Appendix A: Results

Contents

1 Introduction

The objective of this supplement is to provide detail on the analysis of County Equivalent (CCE) characteristics in the historical and present-day time periods. We begin by describing the data used to assess the differences in CCE characteristics across lands in the two time periods. We then detail the methods used to compare the CCEs across time along a suite of characteristics: climate, mineral access, and proximity to federal lands. Finally, we present the results of our analyses as well as assess the robustness of the results.

2 Data Descriptions

We focus on land characteristics that are either durable over long time periods or not heavily impacted by the human inhabitants of the land. We divide the characteristics into categories: climate, mineral resource access, and national lands. The set of climate characteristics consist of: number of extreme temperature days, drought, precipitation, and a measure of wildfire hazard potential. The set of mineral resource access characteristics include: access to oil and gas basins, oil and gas production, and number of wells. Finally, we assess the proximity of historical and present-day CCEs to federal lands. The following sections describe the data sources and any processing to construct the variables for analysis.

Table 1 contains summary statistics for the dataset used in the analyses. However, there are many instances where a tribe is present in only the present-day set or the historical set. We also present the summary statistics of a dataset with only tribes present in both periods. Table 2 contains the summary statistics of the Present-day and Historical dataset. While the number of observations is clearly smaller in the dataset with tribes present in both periods, the distribution of the datasets is very similar suggesting that these tribes who enter or exit the dataset are not systematically different from those in both periods with regard to our CCE characteristics.

2.1 Heat

The National Weather Service's Heat Index incorporates both relative humidity and actual air temperature to describe how hot the temperature feels in degrees Farenheit. We utilize Dahl et al.'s measure of the average number of days per year between 1971 to 2000 that the Heat Index is greater than 100 degrees Farenheit (Dahl et al. 2019).

2.2 Drought

We measure drought conditions as the Palmer Drought Severity Index (PDSI). The PDSI is a unitless measure which assesses exposure to drought and ranges from -10 (extreme drought) to +10 (extreme wet). We gather weekly PDSI measures gridded (4km resolution) across the continental US from gridMET (Abatzoglou, 2013). First, we construct CCE weekly PDSI averages using GIS to spatially intersect CCE boundaries with gridded weather. Second, we calculate weekly decadal averages. We construct the variable *Drought* by taking the difference between the 2010 and 1980 decadal averages for each CCE in the continental US. This variable captures the long-term climate impacts on CCEs.

2.3 Precipitation

Oregon State University's PRISM Climate Group calcualtes average precipitation (inches) over 30-year time periods. We use data that is calculated between 1981 and 2010 (PRISM Climate Group, ND).

2.4 Wildfire Hazard Potential

A changing climate is expected to alter wildfire behavior in the US, and particularly in the Western US (Abazoglou and Williams, 2016; Westerling et al. 2006). We construct a measure of wildfire risk using a gridded (270 meter) index called Wildfire Hazard Potential (WHP) (Dillon, 2018). The WHP is a discrete scale from 1 (very low fire hazard potential) to 5 (very high hazard potential) designed to inform fuel planning efforts. We choose this measure because it synthesizes many ecological, geographic, and atmospheric factors into a single index. We calculate the mean WHP of all grid cells within the county boundary.

2.5 Elevation

We extract elevation data from an open-source digital elevation model (DEM) accessed via the elevatr package in R (Hollister and Shah, 2017). The data sources for the package are high resolution gridded elevation estimates from the U.S. Geological Survey's Global Multi-resolution Terrain Elevation Data 2010 (GMTED2010) and Amazon Web Service's Mapzen Terrain Tiles (U.S. Geological Survey and National Geospatial Intelligence Agency, 2010). The DEM contains elevation in meters at 100 meter resolution across the US. We calculate the average elevation across all pixels in the county to construct a mean county elevation.

2.6 Ruggedness

We calculate a ruggedness index based on the digital elevation model. We use the *raster* package in R (Hijmans, 2020), which states that the Total Ruggedness Index is "... the mean of the absolute differences between the value of a cell elevation and the value of its 8 surrounding cells (Wilson et al., 2007)." The ruggedness is calculated at approximately 100 meter resolution for every county. In each county, we calculate the mean Total Ruggedness Index for consistency with the tribal boundary data and other measurements in the analysis.

