Hal Shelton Revisted: Designing and Producing Natural-Color Maps with Satellite Land Cover Data

Figure 1. A portion of Hal Shelton's 1:5,000,000-scale New Europe *map painted ca. 1968. The original measures 107 x 137 centimeters. Drainages and water bodies are photomechanical additions to the original art. Courtesy of Rand McNally & Company.*

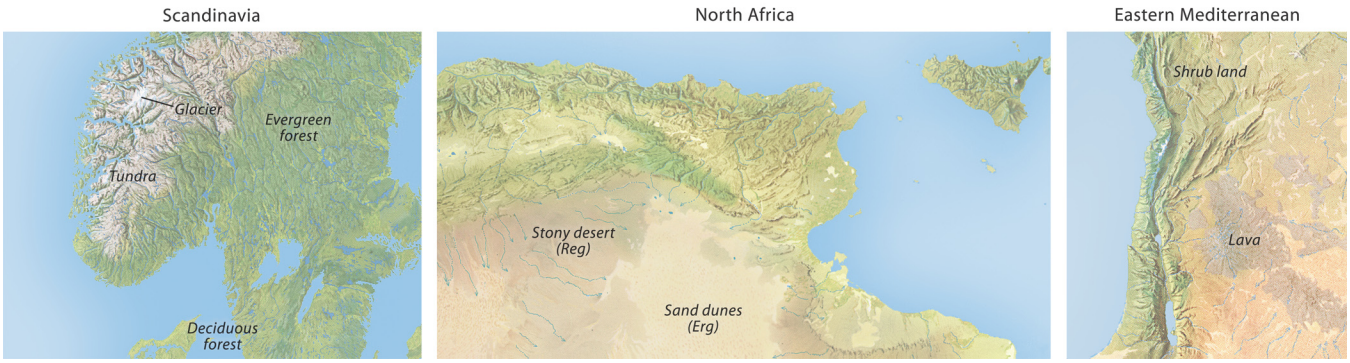


Figure 2. Shelton's standardized palette of natural colors captured the character of disparate geographic regions worldwide. Courtesy of Rand McNally & Company.

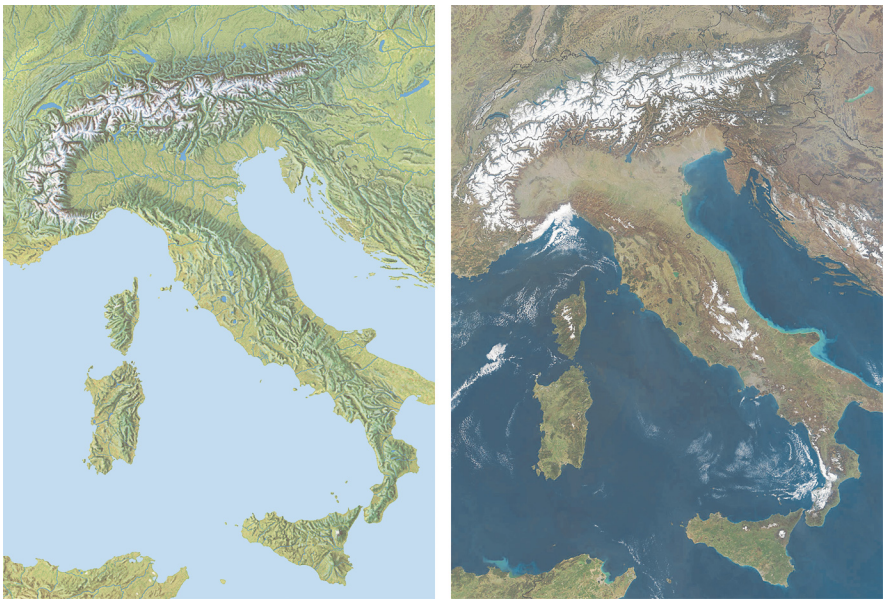


Figure 3. (left) Excerpt of a natural-color map painted by Hal Shelton ca. 1968. (right) NASA MODIS satellite image taken in 2003. Map on left courtesy of Rand McNally & Company.

