

Australia in Oak, Copper, and Quartz

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This article describes a map I made based on a trip to Western Australia I took with my wife in 2014. The map is sculptural, constructed using a combination of wood, metal, and semi-precious gemstones. For the base of the map, I used a 44.5 × 40.5 in (113 × 103 cm) piece of quarter-sawn white oak veneer plywood. Guided by a 1-inch (2.54 cm) grid system, I drilled 773 holes of four different diameters to show the land area and general shape of the continent. I chose two different gauges of copper wire to represent driving and train routes. Amethyst stones represent alkaline saline lakes that Holly—an extremophile microbiologist—sampled for resident microbiota. For the one acidic saline lake she sampled (pH 3.5), I used rose quartz instead of amethyst. I highlighted the stromatolites we observed at Shark Bay (Western Australia) with a green diopside mineral. Finally, anywhere we stayed of note is represented with one (or more) red map pins. The final product is 44.5 × 40.5 in (113 × 103 cm) at a scale of 1:4,118,400 (1 in = 65 mi; 1 cm = 41.2 km).

KEYWORDS: map; cartography; woodworking; metal; gemstones; sculpture; Australia; limnology; microbiology; tourism

INTRODUCTION

THE GOAL OF THIS PROJECT was to make a sculptural map of Australia, illustrating a trip my wife Holly and I took to study microbiology and vacation together. Combining two of my passions—woodworking and cartography—the map was a Christmas present for her. I wanted the map to show the lakes we sampled for their microbiome composition (she is an extremophile microbiologist), the places we stayed, the car and train routes we took, and to include a special nod to the stromatolites of Shark Bay. I started with a half sheet (4 × 4 ft, or 122 ×

122 cm) of quarter-sawn white oak plywood, chosen because it's my wife's favorite wood. I was inspired by two projects posted to Imgur in 2014: “[Plywood map of New Zealand](#)” and “[Map art project](#),” both of which I found to be aesthetically pleasing and interesting representations of the continents. More specifically, I thought the design (different sized holes) combined with the natural wood grain looked spectacular as wall hangings. After seeing these works, I was eager to personalize and enrich the basic concept with my own story and materials.

METHODS

GIVEN THAT MY GOAL WAS a map made to-scale, the first step was building a digital base map of Australia and our travels. Using a Lambert conformal conic projection in ArcGIS Pro, I downloaded a shapefile of the outline of Australia and then used Google Earth to digitize line and point files of the routes we traveled, lakes we sampled, and places where we stayed, all of which I then imported back into ArcGIS Pro. I added a 1-inch grid to the final output

and printed the results on a piece of Arch E (36 × 48 in, 91 × 122 cm) paper.

In the area around the coastline, I then manually labeled (values 1–4) every intersection on the paper grid based upon the percentage of the neighboring cells that were within the land borders of Australia:



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- ½ to 1½ surrounding squares were land: labeled 1
- 1½ to 2½ surrounding squares were land: labeled 2
- 2½ to 3½ surrounding squares were land: labeled 3
- 3½ to 4 surrounding squares were land: labeled 4

Ultimately, this technique gives a tapering visual effect where land meets water and helps preserve shoreline detail more than uniform hole diameters would.

This map was then taped to the half-sheet of quarter-sawn white oak plywood. As reference and starter points, every intersection labeled 1–4 was drilled with a ⅛-inch (0.32 cm) drill setup for starter points.

- ¼-inch (0.64 cm) drill bit (labeled 1): 21 holes
- ⅜-inch (0.95 cm) drill bit (labeled 2): 68 holes
- ½-inch (1.27 cm) drill bit (labeled 3): 63 holes
- ⅝-inch (1.59 cm) drill bit (labeled 4): 621 holes

The holes were first partially drilled from the back in an attempt to eliminate tearout. To further reduce tearout, I



Figure 1. Map showing labeled intersections and ⅛-inch (0.32 cm) drill setup for starter points.

used Forstner bits (instead of spade or pilot point bits) and padded them with wine corks to protect the wood from being hit by the drill once the wood was completely penetrated. The 773 total holes were cleaned up using a Dremel sander (Figure 2).