2.7 Soil Organic Carbon

Ramcharan et. al. (2017) utilize random forest and gradient boosting algorithms to predict soil properties across the United States (Ramcharan et al. 2017), which are then aggregated to the county-level using the data processing technique described by Kane et al (2020). We report changes in soil organic carbon (SOC), measured in percent organic carbon, between historical and present-day lands in this appendix. However, soil health - and proxies for it, such as SOC - is dynamically influenced by the interaction between natural processes and human activities (Stevens, 2018; Haddaway et al 2017). For this reason, the measure itself is not sufficiently durable over time to be an appropriate selection for our primary research design, and is therefore excluded from the manuscript. We include results in the appendix as a starting point for future research which may investigate soil- and agrictulure-focused research questions in greater depth.

2.8 Oil and Gas Basins

The U.S. Energy Information Administration provides a map of sedimentary basin boundaries within the continental United States. Using this map, we construct a binary variable which describes whether a CCE does or does not overlap an oil or gas basin (U.S. Energy Information Administration, n.d.).

2.9 Oil and Gas Production

The U.S. Department of Agriculture reports gross withdrawls of oil and gas at the county level between 2000 and 2011. We take the average count of barrels of oil produced (thousands) and natural gas extracted (billion cubic feet) over this time period (U.S. Department of Agriculture Economic Research Service, 2019).

2.10 Oil and Gas Wells

The U.S. Geological Survey reports all known well locations across the continental United States between 1859 and 2005. We calculate the total number of wells drilled in each CCE over this 146-year period (Biewick, 2008).

2.11 Federal Lands

The U.S. Geological Survey's Protected Lands Database of the U.S. (PAD-US) is a spatial inventory of all formally protected lands. We select only lands protected by the Federal Government (e.g. national parks, national forests, etc.). We calculate total proportion of a CCE's land area which is designated as any type of federally protected area (U.S. Geological Survey (USGS) Gap Analysis Project (GAP), 2018).

Table 1: Full Dataset

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Days over 100F	10,303	5.81	8.97	0.00	0.00	7.00	72.00
Drought	10,307	−0.20	0.46	−1.38	−0.56	0.11	1.17
Precipitation	10,271	912.44	415.70	83.68	590.45	1,124.35	2,960.78
Wildfire Hazard Potential	10,307	1.28	0.96	0.06	0.50	1.91	4.03
Elevation	10,307	528.87	510.16	−1.39	221.15	654.81	3,462.46
Ruggedness	10,307	6.00	6.43	0.06	1.53	8.66	38.10
Soil Organic Carbon	10,307	36.34	18.24	3.83	21.46	49.45	93.75
Oil and Gas Basin	8,733	0.57	0.50	0.00	0.00	1.00	1.00
Oil Production	10,307	761.10	8,172.05	0	0	26.7	175,321
Gas Production	10,307	5.63	33.36	0	0	0.1	856
Well Count	8,733	272.81	534.97	0.00	3.00	342.00	7,743.00
Fraction Federal Land	10,307	0.07	0.17	0	0	0.03	1

Table 2: Present-day and Historical Dataset

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Days over 100F	8,154	5.71	9.26	0.00	0.00	7.00	72.00
Drought	8,158	−0.18	0.43	−1.38	−0.50	0.10	1.16
Precipitation	8,137	898.80	427.44	83.68	572.24	1,096.15	2,960.78
Wildfire Hazard Potential	8,158	1.22	0.90	0.06	0.49	1.77	4.03
Elevation	8,158	556.94	520.45	0.27	240.22	679.81	3,462.46
Ruggedness	8,158	5.61	6.06	0.06	1.53	7.53	38.10
Soil Organic Carbon	8,158	35.57	17.56	6.21	21.47	47.33	93.75
Oil and Gas Basin	7,307	0.59	0.49	0.00	0.00	1.00	1.00
Oil Production	8,158	543.57	5,191.66	0	0	37.3	175,321
Gas Production	8,158	6.43	36.45	0	0	0.2	856
Well Count	7,307	300.27	569.97	0.00	4.00	405.00	7,743.00
Fraction Federal Land	8,158	0.08	0.18	0	0	0.04	1