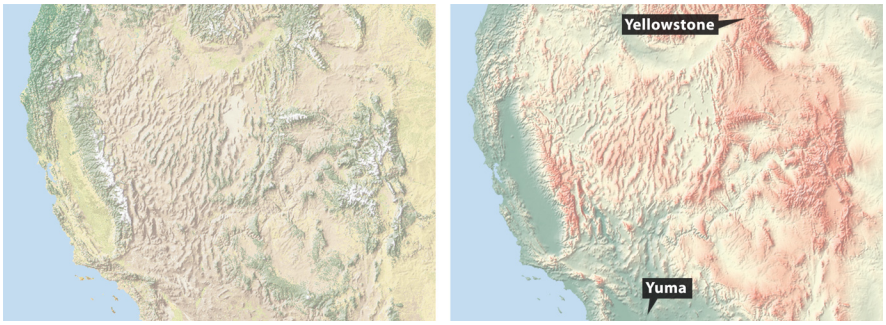
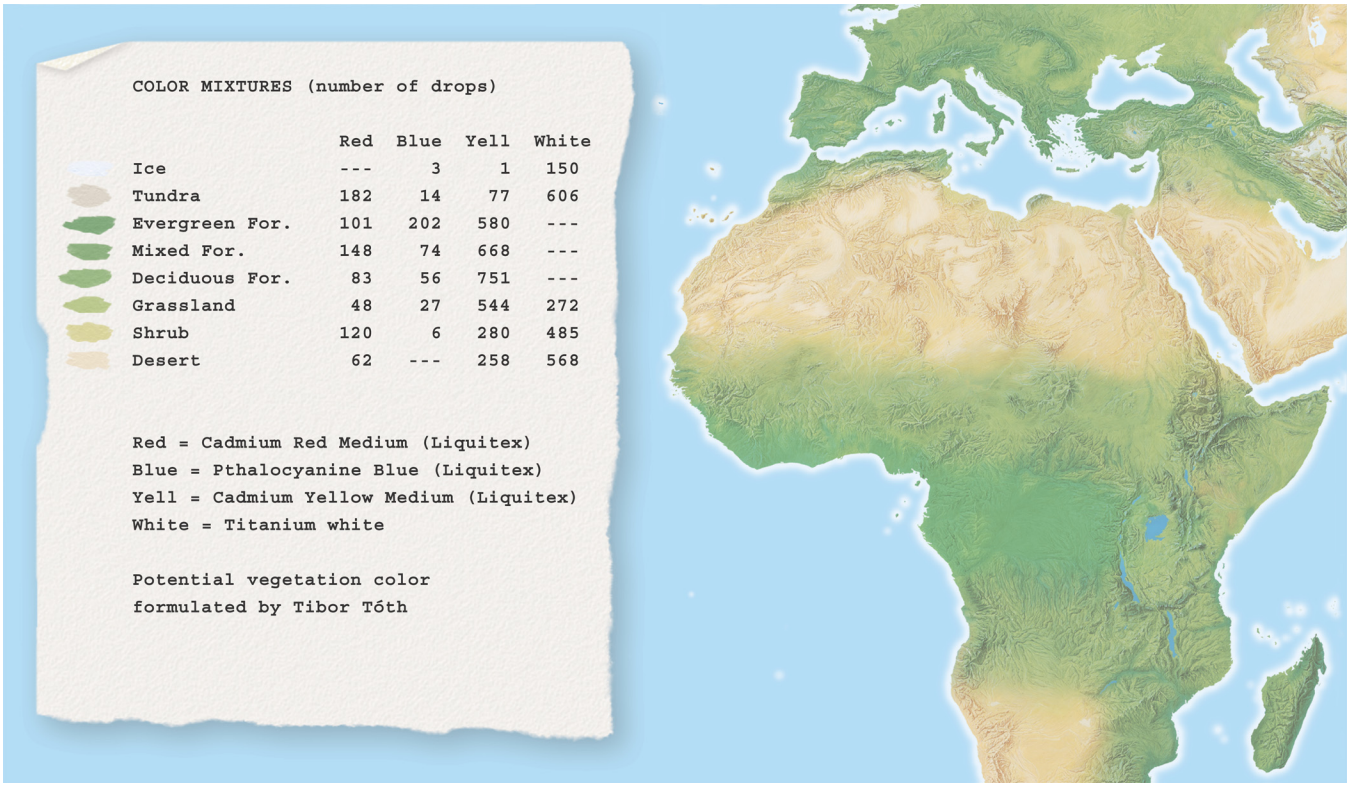


Figure 4. (left) A shaded relief map of southwestern United States combined with natural colors. (right) The same map with blended hypsometric tints. Although hypsometric tints are attractive and show topography clearly, they can mislead readers about the character of the land. Forests cover the Yellowstone region and Yuma, Arizona, is an extreme desert environment.



COLOR MIXTURES (number of drops)

	Red	Blue	Yell	White
Ice	---	3	1	150
Tundra	182	14	77	606
Evergreen For.	101	202	580	---
Mixed For.	148	74	668	---
Deciduous For.	83	56	751	---
Grassland	48	27	544	272
Shrub	120	6	280	485
Desert	62	---	258	568

Red = Cadmium Red Medium (Liquitex)
Blue = Pthalocyanine Blue (Liquitex)
Yell = Cadmium Yellow Medium (Liquitex)
White = Titanium white

Potential vegetation color
formulated by Tibor Tóth

Figure 5. (left) Tibor Tóth's color formulas. (right) His colors applied to a map. Courtesy of National Geographic.

Figure 6. NASA's "Blue Marble" photograph shows Earth from a distance of nearly 48,000 kilometers (30,000 miles). Dominated by the Sahara and Kalahari deserts, Africa is usually the most cloud-free continent. Antartica is also visible in this image for the first time (NASA, 2002).

Figure 7. (left) "The Living Earth." (right) NASA's new "Blue Marble."

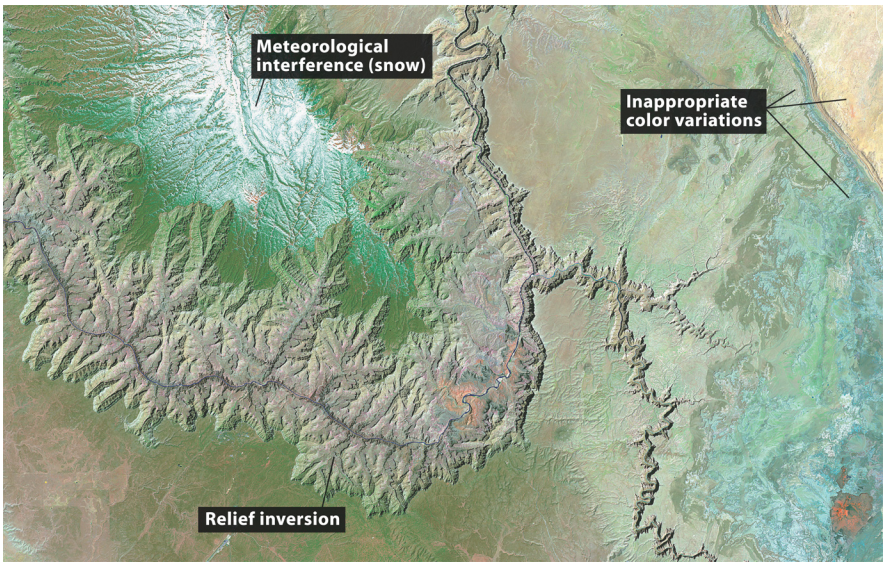


Figure 8. A natural-color Landsat image of the Grand Canyon made from bands 2, 4, and 7. Even the handsomest satellite images contain graphical elements inconsistent with cartographic design goals. Courtesy of the USGS.

