

LAND CONVERSION

Analyzing the potential of diverting an energy bust

Preston Linck

THE HISTORY OF AGRICULTURAL LAND CONVERSION

For better or worse, land conversion is inevitable. Whether induced by human or natural processes, land evolves. This often leads to the land altering in shape, function, and productivity. The discovery of Marcellus Shale in Pennsylvania and its lucrative nature has led to unprecedented natural gas drilling activity. 141 trillion cubic feet of methane, enough to sustain the United States energy demand for up to six years, lies below the majority of the Pennsylvania landscape (Penn State Extension 2012). As a result, land and mineral rights have been leased expeditiously within the last five years to the highest bidding drilling company. In return, land conversion is occurring at accelerated rates. When designed and applied appropriately, land conversion can produce positive outcomes, serving as a powerful tool for diversifying the future of impacted regions.

Rural communities are often viewed as utopian places of abundance and harmony, romanticized for their natural beauty and the small town, hardworking lifestyle of farmers and coal miners. This rural ideal has become a resilient symbol despite the persistent and hardscrabble realities (DeFilippis 2012). While this most recent natural gas boom is a relatively new practice, the extraction of resources in rural Pennsylvania is not unprecedented. Historically, rural communities have been exploited on a variety of levels. Foremost for their coal, which has served as the principal industry for many communities for over a hundred years. Coal mining has consistently been followed by oil and timber extraction, equally altering the landscape's form and state for the future. In addition, many of these rural Pennsylvanian towns served as hubs within the manufacturing belt during the industrial revolution, inevitably the manufacturing demand left these communities to lie amongst the rust belt. Despite the fickleness of resource extraction and manufacturing industries, farming and the production of agriculture has maintained a resilient position culturally and economically within many rural areas, serving as a backbone helping to maintain competitive advantages.

The first highway built in Sullivan County was the Genesee Road, in 1800, from Muncy to Wolf Run, Huntersville, Highland Lake, down Ogdonia Creek to the Loyalsock, up that stream to Elk Creek, Lincoln Falls, over the ridge to Kings Creek, thence eastward over Burnetts Ridge and down Shrader Branch and Towanda Creek connecting with other roads to the Tioga River and thence into New York State. Early road builders tried to follow the shortest route, without regard for steep grades. The Susquehanna and Tioga Turnpike, "by the best and nearest route" from Berwick to the state line nearest Newtown (Elmira) was built from Berwick by way of the Long Pond to the Loyalsock a mile below Ringdale in 1809 and extended to the county line in 1810. Other roads were built as the population grew and settlements sprung up.

The State Line and Sullivan Railroad was completed from Monroeton to Bernice in 1871, after four years of work. Arrangements had been made to use the Barclay tracks from Monroeton to Towanda, and the railroad provided an outlet for the coal from the Bernice mines, then being opened up. In 1886 the Lehigh Valley, which had leased the railroad, extended the line from Bernice to Lopez and later to Harveys Lake. The Williamsport and North Branch Railroad, chartered as the Muncy Creek Railroad, was built from Halls to three miles beyond Hughesville in 1866-67, and by 1885 had reached six miles into Sullivan County, with the eastern terminus at Sonestown. In 1888 the road was completed to Nordmont, and extended to Satterfield in 1893, connecting there with the Lehigh Valley. This provided railroad facilities for Laporte, the objective of Michael Meylert when he had organized the first company twenty-seven years before. The Eagles Mere Railroad, narrow gauge, was built from Sonestown to Eagles Mere in 1892, and later extended around the lake.

When Sullivan County was organized in 1847 it consisted of Shrewsbury, Elkland, Cherry, Davidson, Forks, Fox and Plunketts Creek (now Hills Grove) Townships. Plunketts Creek Township, part of one of the same name in Lycoming County, continued to be so called until 1856, when the Court changed the name to Hills Grove. Colley Township was organized in 1849 and Laporte Township in 1850. Of the four boroughs in Sullivan County, Laporte was incorporated in 1853, Dushore in 1859, Forksville in 1880 and Eagles Mere in 1899. Sullivan County has an area of 458 square miles, being the fiftieth in the state in area. Its population in 1930 was 7,499, sixty-fourth in the state. Laporte, with a population of 163, is the smallest county seat town in Pennsylvania. Its court house stands the high-

est above sea level of any in the Commonwealth. There were 3,816 registered voters in the county in 1930.

Coal mining is the principal industry of Sullivan County today, with agriculture and dairying a close second. The coal mined in the county is a high grade anthracite, free burning, high in heat units, and of lasting quality. Because it is dull in appearance, it is not regarded as highly in Pennsylvania as the shiny coal, but is preferred in the markets of Northern New York, New England and Canada.

Along the Loyalsock and some of the other streams there are farms that have been brought to a high state of cultivation, producing excellent crops in record quantity. The eastern end of the county is a shale soil, also fine for farming. Most of the farmers have large dairies of purebred cows, ready market for the milk being found at the plant of Harrington and Company in Dushore. County Commissioner Frank V. Royce this year established a record of 1,605 bushels of Russet seed potatoes on a three-acre field, through the scientific use of sprays, and also cut four tons of hay to an acre, grown through the generous application of nitrate of soda. His purebred Holstein herd has had a yearly average of 11,200 pounds of milk and 361 pounds of butter fat. Throughout the county farming and dairying are conducted along modern, scientific lines, with generally satisfactory results.

Sullivan County together with Wyoming form the Forty-fourth Judicial District, of which the Hon. Charles E. Terry, of Tunkhannock, is president judge. Floye A. Davis, of Sonestown, and Albert L. Dyer, of Lopez, are the associate judges. Mrs. Davis gives an added distinction to Sullivan County in that she is the only woman in Pennsylvania to have been elected and sworn in as associate judge. Other county officials are: Edward Meehan, sheriff; J. H. Thayer, prothonotary, register and recorder, and clerk of the several courts; Francis W. Meylert, treasurer; Frank V. Royce, Herbert L. Molyneaux and Francis T. McMahon, county commissioners and poor directors; Albert F. Heess, district attorney; Thomas J. Cavanaugh and Charles S. Kilmer, jury commissioners; Martin B. Obert, J. Rovilo Mulnix and Joseph C. Lusch, auditors. Mr. Meylert is also county solicitor. Regular terms of court in Sullivan County are convened in April, June, September and November. Sullivan County is a part of the Fifteenth Congressional District, represented in Congress by Louis T. McFadden, of Canton, Bradford County. Charles W. Soncs, of Williamsport, is the state senator from the Twenty-fourth District, comprising Sullivan, Lycoming, Columbia and Montour Counties.

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Bruin Takes a Stroll
Landing a Speckled Beauty

Game Protector Robert Latimer
Ogdonia Hunting Club

Big Game Pientiful
Rare Albino Deer

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While Marcellus extraction practices may be new, the procedure of extracting and exploiting resources from rural Pennsylvania communities is not a new phenomenon. Extracting resources of coal, timber, and oil has been reoccurring in a repetitive fashion since the beginning of the 19th century, repurposing and converting both agricultural lands and woodlands. The question to ask is at what cost are these land conversions occurring?

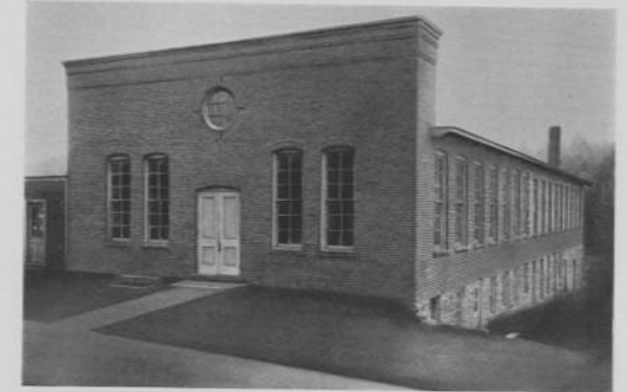
Sullivan County is the home of approximately 6,500 people, nearly half of what it was at the turn of the 19th century. Median income rests at roughly \$36,000, more than \$14,000 below the state average. (Sullivan County QuickFacts). While the land boom from the Marcellus Shale is a godsend for many people who have been scraping by economically for decades (McGraw 2011, 141), a sense of inevitability for landscape and economic degradation has stricken many communities. Like many other historical Pennsylvania counties, Sullivan County is familiar with these energy booms and the associated promises that come along with influxes of money, new businesses, and people. Natural gas companies are more fickle than ever; their invasions and contributions last only as long as the gas and potential revenue. For an economy that has been dependent upon tourism, agriculture, and recreation, the development of natural gas in the region has the potential to dramatically alter existing economic drivers within the community. When these gas companies decide to leave, whether it is 50 or 100 years from now, they will once again leave a trail of their work within the landscape. When the wells run dry, the level of dependency on the gas companies will be tested, and more often than not, communities will realize they have been set up for failure. Many communities do not have a plan to fall back on, eventually leading to loss of social capital and a decrease in quality of life. Despite the reliance the rest of the state and country has on rural Pennsylvania towns for goods and energy, rural areas continue to have higher poverty and unemployment levels while having lower level of educational attainment and wages (DeFilippis 2012). Again, at what cost are these extractions occurring, and is a trade of financial capital a fair exchange for their

SULLIVAN SILK COMPANY

The Sullivan Silk Company at Dushore is the largest employer of female labor in the borough, fifty of the seventy employees being women and girls. This silk mill has been in operation for about thirty years, and was reopened last February after being shut down for a year and a half. Officers of the company are M. J. Harrington, president, and A. R. Meehan, secretary-treasurer. S. R. Merkle is superintendent of the mill.

The Sullivan Silk Company operates seventy looms, weaving broad silk. Output of the mill includes dress silks and satins and linings, all of a high grade. All have a pure silk face; the backs of some are spun silk and others cotton. Considerable of the product is manufactured on special orders, a nationally-known hat company using a large part of the lining silk output in the making of its hats.

At the present time the mill is operating two forty-hour shifts a week. Mr. Merkle, the superintendent, has been with the plant for twenty-four years, and at one time was the owner of the mill. Sullivan Silk is recognized as an important factor in the payroll of Dushore.



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Employees of the Sullivan Silk Company, Dushore, Pa. (From the collection of the Sullivan County Historical Society)



