

The Eagle Ford and Bakken Shale Regions of the United States: A Comparative Case Study

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Abstract

The Eagle Ford and Bakken shale oil plays in the United States (US) have experienced dramatic production increases since 2010, with implications for their communities in Texas and North Dakota (and to a lesser extent, Montana). In both cases, production increased from insignificant or low levels to about a quarter of US production each over five years, largely due to prices and the availability of modern horizontal drilling and hydraulic fracturing techniques. This comparative case study of the Eagle Ford and Bakken regions focuses on the effects of these rapid changes on communities. Overall, this work finds that dynamics associated with strained infrastructure followed patterns similar to those seen in other modern US boom regions. Bakken participants perceived impacts as more severe than Eagle Ford participants, potentially due to greater isolation and limitations associated with extreme winter conditions. In both regions, anticipation of a bust affected behavior in a manner not commonly observed in regions where prior boom/bust cycles do not exist in living memory. Both Bakken and Eagle Ford participants described an idealized future where long-term shale-related prosperity could stabilize their communities, despite an understanding that this was an unlikely outcome.

Keywords: hydraulic fracturing; shale oil; place disruption; boomtowns; energy

1. Hydraulic fracturing and the US oil boom: the Eagle Ford and Bakken Shales

Production from low-permeability reservoirs like shales has dramatically altered the United States (US) oil and natural gas production landscape over the past decade. The technology to perform high-volume multistage hydraulic fracturing of horizontal wells (henceforth abbreviated “HF”) has enabled development of previously inaccessible fluid hydrocarbons. Since 2006, US natural gas production has risen by 40% (Energy Information Administration, 2018a), and US oil production has almost doubled (Energy Information Administration, 2018b). Largely due to production from shales, the US is now the world’s largest oil producer (Energy Information Administration, 2018c). US shale and other tight production now accounts for more than half of both oil and natural gas production (Energy Information Administration, 2018d, 2018c), which has prompted increasing attention to social, environmental, and economic impacts and changes in HF-affected regions.

Much of the growth in US oil production has come from rapid production increases from the Eagle Ford (Texas) and Bakken (North Dakota and Montana) shales. In both cases, shale oil production rose from insignificant levels to over one million barrels per day between 2010 and 2015 (Energy Information Administration, 2018c). Although the surrounding areas have experienced conventional oil production for decades, the shale development boom was sharp. Development of a new play is particularly intensive, involving industrial-scale construction of wells, roads, pipelines, processing facilities, and other infrastructure that was not previously in place. Although new development activity has slowed, with recent price-mediated dips (~2015-

2017) and then rebounds (2017-present) in production, each shale currently accounts for about 10% of US (and 1% of global) production (Energy Information Administration, 2018c).

Despite the dramatic changes associated with Bakken and Eagle Ford shale development, the influence of these changes on communities has received less academic attention than, for example, the Marcellus shale gas region (though see Adeoye, 2017; Anderson, 2014; Archbold et al., 2018; Braun, 2016; Fernando and Cooley, 2016a, 2016b; Junod et al., 2018; McGranahan et al., 2017; Murphy et al., 2018; Murphy, 2016; Pippert and Schneider, 2018; Potterf et al., 2014; Rahm et al., 2015; Theodori and Luloff, 2015; Uzunian et al., 2015). The recent experience of the Bakken and Eagle Ford shale regions is particularly useful for investigating modern booms in part because of the opportunity to compare booms of similar timing and scale, focusing broadly on subnational regions including many communities (Lobao, 2004). HF enabled production where it had not been possible before, and both regions “unlocked” at similar pace and scale when prices and technology supported production. Development in the two regions has followed broadly similar trends since 2010. They thus present an opportunity for a rare comparative cross-regional study.

This study adds to the modern boomtown literature with a subnational comparative case study of community experiences in the Bakken and Eagle Ford regions during the initial shale-driven 2010s boom. Qualitative data were collected during the recent production slowdown in both regions, with semistructured interviews conducted in 2015 (Bakken) and 2016 (Eagle Ford) and surveys fielded in spring and summer 2016 (both regions). Using the frames of social disruption, the sociology of expectations, and the sociotechnical imaginary, I use these qualitative data to address three main research questions: What happened? What will happen? and, What could have happened?

2. Modern boomtowns and theoretical framing

Much of the social science literature on resource extraction and community impacts focuses on the nature of boomtowns, often described as rural or semi-rural communities that experience rapid population growth in response to major new industrial development (Carrington and Pereira, 2011; England and Albrecht, 1984; Gilmore, 1976; Greider and Krannich, 1985; Jacquet and Kay, 2014; Murdock and Leistriz, 1979; Petkova et al., 2009; Stedman et al., 2012; Theodori, 2009). Gilmore’s classic boomtown model addresses an archetypal boom in the 1970s American West, with rapid, unmanaged growth associated with capital intensive, highly concentrated assets (e.g., mines) in extremely isolated communities (Gilmore, 1976). As others have argued (Jacquet and Kay, 2014), this “first wave” boomtown model of energy development requires modifications to reflect conditions in modern energy boomtowns.

Recent US research on boomtowns, sometimes called “second wave” boomtown literature (Jacquet and Kay, 2014), has been dominated by shale gas, and particularly by the Marcellus and neighboring shales (for a few examples, see e.g., Brasier et al., 2011; Burfoot-Rochford and Schafft, 2018; Crowe et al., 2015; Filteau, 2016, 2015a; Genareo and Filteau, 2016; McLaughlin et al., 2017; Perry, 2012; Sangaramoorthy et al., 2016; Schafft et al., 2017, 2014; Schafft and Biddle, 2015; Stedman et al., 2012; Theodori et al., 2014; Willits et al., 2016). Many of the classical findings about boomtowns still apply, notably related to strain on community services. Modern shale booms, however, exist in very different community and resource contexts than

1970s-era mining booms. (Note that oil shale development referenced in older boomtown research refers to mining kerogen-bearing rocks, while shale oil extraction uses wells to extract fluid crude oil.)