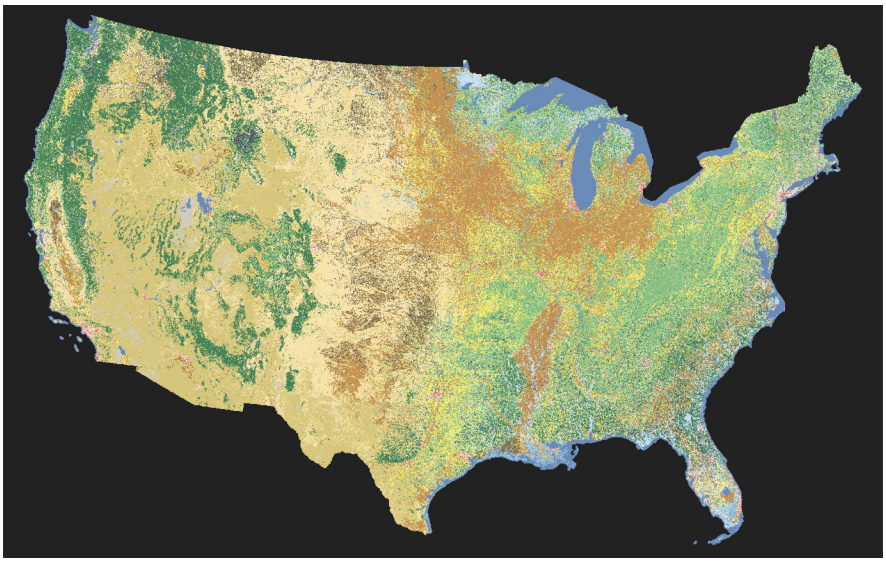


Figure 9. NCLD mosaic of the 48-contiguous states, using the USGS suggested color scheme.

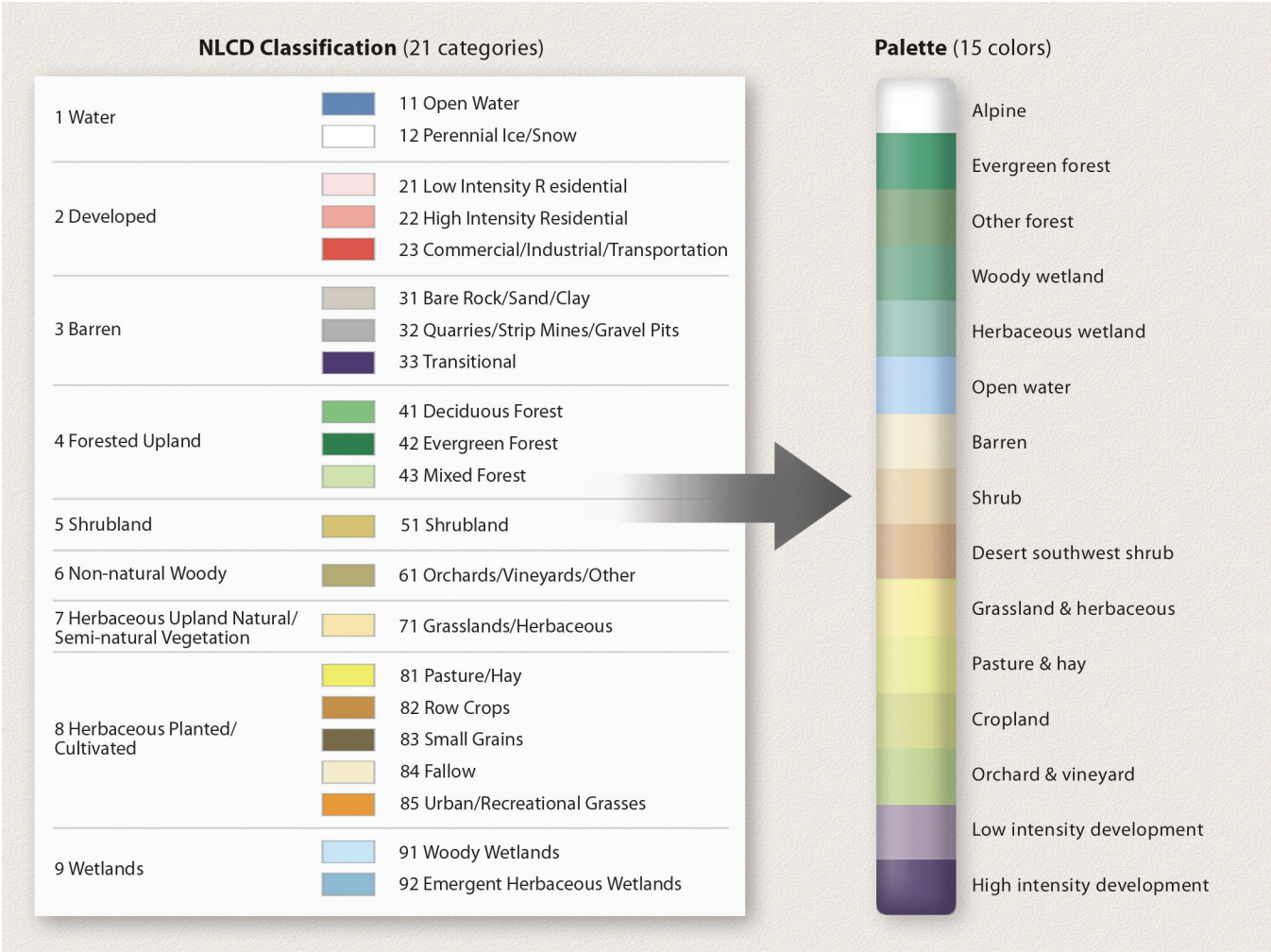


Figure 10. (left) The NLCD classification with USGS assigned colors. (right) The derivative color palette used for natural-color mapping.

