

Cartographic Considerations for Ethical Rockhounding

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When does location information on an interactive web map become too detailed and identifiable? In this case study, I discuss the issues that arose when the Washington Geological Survey converted a decades-old printed rockhounding location map into multiple interactive, variable-scale web maps. These issues include topics relating to privacy, land management, rock-collecting laws, and the ethical responsibility of a state agency to consider the many different ways that such maps could be used.

KEYWORDS: ethics; rockhounding; geology; rock collecting; land management; privacy; state agency; natural resources; state government

ROCK AND MINERAL COLLECTING, ALSO KNOWN AS rockhounding, is an extremely popular recreational activity in the US state of Washington. The Washington State Mineral Council (WSMC) website lists over twenty rock, mineral, and gem clubs in the state, and there are several rock and fossil collecting sites that have been developed to support recreational activity, including the popular Stonerose site in northeastern Washington. However, issues arise when rockhounds seek to collect rocks, minerals, and fossils on lands where these activities are prohibited or only allowed under certain conditions. Therefore, groups and organizations that provide recommendations to rockhounds about locations to explore must keep these issues in mind.

Public requests for guidance about rock-collecting rules have consistently been among the Washington Geological Survey's (WGS) most requested types of information. WGS did not have much up-to-date, public information about rockhounding on their website until 2015, when a [rockhounding page](#) was added to provide rock-collecting information to site visitors. Then, in 2016, WGS published a rockhounding Esri StoryMap titled *Minerals and Fossils in*

Washington. The StoryMap provided an updated view of the information originally found in a 1985 Washington State Department of Natural Resources (WA DNR) rockhounding pamphlet and location map titled *Gems and Minerals of Washington* (Pattie 1985). The data from the print map (Figure 1) were presented in several variable-scale web maps in the StoryMap. Each online map

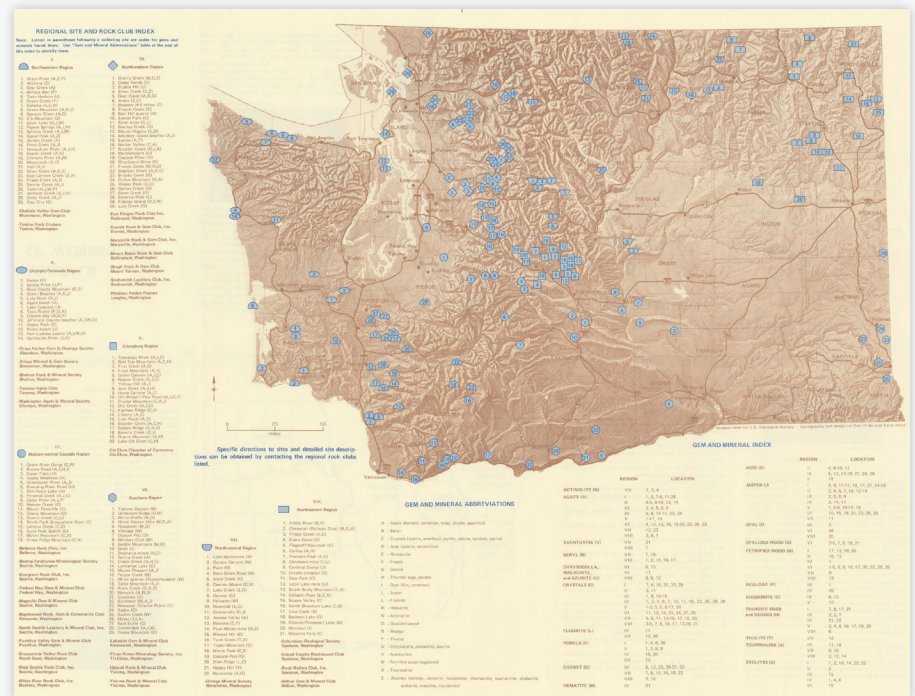


Figure 1. The 1985 WA DNR *Gems and Minerals of Washington* pamphlet by Bob Pattie. The point information on the map was used as the primary data set for the maps in the *Minerals and Fossils in Washington* StoryMap (Figure 2).

showed point locations for the different rock and fossil types on the original map (Figure 2). Additional geologic map unit data were added to several of the maps to provide extra context for where certain minerals and fossils were likely to be found.

Rock collecting is a complicated topic for many reasons, and there were many ethical considerations for WGS to consider when creating the updated maps, especially since WGS is part of an authoritative government agency—WA DNR. The following entry from the WGS Rockhounding webpage reflects some of these considerations:

Before heading out on a rockhounding or fossil-hunting expedition, there are a few important things collectors need to consider:

- Who owns the land you intend to visit?
- What are the specific rules about collecting rocks or fossils on this land?
- Are there special rules in regard to gold panning?
- May I collect vertebrate fossils, meteorites, or archaeological artifacts?

