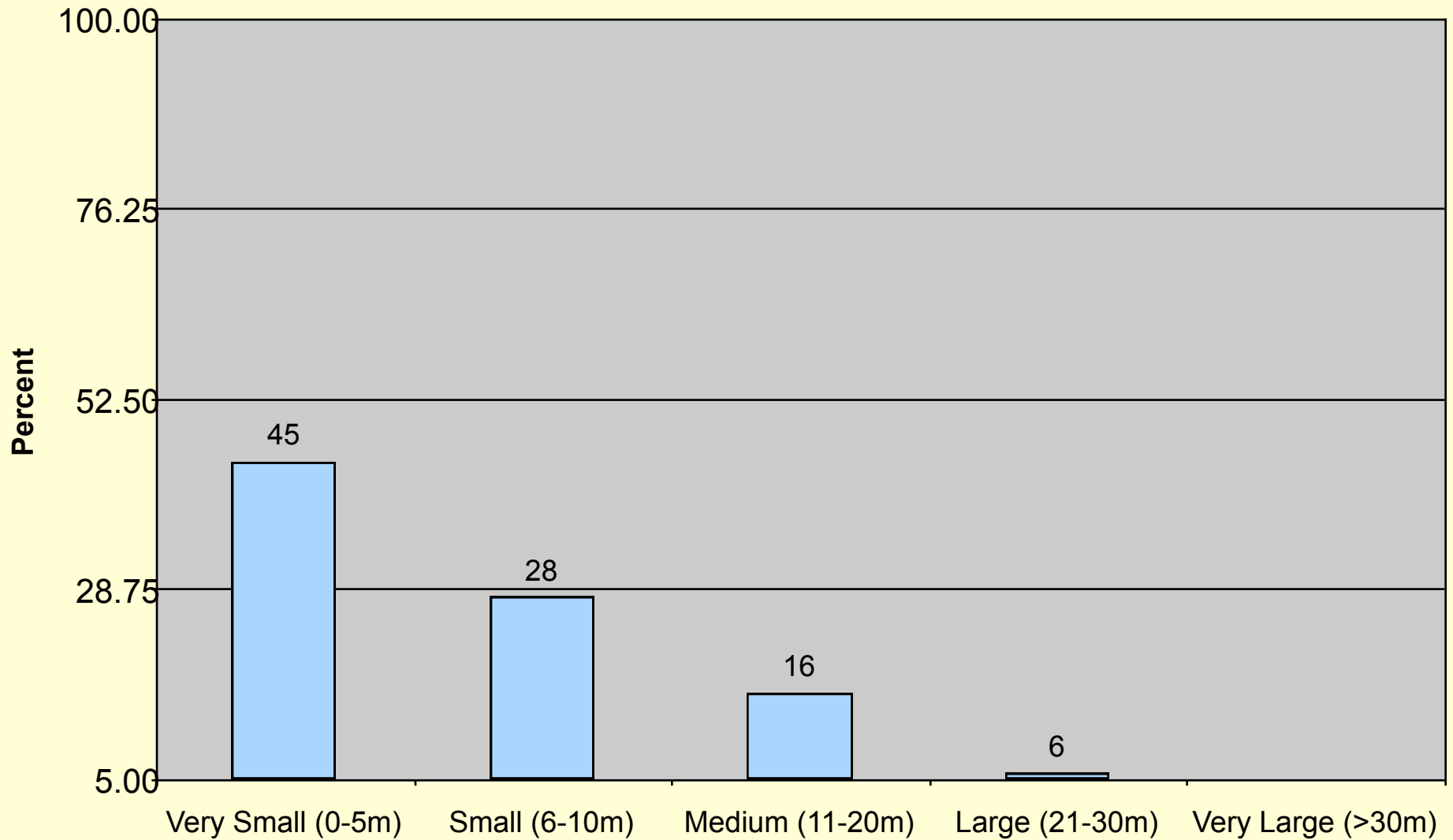


Erosion – The Tree Connection

Michala Peabody, UVM 2005

The goal is to compile visual evidence that clear-cutting is coincident with erosion in Vermont. To achieve this goal, we searched the Landscape Change Program archive using the keywords; clear-cutting, landslides, and erosion. From the search results, we categorized images with respect to the amount of tree coverage, the size of the eroded area, and other landscape characteristics including clear-cut slopes, roads, and farming. From the analysis of these images, we conclude that clear-cutting and the removal of woody vegetation increased the frequency of erosion and landslides in Vermont.

Frequency and Size of Eroded Slopes



We classified erosion into five different categories depending on the size of the eroding area. You can see that very small areas of erosion are much more common than very large areas of erosion.