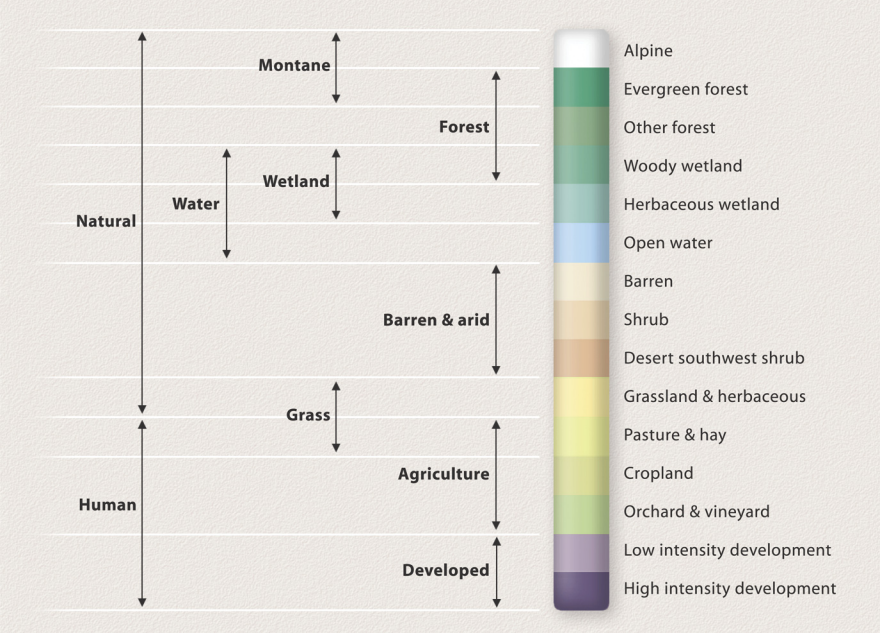


Figure 11. Color groupings in the palette.

Figure 12. California and the southwestern US depicted with colorized NLCD and shaded relief.

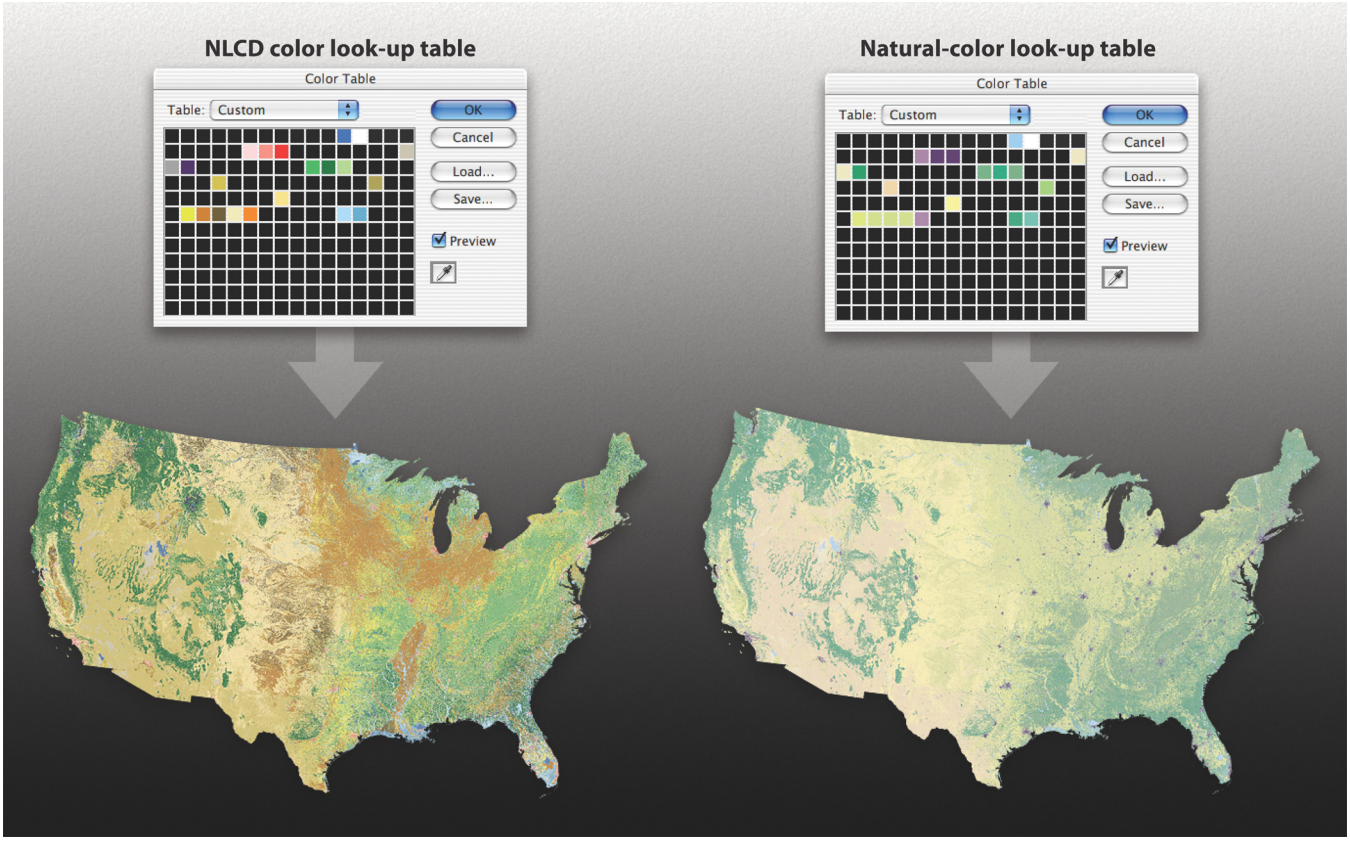


Figure 13. Using the Color Table in Adobe Photoshop with NLCD in indexed color mode to convert USGS colors (left) to natural colors (right).