Some of the most relevant differences between modern shale booms and 1970s-era booms are the degree of community isolation and timelines of resource development (Jacquet and Kay, 2014). Shale resources often coincide with more densely populated areas, so modern boomtown communities are typically less isolated than Gilmore's Pistol Shot—described as 100 miles from a town with 10,000 people and 200 miles from a metropolitan area (Gilmore, 1976). Some shale gas plays, like the Barnett in Texas, have contributed to development in actively urban areas (Fry, 2013), though large cities with urban development are less likely to be characterized as boomtowns (e.g., Brasier et al., 2011). Further, the nature of rurality itself has changed, with increasing interdependence between rural and urban communities that might reduce feelings of isolation (Lichter and Brown, 2011). Also potentially contributing to lower isolation, changes due to both shale gas and shale oil development are typically regional rather than based in a single town in the way that a boom based on a single mine or plant might be. This dynamic emerges because shale development typically relies on many wells and other infrastructure in a large resource region, defined in part by the fixed nature of the hydrocarbon location that connects and shapes communities of extraction (Bunker, 1989). Proximity and shared discourses of development linking communities within “energy regions” can influence collective visions (Späth and Rohracher, 2010) and create “shared fortunes” (Lobao, 2004), even when the energy regions are not politically formalized. For US shale development, manifestations of this regional versus town-based model include hub and spoke dynamics (Murphy, 2016) and periphery/core dynamics (Junod et al., 2018).

Another difference from historical booms is that shale development booms are often more temporally concentrated. Labor requirements and construction activity tend to be high at the beginning of a well's lifetime, then low thereafter. One implication is that worker populations tend to be more itinerant in a shale context (e.g., Filteau, 2015b) than in a mine context, where ongoing production requires ongoing excavation (e.g., Rolston, 2014). Also, modern shale wells might take months to develop, versus years for mines or power plants. Ability to respond fairly quickly to changing conditions contributes to the emergence of a mini-boom/bust cycle (Jacquet and Kay, 2014).

I use three framings to investigate and compare experiences in the Eagle Ford and Bakken shale regions during the 2010s boom: social disruption, the sociology of expectations, and the sociotechnical imaginary. First, I use the concept of social disruption, focusing on decline in satisfaction with the community rather than on social ties (England and Albrecht, 1984) and on resident perceptions rather than numerical metrics (Theodori, 2009). The notion that social disruption is always severe, negative, and numerically measurable through e.g., crime statistics has been critiqued (Albrecht et al., 1982; Wilkinson et al., 1982). Recent boomtown literature has commonly drawn on the concept of social disruption to describe changes experienced by communities, however, including challenges associated with strain on housing, healthcare, education, and other services (Brasier et al., 2011; Measham et al., 2015; Ryser et al., 2016; Schafft et al., 2014; Weber et al., 2014); governance and trust (Mayer, 2018; Ryser et al., 2016); perceived changes in established social structures (Archbold et al., 2018; Fernando and Cooley,

2016b; Forsyth et al., 2007; Grubert and Skinner, 2017; Murphy et al., 2018); identity disruption (Fernando and Cooley, 2016a; Jacquet and Stedman, 2014; Junod et al., 2018); and gender-differentiated experiences (Filteau, 2016; Mchenry-Sorber et al., 2016; Measham et al., 2015; Pippert and Schneider, 2018; Willow and Keefer, 2015).

In evaluating how people reacted to the boom, I then draw on the “sociology of expectations” (Borup et al., 2006; Brown and Michael, 2003). Experience with an activity gives people a sense of what to expect the next time it happens, which alters attitudes and behaviors. Here, I use the concept to describe how residents’ previous experience with booms and busts changed their experience of the new boom. My data collection took place at the beginning of the slowdown, which makes participants’ recollections of what they thought would happen prior to the slowdown—a “retrospected prospect” (Brown and Michael, 2003)—especially interesting. I observe that the “repeat modest boom factor” (England and Albrecht, 1984) in the Eagle Ford and Bakken affected response to the boom. In particular, expectations helped to mobilize capital and activities (e.g., organizing) (Borup et al., 2006; Upham et al., 2015) in a way that differs from what has been observed in places without a history of booms and busts. Finally, I use the concept of the sociotechnical imaginary (Jasanoff and Kim, 2009; Smith and Tidwell, 2016) to describe how people collectively perceived the boom’s potential to provide a “good life” or idealized future.

3. Methods

This mixed methods comparative case study is part of a larger project investigating socioenvironmental attitudes in communities experiencing energy development (Drummond and Grubert, 2017; Grubert, 2017a; Grubert and Skinner, 2017). This work focuses on impacts and contexts experienced by residents of development regions, largely because new industrial activity brings major changes that are often felt most strongly at a local level. My decision to focus on individuals’ experience in several communities in specific resource regions is thus strategic (Flyvbjerg, 2006) in that I expect to find more evidence of impact at this scale. This approach is consistent with other social science research on energy (e.g., Benham, 2016; Boudet and Ortolano, 2010; Fernando and Cooley, 2016a; Haggerty et al., 2018; Jacquet, 2012; Kriesky et al., 2013; Larson and Krannich, 2016; Loe and Kelman, 2016; Olson-Hazboun et al., 2016; Theodori, 2012; Theodori and Luloff, 2015; Uzunian et al., 2015).

3.1 Interviews

Data were gathered in part through in-depth, semistructured interviews conducted in 2015 and 2016. In the Bakken region, eight interviews with 11 informants were conducted in early summer 2015. All Bakken interviews were conducted solely by the author, and all in North Dakota. In the Eagle Ford region, nine interviews with nine informants were conducted in summer 2016, all in Texas. Most Eagle Ford interviews were conducted jointly by the author and a research assistant. Interviews lasted between 30 minutes and 4 hours and were audio recorded with consent.

Participants were recruited using several approaches, including direct outreach to residents of the communities of interest; convenience sampling based on recommendations of acquaintances, colleagues, and other personal and university connections; and snowball sampling based on recommendations from interviewees. Recruiting participants with a multi-year history in the region (including participants who had since left the region) was a particular priority. Potential

participants were approached directly by telephone or email. Additional solicitations were made based on iterative evaluation of participant demographics and concept saturation. Despite effort, participation by men in the Bakken and by women in the Eagle Ford was difficult to secure, and younger people were difficult to recruit in the Eagle Ford. Also, Eagle Ford informants were more likely to have some professional interest (e.g., law or government work) in energy extraction. One potential informant withdrew consent to a formal interview because they were asked to speak as an individual rather than professional representative, and potential nonprofessional Eagle Ford participants were more likely to decline interviews. It is unclear whether such responses were related to researcher characteristics or other dynamics. In particular, my positionality as someone with family and professional ties in the liberal city of Austin, Texas might have contributed to informants' response to me in Texas more than in North Dakota.

