

Firewood and Indigenous Ecological Knowledge on Cedar Mesa, UT

Anna Johnson, Piper Christian, Sarah Buening, Kate Magargal
 SPARC Environmental Justice Lab, Environmental and Sustainability Studies
 University of Utah

ABSTRACT

Firewood is identified by Tribal elders as one of the most important relationships maintained by Native people with forested landscapes on public lands in Utah. Indigenous communities have maintained a legacy of land tenure since time immemorial, but have are currently underrepresented in forest management decision-making. Here, we explore one aspect of the culturally essential practice of firewood harvesting among Diné people. This study focuses on the dynamics of Indigenous Ecological Knowledge (IEK) — knowledge and practice developed over generations of interactions tethered to specific places and environments [1] — practiced by the Diné through the harvest of juniper and pinyon species for firewood on Cedar Mesa in southeastern Utah. Through this analysis, IEK is shown to guide people towards the most energy-dense wood, which has important implications for how forest management should embed existing relationships between Native communities and the woodlands.

BACKGROUND

In the course of working with Diné wood haulers — the local term for those who harvest and use wood from local woodlands — experts shared why they prefer certain types of wood over others. IEK guides people to wood with specific characteristics, including, what is referred to in Diné as “jeeh teetshiin,” a heavy pitchy wood. Field observations also showed that people preferred trunk wood to branch wood. To understand more about why certain wood is preferred in certain locations, we collected and analyzed wood from across a region of southeastern Utah (see map) where Diné woodhauling is common.