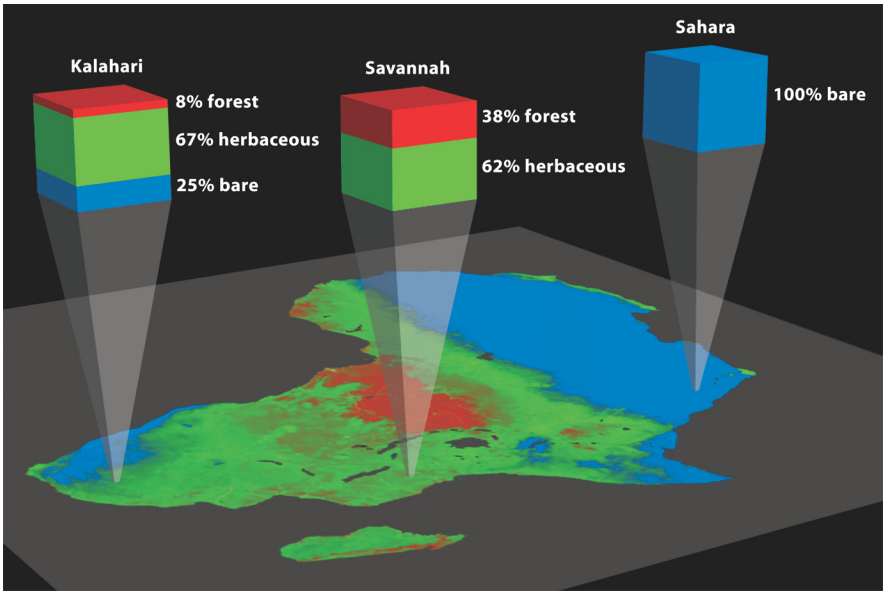


Figure 14. Blended lands cover categories in MODIS VCF. The combined values for any sampled pixel on the map are 100 percent.

Figure 15. (left) MODIS VCF in Photoshop presented as uniform colors. (right) With environmental color adjustments applied to the herbaceous layer.

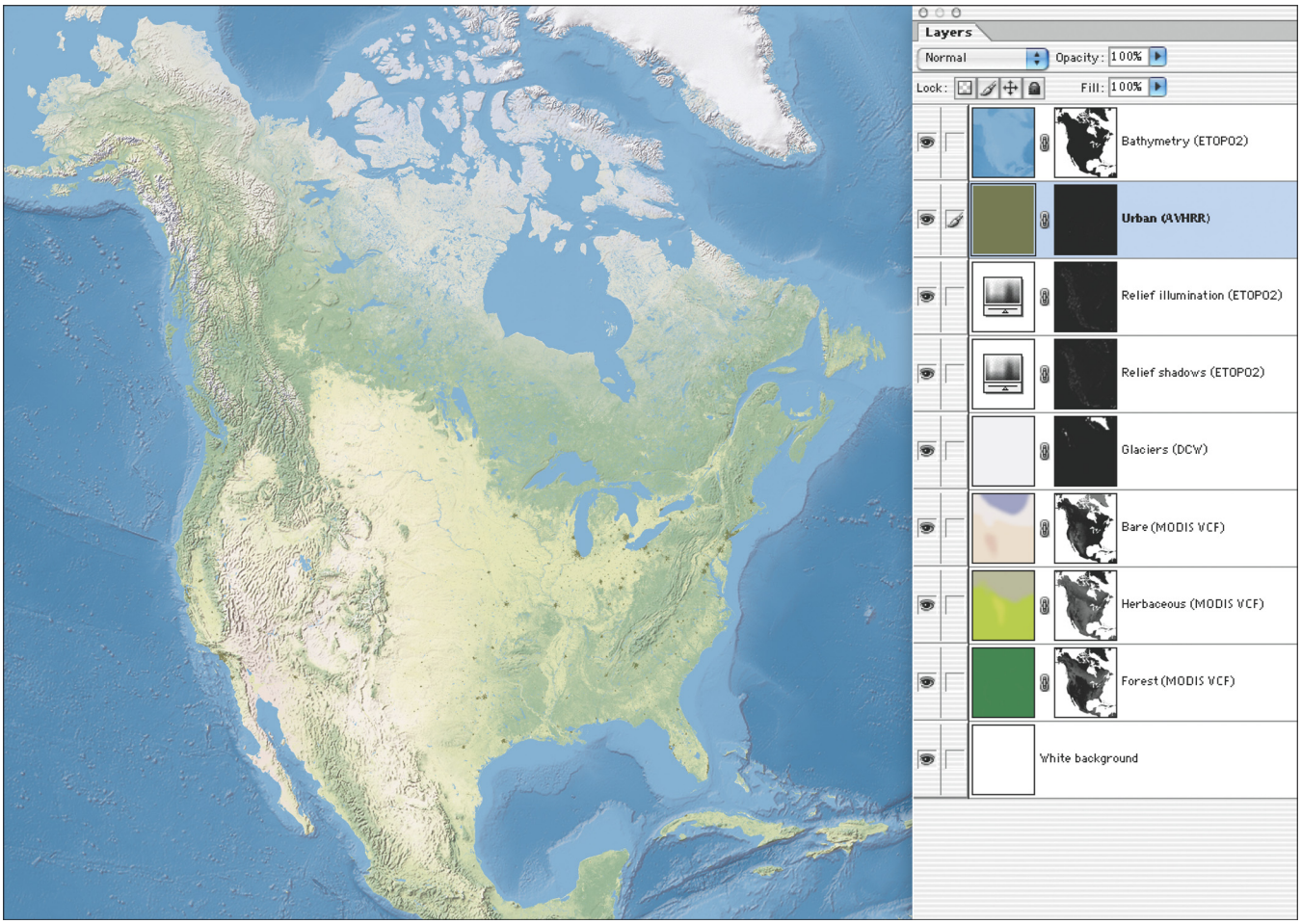


Figure 16. (left) The final map primarily based on MODIS VCF data. (right) The top five Photoshop layers contain supplemental data added to the MODIS VCF base.