3 Methods

We employ several statistical methods to test whether characteristics of the historical lands differ from the present-day lands. Our primary method to compare the historical and present-day CCEs is a linear regression

of the CCE characteristic as a function of a binary indicator for present-day lands (and an intercept), which amounts to simple ANOVA test of whether the means are equal in the historical and present-day CCEs. The intercept in these models is the mean of the CCE characteristic in the historial period while the present-day coefficient represents the change from the historical to the present-day period. All statistical tests are conducted using cluster-robust standard errors, which account for heteroskedasticity and serial correlation that may exist within a tribe and within CCEs. Observations within a tribe may be correlated because of the proximity of CCEs within a tribe's historical or present-day extent. Tribal lands may also overlap CCEs creating correlation within CCEs across tribes.

We assess the robustness of our estimate using several alternative model specifications and two forms of the data: 1) only tribes with records in the present-day and historical period, and 2) all tribes including those with records in only one time period (denoted Full in the following tables). In each table below, we present a set of the following models:

- OLS: Ordinary Least Squares (OLS) model using only data on tribes with records in the historical and present-day periods.

- Weighted OLS: weighted OLS model using only data on tribes with records in the historical and present-day periods. We construct weights as the inverse of the total number of CCEs associated with a tribe in each time period. The weighted regression model effectively places equal weight on each tribe given that the number of CCEs varies with the historical range of the tribe. Larger, more dominant, or tribes with CCEs in the Eastern US may include more CCEs, which effectively increases the weight on those tribes in a simple regression setting. By weighting the observations, the results can be interpretted as a tribe-level analysis.

- Full OLS: OLS model using the full dataset, which includes tribes present in either the historical or present-day periods. The full dataset increases the sample size but may introduce bias due to the dissolution and formation of tribes between our time periods.

- Full Weighted OLS: weighted OLS model using the full dataset.

- Poisson: a Poisson regression when the data are integer count data.

- Tribe FE: an OLS regression with tribe fixed effects. The fixed effect regression estimates tribe-specific means in the historical period, but a common coefficient on the difference between the historical and present-day periods. This model would control for unobserved factors within a tribe that may influence any relocation policy and thus the characteristics of the CCEs in both the historical and present-day periods.

- BEZI: zero-inflated Beta regression when the dependent variable is bounded between zero and one (e.g., percent).

4 Results

This section presents the results of the analysis along with several robustness checks. Throughout the text 95% confidence intervals are presented as [lower,upper].

4.1 Heat

The results in Table 3 suggest that the present-day lands experience 2-3 more days in excess of 100 degrees per year compared to historical lands. All point estimates yield significant increases, ranging from 2.54 [1.6, 3.48] from the Weighted OLS model to 2.92 [1.00, 4.83] from the Full OLS model. The coefficients of the Poisson model are not directly comparable to the OLS estimates. The model suggests that historical lands experience about 5.5 (5.5=exp(1.705)) days a year over 100 degrees, while the present-days lands experience 2.6 (2.6=exp(1.71)*(exp(.39)-1)) , additional days over 100, which is comparable to the OLS estimates.

Table 3: Extreme Heat

	Dependent Variable: Days per Year in excess of 100 degrees F				
	OLS	Weighted OLS	Full OLS	Full Weighted OLS	Poisson
	(1)	(2)	(3)	(4)	(5)
Historical (Intercept)	5.51***	4.75***	5.62***	4.72***	1.71***
	(4.06, 6.96)	(3.30, 6.20)	(4.41, 6.82)	(3.85, 5.59)	(1.45, 1.96)
Present-day Change	2.61**	2.54***	2.93**	2.88***	0.39***
	(0.33, 4.89)	(1.60, 3.48)	(0.59, 5.26)	(1.56, 4.20)	(0.15, 0.63)
Obs	8,154	8,154	10,303	10,303	8,154
Note:					

*p<0.1; **p<0.05; ***p<0.01
95% confidence intervals in parentheses based on twoway-clustered standard errors (tribe and CCE).

