across broad regions.

His co-authors include scientists from the Yukon Department of Environment, Oregon State University, University of Washington and the UAF Scenarios Network for Alaska and Arctic Planning.

Agricultural & Forestry  
Experiment Station



**AGRICULTURAL & FORESTRY  
EXPERIMENT STATION**

905 N. Koyukuk Drive  
(O'Neill Bldg., UAF Campus)  
PO Box 757200, Fairbanks AK  
99775-7200



**SCHOOL OF NATURAL  
RESOURCES AND EXTENSION**

University of Alaska Fairbanks