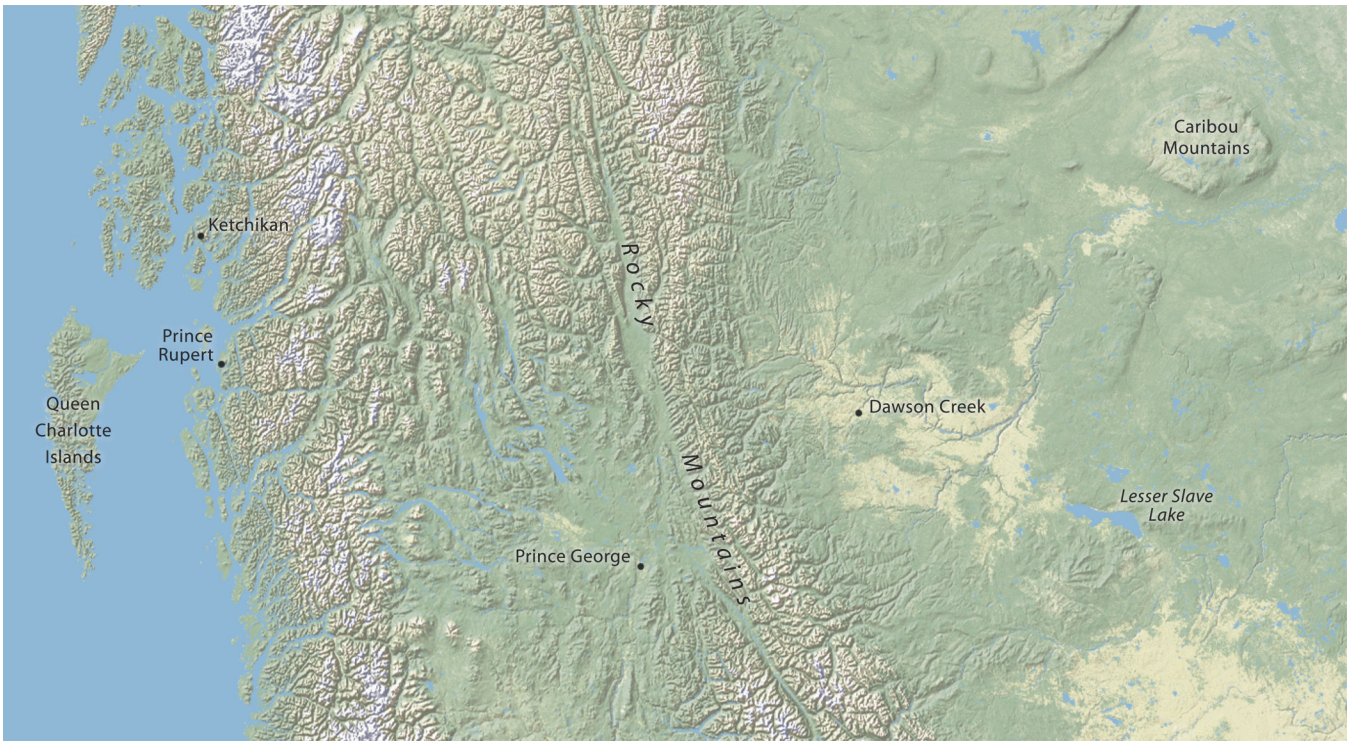


Figure 17. Shaded relief merged with a natural-color base made from MODIS VCF data.

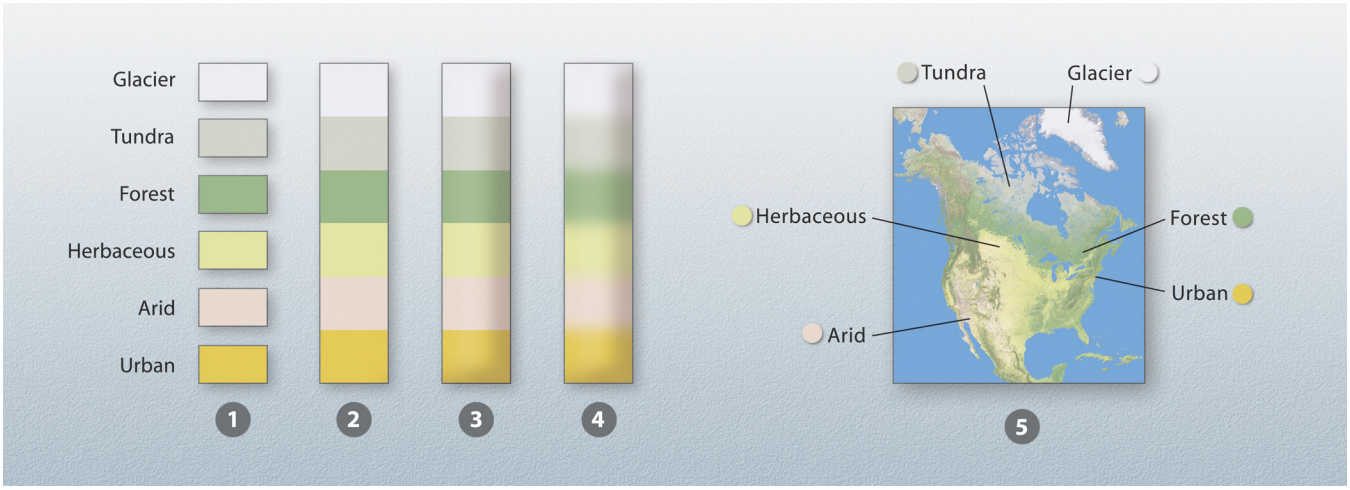


Figure 18. (1–4) Variants of the traditional legend. (5) A natural legend. Legend portrayal becomes less abstract and more cartographically realistic from left to right.