4.2   Drought

Table 4 present the results of the analysis of differences in drought across the historical and present-day lands. Our variable is the change in drought over time. The coefficients on historical indicate that even the historical lands are experiencing more drought. The coefficients on present-day change indicate that present day lands are becoming even drier. OLS, Weighted OLS, Full OLS, and Tribe Fixed Effects models all indicate that present-day lands are about twice as dry as historical lands, with point estimates ranging between -0.06 (Weighted OLS) and -0.18 (OLS).

4.3   Precipitation

Table 5 present the results of the analysis of precipitation across the historical and present-day lands. The coefficients on Historical across models range from 899 mm to 994 mm of precipitation each year on historical lands. While the estimates in the unweighted models are statistically insignificant, the weighted models suggest an increase in precipitation of around 58 mm per year (Weighted OLS) or 135 mm per year (Full Weighted OLS). These results suggest that on average tribes are now in areas with higher precipitation but that larger tribes were relocated to areas with more variable precipitation patterns (insignificant estimates).

4.4   Wildfire Hazard Potential

The results in table 6 suggest that present-day lands have higher wildfire hazard potential (WHP) compared to historical lands. The coefficients on Historical indicate that the historical lands have an average WHP rating of around 1 on a scale of 1 (very low fire hazard potential) to 5 (very high hazard potential). The results indicate that the present-day lands have a higher WHP than the historical lands by 0.55 points on the index, a 47% increase. This estimate is robust to several alternative specifications, including the Full OLS and Tribe Fixed Effects models. The Full Weighted OLS model is the only specification which estimates a reduction in WHP in the present day. This suggests that tribes with a broader historical spread across many CCE's experienced greater increases in WHP, while tribes with less historical spread across CCE's did not. While wildfire hazard potential is a function of the natural environment, it is also influenced by human modifications of the natural and built environment.

4.5   Elevation

The results in table 7 suggest that the elevation of present-day lands is greater than historical lands. The coefficients on Historical indicate that the historical lands have an average CCE elevation of 541.46 meters. The results indicate that the present-day lands are an average of 196.43 meters higher than the historical lands, a 36% increase. While we find similar results with the Full OLS model, the weighted models and Tribe FE model indicate no or a small decrease in elevation. These results suggests that tribes with a broader historical spread across many CCE's experienced a small decrease in elevation. The weighted versions of the model compare across tribes rather than the population and extent of the peoples in the tribe.

4.6   Ruggedness

The results in table 8 suggest that present-day lands are more rugged than historical lands. The coefficients on Historical indicate that the historical lands have an average CCE ruggedness index of 5.36. The results indicate that the present-day lands have an average ruggedness index 3.14 points higher than the historical lands, a 59% increase. While we find similar results with the Full OLS model, the weighted models and Tribe FE model indicate no difference between historical and present-day ruggedness.

Table 4: Drought

	Dependent Variable: Median PDSI				
	OLS	Weighted OLS	Full OLS	Full Weighted OLS	Tribe FE
	(1)	(2)	(3)	(4)	(5)
Historical (Intercept)	−0.16***	−0.28***	−0.19***	−0.42***	
	(−0.24, −0.09)	(−0.32, −0.24)	(−0.26, −0.12)	(−0.46, −0.39)	
Present-day Change	−0.18***	−0.06***	−0.16***	0.08***	−0.11***
	(−0.26, −0.10)	(−0.09, −0.03)	(−0.23, −0.08)	(0.03, 0.12)	(−0.17, −0.04)
Obs	8,158	8,158	10,307	10,307	8,158

Note:

*p<0.1; **p<0.05; ***p<0.01
95% confidence intervals in parentheses based on twoway-clustered standard errors (tribe and CCE).

