



Migrating Medicine: How Shifting Woodlands Affect Navajo Health

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Introduction

The Navajo Nation is about sixteen million acres (28,000 square miles) and spans across three states: Arizona, Utah and New Mexico. The Navajo Nation is divided up into five agencies and then further organized into chapter houses. The Chinle Agency has 14 chapter houses, 1,363,423 acres, and a total population of 27, 823 (U.S. Department of the Interior n.d.). The landscape is composed of high elevation plateaus, sandstone canyons, pinyon-juniper woodlands, and mesas (Bureau of Indian Affairs Navajo Region 2017, 12). The Navajo people have lived in the same area since time immemorial. According to the Navajo Creation Story, the boundary of Dinétah (Navajo Nation) are the four sacred mountains: Sisnaajiní (Blanca Peak), Tsoodzilí (Mount Taylor), Dook’o’ oosłííd (San Francisco Peak), and Dibé Nitsaa (Hesperus Mountain). Traditionally, the Navajo have conducted their whole lives within the sacred mountains. Now many are forced out of their homelands to find work, education, healthcare, and viable vegetation.

How has anthropogenic climate change affect the juniper-pinyon woodland ecotones and consequently affect the ethnomedicine of Chinle Agency in the Navajo Nation?

Health Challenges

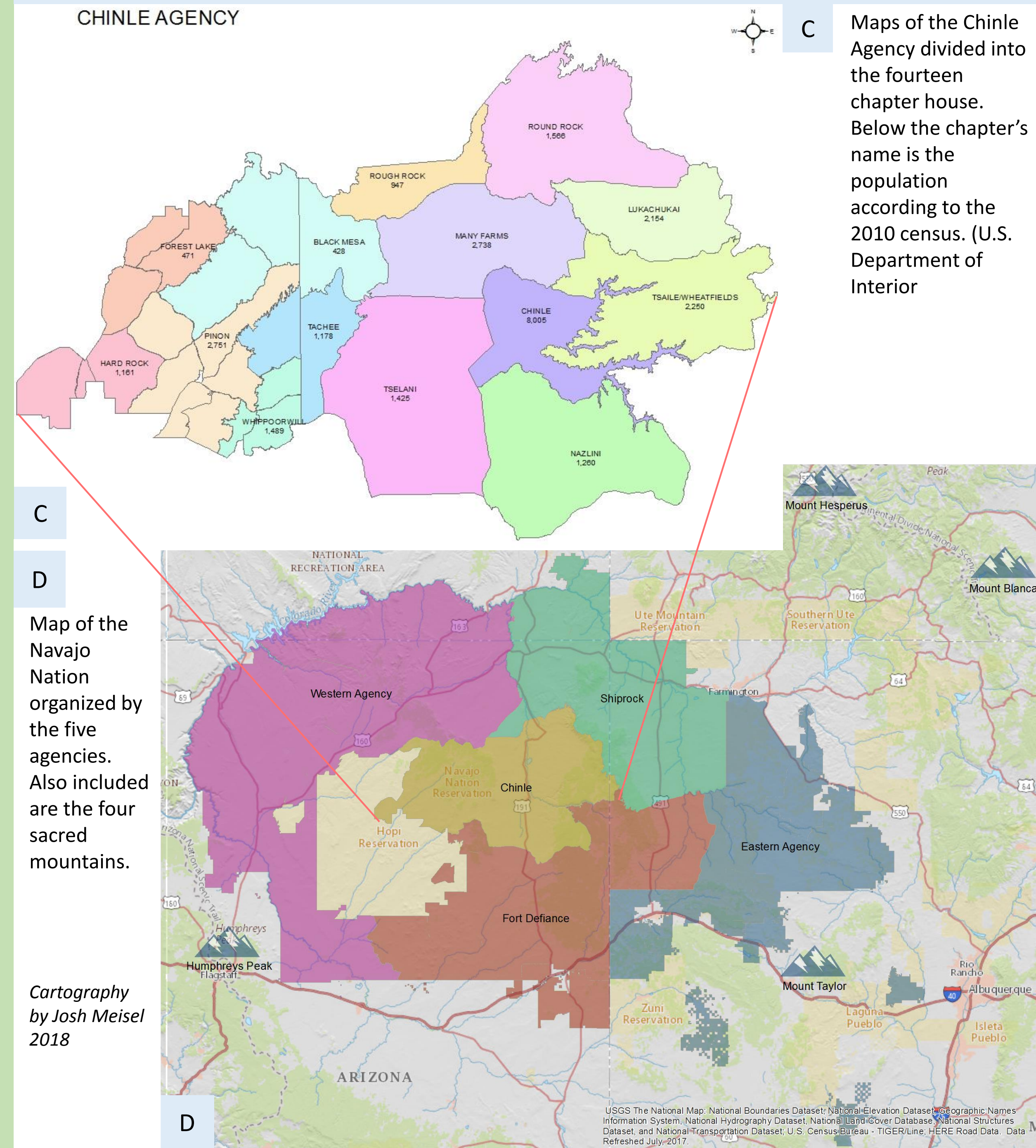
The Navajo Nation is about 4,000 square miles larger than West Virginia but only has twelve health care facilities. Finding medical care off the reservation is especially hard since the Chinle Agency is surrounded by the Navajo Nation and Hopi Nation. In 2013, the Navajo Epidemiology Center, and Navajo Department of Health conducted a health survey on the Chinle Agency. In the report the survey concluded that:

- 48% of residents who could not make it to a clinic was due to transportation issues (e.g. no car, no gas, roads too dangerous)
- 30% of residents have one person they think of as a personal doctor
- 63% of residents have visited the doctor in the past twelve months
- 94% of residents have electricity and only 73% have running water
- Diabetes, high blood pressure, depression, and arthritis were the top four chronic diseases

Ethnomedicine

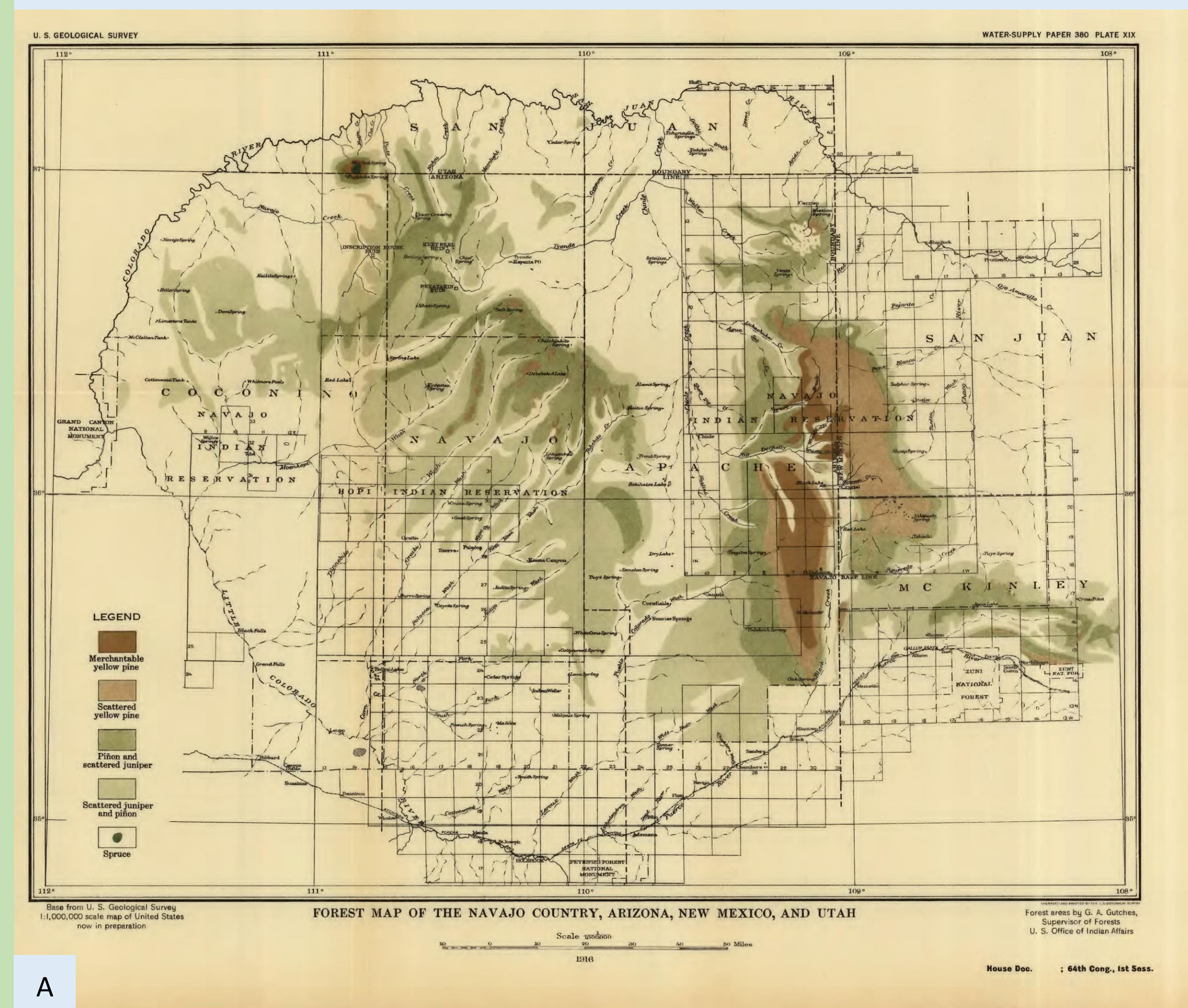
According to a survey conducted by the Navajo Epidemiology Center, 68% of adults within Chinle Agency said they use either traditional medicine or see traditional healers (Navajo Epidemiology Center 2016, 6). Traditional remedies rely on the growth of specific vegetation at specific locations during specific times for proper health management. Majority of the Navajos have a diet that contain little to no dairy. Instead, juniper ash is the main source of calcium. Christensen et. al., conducted a study examining the nutritional levels in a single teaspoon (about a gram) and discovered that there was the same amount of calcium as one cup of milk (Christensen et al. 1998, 333). Along with the calcium, a teaspoon of juniper ash has twenty-eight percent of the Recommended Dietary Allowance (RDA) of iron and nine percent of RDA for magnesium (Christensen et al. 1998, 333). Juniper is also said to help influenza, postpartum pain, and nausea (Mayes and Lacy 1989, 55). Juniper can be made into a Vaseline-like substances that soothes irritated skin and protects against sunburns (Mayes and Lacy 1989, 78). In addition, pinyon leaves boiled into a tea can treat diarrhea (Mayes and Lacy 1989, 79).

Introduction – Navajo Nation and Chinle Agency



Cartography
by Josh Meisel
2018

Migration - Juniper-Pinyon Population Over Time: 1916 and 2002 Survey Maps



A

1916 Survey Map: “Forest Map of the Navajo Country , Arizona, New Mexico, and Utah” The green are juniper and pinyon and the brown is yellow pine (Smith 1916, 245).

Migration

Pinyon and juniper are co-dominant in the Great Basin Conifer woodlands in the Chinle Agency. The woodlands naturally occur around 5,000 and 7,500 feet above sea level (Arizona Department of Water Resources 2014). The woodlands are situated between ponderosa pine forest and brush/grasslands. In this area it is common to see Rocky Mountain juniper (*Juniperus scopulorum*), Utah juniper (*Juniperus osteosperma*), and one-seed juniper (*Juniperus monosperma*). Among the juniper listed either they have complete dominance or more commonly they share dominance of the woodlands (Brown 1982, 52). Typically, it is common pinyon (*Pinus edulis*) that grows in the Great Basin Conifer woodlands (Brown 1982, 52). Juniper is more resistant to climatic changes and found more often than pinyon. Only when juniper has substantially reproduced and grew then will pinon be seen regularly. Overall, juniper is more common to see than pinon.