Ultimately, 20 informants agreed to formally participate and are introduced pseudonymically in Table 1. Many additional conversations were conducted informally or off the record: although these conversations and observations from field experience contribute to my understanding of the areas, interview analysis includes only data from recorded and transcribed interviews for which formal consent was received.

Table 1. Informants interviewed in the Bakken and Eagle Ford shales. Names are pseudonyms, starting with “M” for Bakken informants and “D” for Eagle Ford informants to improve clarity. Pseudonyms were selected from popular US baby names from each informant’s approximate decade of birth (Social Security Administration data).

Bakken					
Pseudonym	Gender	Age	From area?	Still in area?	Sector
Madison	woman	20s	yes	yes	retail trade
Marcia	woman	60s	yes	yes	health care
Margaret	woman	60s	yes	yes	oil and gas and related services
Marissa	woman	20s	yes	yes	education
Mark	man	40s	yes	yes	retail trade
Mary	woman	50s	yes	yes	education
Matthew	man	20s	no	yes	oil and gas and related services
Megan	woman	20s	yes	no	education
Melissa	woman	30s	yes	yes	retail trade
Michelle	woman	50s	yes	yes	education
Morgan	woman	20s	yes	yes	oil and gas and related services
Eagle Ford					
Pseudonym	Gender	Age	From area?	Still in area?	Sector
Dale	man	60s	yes	yes	government
Danny	man	50s	yes	yes	government
Darryl	man	50s	no	yes	law
David	man	40s	no	yes	law
Dean	man	50s	yes	yes	law, agriculture
Denise	woman	70s	self no; family yes	yes	agriculture
Dennis	man	50s	yes	yes	government
Donna	woman	70s	no	no	consulting
Douglas	man	60s	yes	yes	law

Interviews followed a protocol with questions focused broadly on informants’ backgrounds, history with either the Eagle Ford or Bakken regions, attitudes toward and experience with oil development generally, and experience of the oil boom cycle that started around 2010.

Transcripts and notes were managed and coded using thematic coding techniques in NVivo 11.

3.2 Surveys

In addition to interviews, qualitative data from a mixed qualitative/quantitative survey instrument were analyzed for this work (quantitative data are part of a larger effort focused on patterns of socioenvironmental priority: see Grubert, 2017a). Questions are listed in Table 2, and text boxes were sized for about a sentence. The intent of these questions was to understand nonexpert perceptions of what makes a “good life” (Tidwell and Tidwell, 2018) and to contextualize other data collected about socioenvironmental priorities.

Table 2. Open-ended questions posed to survey respondents

Question code	Question/description text
Env_description	The <u>natural environment</u> refers to things that are not man-made, like the air, water, land, plants, and animals found in an area.
Env_good	What is the first <u>positive</u> thing that comes to mind, or your favorite thing if you have one, about the natural environment where you live?
Env_bad	What is the first <u>negative</u> thing that comes to mind, or your favorite thing if you have one, about the natural environment where you live?
Soc_description	Your <u>local community</u> refers to how you interact with other people in your area, like being part of a church or other organization or feeling safe in your neighborhood.
Soc_good	What is the first <u>positive</u> thing that comes to mind, or your favorite thing if you have one, about your local community?
Soc_bad	What is the first <u>negative</u> thing that comes to mind, or your favorite thing if you have one, about your local community?

The survey instrument, described in more detail in Grubert (2017b) and included in full in Grubert (2017c), was delivered by mail as a 12-page 5.5 by 8.5-inch booklet as part of a three-contact survey. Potential respondents had the option to complete the survey online, using a link provided in the post-questionnaire postcard. For zip codes with low English proficiency (<90% of population speaks English at least “very well”, according to ACS) and high Spanish language penetration, Spanish language materials were mailed, either alongside English language materials (for zip codes with Spanish language penetration <90%) or alone (for zip codes with Spanish language penetration $\geq 90\%$). The web survey was set to display in English or Spanish based on the respondent’s local settings, with the option to change language. No other languages were found to be dominant in target zip codes.

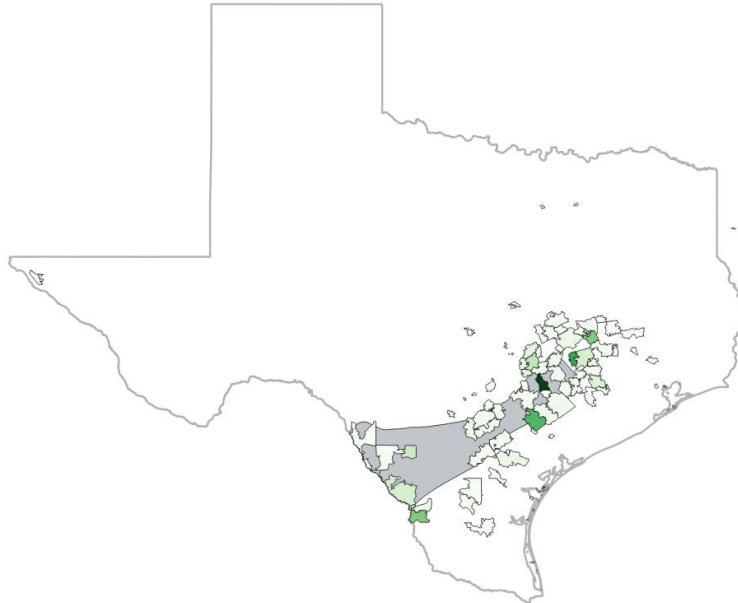
Surveys allowed for participation by people with more diverse histories and perspectives than was possible using interviews. Given the geographic frame and logistical constraints associated with the decision to use Every Door Direct Mail (EDDM)-style mailings to assure anonymity and prevent residents from feeling specifically targeted, entire postal routes were selected for sampling. Postal routes in the zip codes associated with each shale play (cataloged from <http://bakken shale.com/counties/> and <http://eagleford shale.com/counties/>) were manually harvested from the United States Postal Service (USPS) Every Door Direct Mail (EDDM) tool, including residential population, percentage of residents aged 25-44, and average household income. For the Bakken Shale in North Dakota and Montana, this was 288 postal routes covering over 70,000 people. For the Eagle Ford Shale in Texas, this was 774 postal routes covering over 410,000 people, reflecting both its greater size and higher population density.