Very Small Erosion on a Road



Erosion can occur in many different areas, even on hard-packed roads. Look how water has washed out a portion of the old dirt road. Where are all the trees?

LS06469

Small Landslides Behind the State House



Look closely and you can see the small landslides behind the State House. Look closer to try to find vegetation on the cleared slope. Where are all the trees?

LS00410

Medium Sized Landslide



Landslides can be anywhere, including farms. Why are there no trees near the landslide?

LS04154

A Large Slide on the Edge of Town



How did this large landslide occur? Was there anything on the slope to keep it stable? Are there trees on the slope or around the landslide?

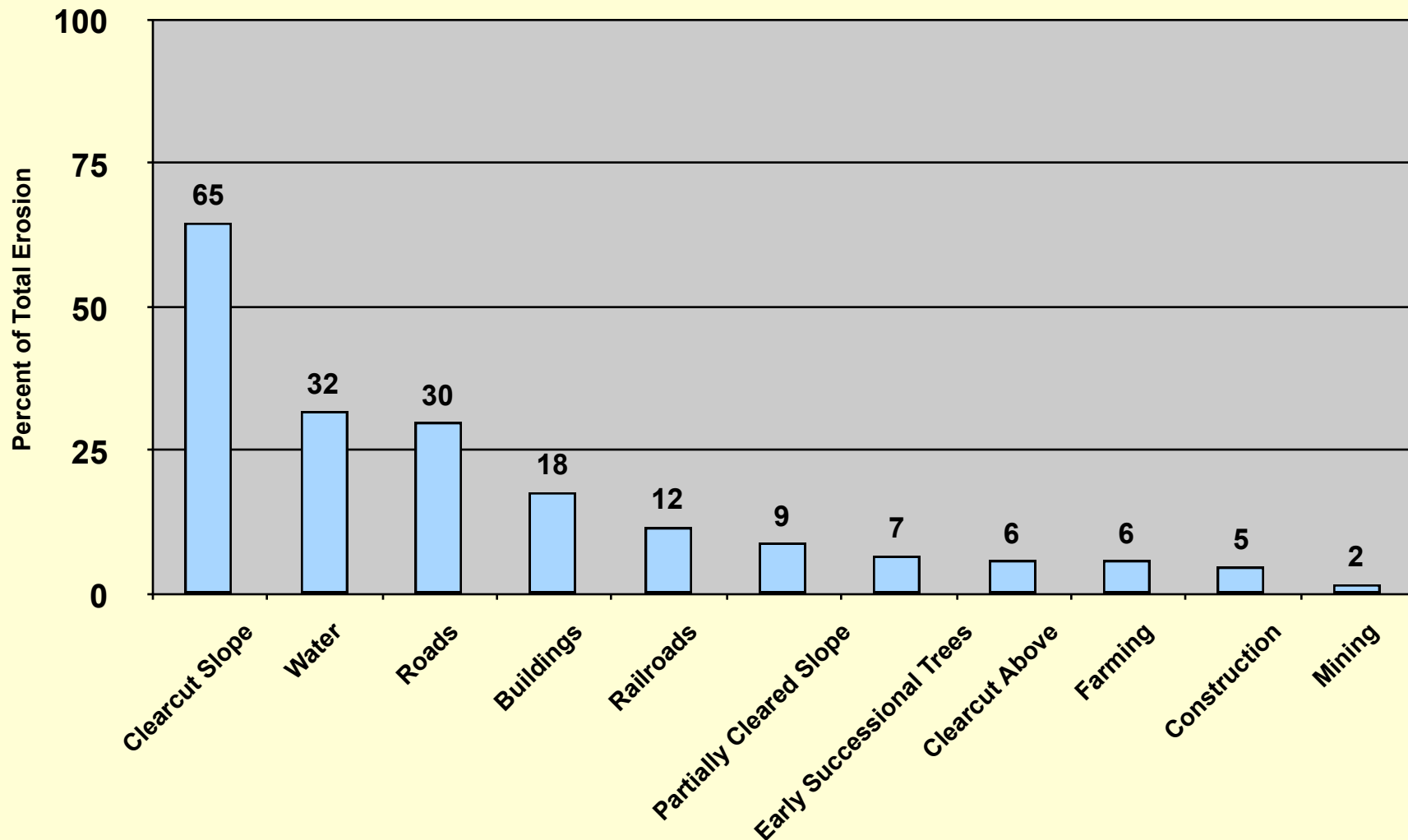
LS04285

Very Large Landslides can Occur Too!