Loyalsock Creek Near Hills Grove
Lincoln Falls and Gorge

Dutchman's Falls Near Ringdale
Whirl's End and Bridge

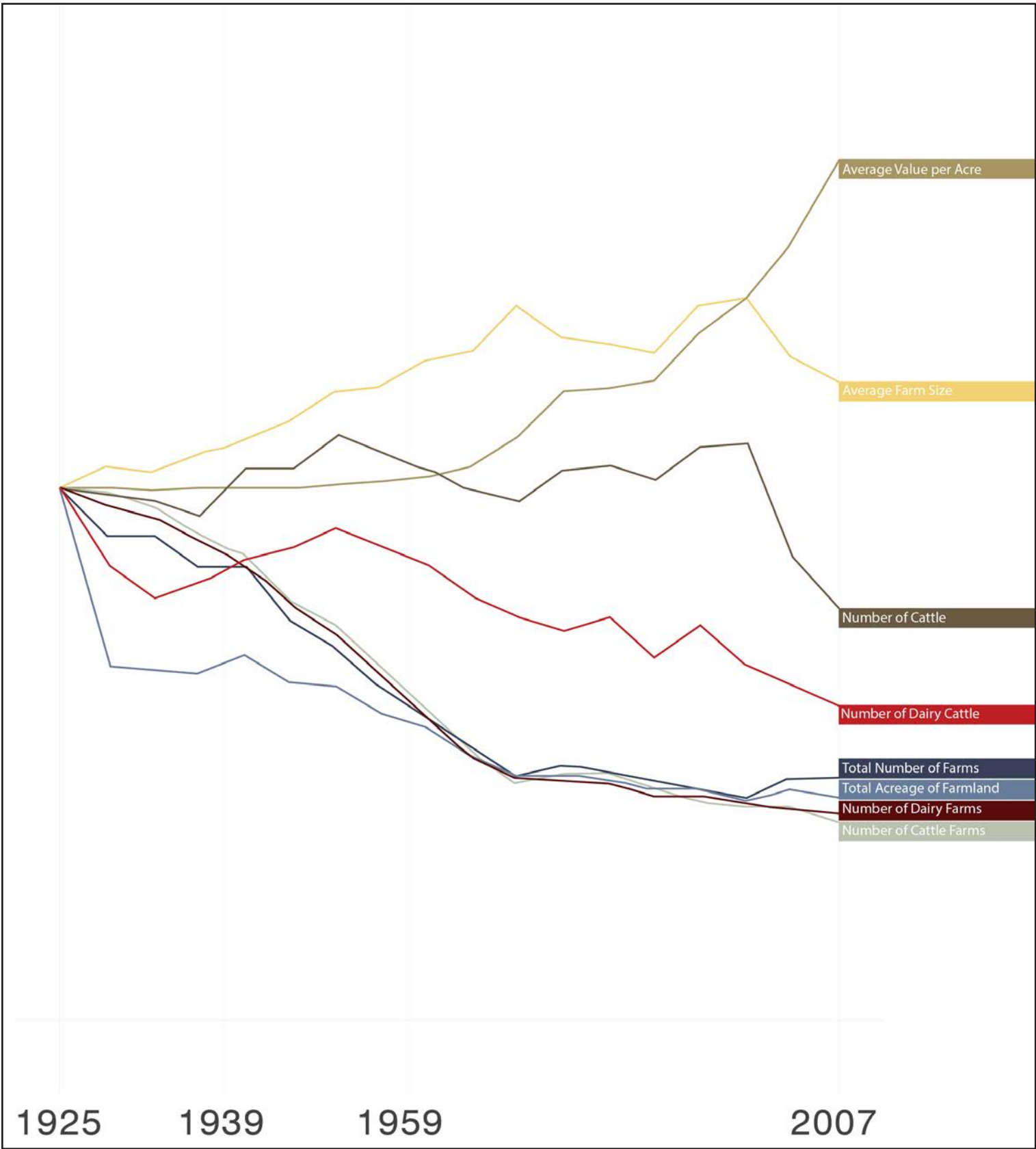
THE HISTORY OF AGRICULTURAL LAND CONVERSION

natural resources? If so, can this money be recirculated back into the local community or repurposed to assure a better future? For typically disadvantaged counties and towns similar to Sullivan County, the land is their wealth, and its degradation can lead to a less resilient future.

Like that majority of rural Pennsylvania, the identity of Sullivan County has been historically defined by varieties of mining and farming. Both industries are part of the culture and identity, and carry the romanticized image and symbol of rural Pennsylvania. Now, with the most recent energy boom of Marcellus Shale drilling, resource extraction is as high as it has ever been, while on the other hand, agriculture is as low as it has ever been. Teddy Roosevelt in the 1909 report of the Country Life Commission described, farming as “one of the most dignified, desirable, and sought after ways to earn a living.” Now, Pennsylvania farmland may be put to its most difficult test, to withstand the new inclinations of the Marcellus energy boom. In an era where land rich communities have once again been thrust into a cash economy where products are sold into capitalistic markets, wage relationships may begin to take precedence over personal relationships. (DeFilippis 2012).



HISTORIC AGRICULTURAL LAND CONVERSION DATA

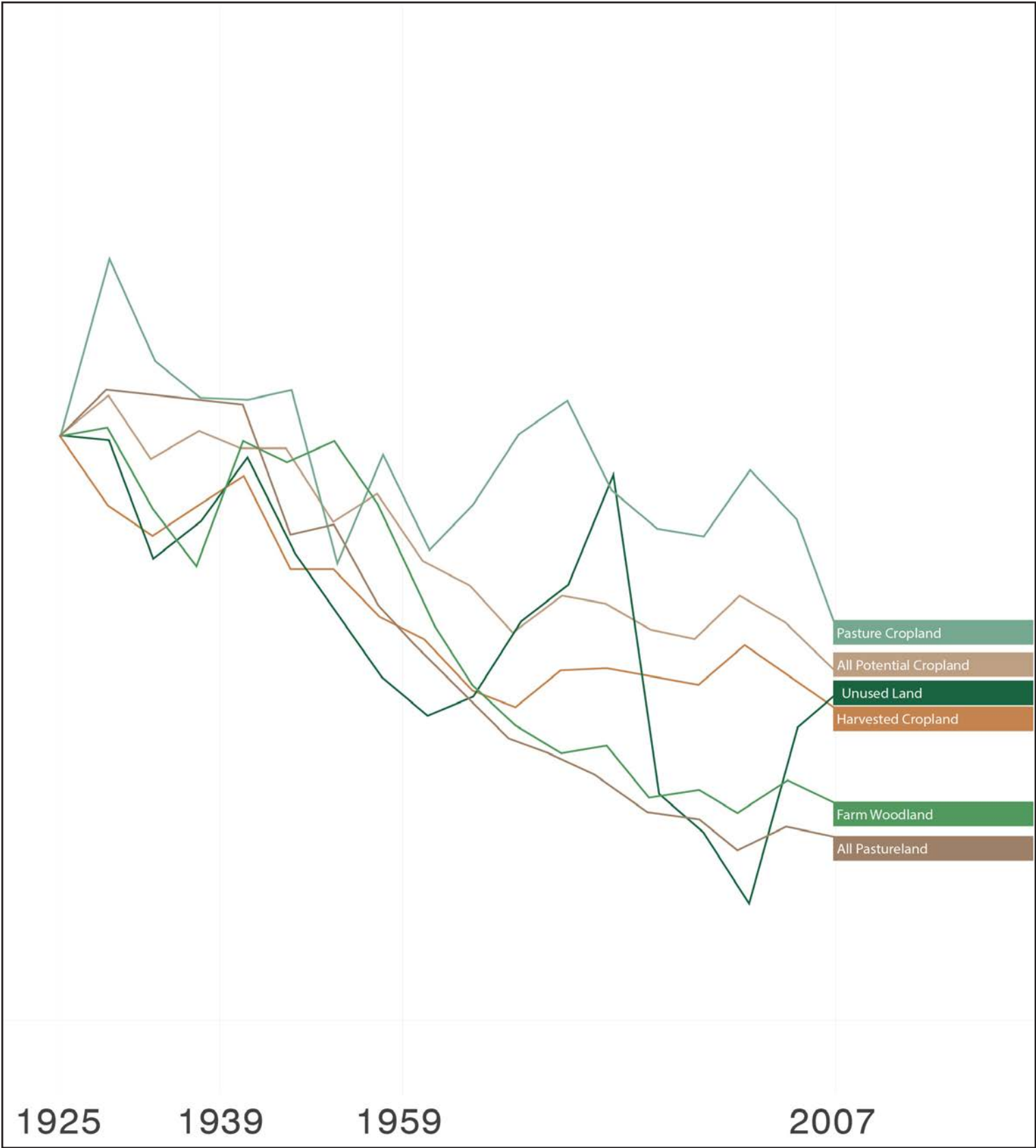


Farming in the United States has been in decline since it initially established prominence. In 1790, farming was the livelihood of more than 90% of the population. The 1800's mechanization of agriculture and the migration of a large percentage of the rural population to cities dealt a major blow to small town development. By the 1880's, farmers declined to 42% of the population. The trend continued: 27% in 1920, 14% in 1945, 4% in 1975, and finally to just 2% between the 1990 and 2000 US census (Bowns & Stevenson 2012). Pennsylvania has not been exempt from this decline in agricultural relevance despite its resilient image of a farmstead amongst agriculture fields of dairy cows backed by forested hillsides.

This study looks into the decline in agricultural presence across the Pennsylvania landscape and its battle against land conversion from the likes of farmland consolidation, new developments, and most recently, new land demands as a result of the Marcellus energy boom. The study examines Sullivan County and compares its trending land conversion patterns based on the USDA agriculture census data to Pennsylvania and three other counties, Washington, Bradford, and Berks. The study then seeks to traject future scenarios of the landscape with and without Marcellus Shale development. Lastly, the study looks at Marcellus Shale production as an opportunity to attain more resilient futures for rural Pennsylvania communities by means of planned land conversion.

The figure to the left has been generated from USDA census data, and demonstrates the relevant fluxes between 1925 and 2007 in Sullivan County. The graph shows that acreage and number of farms and farmland has declined steadily between these years. Opposite to these declines, average farm size has steadily risen along with the average value per acre. This could be a result in the overall decline in family farms and the consolidation of farmlands. In addition, it is interesting to note that as of 2007, the average value of an acre of farmland was \$2,480, and is approximately the time in which this same land was being leased of its mineral rights for \$25 per acre. (See spreadsheet for numerical values)

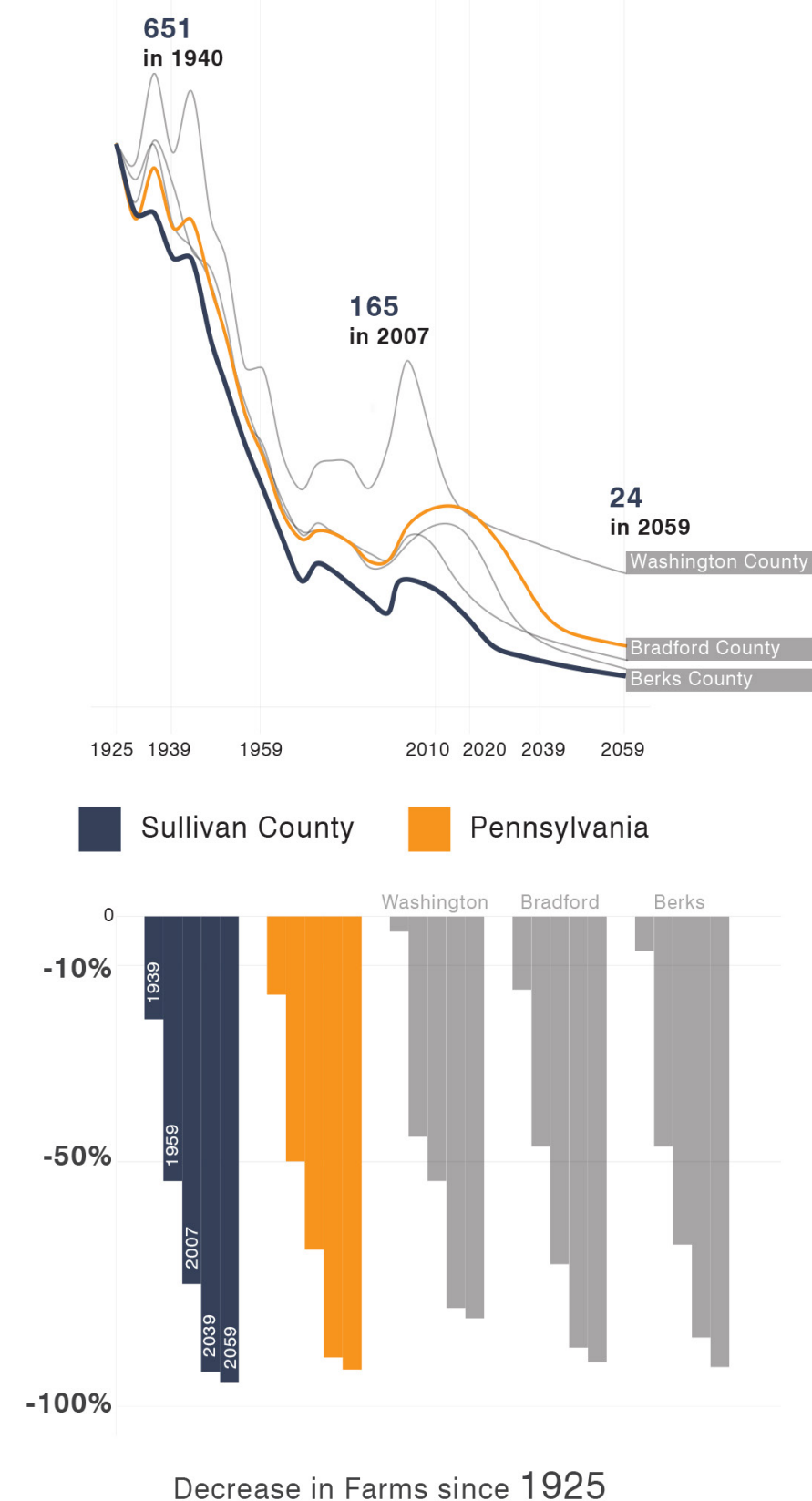
HISTORIC AGRICULTURAL LAND CONVERSION DATA