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Table 5: Precipitation

	Dependent Variable: Mean Annual Precipitation				
	OLS	Weighted OLS	Full OLS	Full Weighted OLS	Tribe FE
	(1)	(2)	(3)	(4)	(5)
Historical (Intercept)	899.90***	994.88***	912.75***	934.04***	
	(830.70, 969.10)	(907.50, 1,082.26)	(854.35, 971.15)	(883.04, 985.04)	
Present-day Change	−14.02	57.59***	−4.61	135.00***	6.39
	(−135.67, 107.63)	(25.38, 89.80)	(−126.72, 117.50)	(73.73, 196.27)	(−46.42, 59.20)
Obs	8,137	8,137	10,271	10,271	8,137
Note:					

*p<0.1; **p<0.05; ***p<0.01
95% confidence intervals in parentheses based on twoway-clustered standard errors (tribe and CCE).

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Table 6: Wildfire Hazard Potential

	Dependent Variable: Mean Wildfire Hazard Potential				
	OLS	Weighted OLS	Full OLS	Full Weighted OLS	Tribe FE
	(1)	(2)	(3)	(4)	(5)
Historical (Intercept)	1.17***	1.73***	1.25***	1.93***	
	(1.01, 1.34)	(1.62, 1.84)	(1.10, 1.40)	(1.85, 2.01)	
Present-day Change	0.55***	0.02	0.47***	−0.16***	0.14**
	(0.39, 0.71)	(−0.05, 0.09)	(0.31, 0.64)	(−0.26, −0.07)	(0.03, 0.25)
Obs	8,158	8,158	10,307	10,307	8,158

Note:

*p<0.1; **p<0.05; ***p<0.01

95% confidence intervals in parentheses based on twoway-clustered standard errors (tribe and CCE).

Table 7: Elevation (meters)

	Dependent Variable: Elevation				
	OLS	Weighted OLS	Full OLS	Full Weighted OLS	Tribe FE
	(1)	(2)	(3)	(4)	(5)
Historical (Intercept)	541.46***	784.46***	515.29***	707.94***	
	(454.07, 628.85)	(697.50, 871.42)	(442.73, 587.84)	(652.92, 762.97)	
Present-day Change	196.43***	−49.48***	200.85***	0.31	−49.83*
	(73.55, 319.30)	(−84.50, −14.47)	(80.57, 321.13)	(−60.50, 61.12)	(−104.57, 4.90)
Obs	8,158	8,158	10,307	10,307	8,158
Note:					

*p<0.1; **p<0.05; ***p<0.01
95% confidence intervals in parentheses based on twoway-clustered standard errors (tribe and CCE).

Table 8: Total Ruggedness Index

			Dependent Variable: Ruggedness		
	OLS	Weighted OLS	Full OLS	Full Weighted OLS	Tribe FE
	(1)	(2)	(3)	(4)	(5)
Historical (Intercept)	5.36***	10.71***	5.82***	10.78***	
	(4.52, 6.20)	(9.77, 11.65)	(4.98, 6.67)	(10.15, 11.41)	
Present-day Change	3.14***	−0.05	2.66***	−0.08	−0.25
	(1.78, 4.50)	(−0.55, 0.45)	(1.26, 4.07)	(−0.93, 0.76)	(−0.73, 0.24)
Obs	8,158	8,158	10,307	10,307	8,158

Note:
*p<0.1; **p<0.05; ***p<0.01
95% confidence intervals in parentheses based on twoway-clustered standard errors (tribe and CCE).

4.7   Soil Organic Carbon

The results in Table 9 provide mixed evidence that the percent organic carbon is greater in present-day lands compared to historical lands. Our primary OLS model indicates that present-day lands have 8.25 percentage points higher SOC content than historical lands. While the Full OLS model yields similar results in direction and magnitude, both Weighted OLS and Tribe FE models suggest that the magnitude of increase was relatively small and insignificant. The Full Weighted OLS model suggests that SOC levels are lower in the present day. We do not report these results in the manuscript because the measure of organic carbon is not durable over time (see notes in Data Description).