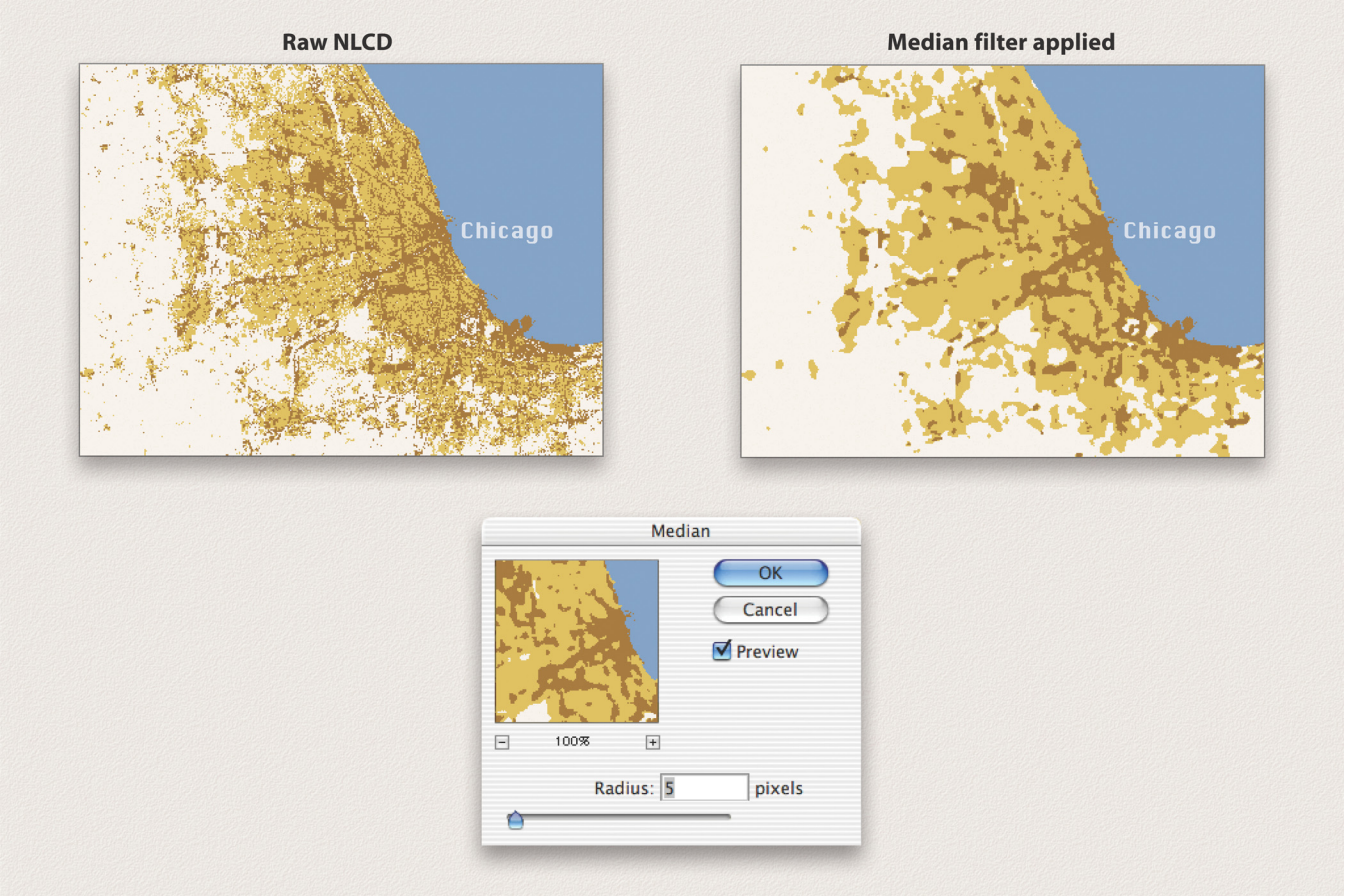


Figure 19. Using the Median filter to generalize urban land cover data.