Postal routes were selected using a modified randomized approach designed to maximize sample diversity, given a budget allowing for about 2,000 households per region. Zip codes were organized by population, and each resident was assigned a number. Random numbers were drawn from the total number of residents, and the lowest-population postal route associated with the selected resident’s zip code was chosen for a mailing. Note that this approach made it impossible for residents in high-population postal routes to be selected, so it is not a probability sample. Further, given an interest in diversity, several postal routes were discarded and re-drawn if they were demographically similar to one already in the study in favor of routes with unusually low or high incomes and unusually low or high Spanish-speaking populations. Given the fundamentally qualitative nature of the work, demographic diversity was a higher priority than

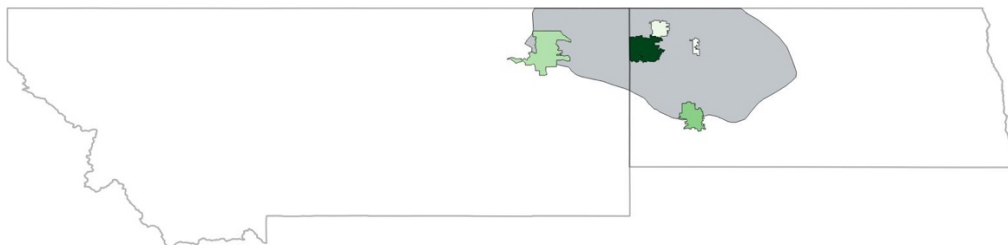
representativeness (see also Raman et al., 2015). Figure 1 shows respondent zip codes relative to the location of the Eagle Ford and Bakken shales. Note that respondents were asked for the zip code of the place where they currently live, so in some cases, respondent zip codes fall outside the shale regions where surveys were distributed.

Figure 1. Zip codes where respondents to surveys distributed in the Eagle Ford and Bakken regions live

1a. Eagle Ford response zip codes (shades of green) and the Eagle Ford play (gray) in Texas. Darker green = more responses; max responses from zip code = 26.



1b. Bakken response zip codes (shades of green) and the Bakken play (gray) in North Dakota and Montana. Darker green = more responses; max responses from zip code = 74.



In total, 1884 households in the Bakken region were contacted, including 205 within Montana's Fort Peck Indian Reservation. In the Eagle Ford region, 1957 households were contacted, including 695 in the Spanish-dominant community of Laredo. The overall response rate for the mail survey was 8% in the Bakken (154 responses) and 4% in the Eagle Ford (80 responses). The response rate to the English-language surveys in the Eagle Ford was much higher, at 4.9% versus 1.5% to Spanish-language surveys. Seven respondents chose to use the web link rather than the mailed questionnaire, out of 234 respondents to the mail survey from the two regions.

In addition, 139 Eagle Ford responses were elicited through Qualtrics, with the goal of reaching additional population segments. Based on demographic differences between mail respondents and Qualtrics respondents (Table 3), this effort appears to have been successful. Qualtrics respondents were more likely to be women, short-term residents, and young, and less likely to identify as environmentalists, than mail respondents. Much lower population density in the Bakken shale region did not allow for a similar Qualtrics elicitation. One of the disadvantages of

Qualtrics panel web surveys is that the response rate is unknown: Qualtrics is unwilling to disclose the number of contacts or sampling strategy it employs.

Table 3. Self-reported survey respondent demographics

	Bakken	Eagle Ford mail	Eagle Ford Qualtrics
Gender*			
man	41%	42%	29%
woman	59%	57%	71%
Race/ethnicity			
non-hispanic white	87%	78%	70%
Length of residence			
<1 year	1%	1%	9%
1-2 years	2%	8%	17%
3-5 years	5%	9%	12%
6-10 years	6%	13%	17%
11-20 years	10%	23%	26%
>20 years	73%	47%	20%
Age			
18-24	4%	3%	16%
25-34	5%	5%	21%
35-44	8%	5%	10%
45-54	13%	11%	13%
55-64	38%	23%	17%
>65	32%	52%	22%
Education			
<high school diploma	1%	5%	1%
>= bachelor's degree	53%	42%	36%
Occupation			
oil/gas affiliated	10%	11%	5%
agriculture affiliated	17%	14%	2%
government affiliated	11%	8%	5%
Political affiliation			
Republican or conservative	32%	42%	40%
Democrat or liberal	19%	19%	16%
Employment status			
employed	63%	47%	44%
retired	31%	41%	23%
student	1%	0%	10%

unemployed	1%	3%	4%
full-time homemaker	3%	5%	14%
other	1%	5%	4%
Other characteristics			
Identify as environmentalist	40%	51%	29%
1 = not at all; 5 = extremely			
Reported financial security	3.5	3.3	3.2
Reported health	3.8	3.6	3.7
Reported happiness	3.8	3.7	3.8

*This question was not binary, but no respondent in these regions self-characterized other than as a man or woman.

Qualitative responses were analyzed using both traditional open-ended coding techniques (organized in NVivo 11) and exploratory topic modeling (Blei, 2012; de Wildt et al., 2018; Grubert and Siders, 2016).

4. Results

Results are organized in three sections, focused on experiences during the boom, responses to the boom, and idealized conceptions of what the boom could have caused. Results are based on the interviews and surveys described in Section 3, noting that the two approaches used very different framing. Specifically, the interviews conducted for this study were explicitly focused on the shale oil boom, while the survey was framed around social and environmental priorities in the community. Survey responses are thus expected to reflect residents' overall experience in place and be less likely to have differentially attracted participants interested in discussing the energy boom.

4.1 What happened? Social disruption: “Can you please clean the spaghetti out of the shower?”

Qualitative interview- and survey-based assessments of “what happened” in the Bakken and Eagle Ford shale regions during the initial development boom and slowdown provide evidence for perceived social disruption. One of the most common themes in both regions was that rapid and large population expansion associated with oil worker communities were drivers of strain on infrastructure and community services, which in turn were associated with disruption to people's daily lives and low trust in governance structures. This finding is consistent with previous literature, both generally (England and Albrecht, 1984) and in the Bakken (Fernando and Cooley, 2016a; Junod et al., 2018) and Eagle Ford (Murphy et al., 2018; Theodori, 2018; Uzunian et al., 2015) specifically. This section focuses on the types of disruption experienced in the Bakken and Eagle Ford regions, and particularly on some of the apparent drivers of differences.