4.8   Oil and Gas Basins

We evaluate access to oil and gas based on the likelihood that a tribe's CCEs lie over subsurface oil and gas. Our main specification, OLS, in Table 10 (column 1) indicates that present-day lands are 11% [0.20, 0.01] less likely to have access to subsurface oil and gas than the baseline historical lands (60% [0.53, 0.66]). Estimating OLS with a binary dependent variable is known as a linear probability model (LPM). The LPM has two well-known shortcomings: 1) bias when the mass of the distribution lies outside of the unit interval, and 2) heteroskedasticity. Since we estimate all models with robust standard errors, we correct for heteroskedasticity. We estimate a logistic regression (column 5) to assess the robustness of the difference between present-day and historical lands. The results of the logistic regression indicate that present-day lands have less access to oil and gas supporting the results of our main specification.

Weighted OLS and Full Weighted OLS models show a significant increase in the likelihood for present-day lands to have access to oil and gas reserves. In contrast, the unweighted model results suggests that tribes with larger historical lands experienced reductions in oil and gas access. This result, again, highlights the variation across tribes in the dataset.

4.9   Oil Production

We compare annual oil production (measured in thousands of barrels) between historical and present-day lands, with model specifications providing some evidence that there is less oil production on present-day CCEs (Table 11). While our primary OLS specification shows a statistically insignificant reduction in oil production (123 thousand barrels), additional model specifications show significant reductions. When the full dataset is included, the average oil production of present-day CCEs falls by 334 thousand barrels per year, a 50% reduction from the average across the historical CCEs (783 thousand barrels).

4.10   Gas Production

Drawing on the U.S. Department of Agriculture's natural gas production data (measured in billion cubic feet), we compare gas production between historical and present-day lands. Our estimates indicate that gas production increased by 4.29 billion cubic feet per year in present-day CCEs up from 6.1 billion cubic feet on the historical CCEs (Table 12). However, these results do not seem to be robust across specifications. Additional model specification yield mixed results. The Weighted, Full Weighted OLS, and Tribe Fixed Effects models show insignificant changes in gas production between time periods.

4.11   Oil and Gas Wells

Utilizing U.S. Geological Survey data on well locations between 1859 - 2005, we evaluate differences in the total number of oil and gas wells between historical and present-day lands. Table 13 shows the results of the OLS model and indicates that present-day CCEs have 94.82 more wells than historical CCEs. We find additional evidence of this statistically significant and positive relationship in all other model specifications.

Table 9: Soil Organic Carbon

| | Dependent Variable: Soil Organic Carbon | | | | |
| | OLS | Weighted OLS | Full OLS | Full Weighted OLS | Tribe FE |
	(1)	(2)	(3)	(4)	(5)
Historical (Intercept)	34.92***	43.41***	35.85***	45.74***	
	(32.13, 37.70)	(41.76, 45.06)	(33.15, 38.54)	(44.58, 46.91)	
Present-day Change	8.25***	0.43	7.26***	−1.94***	1.77
	(4.75, 11.76)	(−0.80, 1.66)	(3.88, 10.64)	(−3.41, −0.48)	(−0.92, 4.46)
Obs	8,158	8,158	10,307	10,307	8,158

Note:

*p<0.1; **p<0.05; ***p<0.01
95% confidence intervals in parentheses based on twoway-clustered standard errors (tribe and CCE).

Table 10: Oil and Gas Access

	Dependent Variable: Presence of Subsurface Oil and Gas				
	OLS	Weighted OLS	Full OLS	Full Weighted OLS	Logit
	(1)	(2)	(3)	(4)	(5)
Historical (Intercept)	0.60***	0.35***	0.57***	0.30***	0.39***
	(0.53, 0.67)	(0.28, 0.41)	(0.51, 0.64)	(0.25, 0.36)	(0.12, 0.66)
Present-day Change	−0.11*	0.03*	−0.07	0.09***	−0.43**
	(−0.22, 0.005)	(−0.01, 0.07)	(−0.18, 0.04)	(0.04, 0.15)	(−0.80, −0.06)
Obs	7,307	7,307	8,733	8,733	7,307
Note:					

*p<0.1; **p<0.05; ***p<0.01
95% confidence intervals in parentheses based on twoway-clustered standard errors (tribe and CCE).