Stump showing yellow coloration of a jeeh teetshiin pinyon

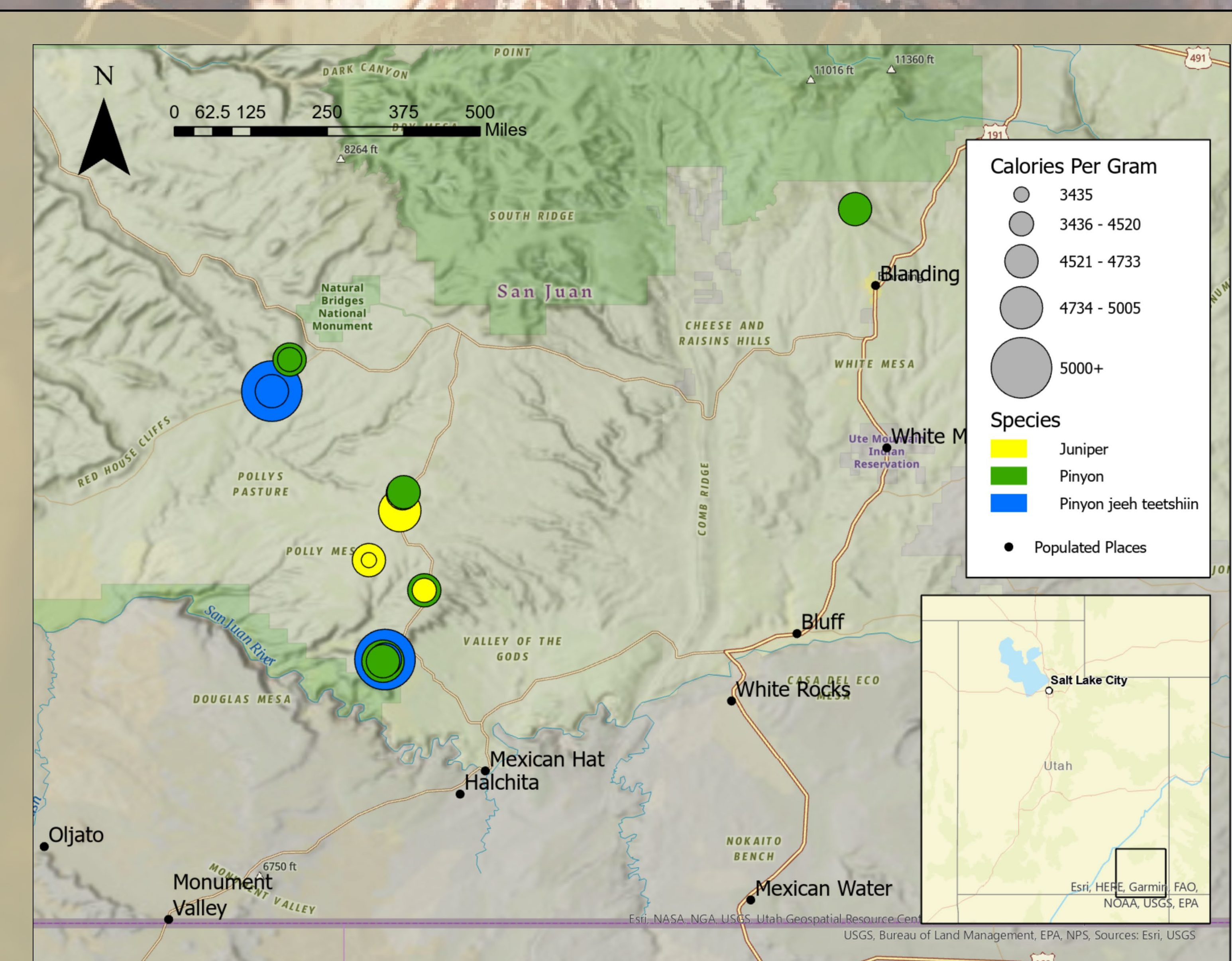