Generated from USDA census data, the figure to the left suggests, concurrent to the loss in farm numbers and total acreages of farmland, between 1925 and 2007, there has been a decline in total croplands, harvested croplands and pasture lands with a more recent increase in unused lands. (See spreadsheet for numerical values)

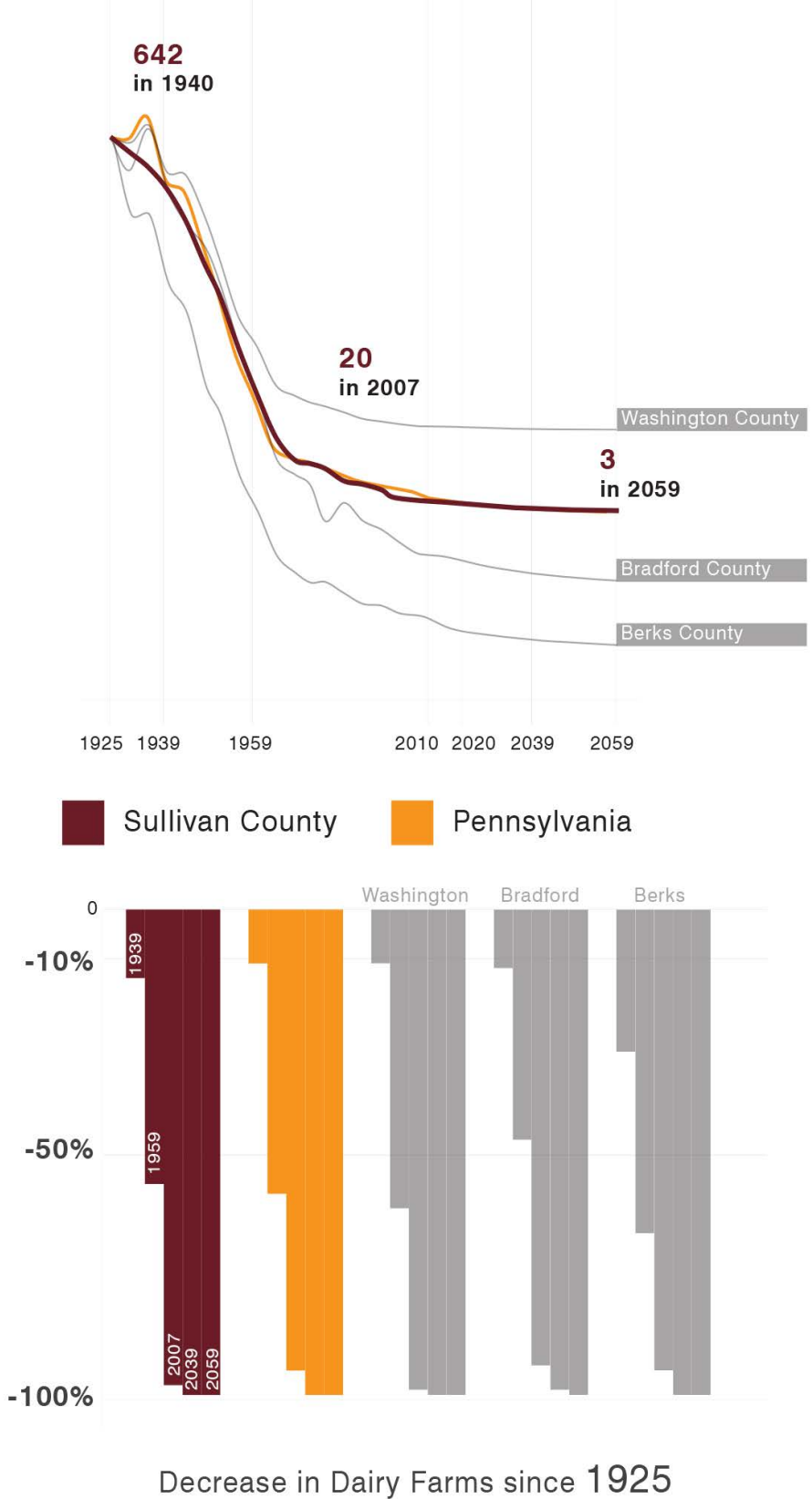
Currently, rural regions host 17% of the country's population, but covers 75% of the land (DeFilippis 2012). As agricultural lands continue to decline, this land will become an alternative landscape, whether it be new developments, fallow lands, or woodlands. These rural populations often remain economically and socially depressed from deindustrialization and depopulation, as dependency upon monocultured economic drivers persists. Moving forward, the fate of small towns is not merely an inevitable demise by this depopulation (Bowns & Stevenson 2010), but rather is dependent upon resourceful usages of their greatest amenity, land. Considering the vastness of rural landscapes, it makes sense that most of our nation's natural resources are extracted from rural areas, and the future of this economic base depends upon these communities. These communities have potential to utilize one cultural aspect of rural landscapes, the lucrative nature of resource extraction, to reinvest their finances and plan toward the future. Potentially through planned land conversion scenarios, the culture of farmland, its economic value, and scenic views could all be preserved.

LOSS OF FARMS



This figure represents the number of farm losses between 1925 and 2007 based on USDA census data. The figure compares the decline of Sullivan County to the state of Pennsylvania, Washington County, and Bradford County, where there is extensive Marcellus activity, and to Berks County, where there is no Marcellus activity. The figure then trajectories the future of farm losses based on an overlay of an exponential trend line. This graph represents the current trend and future trend without the inclusion of Marcellus activity. As the graph demonstrates, Sullivan County is consistent to the other comparisons, only representing a slightly larger decrease overall. All counties, along with the state, approach the upper ninety percentiles in terms of farm decrease as trajected to 2059. (See spreadsheet for numerical values)

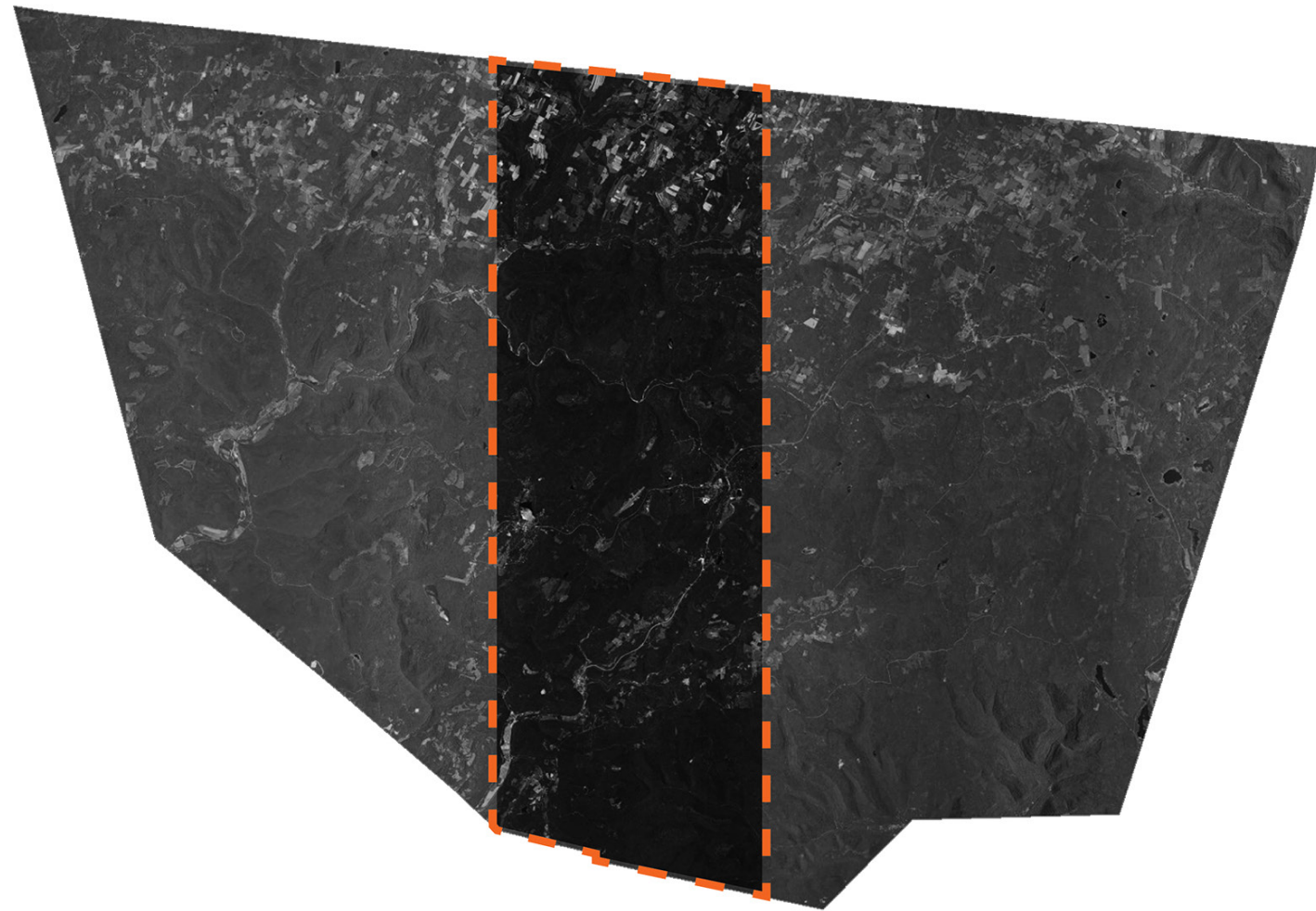
LOSS OF DAIRY FARMS



This graph shows the relative comparison of the decline in Sullivan County dairy farms to Pennsylvania, Washington County, Bradford County, and Berks County. (See spreadsheet for numerical values)

Most notably, and potentially most relevant to Pennsylvania, is the drastic loss in the dairy farms and dairy cattle. Between the years of 2006 and 2009, Pennsylvania saw a 14% decrease in its dairy farms (Haggerty 2010). Despite this decrease, as of 2009, Pennsylvania remained the nation's 5th leading dairy producer (PA Center for Dairy Excellence). More recently (between 2007 and 2010), it has been revealed that there has been an 18.7% decrease in dairy cows in counties where 150 or more Marcellus Wells are located compared to a 1.2% decrease where there are no Marcellus wells (Vogel 2012). These drastic decreases could be a result of farmers no longer needing to work, as they pay off their debt with incoming royalties and mineral rights leaseings. It could also be a result of involuntarily forfeiting their productive farms because of environmental degradation, decreased efficiency, or inconvenience. Nonetheless, there appears to be a direct correlation between Marcellus Shale activity and the loss in farmland. Without a planned alternative in place, a continued decrease in dairy farms could be hazardous to the future of the landscape and quality of life for community residents.