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Table 11: Oil Production

	Dependent Variable: Oil Production (thousands of barrels)				
	OLS	Weighted OLS	Full OLS	Full Weighted OLS	Tribe FE
	(1)	(2)	(3)	(4)	(5)
Historical (Intercept)	553.27***	687.49***	783.68**	2,137.20***	
	(214.70, 891.84)	(352.75, 1,022.24)	(4.63, 1,562.72)	(1,011.30, 3,263.10)	
Present-day Change	−123.10	−413.31**	−333.87	−1,804.29***	−259.55
	(−482.64, 236.43)	(−734.68, −91.94)	(−1,122.98, 455.23)	(−2,932.07, −676.51)	(−782.99, 263.90)
Obs	8,158	8,158	10,307	10,307	8,158
Note:					

*p<0.1; **p<0.05; ***p<0.01
95% confidence intervals in parentheses based on twoway-clustered standard errors (tribe and CCE).

Table 12: Gas Production

	Dependent Variable: Gas Production (billions cubic feet)				
	OLS	Weighted OLS	Full OLS	Full Weighted OLS	Tribe FE
	(1)	(2)	(3)	(4)	(5)
Historical (Intercept)	6.09***	8.27***	5.27***	6.60***	
	(3.49, 8.68)	(2.40, 14.15)	(3.08, 7.47)	(3.43, 9.77)	
Present-day Change	4.31	−0.58	5.25*	1.03	2.35
	(−1.50, 10.11)	(−4.23, 3.07)	(−0.49, 10.99)	(−2.14, 4.20)	(−2.39, 7.10)
Obs	8,158	8,158	10,307	10,307	8,158

Note:

*p<0.1; **p<0.05; ***p<0.01
95% confidence intervals in parentheses based on twoway-clustered standard errors (tribe and CCE).

Table 13: Oil and Gas Wells

			Dependent Variable: Count of Oil and Gas Wells		
	OLS	Weighted OLS	Full OLS	Full Weighted OLS	Tribe FE
	(1)	(2)	(3)	(4)	(5)
Historical (Intercept)	293.34***	238.11***	263.49***	192.42***	
	(223.79, 362.89)	(173.54, 302.67)	(203.64, 323.33)	(144.53, 240.32)	
Present-day Change	94.82*	59.83*	141.38***	118.73***	105.69***
	(−9.70, 199.34)	(−7.48, 127.14)	(35.65, 247.11)	(52.48, 184.99)	(28.08, 183.31)
Obs	7,307	7,307	8,733	8,733	7,307

Note: *p<0.1; **p<0.05; ***p<0.01
95% confidence intervals in parentheses based on twoway-clustered standard errors (tribe and CCE).

4.12   Federal Lands

Finally, we study the difference between proximity to federal lands during the historical and present-day periods. We estimate two types of models on the two datasets. The first model is a Zero-Inflated Beta model designed to analyze data bounded by 0 and 1. The zero-inflated version of the model accounts for the over abundance of zeros (Table 2). The results suggest that present-day lands are closer to federal lands compared to historical lands. The BEZI and Full BEZI coefficient estimates on Present-day Change is 0.51 and 0.52, which implies that the odds of being in proximity to federal lands in the present-day period are 1.65 higher than in the historial period. The OLS estimates suggest that the present-day CCEs are about 11% more likely to be near federal lands.

Table 14: Proximity to Federal Lands

| | Dependent Variable: Proximity to Federal Lands | | | |
	BEZI	Full BEZI	OLS	Full OLS
Historical (Intercept)	-1.54^{***}	-1.59^{***}	0.067^{***}	0.075^{***}
	$(-1.59; -1.49)$	$(-1.64; -1.55)$	$(0.051; 0.082)$	$(0.055; 0.094)$
Present-day Change	0.51^{***}	0.52^{***}	0.078^{***}	0.077^{***}
	$(0.39; 0.63)$	$(0.41; 0.63)$	$(0.045; 0.110)$	$(0.044; 0.110)$
Obs.	8165	10314	8165	10314

*p<0.1; **p<0.05; ***p<0.01

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