These considerations mirror the first two entries in *A Rockhoulder's Code of Ethics* from the original *Gems and Minerals of Washington* publication:

- I will respect both private and public property and will do no collecting on privately-owned land without permission from the owner.
- I will keep informed on all laws, regulations, and rules governing collecting on public lands and will observe them.

In the state of Washington, there are additional regulations and restrictions on gold panning due to the potential environmental impacts of this activity (Washington Department of Fish and Wildlife 2021). Likewise, the collection of vertebrate fossils, meteorites, or archaeological artifacts is also regulated due to their relative rarity, value to science, and cultural importance.

Perhaps of more relevance to the maps, however, is that Washington has a myriad of federal, state, and local land

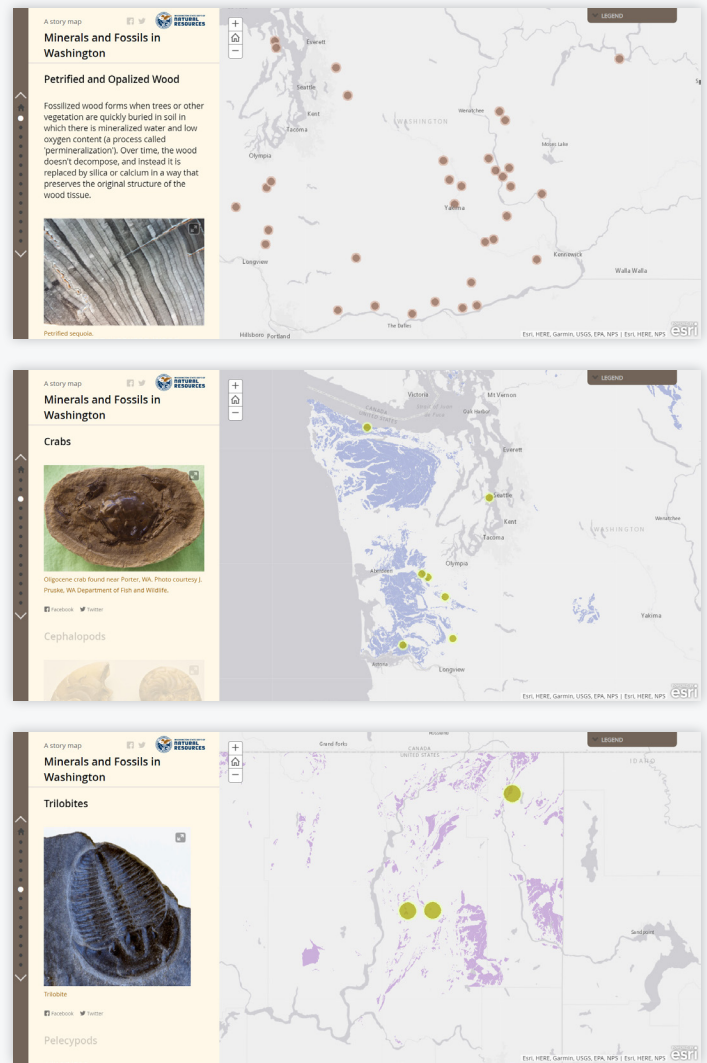


Figure 2. Selected maps in the 2016 WGS *Minerals and Fossils in Washington* StoryMap. The points on these maps were derived from the *Gems and Minerals of Washington* map (Figure 1).

management agencies, all with differing rules and regulations regarding rock collecting. WGS must be careful not to provide information about rockhounding regulations in places that are outside of its purview. If map users started showing up in specific locations provided by a state agency, on restricted federal land, for example, it would be very problematic for all involved. WGS Assistant State Geologist Jessica Czajkowski, who created the StoryMap, summed up how these considerations influenced the design of the maps:

In doing the research to create our rockhounding webpage, we had to understand the rules and context around gold panning, prospecting, and rockhounding on different types of land in different settings. This information not only guided the

context that we provided in the StoryMap but also how we approached it cartographically. (interview with author, January 9, 2024)

With this in mind, the updated maps included in the *Minerals and Fossils in Washington* StoryMap were designed to give users only a general idea of where certain types of geologic specimens could be found. Data on a variable-scale web map can be viewed at an extremely large scale, since the user can zoom in to locations of interest. This meant that the locations of the digitized points could potentially be identified with specific land parcels. This apparent precision was also problematic because the points on the original map were seemingly meant to be general locations for rockhounding, such as streams or mountains, rather than specific locations in or on those

geographic features. The challenge, then, was to figure out how to use the valuable data from the original *Gems and Minerals of Washington* map while obscuring the individual point locations. This would allow WGS to provide useful guidance to people searching for general areas to go rockhounding, without creating the previously mentioned ethical problems relating to land ownership, land access, and collection restrictions.

Our solution to this problem was to convert the point locations to polygons at a statewide scale, so that when the user zoomed in to them, the “points” would cover larger, more general areas, rather than staying the same size when the map scale changed and allowing a more detailed location to be derived (Figure 3). The addition of associated 1:100,000-scale geologic unit polygons reinforced the idea of a more generalized, regional-level context for the rocks, minerals, and fossils that were being described.