To simulate a cartographic neatline and provide visual contrast, I added a ⅞-inch (1.43 cm) walnut border, completing the woodworking phase of the map sculpture. I

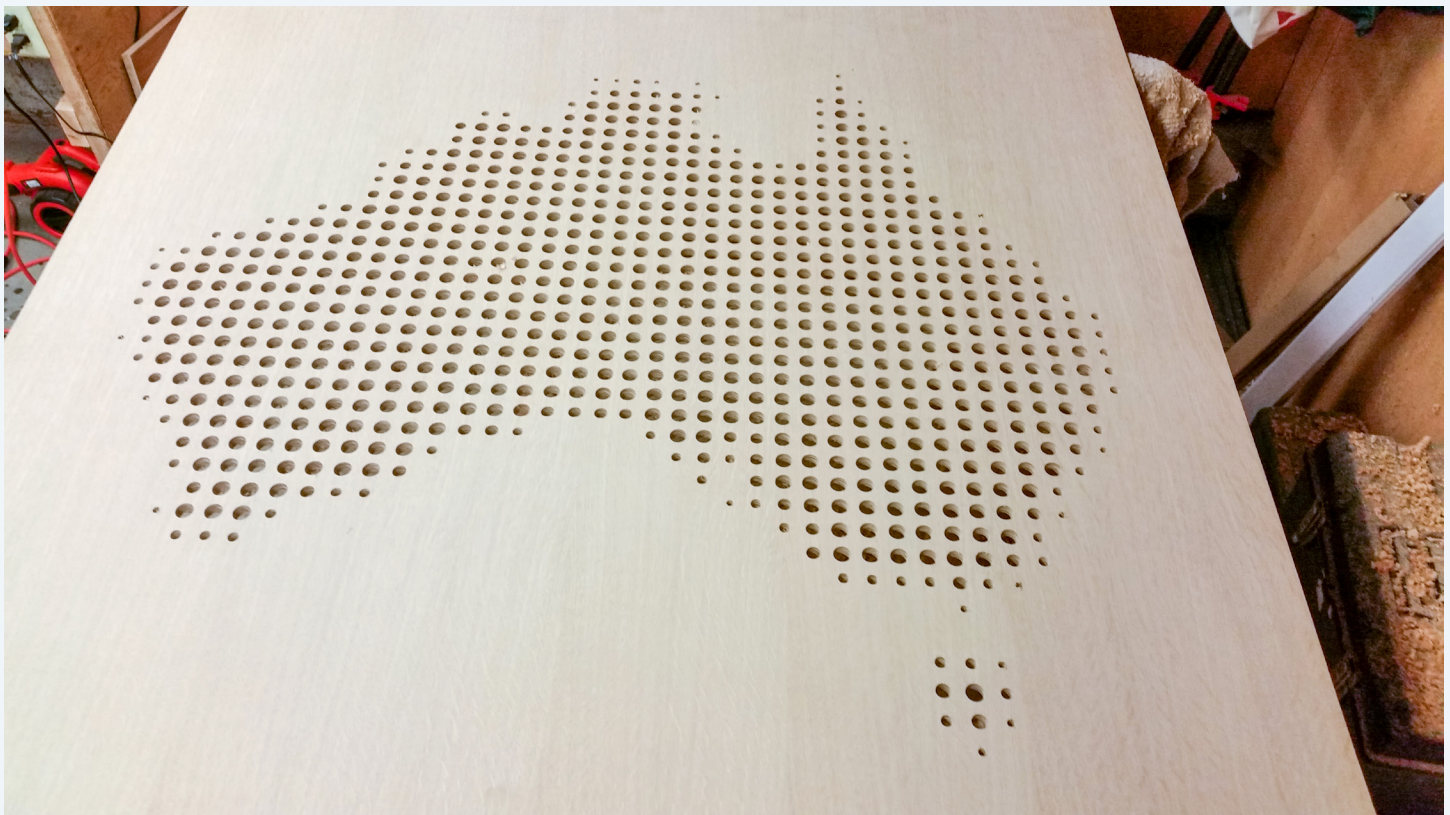


Figure 2. Map with all holes drilled, and after sanding with 120 and 220 grit sandpaper.

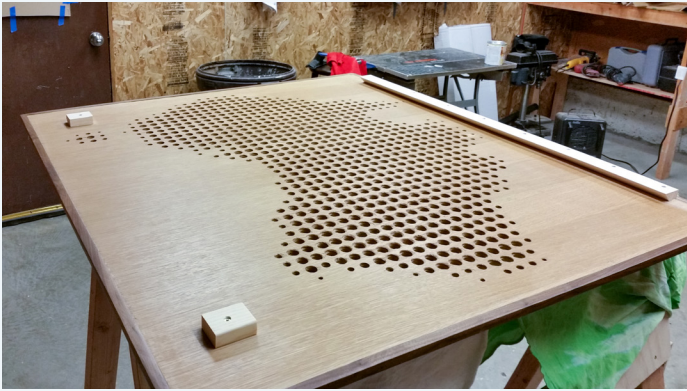


Figure 3. Back of map showing French cleat mount system.