AGRICULTURAL LAND CONVERSION SWATHS



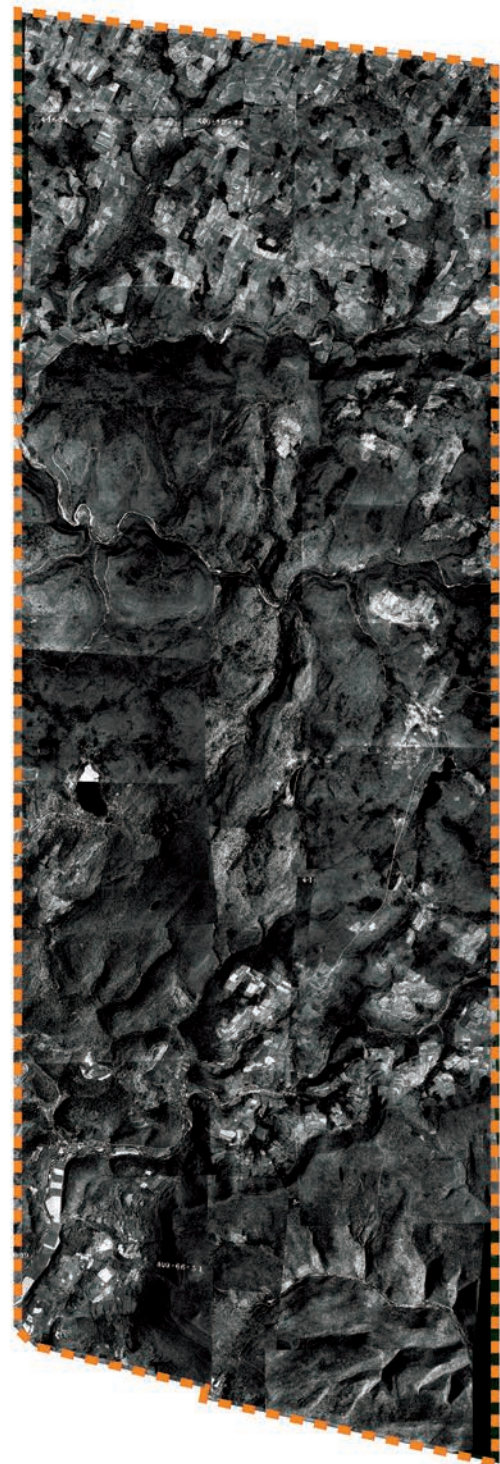
The study continued through the designation of a vertical swath sample through the north-south entirety of the Sullivan County landscape. Horizontally, the swath stretches from Eagles Mere to Lake Mokoma. The northern tier hosts the majority of the current and past farmlands.

As the proceeding pages will show, the swath was implemented to visually represent the realities and impacts of farm conversion in the region. Historic photographs were stitched to form a swath from 1939 and 1959, which compares the conversions to present day. Furthermore, swaths were generated based on current trends to represent 2039 and 2059, demonstrating landscape changes based on percentages of farmland lost. Each swath is accompanied by data driven visual graphs demonstrating the loss in farmland of the specific year in comparison to 1925 statistics.

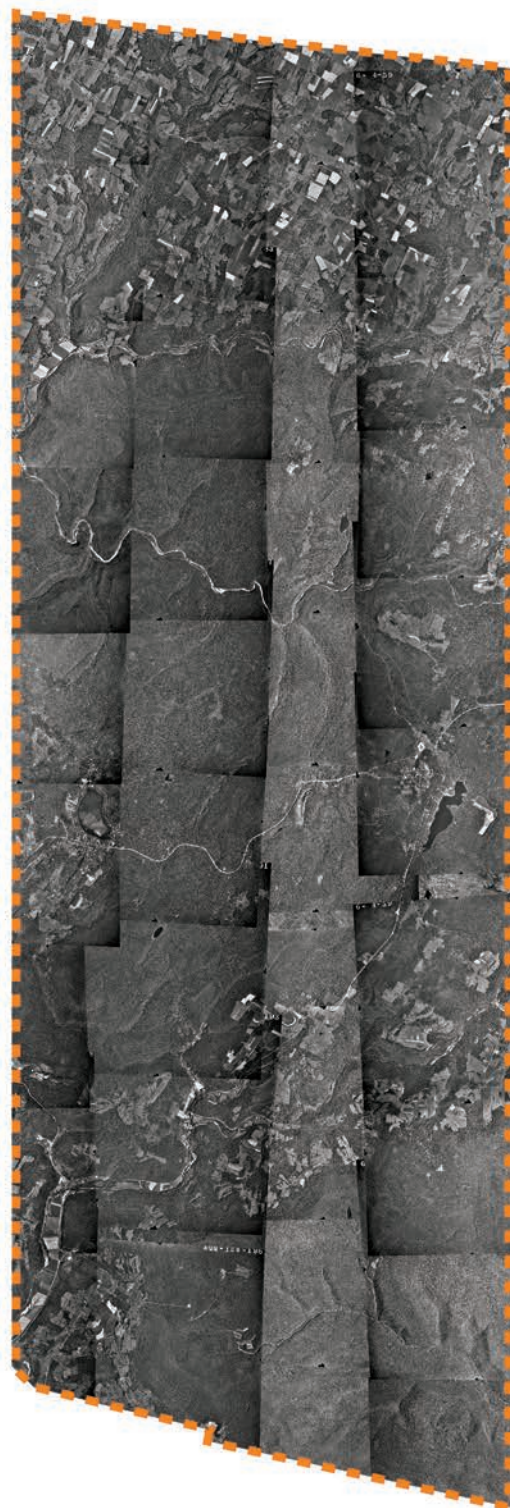
The swaths will demonstrate the continuity of agricultural lands being converting into wooded areas.