Prior to 1955 there were no trees on this slope. Look what happened in December of 1955. Where did the road go? Take a trip back to Riverside Avenue in Burlington to find trees covering the entire slope today. LS01781

Frequency of Eroded Slope Correlation



We found all of the images in the collection that showed evidence of erosion and classified land use in the area of the image that included erosion. Look how many images had cleared slopes! Hmm, is there a connection here?

Clear-Cutting



“Where have all the trees gone?”

No wonder the soil wasn't happy on that cleared slope, there's nothing to hold it there. Look at all of those stumps in the field.

LS03668

Rivers Can Cause Erosion



If there's nothing on the riverbank to hold it there, then the water just picks up the soil and moves it downstream. Where did the soil go?

LS06378

Did the Road do This?



There's not supposed to be huge chunks of soil on the roads are there?
Notice how there are no big trees on the eroding slope in the background?

LS01357

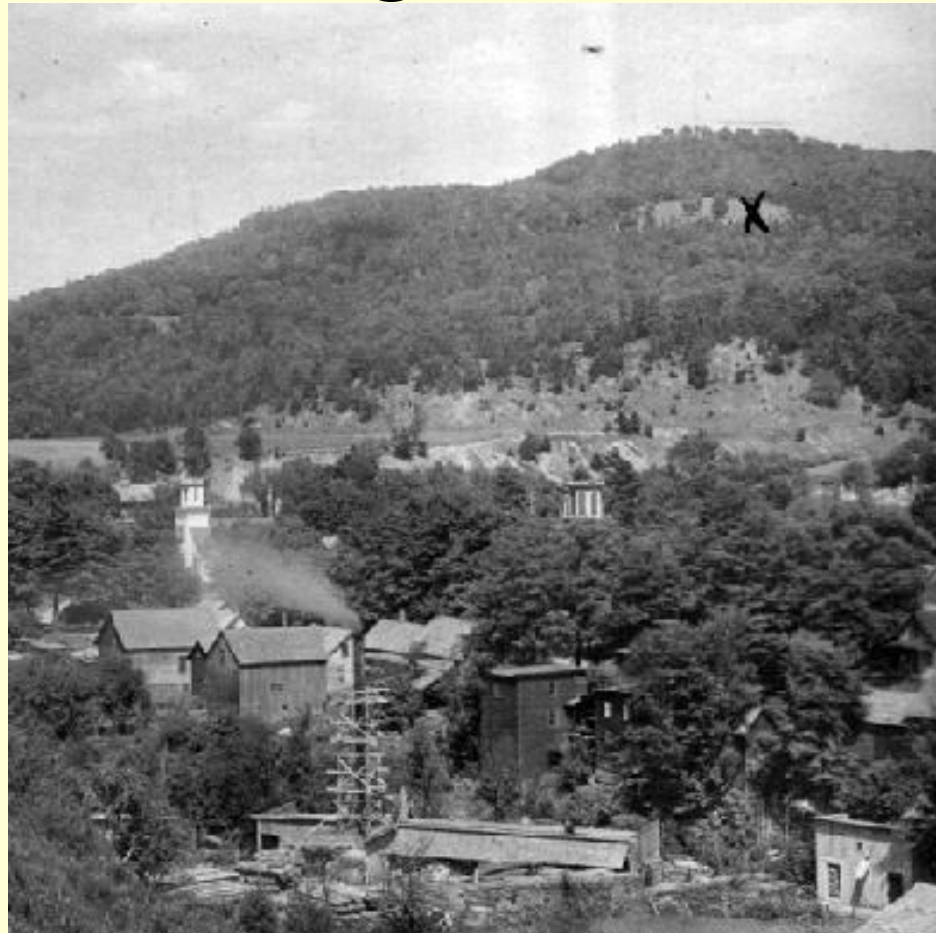
Is This Railroad Safe?



What happened to this slope? Is that a river on the right eroding the slope? What did the landscape look like before the railroad was built?

LS02477

Clear-Cutting Above a Slide



Look at the eroding slope is just below the cleared field at center.
Why would the erosion occur here?