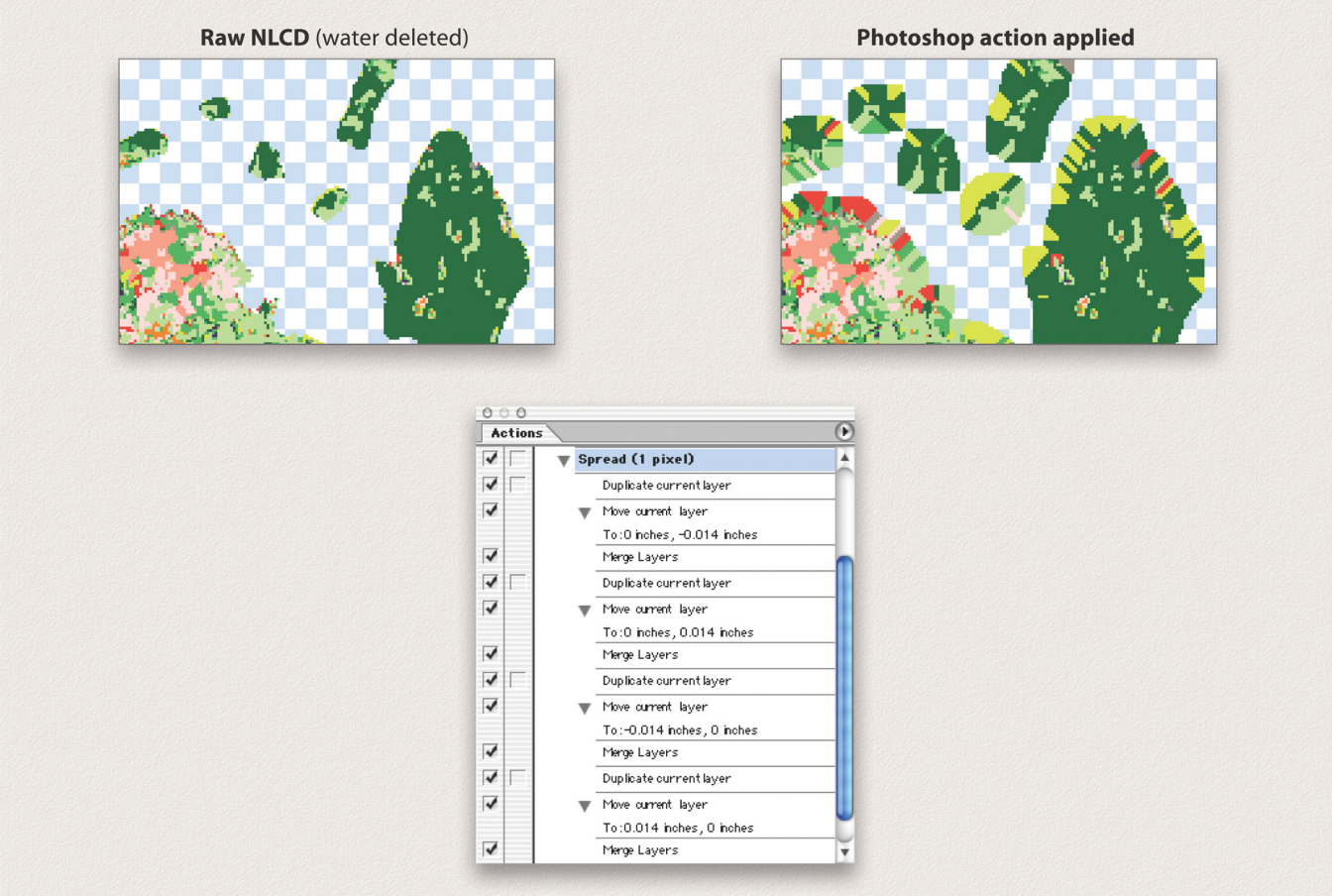


Figure 20. Using the Actions palette in Photoshop to spread shoreline pixels outward.

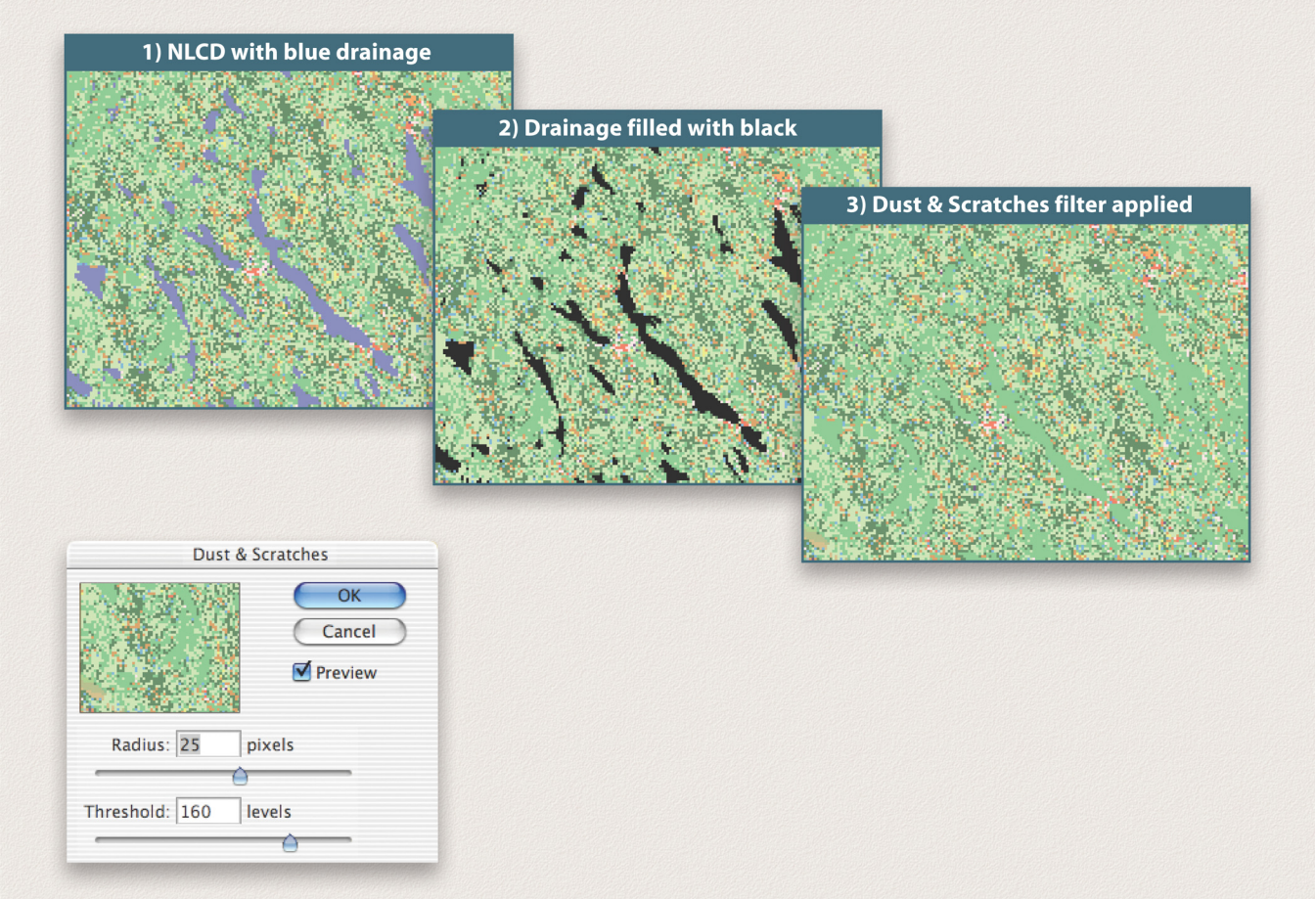


Figure 21. Removing drainages from NLCD with the Dust & Scratches filter.

Figure 22. "Canyon Lands" by Hal Shelton. Millard Canyon, Utah, dominates the center of the scene and the snowcapped LaSal Mountains are faintly visible on the right horizon. The vertical triptych joints do not appear because of digital compositing. Courtesy of Library of Congress.