Juniper and pinyon have always been a staple within the Navajo Nation, however recent studies state that the environment of juniper and pinyon are being reduced. Due to rising temperature both pinyon and juniper are dying at higher frequency. Morality rates of pinyon at high elevation within and near the reservation are ninety percent or more (McAilfee et al. 2014, 2; Breshears et al. 2005, 15147). Pinyon’s codominant species, juniper has mortality rates nearing thirty percent (Breshears et al. 2005). The reduction in vegetation cause soil to be exposed. When the soil is exposed there is an increasing of soil loss by evaporation, runoff, and erosion (McAiliffe et al. 2014, 10). When soil is lost, then vegetation is often lost as well which leads to soil to be exposed. The vegetation loss and nutrient loss are then put in a cycle of destruction. The environment that juniper and pinyon once thrived in is turning into an unsuitable area due to climate change. The woody species are being forced to find valuable soil to grow in which will encroach into other biomes, such as the shrublands.

Vegetation distribution is projected to change because of rising temperature and increased drought. Large woody plants are the easiest to track in their journey of mortality and invasive growth. The transitional area between habitats (ecotones) are the first terrestrial zone to change due to environmental changes. There are documented cases that juniper-pinyon woodlands have been invading shrubland for 120 years (Miller et al. 2000, 574). The movement of juniper, followed by pinyon, into the brushlands are causing the vegetation reduction. Brushland plants such as sagebrush, rabbitbrush, saltbush all already take up a small amount of canopy cover (McAuliffe et al. 2014, 9) while pinyon has increased by eleven percent (Ffolliott and Gottfried 2002, 2). Since pinyon and juniper are no longer able to thrive in the woodland biome, they have moved into the brushlands. The brush species are struggling to survive causing organisms that depend on those species to struggle as well.

Health Effects

Adding juniper ash to food is common place in the Navajo Nation. As stated earlier, juniper ash has 28% of the RDA for iron, 9% of the RDA for magnesium, and 36% of the RDA for calcium in just a gram (Christensen et al. 1998, 1). Caring facilities, such as nursing homes, put ash into food (e.g. bread, oatmeal) in place of other foods typically not preferred (e.g. dairy). Facilities also prefer to use diet instead of prescription drugs. Calcium supplements double the risk of a heart attack, harm the kidneys, and can hinder the absorption of iron, magnesium, and zinc (Arthritis Foundation n.d.). The heart risk associated with supplements stems from calcium blood level spikes. In contrast, when calcium is absorbed from food the increase is gradual enough that it does not pose the same risk as supplements (Arthritis Foundation n.d.).

Studies link magnesium levels in the body to depression. In youth, high magnesium is associated with higher rates of depression but in elders it can be used as a depression preventer (Tarleton and Littenberg 2015, 254). Navajo people knew how to treat themselves before Western medicine. Much of the reservation use both Western and traditional medicine in conjunction with each other. Now, however, the redistribution of vegetation is threatening the viability of ethnomedicine.

Conclusion

Incorporation of traditional ecological knowledge (TEK) can be an important aspect of conservation and restoration efforts. TEK projects focusing on the restoration of Canyon de Chelly should include prescribed burns and foraging. Future mining, especially strip mining for coal, should be limited.

Woodland restoration attempts post-mining have thus far been futile. Funding for restoration should come with long-term project objectives that address problems like invasive plants. Restoration of Canyon de Chelly through the removal of Tamarisk and Russian Olive – both invasive species, was a failure due to a lack of long-term planning and funding. Future projects should also address the role of climate change on woodland communities.