LS01979

I-89 Construction



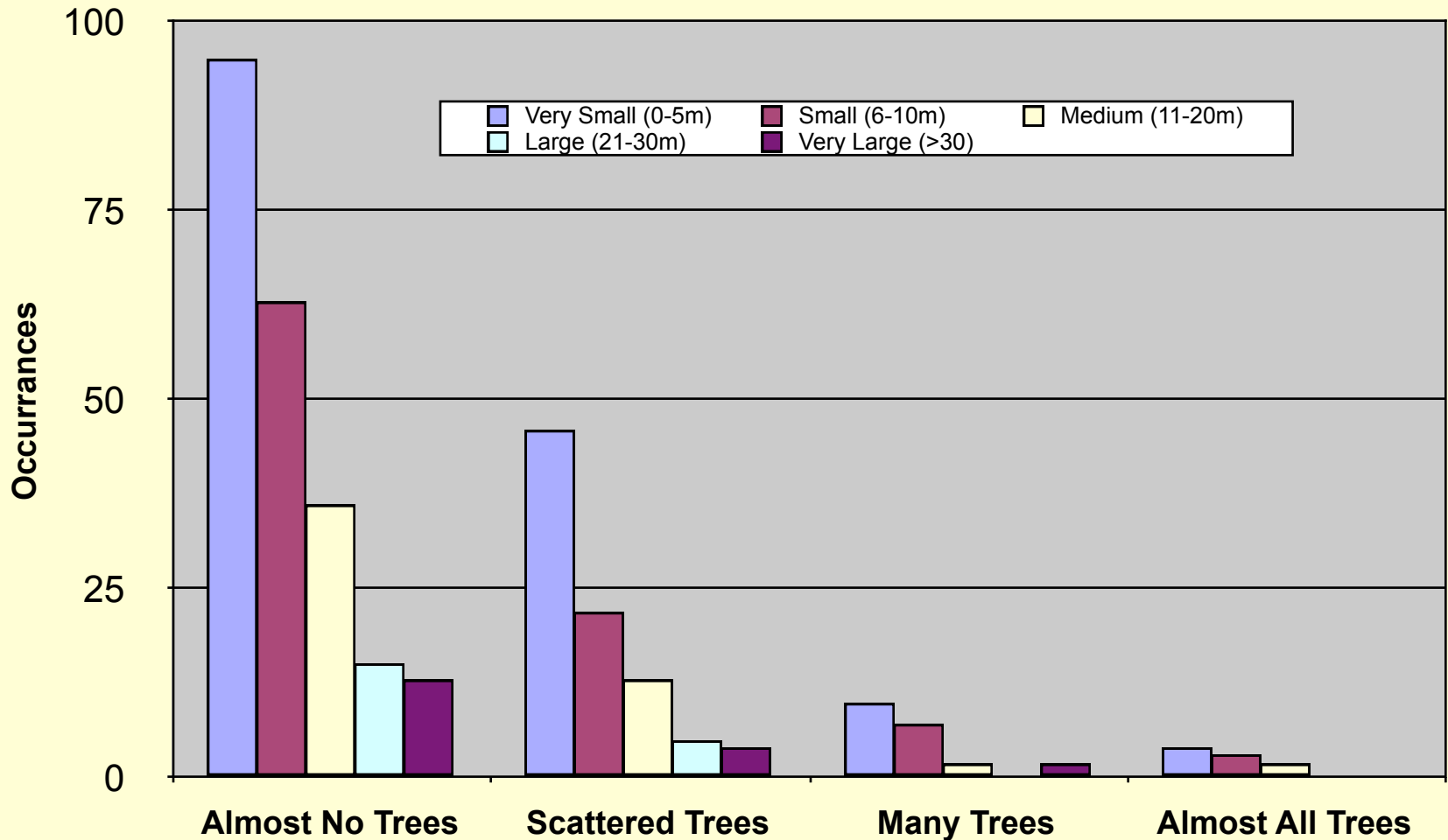
Where is all of this eroding soil from the road construction going? Look at that small cleared slope in the center with all the soil erosion.

LS04580

Relationships

- From the data collected in the images we found a strong inverse relationship between the tree cover and number of images with erosion
- 222 of the 342 images with erosion had very few trees
- Only 9 of the 342 images with erosion were completely covered by trees

Frequency and Size of Eroded Slopes Correlate with Tree Cover



Notice there is a smooth trend of increasing tree cover and decreasing erosion. This means the smaller areas of erosion are always more common than larger areas of erosion, no matter how many trees are present.

Conclusions and Connections

- 65% of the erosion occurs in clear-cut areas
- Only 3% of the erosion occurs in completely forested areas
- Data from Vermont spanning over 150 years closely matches data from a 1996 Storm in Oregon
- Both data sets suggest people catalyze soil erosion by clearing slopes and building roads

Correlation Between Landslides and Soil Erosion in Vermont and Oregon



If human actions increase the amount of soil erosion in both Vermont and Oregon by clearing vegetation from the landscape and building roads, it is probably happening in most places throughout the world.

Final Thoughts

- What can you do to decrease the amount of soil erosion in Vermont, in your town, or in your yard?
- What happens to all of the soil that gets eroded away from slopes?
- Why would erosion occur more often in cleared areas than anywhere else?
- How do trees help slopes resist erosion?