4.1.1 Infrastructural and community service strain

Participants from both regions noted population-associated strain on infrastructure like housing, roads, emergency services, healthcare, power, water, sewage, postal services, and leisure, with particular emphasis on housing and transportation problems, consistent with prior work (Fernando and Cooley, 2016b; Theodori, 2018). However, Bakken region participants described more severe impacts than Eagle Ford region participants. Although this finding might be related

to the relatively higher concentration of lifetime residents among Bakken participants (Table 1, Table 3), it is also potentially related to the different geographies of the two regions, weather and proximity to large cities in particular.

Survey respondents neatly summarized weather differences: wind and winter in the Bakken; humidity and heat in the Eagle Ford. Bakken winters are extreme in a way that Eagle Ford summers are not. Megan described a lifelong reluctance to let her car's fuel level fall below a quarter tank because of the potentially fatal consequences of running out of gas in the winter. These extreme winter conditions heavily constrain the Bakken's construction season and therefore infrastructural development. The relative isolation of the Bakken versus the Eagle Ford further exacerbates infrastructure limitations. The main hub city in the Bakken region is Williston, North Dakota, with a population of roughly 27,000 people in 2015 (up from less than 15,000 in 2010). The closest cities over 500,000 residents (Denver and the combined population of Minneapolis/St. Paul) are nine to ten hours away. By contrast, many Eagle Ford residents live in cities much smaller than Williston but within one to three hours of two cities with over one million people (San Antonio and Houston). This difference means that the Bakken's access to construction labor and ability to rely on nearby areas for overflow is lower, and material costs are higher, than in the Eagle Ford. The fact that oil-related businesses absorb much of the available labor and materials and are willing to pay more during boom times also aggravates this limitation, an issue noted in the resource curse literature as the Resource Movement Effect (Gilberthorpe and Papyrakis, 2015). Further, residents' ability to leave town for amenities is much lower in the Bakken, which might contribute to a greater feeling of overwhelm and stress associated with community changes. Eagle Ford participants referenced their ability to travel to nearby cities as coping strategies in ways that were not present in the Bakken.

In the Bakken, insufficient housing was characterized as a major social problem not just because of high rents, but because, as Marcia noted, "people can freeze to death here." Many in-migrants did not understand how serious the lack of housing and other services would be, leading to outcomes like vehicular residence or out-migration during the winter. Another issue was the spillover effect on businesses that housing-insecure workers turned to for services that would usually be obtained in a residence. For example, workers used gym memberships for access to running water and bathrooms. Melissa, who worked at a gym, recalls needing to ask one member "Can you please clean the spaghetti out of the shower?"

Despite acknowledging strain, participants were less concerned about housing insecurity in the Eagle Ford region, usually because workers were perceived as able to commute in to the region from their homes elsewhere. Housing supply discussions in the Eagle Ford focused more on short- to medium-term accommodations (e.g., hotels and RV parks; see also (Murphy et al., 2018) than on the medium- to long-term housing like mancamps and permanent housing discussed in the Bakken. Participants described high rents and difficult decisions about permits by cities trying to grow responsibly, but the housing stress was lower overall. As Douglas described, "a lot of them just drove in every day to work here from nearby areas like San Antonio."

As the boom began to subside, overdevelopment became a concern. Dean described hotels going bankrupt and oil companies abandoning lodging built for workers: "They just left the building

there and said, ‘Here’s the keys, bank. There you go. This is how you’re going to pay your, you know, my loan off.’” In the Bakken, concern about the slowdown focused on two stages. At first, Michelle pointed out that laid off workers who previously inhabited company housing might have only a few days to move out and find a place to live, confronted with rents of \$4,000 per month. Matthew expressed concerns similar to Dean’s, anticipating abandoned, empty buildings in a bust.

Traffic was another major theme in both regions, including both congestion and impacts of industrial traffic on roads. Comments about traffic increasing travel times and degrading road quality at high cost to the area were common in both regions. In the Bakken, several people also brought up danger associated with driving, including not having enough space to make left-hand turns on narrow, hilly roads with high speed limits. Both Mary and Marcia volunteered stories about themselves and immediate family members being in accidents they characterized as potentially fatal near-misses related to oilfield traffic. Michelle, a teacher, described a small child being hit in a busy intersection because stop signs had been removed in order to increase the pace of traffic: his severe injuries contributed to a decision to control the intersection again. As with housing, limited infrastructural improvements and especially dangerous winter conditions for Bakken roads are aggravated by remoteness and weather. Traffic safety did not come up specifically in the Eagle Ford interviews, though other research (and personal experience in the field) indicates it is a problem (Theodori and Luloff, 2015). Although he focused on the challenges associated with congestion and road damage, Douglas even characterized congestion as partly positive in that it promoted business for local establishments.

Other place-based services and amenities that require new construction and/or local workers, like daycare and health care, were also characterized as more severely strained in the Bakken—often with disproportionate impacts on women and elderly residents who rely on those services. More generally, demand for goods and services outpaced supply during the Bakken boom, leading to residents’ needing to change their routines to account for issues like long lines at understocked grocery stores. Access to personal safety also changed. Both women and men expressed concern about being drugged at local bars. Multiple women noted safety-related behavioral changes like wearing fake wedding rings, not going out after a certain time, or beginning to carry a gun. Although these infrastructure-related concerns were not characterized as so severe by Eagle Ford participants in this study, survey participants in particular noted crowding issues and fear that “city people” were changing their communities for the worse.

4.1.2 Governance

In part due to experience with strained infrastructure, many informants also expressed a lack of trust that governance was robust enough to manage the boom. Participants in both the Bakken and Eagle Ford were concerned that communities’ taxes were being redirected out of the region despite serious need for tax-supported infrastructure like roads, schools, and healthcare. Eagle Ford participants also described the challenges of city planning when taxes are highly variable from year to year, and Bakken participants described displacement of elderly and other pre-boom residents related to property taxes.