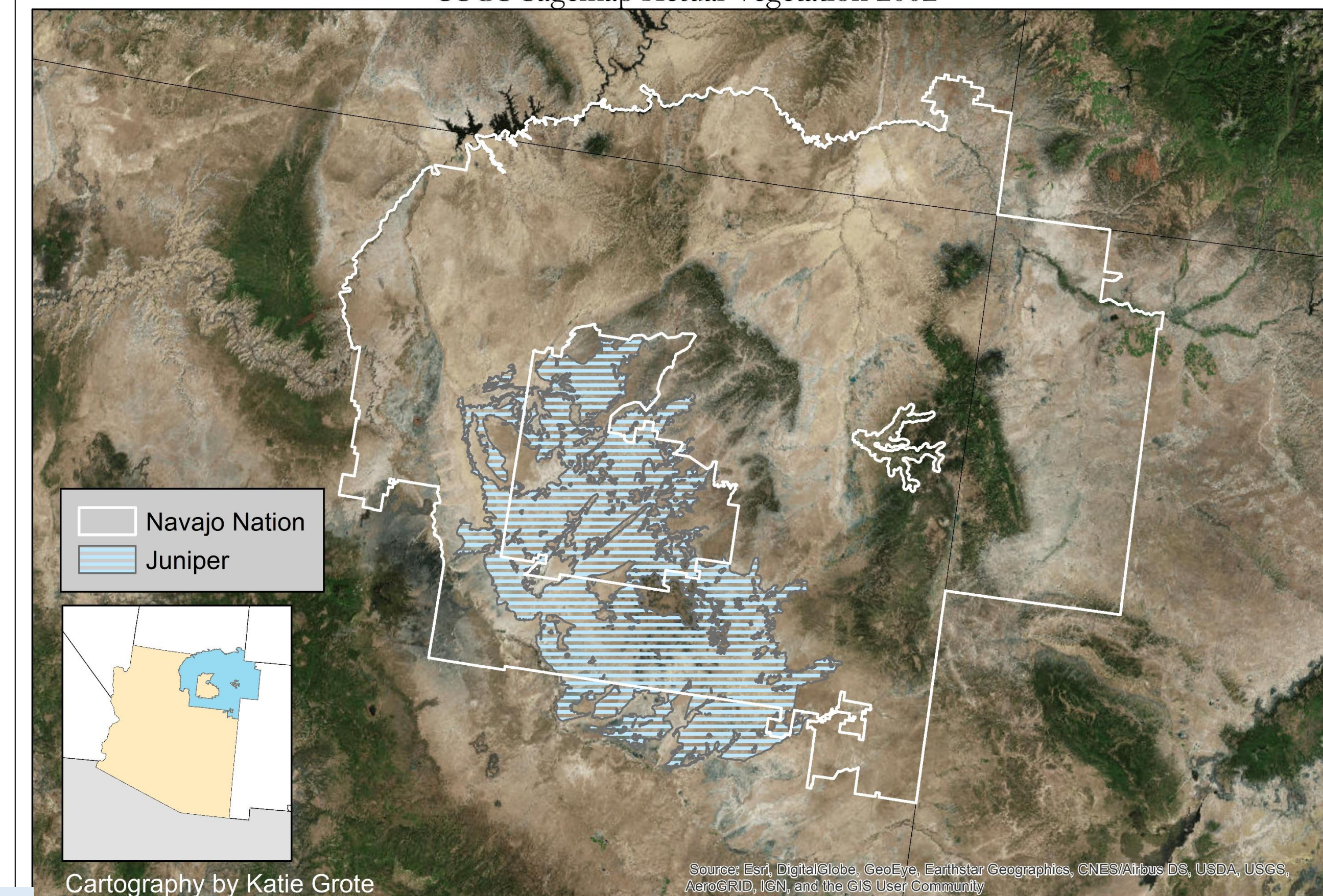
References

- Arizona Department of Water Resources. 2014. “Environmental Conditions of the Eastern Plateau Planning Area.” March 27, 2014.
- Brown, David. 1982. “122.4 Great Basin Conifer Woodland.” *Arizona Game and Fish Department*. Bureau of Indian Affairs Navajo Region. 2017. “The Navajo Nation Council.” Department of the Interior.
- Christensen, Nedra, Ann Sorenson, Deloy Hendricks, and Ronald Munger. 1998. “Christensen_Juniper-Ash” 98 (3): 333–34.

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Navajo Nation and Juniper Locations USGS Sagemap Actual Vegetation 2002



B

Data Used: Esri Basemap, USGS Sagemap Actual Vegetation (GAP) shapefile (2002), and USGS Indian Lands shapefile. (2014).