AGRICULTURAL LAND CONVERSION SWATHS

1939



1959



2010



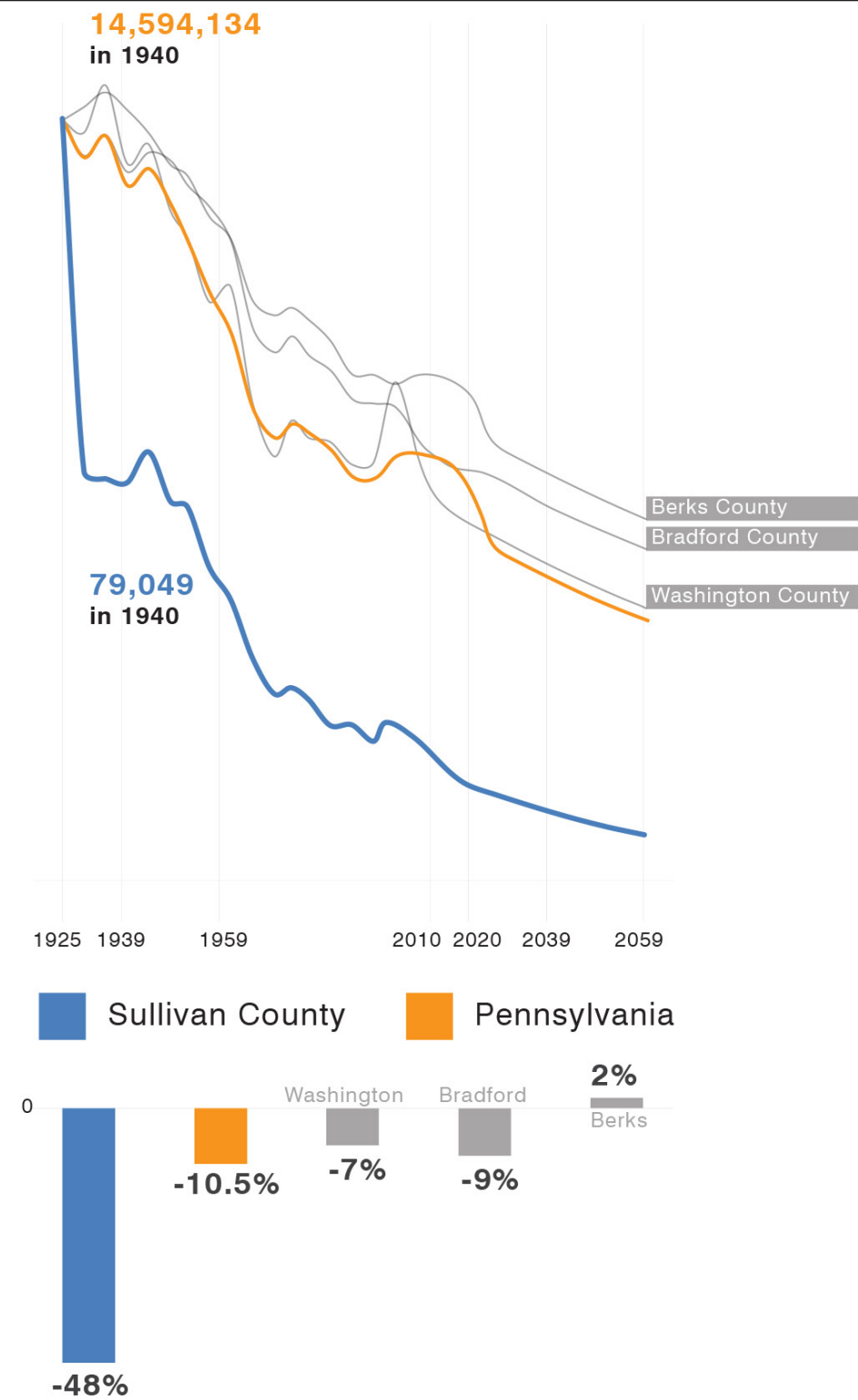
2039



2059

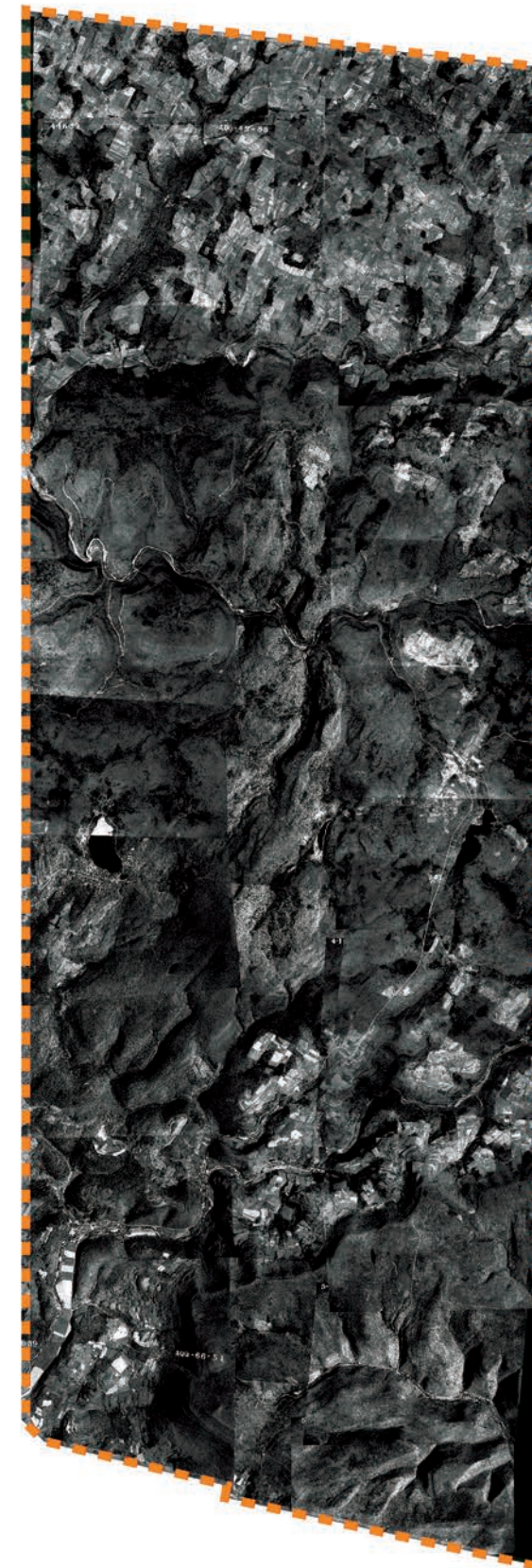


AGRICULTURAL LAND CONVERSION DATA

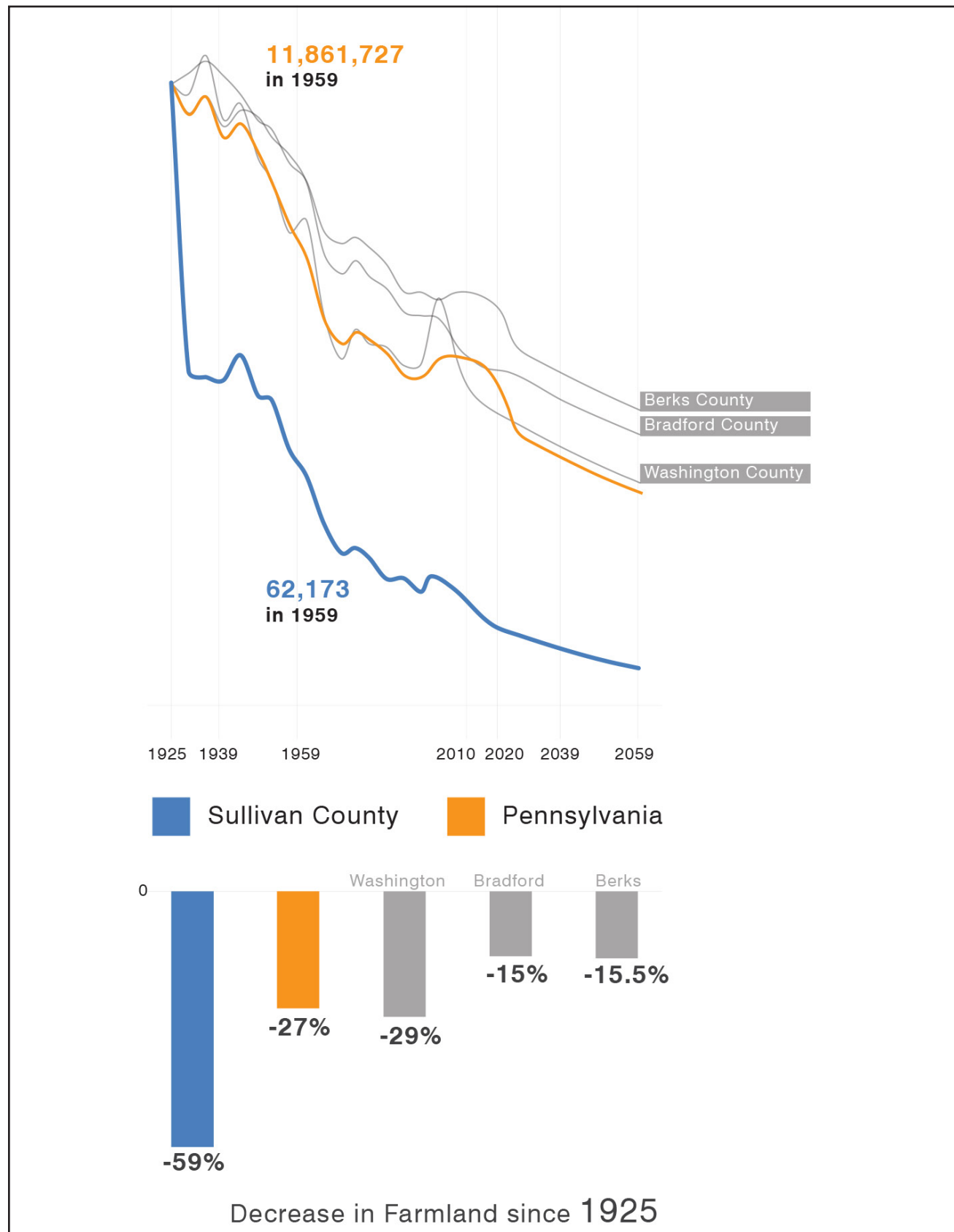


Decrease in Farmland since 1925

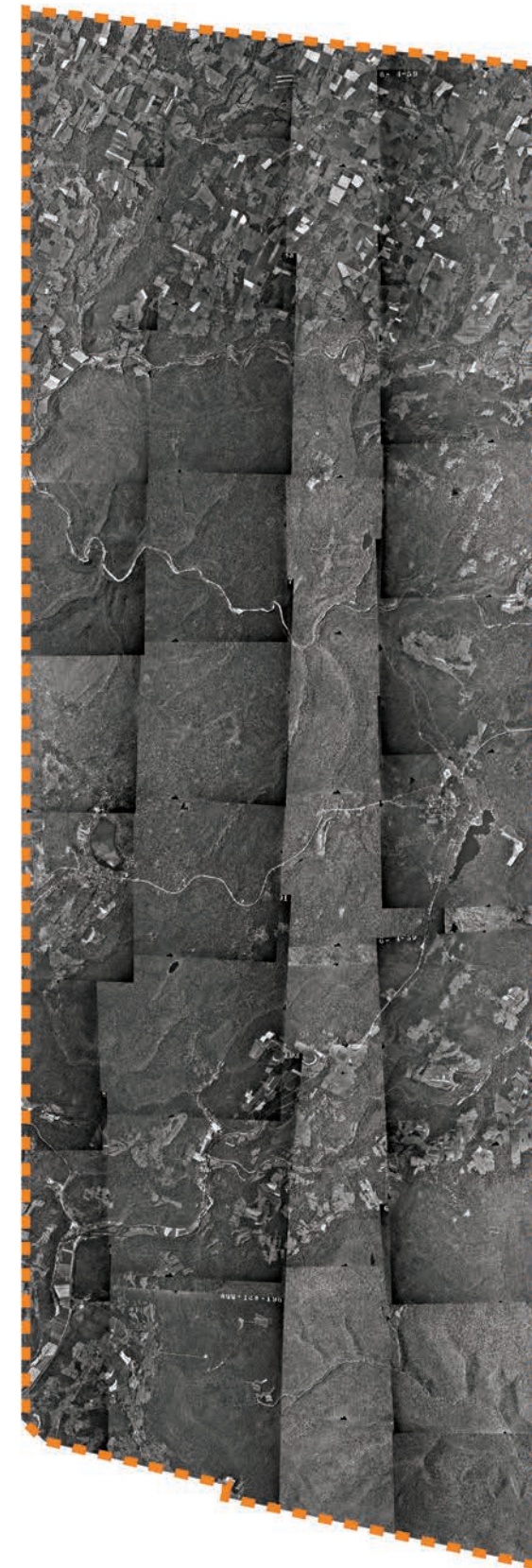
AGRICULTURAL LAND CONVERSION SWATH



AGRICULTURAL LAND CONVERSION DATA



AGRICULTURAL LAND CONVERSION SWATH

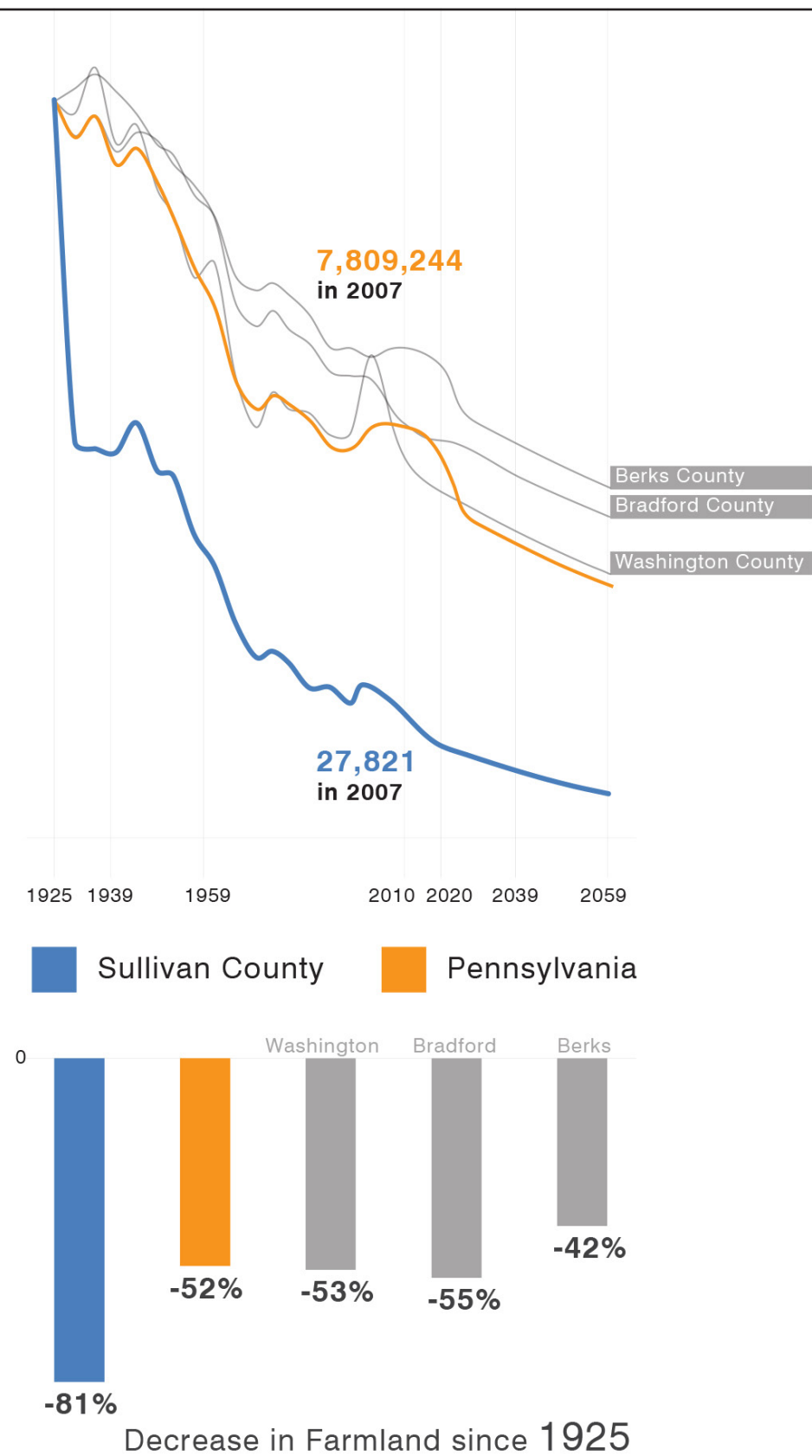


1939

1959

2010

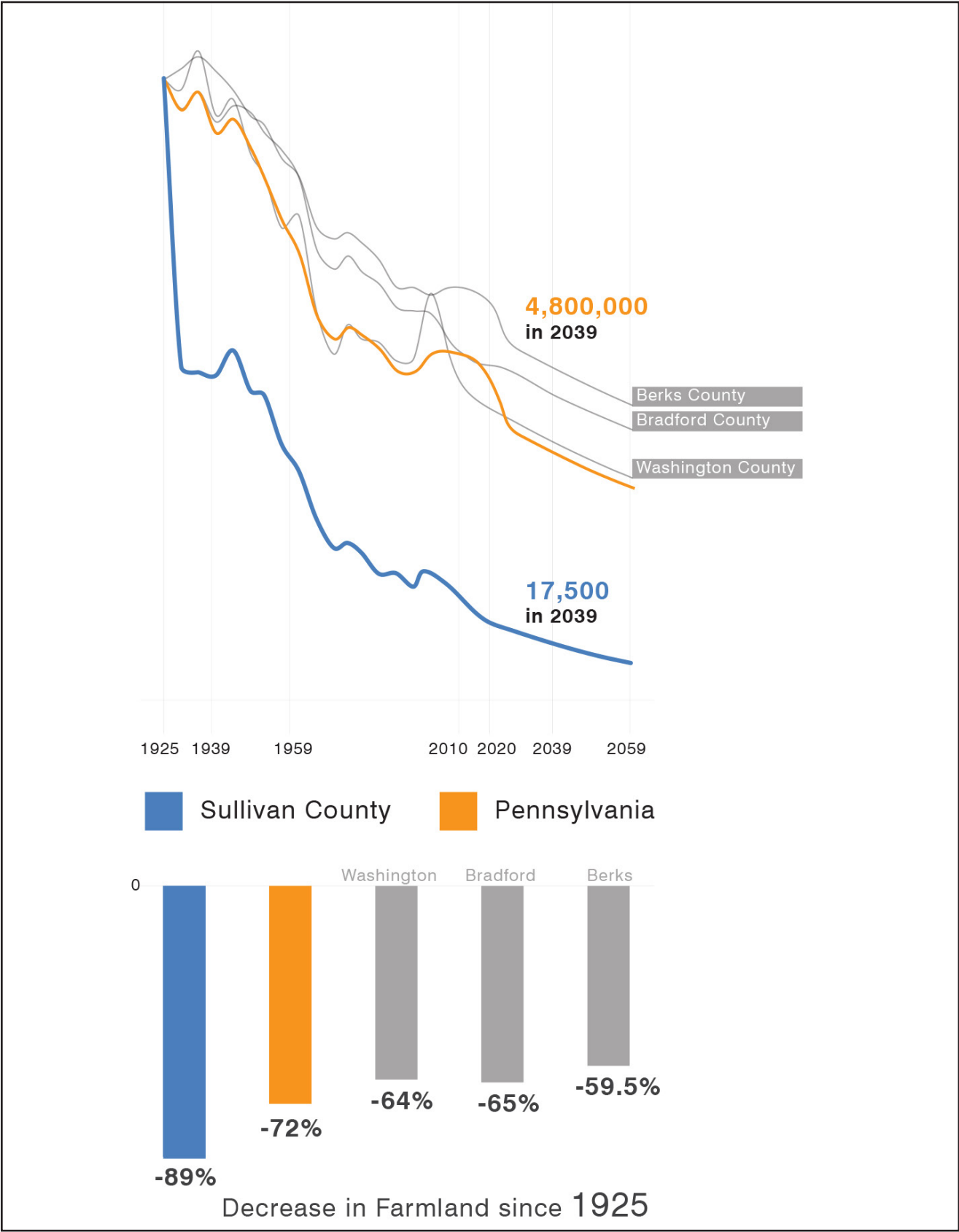
AGRICULTURAL LAND CONVERSION DATA



AGRICULTURAL LAND CONVERSION SWATH



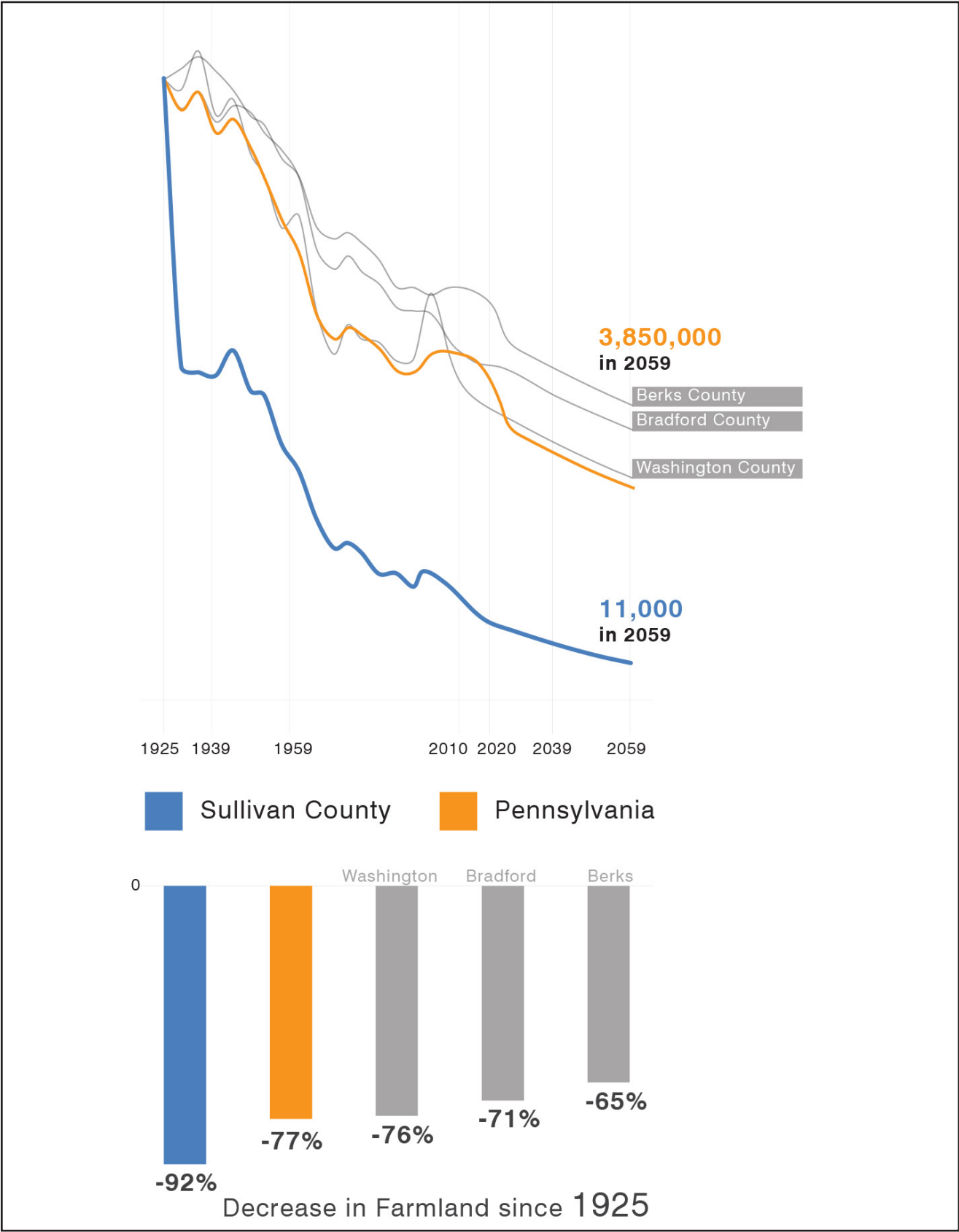
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AGRICULTURAL LAND CONVERSION SWATH



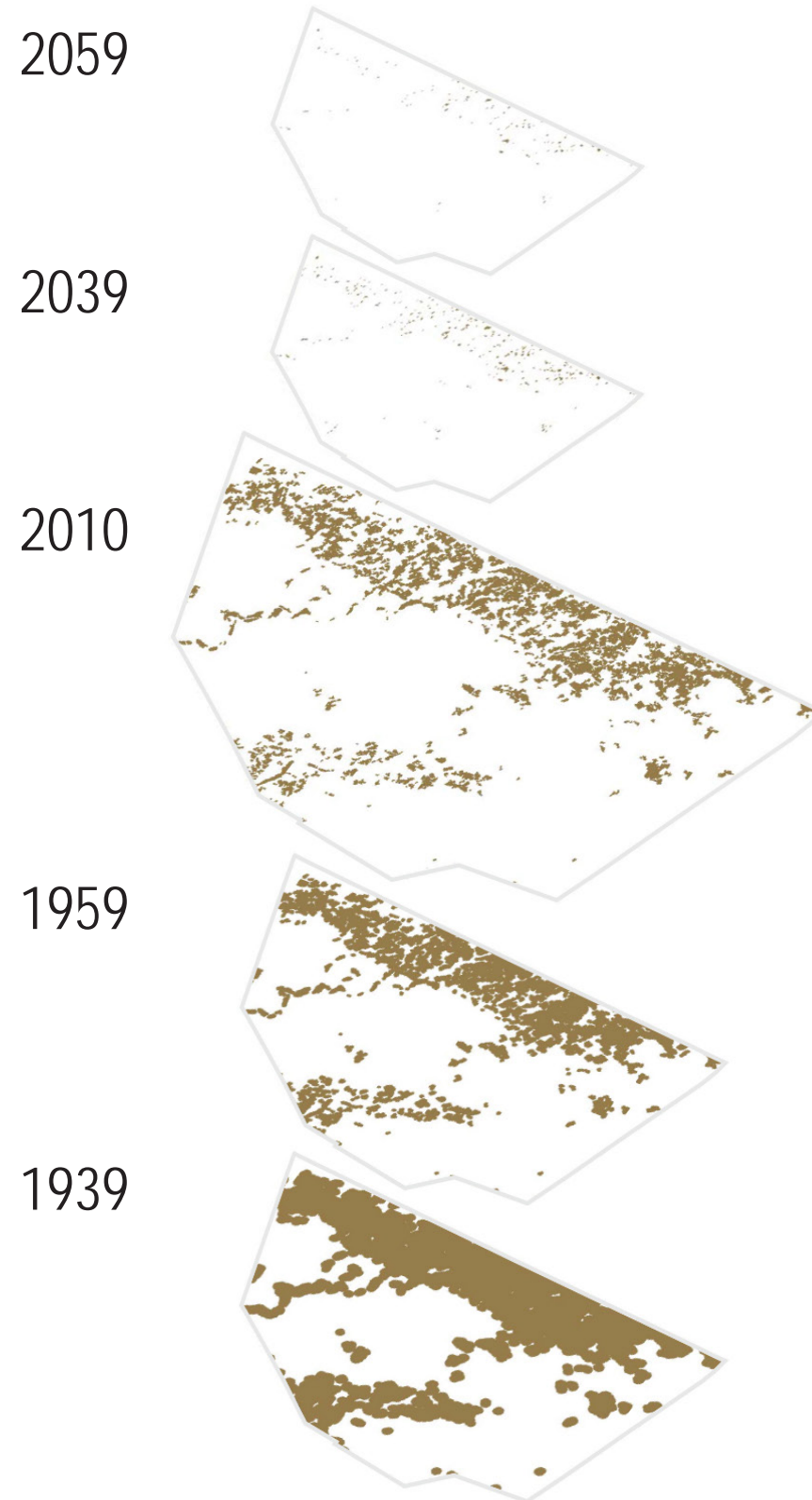
AGRICULTURAL LAND CONVERSION DATA



AGRICULTURAL LAND CONVERSION SWATH



AGRICULTURAL LAND CONVERSION



The adjacent diagram represents agricultural progression from 1939, 1959, 2010, 2039, and 2059.

The future of the Sullivan County landscape and more specifically the conversion of farmlands was trajected based on current data recessing back to 1925. Information relevant to Marcellus drilling infrastructure was then added to traject a future landscape with Marcellus impacts and its potential to accelerate the rates of land conversion.

The information was divided from the following calculations:

- Agriculture lands occupied by wells and pads
 - 142 wells in agriculture lands
 - 1.70 wells per pad
 - $142/1.40 = 83.5$ well pads
 - $83.5 \text{ pads} \times 5$ (average acres per pad)
 - = **417.5 acres occupied by well pads in agriculture lands**
- Agriculture lands occupied by new access roads
 - .79 acres of new access roads per well
 - $.79 \times 83.5$ well pads
 - = **66 acres occupied by new access roads**
- Agriculture lands taken by pipelines
 - 138.13 acres of existing pipelines
 - 295.24 acres of pipelines are proposed
 - $138.13 + 295.24$
 - = **433 acres occupied by pipelines**

$417.5 + 66 + 433 = 916.5$ total acres to be occupied by Marcellus Infrastructure