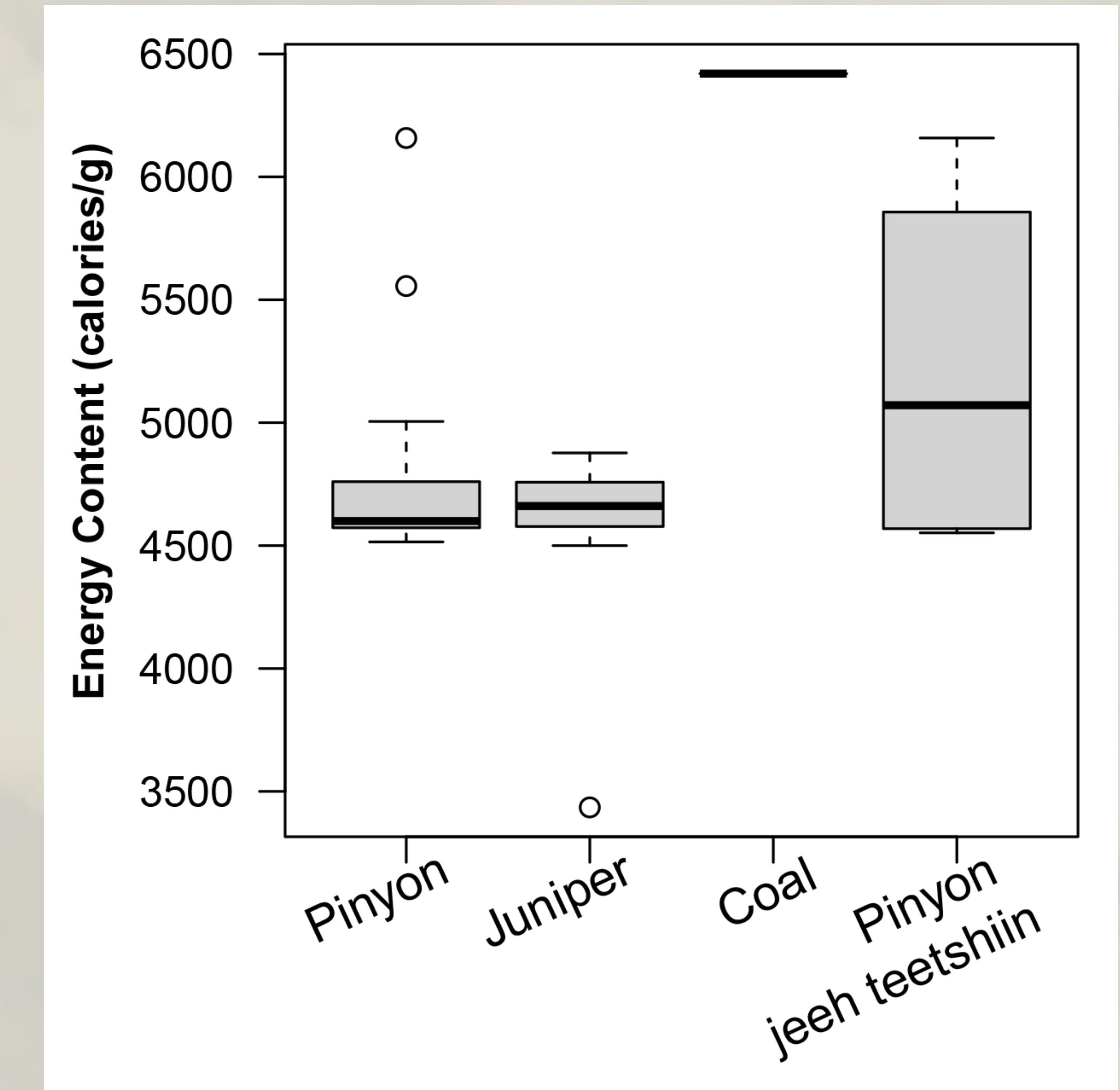
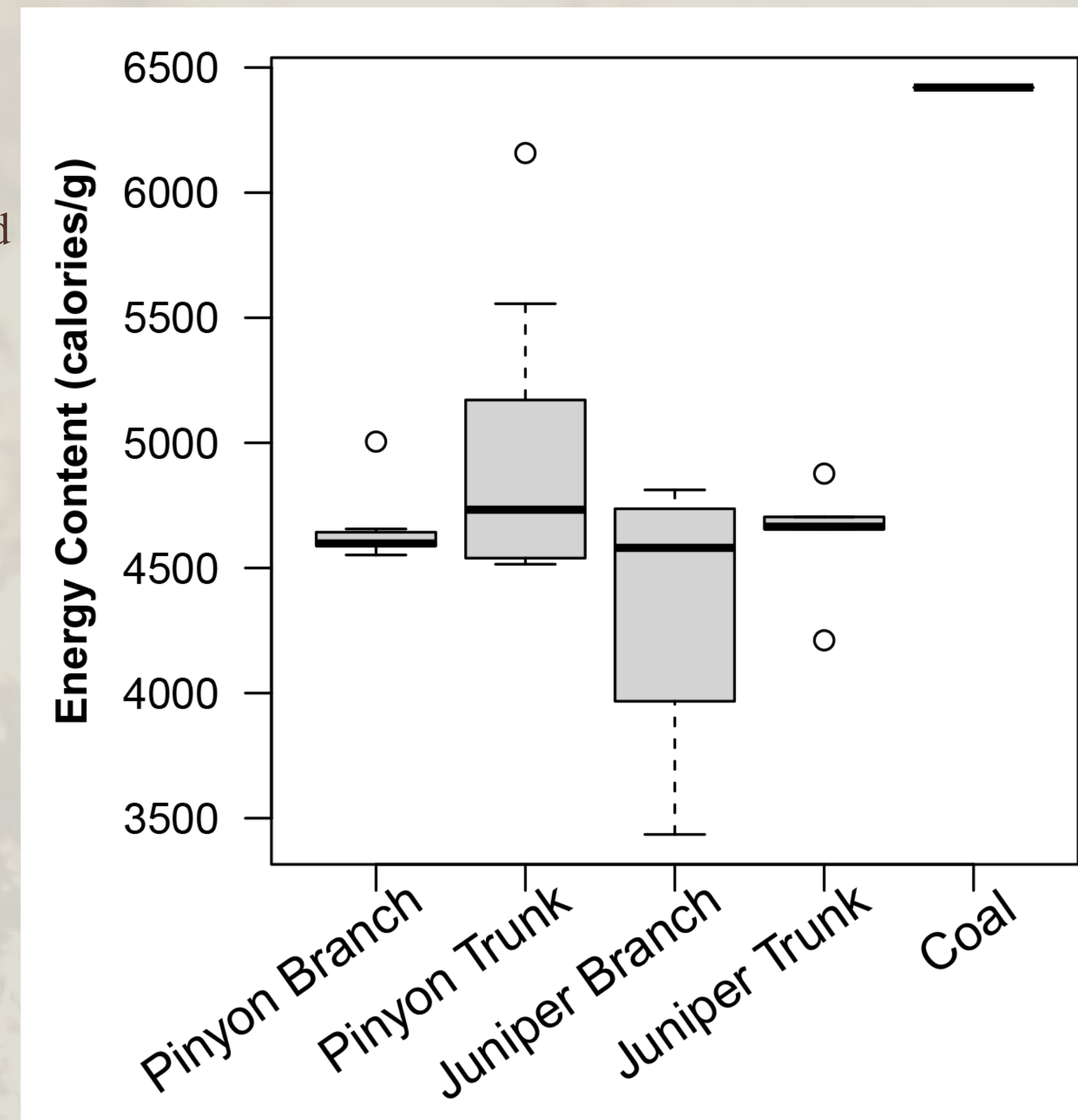
METHODS