Participants in both regions believed that regulators were more interested in serving industry than the public. David described the Texas regulator as “sophisticated,” with “a very clear mission to

serve the industry...these engineers who work for the state are masterful at helping the company get around, you know, the hard stuff.” By contrast, Megan described the North Dakota regulator’s website thus: “Someone straight up could have made it in 1996 using Angelfire...we are so far out of our league.” Multiple Eagle Ford informants had personal stories about experiences with a competent, pro-industry Texas regulator. Denise described the regulatory process for an HF waste disposal site near her home as “pretty sad because I honestly believe that they were very calculated in how they did a lot of tests...to make it come out the way they wanted it to come out.” Darryl, a lawyer, recounted the story of an environmental nuisance lawsuit he lost: “Turns out the trial judge had three oil leases herself, with the oil company that I had sued.” Dean, also a lawyer, explained: “[the regulator’s] client, to a large extent, are the service providers and the oil and gas industry in general....and the only time that we win generally is when it’s embarrassing for us not to win.” Notably, Darryl and Dean both explicitly described themselves as pro-oil development, with an interest in having development done right.

Some North Dakotan Bakken residents described similarly pro-industry conditions more negatively, particularly in contrast with conditions in Montana and Colorado that they perceived as being more protective of residents and the environment. Mary characterized the North Dakota regulator as “corrupt” and motivated by the state’s financial interest in development. Morgan described the state regulator as ineffective in detecting corporate noncompliance, recounting stories of oil spills disguised by dirt and the cooperation of corporate “‘Safety Bob,’ who is paid to just keep an appearance that they are regulating things.” From an industry perspective, Margaret described her interaction with regulators in North Dakota positively, noting the supportive relationship with her company and the diligence of the regulators, who she described as ably meeting the rapid increase in demand for inspectors and permits.

Overall, informants in both regions overwhelmingly acknowledged financial benefits both to individuals and to local governments. Particularly once the slowdown began, it became increasingly clear that many people understand the financial benefits as direct compensation for social disruption and environmental harm, and the balance is precarious. As Darryl described,

“As production goes down...people are getting more annoyed. Because now the royalty checks aren’t as big as they used to be and you know what, it stinks like crazy. Like, ‘I’ve always got headaches, my wife gets nauseous, or you know, my kid’s nose bleeds. It never used to bleed before’...But as long as the checks remain at a place where it’s something they still see as significant, they’re not going to say much.”

Many echoed Michelle’s sentiments: after describing the financial benefits that had accrued to her family and community, she commented that “I guess I just wish the boom wasn’t so boom.”

4.1.3 The Bakken and the Eagle Ford

How different were Bakken and Eagle Ford experiences of the boom? Survey data are particularly useful here, given the more diverse population of participants. Further, as the surveys were focused on life in the community as opposed to the boom, the difference between emergent comments on the boom itself are instructive. Most notably, Bakken survey respondents explicitly referenced oilfield development far more often, usually negatively. In response to the question about social negatives, Bakken survey respondents reflected some of what I heard during

interviews about explicitly boom-related issues: negative media attention, strain on services, persistently high costs even after the oil price declined, trash, crime, environmental damage (especially to land and water), and bright flares interrupting dark nights. One respondent even mentioned strain from the boom to describe what they like about the community, noting that people in the region were working very hard to avoid letting the community feel like a boomtown. Eagle Ford survey respondents were much less explicit about boom-related social disruption, although many described challenges associated with crowding and traffic disrupting the quiet and small-town feel they liked about their communities. Descriptions of environmental negatives followed a similar trend, though more Eagle Ford respondents specifically commented on the boom in an environmental context. Still, Bakken respondents were much more explicit about connections between harms and the boom, in addition to being more specific about what the problems were. Eagle Ford respondents wrote of oil-related pollution somewhat generally, while Bakken respondents used stronger and more specific language to describe oil-related pollution, poor land use planning, trash, and flaring. For context, more than a quarter of Bakken survey respondents explicitly brought up negative oil and/or HF impacts unprompted, compared with about 5% of Eagle Ford respondents. Interpretive caution is advised given that there was no specific question about oil development and the survey is not statistically generalizable.

Both surveys and interviews suggest that Bakken residents perceived the boom as more disruptive than Eagle Ford residents. There are several possible explanations. Growth in the Bakken was more significant to western North Dakota and eastern Montana than parallel growth in the Eagle Ford was to Texas (Energy Information Administration, 2018c). Also, urban proximity matters. Residents in the Eagle Ford have access to different opportunities than residents in the Bakken because of their proximity to large cities. The opportunity to leave the oilfield and belief that the community is less dependent on the oil industry likely affects perception of the severity of boom-related social disruption.

4.2 What will happen? Influence of expectations: “You have to be ready for it always.”

Bakken and Eagle Ford residents frequently referenced prior experience with oil boom/bust cycles when describing their experience of the 2010s boom. In the Bakken, multiple people referenced the 50s, 70s, and 80s booms. In the Eagle Ford, the booms were characterized as so numerous as to blend together: Dennis referred to people having “gone through this experience so many times before, and they’ve seen what a bust can do.” Although prior extractive industrial histories are sometimes referenced as context when new development begins (e.g., [Carter et al., 2011](#); [Gilmore, 1976](#); [Grubert and Skinner, 2017](#)), modern boomtown literature has limited discussion of the influence of prior boom/bust cycles in living memory (though see, e.g., [Fleming and Measham, 2015](#)). This section draws upon the concept of the “sociology of expectations” ([Borup et al., 2006](#); [Brown and Michael, 2003](#)) to discuss how people’s expectations of what the future would hold, based on prior experience, influenced behavior.

This work suggests past experience with oil development created expectations that led people and communities of the Bakken and Eagle Ford regions to proactively address expected boom- (and bust-) related outcomes. As Dale described: “This area has been developed since the 1920s...communities have seen it before and know what to expect.” The severity of boom-related “social and institutional changes of rapid and unanticipated development” ([Burfoot-Rochford and Schafft, 2018](#)) perhaps was moderated in the Bakken and Eagle Ford because the boom was

not fully unanticipated. That is, despite being unanticipated in *specific*—that is, the timing was not known in advance—the booms in the Bakken and Eagle Ford were not unanticipated in *general*. Although the shale oil boom was qualitatively different from previous booms (some called it the “big boom”), people in both the Eagle Ford and Bakken shales spoke of booms and busts as events that people understood could happen any time. As Matthew said, “You have to be ready for it always.”