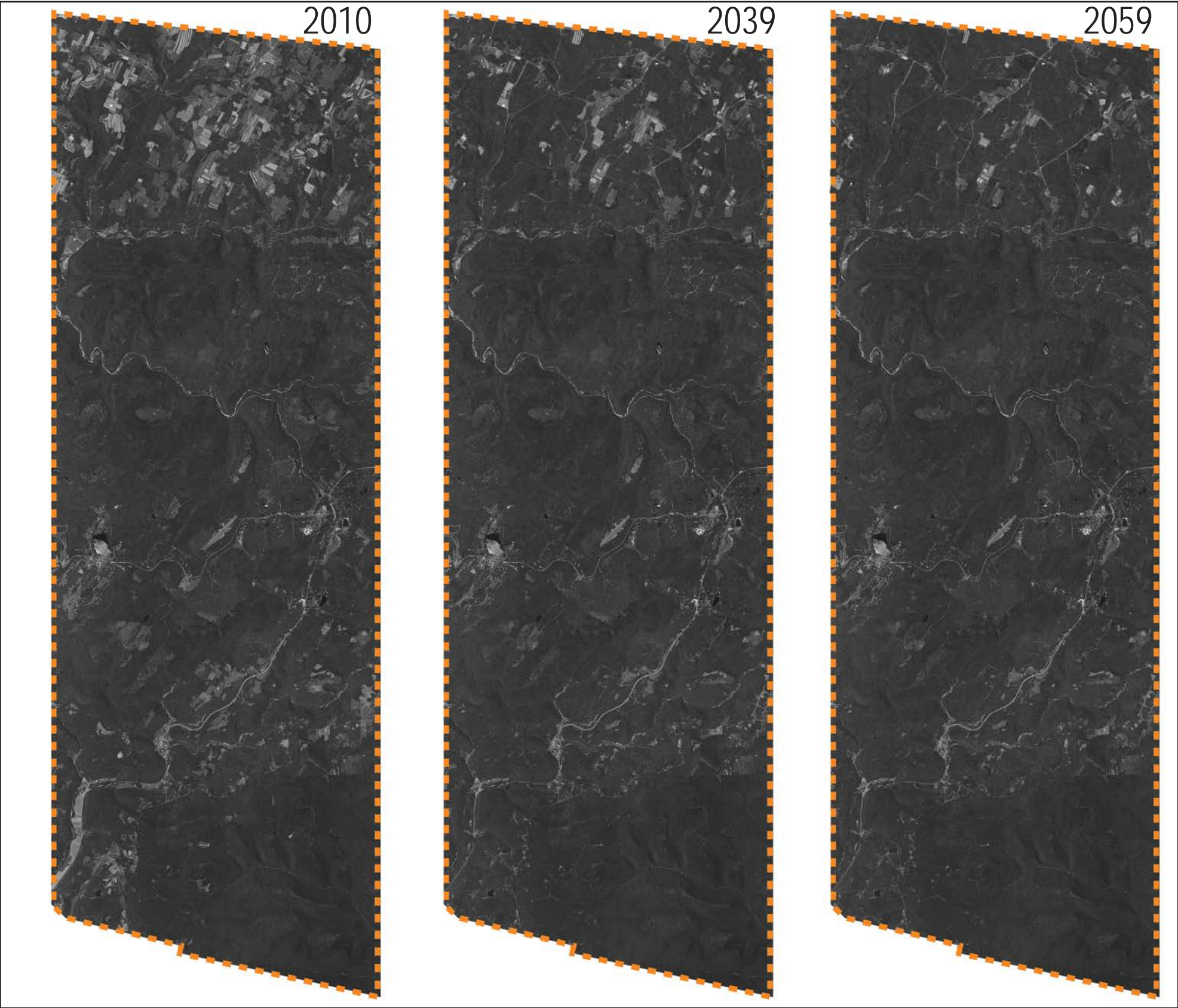
AGRICULTURAL LAND CONVERSION: CURRENT TRENDS

2010_2039_2059 CURRENT TRENDS

2010_2039_2059 MARCELLUS IMPACTS

2010_2039_2059 MARCELLUS IMPACTS WITH ROADS

"Landscapes are a collective good that are a result of both natural and man-made resources" (Primdahl 2010, 76). Usage of these resources has led to a modification of their natural state, thus indicating that there is no accurate way to fully detect the future layout of the landscape. Nonetheless, the adjacent images reflect a possibility and demonstrate a linear scenario moving toward the future. The images traject the landscape characteristics of 2039 and 2059 based on trends throughout the last 90 years.



2010_2039_2059 CURRENT TRENDS

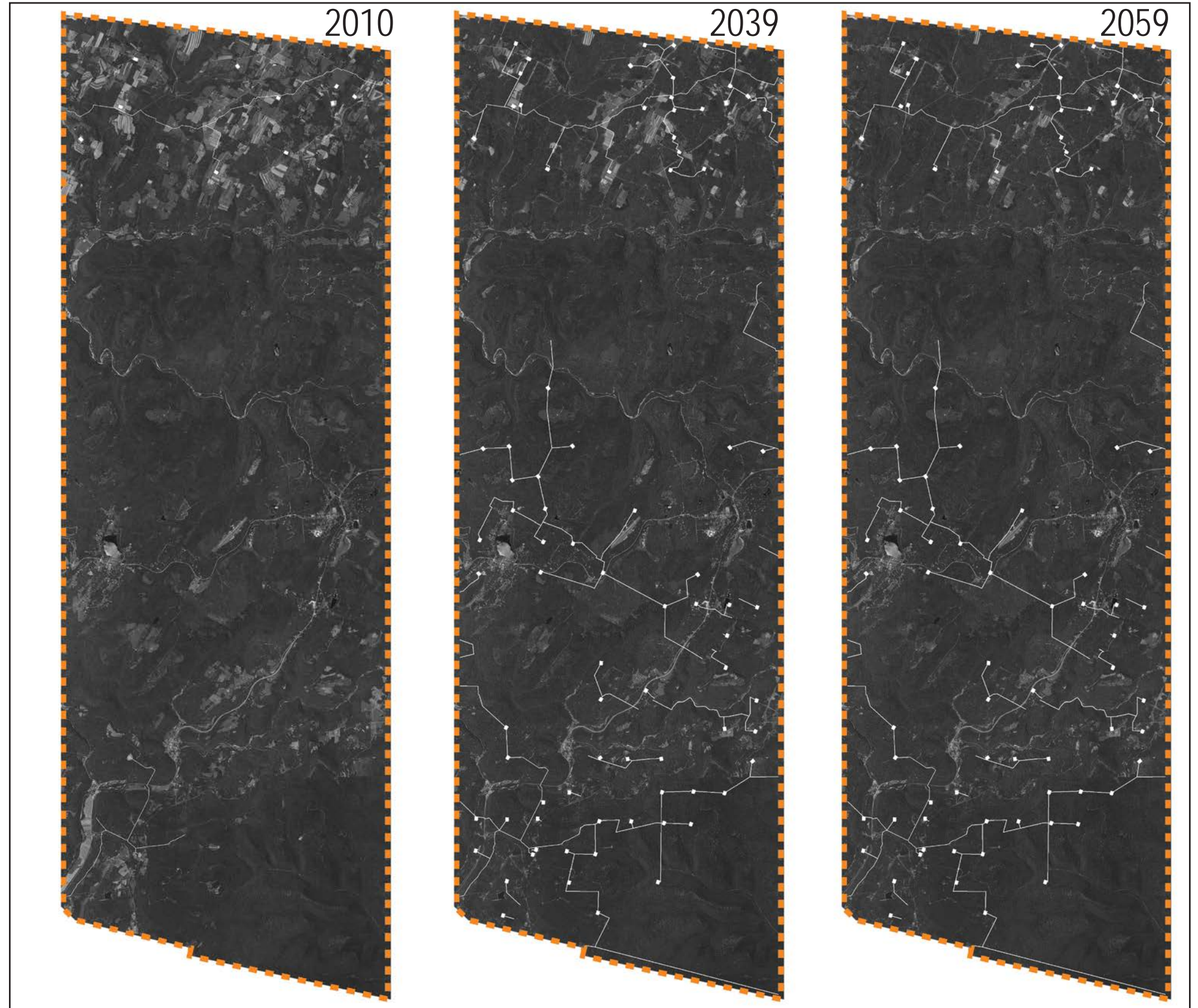
2010_2039_2059 MARCELLUS IMPACTS

2010_2039_2059 MARCELLUS IMPACTS WITH ROADS

AGRICULTURAL LAND CONVERSION: MARCELLUS IMPACTS

With the introduction of Marcellus activity onto the landscape, choices today, more than ever, have the potential to shape the future of the rural Pennsylvania landscape (Hulse 2002, 83). By visually portraying potential scenarios, it is hoped that better understandings of these consequences promote more mindful choices rather than indecisions. Agriculture has been an integral part of rural Pennsylvania and Sullivan County for centuries; now, it is left up to individuals, and more specifically, land owners, who have come into new positions of power, giving them the ability protect and improve their own surroundings. As Thomas Jefferson once said, "small landholders are the most precious part of the state."

These images show the state of the landscape with existing and proposed Marcellus infrastructure, beginning in 2010, where existing wells and pipelines are exemplified in white.