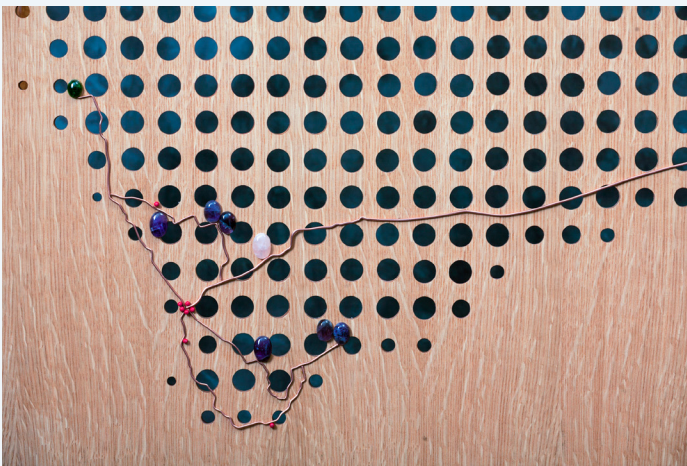


Figure 4. Closeup of the Western Australia portion of the trip.

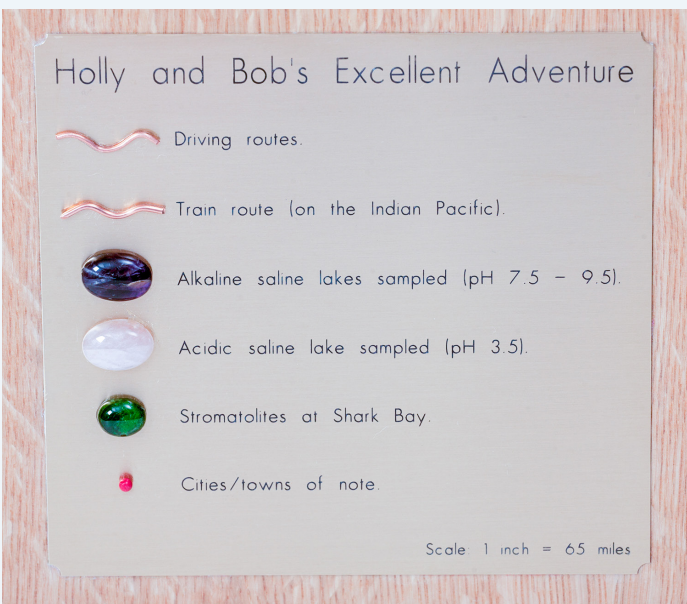


Figure 5. Legend.

installed French cleats on the back to serve as wall mounts (Figure 3). Everything was finished with three coats of OSMO oil/wax finish.

With the base map complete, I moved on to the symbology. We spent most of our time in Western Australia, acting both as tourists and sampling the microbiomes of a number of saline lakes for my wife's research. Western Australia wasn't enough, though, and we took a train to Adelaide, rented a car, and drove to Melbourne, sampling along the way. I used the following to depict the routes and stops:

- Copper wire for the routes driven, with a larger gauge for the train portion of the trip.
 - + If I were to do this again, I would use a different colored wire, perhaps aluminum, for the train segment to provide better contrast.
- Different semi-precious stones for the sampling locations. My choices were dependent on what was available as a cabochon from eBay at a reasonable price and with sufficient contrast.
 - + Rose quartz for the acidic saline lake (because I mentally associate acids with red).
 - + Amethyst for the alkaline saline lakes (because I mentally associate alkalinity with blue).
 - + Diopside for the stromatolites (because it provided sufficient contrast to the above and was readily available). This particular stop was included on the map because a trip to visit stromatolites is something of a career pilgrimage for microbiologists.
- Red-tipped map pins for locations where we stayed, chosen because they were easy to obtain, high contrast, and not overwhelming.

I bent the copper wire to shape, then added earring posts to the wire. Small holes were drilled into the map, and the posts were epoxied in. All the gemstones were epoxied onto the map; the red pins were simply driven into the map (Figure 4). A legend with a verbal scale was included to complete the cartography (Figure 5).