Two particular observations about the influence of expectations on people’s reactions and attitudes in the Bakken and Eagle Ford shales stand out: the degree to which communities proactively sought help, and the degree to which anticipating a bust shaped behavior. Particularly in the Eagle Ford, with its collection of clustered, small communities, people described reaching out to experienced groups or others in similar positions to collaborate. As Donna, who is not from the area but works with communities across resource development regions, noted: “the issue is not being surprised—it’s the impact.” Outreach occurred on individual through local governmental levels, with neighborhood workshops, community forums, and government-industry meetings being organized with the intent of sharing information. Such organizing was not as evident in the Bakken, though people clearly contextualized their experiences relative to other communities undergoing development. In both regions, people were aware that parallel development was occurring in the other.

One important caveat is that more Eagle Ford participants had some public role in their communities and might have been better positioned to personally observe community outreach efforts. Further, the Eagle Ford comprises many more communities than the Bakken. Megan suggested another potential explanation: prior Bakken experience with development had not led people to expect the full range of outcomes they experienced with the “big boom.” Although both the Eagle Ford and the Bakken had decades of experience with oil development, Texas has been a larger and longer-term producer such that communities might have expected a broader range of possible outcomes.

A second, related aspect of the influence of expectations is that it was widely understood that a bust would come. This extended to the community-scale collaboration discussed above: Dennis described people being interested in collaborating in part because of their shared understanding that they needed to prepare for a bust. Many informants spoke of the boom with a clear assumption that the financial benefits, at least, would be relatively short term. Marcia summarized:

“I’ve seen the booms, up and down, several...But this one they say, ‘This is’—this is always the story though, ‘No, this one is different. It’s going to last for a long time...I’m like, ‘Well, we’ll see. We’ll see,’ because I’ve seen it before.”

I note that the interviews I conducted were in 2015 and 2016, when the slowdown was becoming apparent: by that point, people’s recall of their expectations (the “retrospected prospect,” (Brown and Michael, 2003) might have overstated their confidence in the inevitability of the bust. Descriptions of actions they or their neighbors had taken in the past, however, corroborate claims that people expected a bust. In both regions, people recalled the challenges with planning given the assumption that much of the new population would leave. Particularly in the Eagle Ford,

informants told stories of neighbors who were using royalties as a way to secure the future for their non-oil way of life, particularly related to agriculture. Investments in fences, tractors, stump clearing, and other practical tools were apparently common. As Denise summarized:

“A lot of people out here I don’t think are changed by the money other than perhaps making their lives a little easier...If you want ‘flashy,’ what you’ll see is they’ll get a tractor that has an air conditioned cab... ‘I would have always liked to not have to sweat while I’m out there cutting the hay.’”

In the Bakken, people talked about paying school loans or helping out their kids. Even itinerant workers were described as taking advantage of a short-term condition. Marcia explains: “they’re trying to save their home in Michigan or Wisconsin or whatever other state.”

This emphasis on boom-related money as a windfall rather than permanent condition contrasts with literature on first boom communities like those in the Marcellus. Malin quotes Marcellus farmers expecting long-term income (though she notes that neoliberal frames can mask the reality of boom-bust cycles): “It’s like, three months noise, thirty years royalties—it’s a no-brainer!” and “[The natural gas companies] came with a 100 year plan...So they’re going to be here long term. Things will settle down, and we’ll settle into a new normal” (Malin, 2013). Marcellus residents often also express expectations of long-term damage (e.g., Eaton and Kinchy, 2016; Sangaramoorthy et al., 2016), though ongoing production is not required for damage to be long-term. The term ‘shaleionaire’—referring to someone who has become suddenly, ostentatiously wealthy as a result of shale money—is almost exclusively applied to people in the Marcellus (Guignard and Killingsworth, 2015; Schafft et al., 2013), despite windfalls of similar scale in other areas. Schafft et al. quote a participant noticing their neighbors investing in gas-related capital: “they could really be stuck if this is kind of a transient thing” (Schafft et al., 2014). Although clearly not all Marcellus residents expected permanent production, and expectations of a coming bust in the Eagle Ford and Bakken might be offset by expectations of a coming boom in bust times, the influence of expectations on reactions is notable.

4.3 What could have happened? The sociotechnical imaginary of the boom: “It was part of our history and never part of our future”

Many informants also described—sometimes wistfully—an alternative future wherein the boom lived up to hopes of longevity rather than history-based expectations of busts. This section uses the concept of the sociotechnical imaginary, or vision of an ideal social life (Jasanoff and Kim, 2009; Smith and Tidwell, 2016; Tidwell and Tidwell, 2018), to frame findings on what residents hoped the boom could accomplish, and how residents talked about the “good life” that the boom might be able to bring.

The sociotechnical imaginaries expressed in both the Bakken and the Eagle Ford centered on community revitalization, largely through the creation of long-term opportunities for younger workers. As Morgan said, before this boom, “[oil] was part of our history and never part of our future”—but maybe things had changed. Participants often included hypotheticals for why this boom could be different before describing the “good life” that could result. Margaret described the development to date as potentially only 25% of an opportunity that generated 25-30 year

stability. Danny suggested that perhaps jobs were “veering away from exploration jobs right now, into sustainable jobs on the production side.” Such anticipation of an ambiguously better future condition that encourages personal and other investment in the energy industry recalls a long history of “addictive” expectations related to energy extraction (Freudenburg, 1992).

What could long-term, sustainable production from the shales mean for the Bakken and Eagle Ford? People in both regions expressed hope that shale-related prosperity could increase opportunities in the area, particularly given a pattern of outmigration by younger people—Megan and many of the friends and children of other informants included. Perhaps the boom could be substantial and stable enough to keep existing residents (and particularly children) in the area. As Douglas described:

“The hope I think is...that the influx of money and interest in industry and creation of new jobs in the county could lead to increased opportunity for the youth who grow up in the county and would lead them to stay in the county, you know?”