27 samples were collected from wood harvest locations across the study area, rasped into a sawdust-like consistency, and sent to the Central Analytic Laboratory at the University of Arkansas for energy analysis. The samples were then run through a bomb calorimeter, which is a process that measures the heat released from a combustible substance [2]. We then compared the energy density of pinyon and juniper branches versus trunks, as well as jeeh teetshiin pinyon using box and whisker plots (see figures).

RESULTS

The first plot (left) shows no statistical difference between branch and trunk energy density, suggesting that trunk wood is preferred for other reasons. The pinyon species has a higher range of energy content than the juniper species, including outliers that range into high energy density, which may be why pinyon is preferred for heating wood.

The second plot (right) categorized the data by species, including a separate category for jeeh teetshiin pinyon. Jeeh teetshiin pinyon has a statistically higher energy density than the other wood categories. The plot also shows an outlier of juniper having the lowest energy content of 3435 calories/gram, while the pinyon jeeh teetshiin has the highest level of energy content at 6158 calories/gram.



Map showing the distribution of wood samples. Yellow dots represent juniper, green is pinyon, and blue is jeeh teetshiin pinyon. The size of the circles indicates energy content. Circles overlap where samples were collected in proximity to each other. Roads and place names are plotted for geographic context.

DISCUSSION

The higher energy content of the jeeh teetshiin suggests that the application of IEK results in higher energy outcomes for Diné wood haulers. We also confirm that many pinyon samples contain higher energy density than juniper, which contributes to why people preferentially harvest pinyon. When Diné are selecting which wood to harvest for firewood, they say the best wood to attain in the pinyon jeeh teetshiin.

Diné do not attempt to collect fresh, living trees but instead aim for ‘dead’ wood. As climate change brings increased drought to the southwestern US, there will initially be many recently dead trees to collect firewood from. However, as time goes on, there will be less sources of firewood, and less pinyon jeeh teetshiin. The loss of this important relationship between Diné people and the woodlands would result in substantial cultural and ecological losses. By incorporating existing IEK into forest management, we can mitigate those losses by ensuring, in this case, that Diné wood haulers continue to have access to areas with jeeh teetshiin pinyon, and thus sustain an important part of the relationship with the land. This study exemplifies only a small facet of the value IEK holds for sustaining such relationships.

REFERENCES

- [1] Hunn, E. (1993). What is traditional ecological knowledge: . 13 15 (1993). In N. Williams & G. Baines (Eds.), Traditional ecological knowledge: Wisdom for sustainable development. (Vol. 15). Australian National University.
- [2] Atwater, W.O., Snell, J.F., 1903. Description of a bomb-calorimeter and method of its use. J. Am. Chem. Soc. 25, 659e699. <https://doi.org/10.1021/ja02009a001>

ACKNOWLEDGEMENT

This work was conducted in collaboration with Utah Diné Bikéyah. We are particularly grateful to Jonah Yellowman.

We received support from the National Science Foundation (NSF Award #1714972).