CONCLUSION

THE FINAL PRODUCT COMBINES aspects of traditional (pen and ink and/or digital) cartography with woodworking and jewelry smithing, giving a unique end product. I gave this to my wife on Christmas in 2014, and she was

thrilled to receive it and look back at the wonderful trip. It also serves to help educate students, both in the biology and geography departments, as we talk about the cartography, geography, and ecology depicted on the map.

ACKNOWLEDGEMENTS

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Finally, thanks to individuals at the Department of Parks and Wildlife, Western Australia for permission to visit some of the lakes.

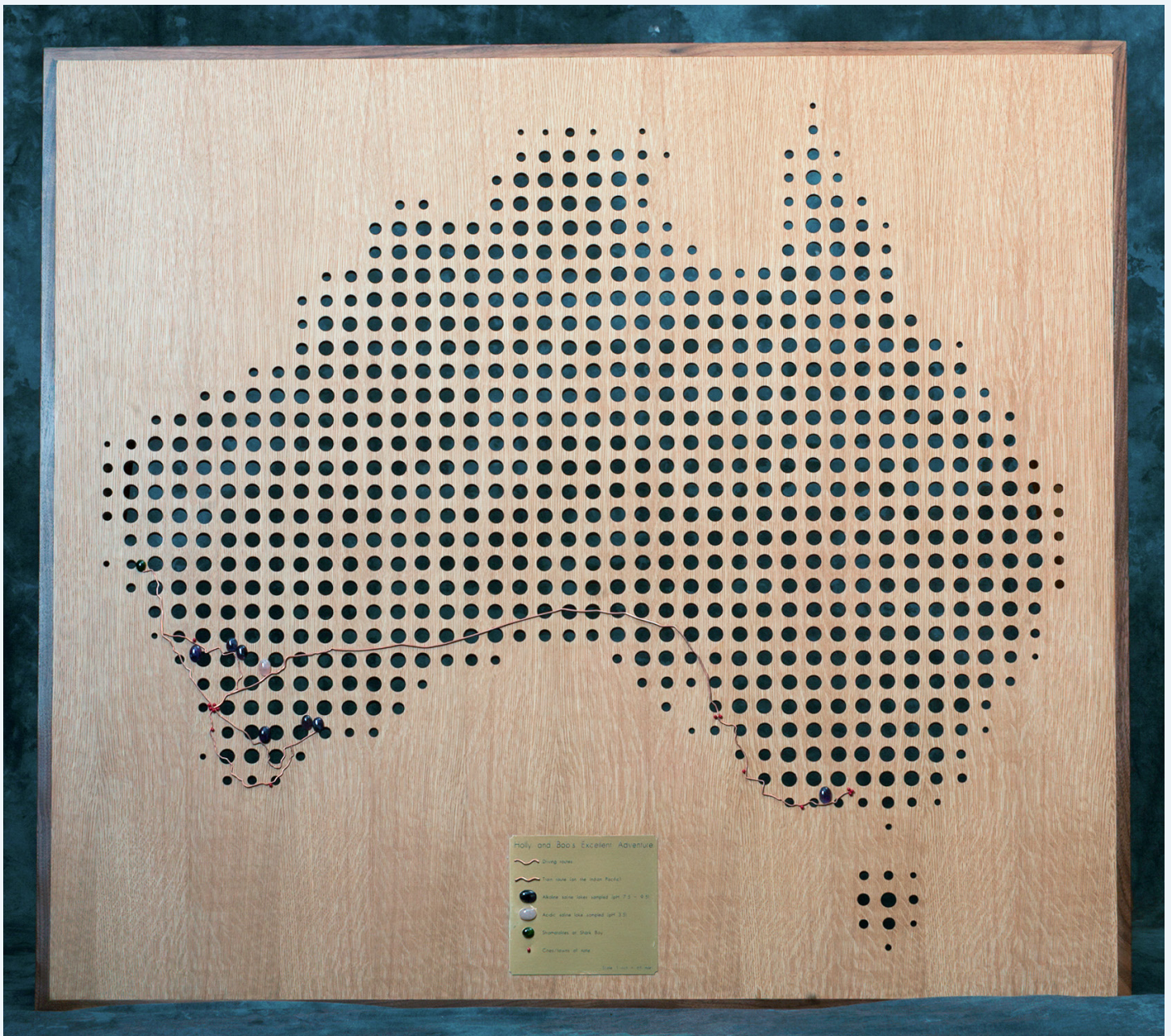


Figure 6. The final map.