People also described a future where new people would settle and contribute to the community. Even as they described a desire not to overinvest in housing for workers who would not stay, several people imagined a future of sustained prosperity with larger, stable populations. Consistent with Fernando and Cooley’s findings, Bakken residents in particular were excited about the prospect of having new community members with greater ethnic and experiential diversity (Fernando and Cooley, 2016a). As Madison described,

“It’s really easy to look back on [small town life] and miss it. But I will say this. It’s like, holy cow, we’re so blessed. I’m so blessed to have met some of the most amazing people that there’s no way I would have met before.”

Upon being asked if she thought newcomers would stay, she continued, revealing her idea of a “good life” in contrast with her experience-based expectation:

“No. I think that’s why there was kind of a rift between the locals and then the newcomers....Like, I think the locals felt sad in a sense because we didn’t want to make people feel unwelcome. But also unfortunately...we’ve lived through this [pattern of departure after previous oil booms].”

Survey respondents described their communities’ social and environmental settings (Table 2) in ways that further frame the sociotechnical imaginary. Respondents in both regions appreciated friendliness; the availability of help; safety; church and other communities; the small town feel of the areas; access to wide open spaces; low population density; and a clean environment relative to other places. Eagle Ford responses also noted the strength of community and existing familial and cultural connections, and Bakken responses praised residents’ work ethic. Notably, many of the negative issues people reported were things that interview participants felt that oil development could improve through population and tax revenue increases. Long-term issues mentioned in both communities include racism; close-mindedness; towns being too small; outmigration and a lack of opportunity for youth; and a lack of access to services and amenities.

In the Eagle Ford, respondents also described poor schools; in the Bakken, respondents noted the aging population.

In summary, many people described their communities as being too small to thrive, while also not wanting the close-knit, non-urban character to change. Survey respondents characterized the influx of new people as a potential problem primarily because they did not expect newcomers to respect existing ways of life (in the Eagle Ford) or work to improve the community (in the Bakken), not simply because they were new people. Having newcomers stay in town is an imaginary rather than an expectation in part for this reason—people did not really expect compatible newcomers to come and stay. This expectation might be one reason why people in both regions focused on the potential to bring back what Danny referred to as “locally raised young adults,” people who would be amenable to preserving rather than changing the community. The “collectively imagined social life” (Jasanoff and Kim, 2009) revealed by surveys and interviews focuses on long-term stability and the end to the threat of community disappearance, both physically and culturally—a long-held goal in rural and semi-rural energy impacted communities (Murdock and Leistritz, 1979).

5. Conclusion

The Bakken and Eagle Ford shales, which have become major oil producers, were sites of social disruption during their recent simultaneous development booms. Based on qualitative research performed at the beginning of a slowdown (2015-2016), boom impacts on communities in these regions were consistent with much of what has been reported elsewhere. In comparing these two regions with each other and investigating literature on other HF-mediated hydrocarbon producing areas, three major conclusions emerge. First, a place’s degree of isolation remains relevant in modern boomtowns. The more geographically isolated (and weather-restricted) Bakken apparently experienced more disruption associated with the boom, largely because of limited access to major construction inputs like time, materials, and people and because of an inability to rely on services in nearby metropolitan areas during major times of strain. By contrast, the more populated and more urban-proximate Eagle Ford experienced locally significant stresses, but the overall impact did not seem to be as severe as in the Bakken. Second, lived experience with prior extractive development mediates residents’ and communities’ responses to boomtown dynamics, potentially leading to greater stability. This research suggests that communities in the Eagle Ford, located in a state (Texas) with a long-term and persistent history of oil development, were particularly proactive in seeking expertise and attempting to stay ahead of boomtown dynamics. Both Eagle Ford and Bakken participants described individual responses to the boom as bust-conscious in a way that has not been as clearly visible in, e.g., the Marcellus region. Third, participants in both the Bakken and the Eagle Ford regions expressed an idealized vision, though not expectation, of long-term stability and prosperity in their communities, focused on sustainable populations both of generational residents and like-minded newcomers.

In considering how future research might be informed by the experience of the Bakken and Eagle Ford during this 2010s boom cycle, I return to Jacquet and Kay’s conceptualization of the mini-boom and mini-bust cycle of modern resource development, contrasting with the older conceptualization of the one time boom/bust event (Jacquet and Kay, 2014). The Eagle Ford and Bakken are likely to follow this pattern of mini-booms and mini-busts, as evidenced so far by the

slowdown and ramp-up of 2015 to present. As described in this work, however, even though the “big boom” that ramped up between about 2008 and 2010 was one of many booms that each region has experienced over the decades, it created significant disruption to a degree that seems mischaracterized by the idea of a mini-boom (although the “slowdown” appears well characterized as a mini-bust). The scale and community implications of such an initial-development boom are fundamentally different from those of the fluctuations associated with ramping up and down over the full lifetime of the shale resource. Although residents of the Bakken and Eagle Ford shale regions described how their experience of past (smaller) booms affected their plans and responses to the “big boom,” they were not fully, nor uniformly, prepared for the social disruption or slowdown that followed. Many residents acted upon their expectation that the boom conditions would not last, which was likely informed by their prior experience. Others, however, created and described sociotechnical imaginaries of a better future of community revitalization and sustainability enabled by this “different” boom.

Taken together, these observations suggest the potentially obvious point that even in the same place, community experiences of booms are dependent on scale and pace. Future work might productively address how behaviors associated with ramping in shale gas regions change now that one “big boom” has occurred, whether those changes are related to individuals’ experience with the prior boom, and whether similar patterns play out in development and redevelopment of renewable electricity generating sites that share characteristics like modularity with HF development. Another potential area of interest is whether communities with “big booms” followed by mini-boom/mini-busts expect future “big busts.” In Freudenburg’s language of the “addictive economy” (Freudenburg, 1992) does the mini-boom/mini-bust cycle substantially change the dynamic of addiction and withdrawal in resource-producing communities? For example, if the “big boom” is followed by a series of mini-boom/mini-bust cycles where the size of the mini-busts generally exceed the size of the mini-booms, communities might experience more gradual declines that could soften the withdrawal, or they might commit more deeply to the resource economy given expectations of future highs. As Freudenburg notes, intermittent shutdowns can prompt workers to remain committed to an industry without long-term prospects (Freudenburg, 1992). Boom and bust cycles strain community resources, but understanding and anticipating common patterns observed in resource development communities can potentially mitigate impacts.

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