Seemingly minor cartographic decisions, such as the ones we made to show points as polygons and to add related areal contextual information, can play an important part in mitigating the potential for a map design to be misused and in protecting the integrity of the mapmaking organization. As a governmental entity, WGS must take extra care to meet high ethical standards, not only by providing the most accurate information possible, but also by being cognizant of how that information could be used in detrimental ways. This is an important principle for all the spatial data WGS produces, because users of these data may make important decisions based on what they see, and much of the work WGS produces is not intended for site-specific interpretation. In keeping with these ethical

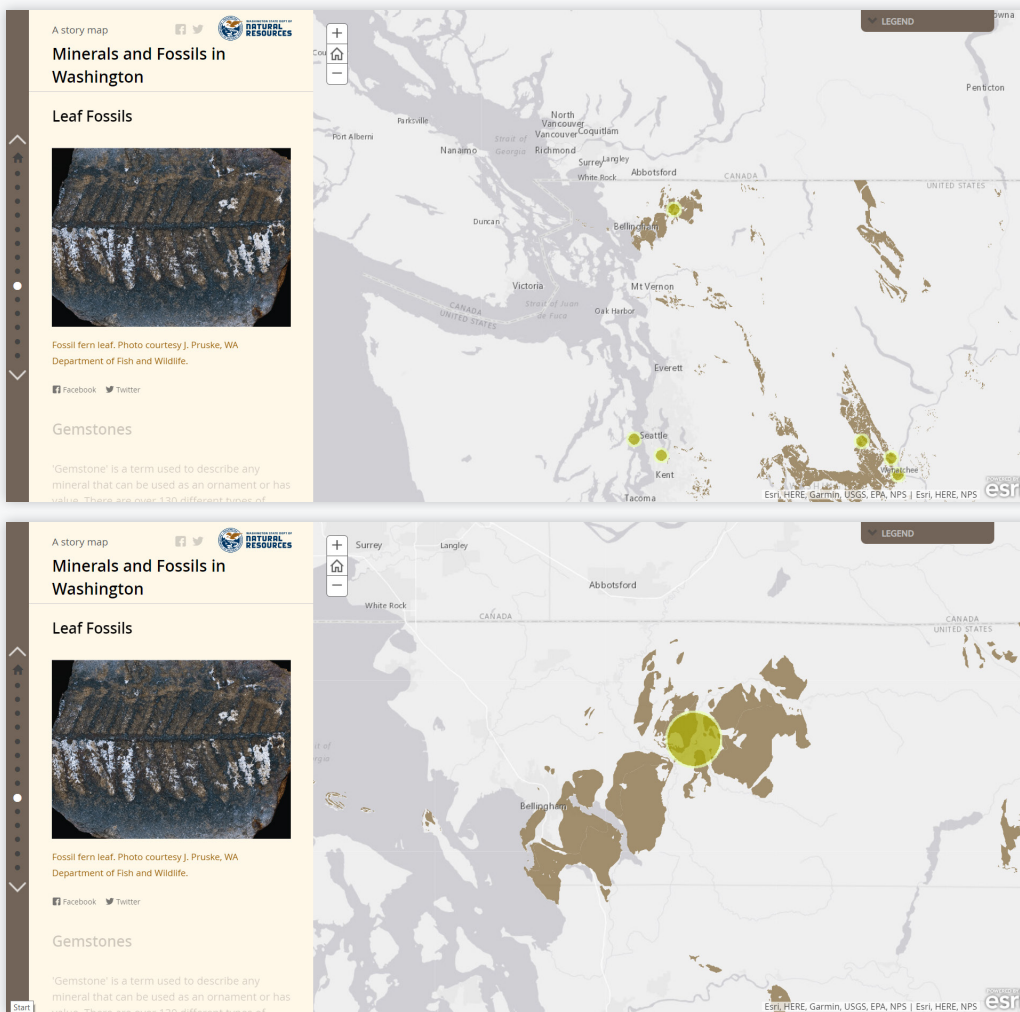


Figure 3. The image at the left shows a zoomed-out view of the map of leaf fossils from the *Minerals and Fossils in Washington* StoryMap. Note the yellow point in the Chuckanut Formation in northwestern Washington east of Bellingham. Because the point was converted to a polygon, it grows in size as the map is enlarged. This generalization of the data obscures the precise location of the original point data.

considerations, WGS also must be careful to not provide inappropriate guidance for rockhounding sites that are outside of its jurisdiction. By giving users more general information, as well as links to other related rockhounding sources, mapmakers put the onus on the users to know the rules and regulations at their desired collecting site. The *Minerals and Fossils in Washington* StoryMap and the WGS rockhounding webpage continue to be two of WA DNR's most popular webpages, thus underscoring the importance of these mapmaking decisions.

REFERENCES

- Pattie, Bob. 1985. *Gems and Minerals of Washington*. Washington Division of Geology and Earth Resources. 1 sheet, scale 1:443,520.
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