AGRICULTURAL LAND CONVERSION: MARCELLUS IMPACTS WITH EXISTING IMPACTS

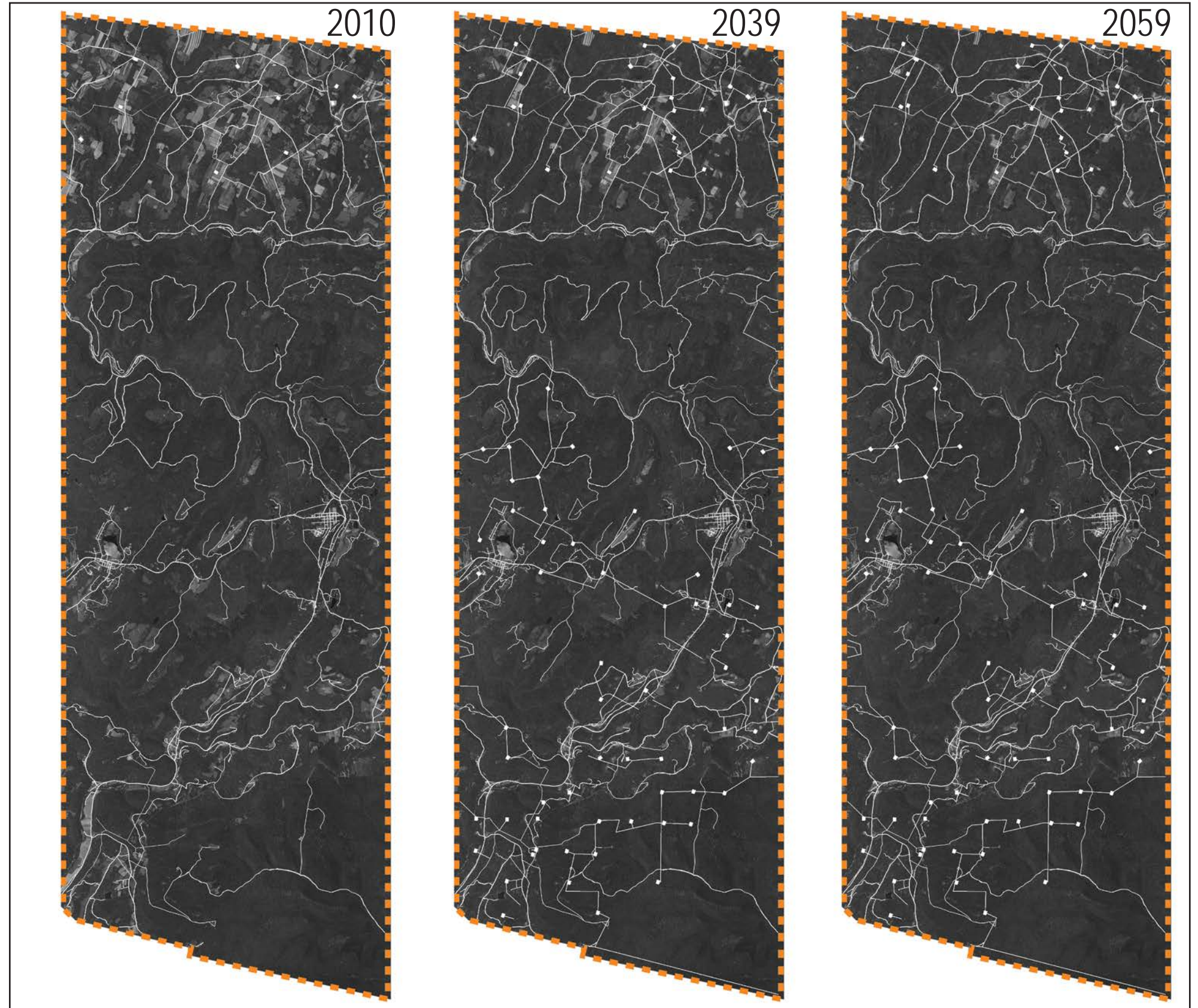
2010_2039_2059 CURRENT TRENDS

2010_2039_2059 MARCELLUS IMPACTS

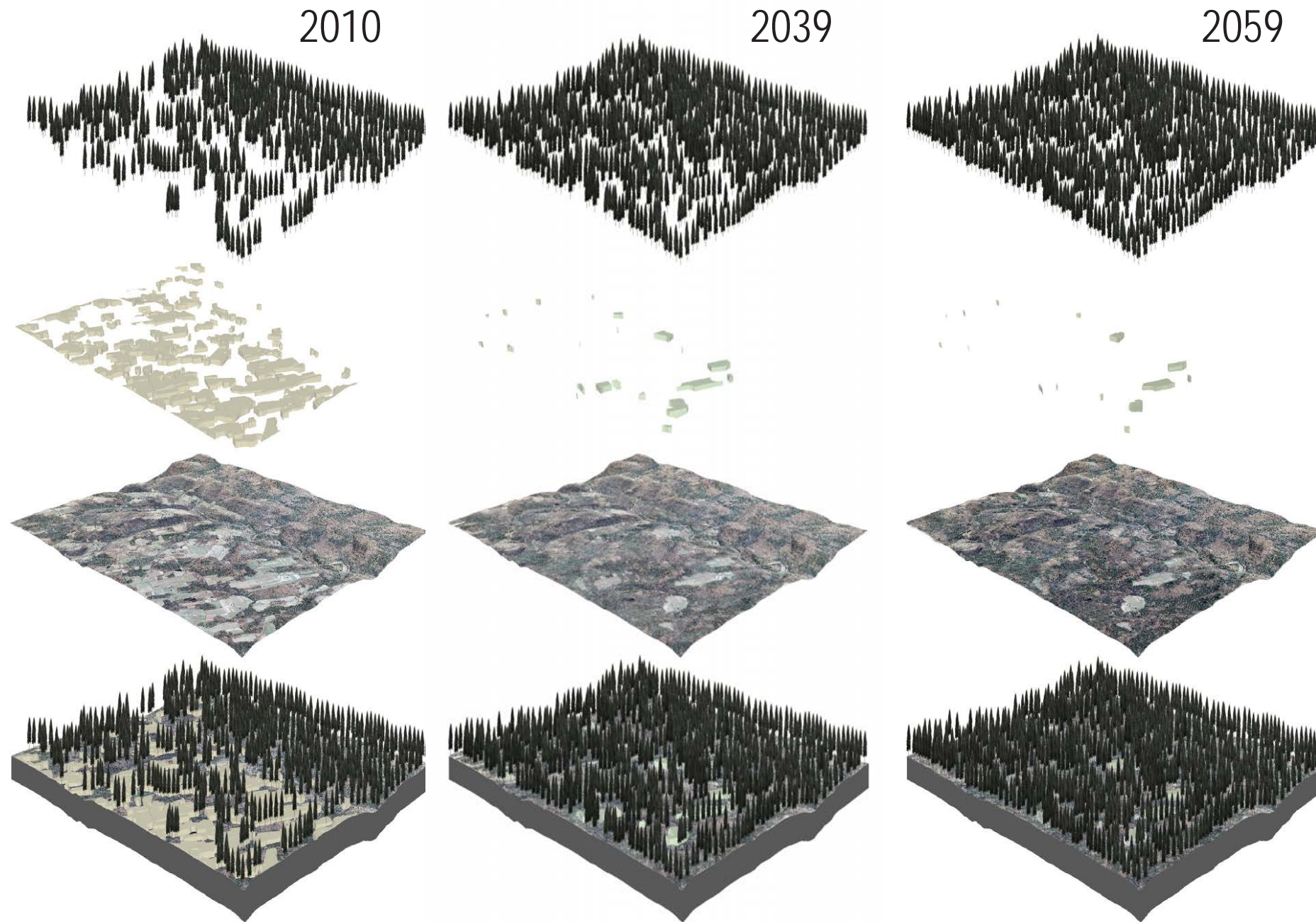
2010_2039_2059 MARCELLUS IMPACTS WITH ROADS

These images show an overlay of Marcellus impacts with existing roads. Beginning from the left in 2010, this swath features existing well pads and pipelines overlaid with existing road infrastructure. Progressively to the right, there is a noticeable decline in agricultural areas in 2039 and 2059.

These swath overlays demonstrate the disconnectivity that already lies in place within many rural Pennsylvania zones. As a state, we often overgeneralize Pennsylvania as a scenic place of beauty, despite the extensive infrastructural impacts on the landscapes.



AGRICULTURAL LAND CONVERSION

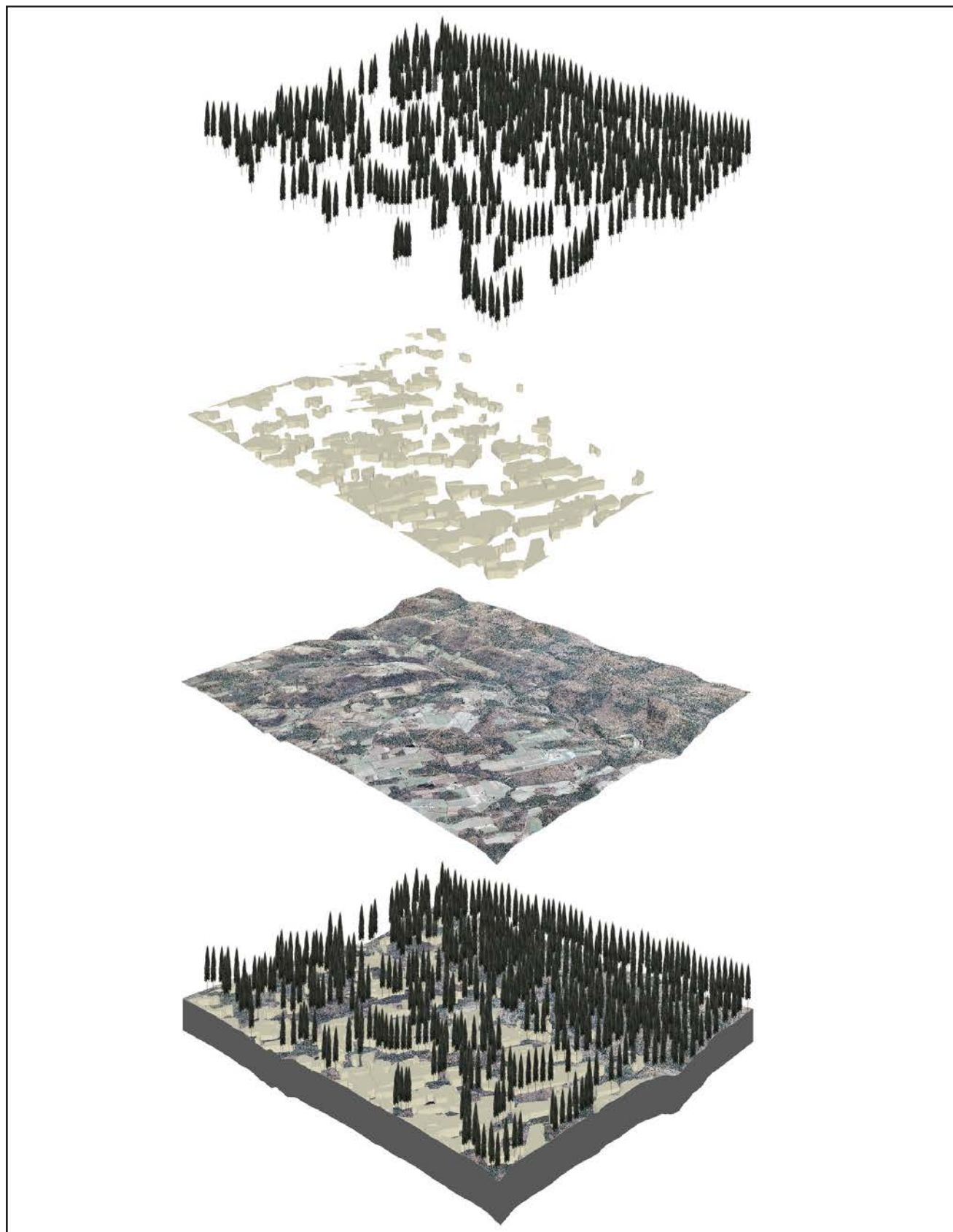


The adjacent drawings represent a portion of the northern tier of the Sullivan County landscape swath. Stacked vertically, the top layer represents forested areas, followed by agricultural areas, the terrain, and then the composite sample. Progressively, it is projected that agricultural land will decrease and be taken over by new forests and scrub lands.

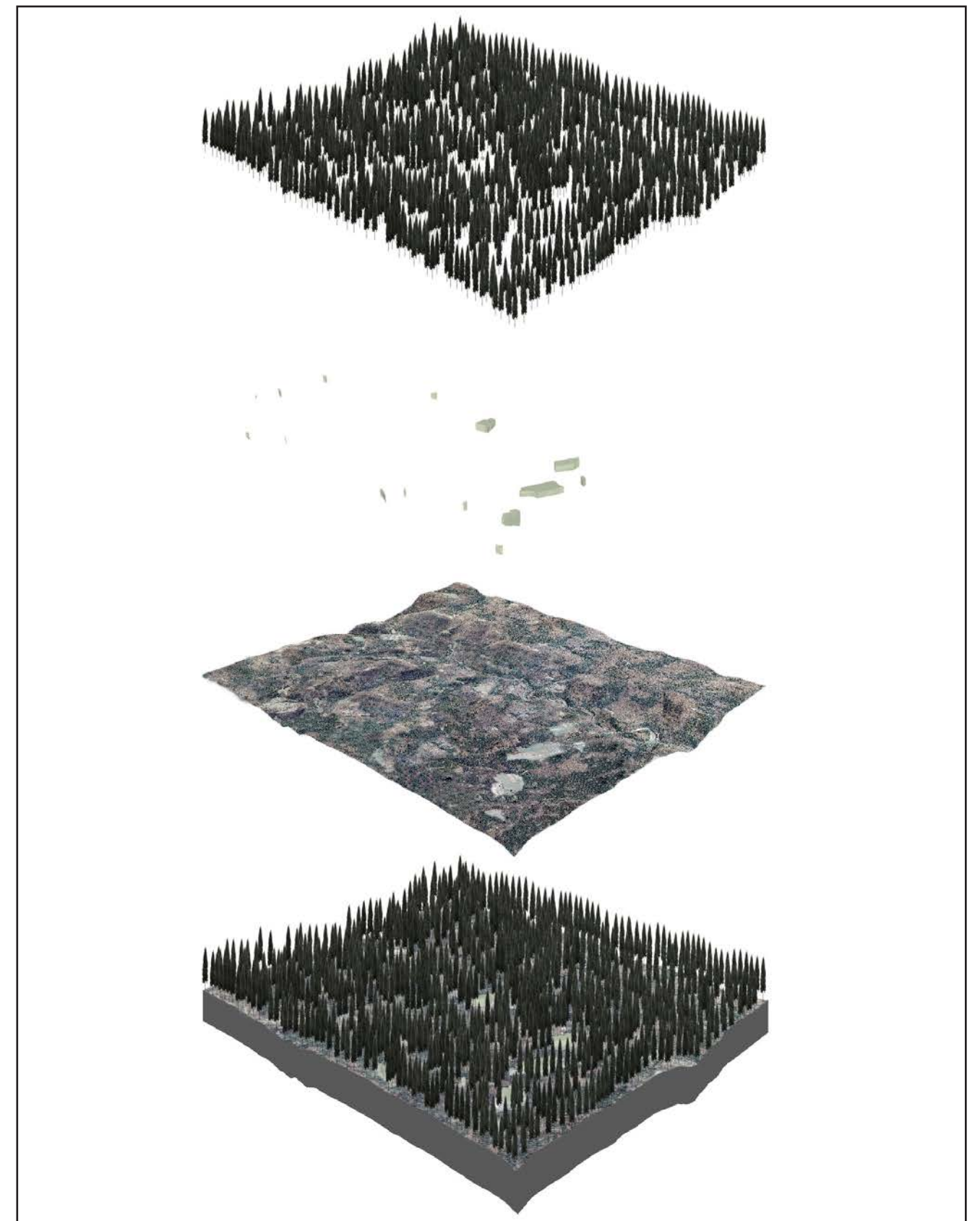
The proceeding images will overlay 2010 and 2059 current trending conditions with Marcellus influenced conditions from the same years. As the axonometric diagrams will show, in current trends, most wells and pads, along with the concurrent pipelines will impact agricultural lands, and the opposite will be the case in 2059. These drawings represent unstable conditions of these highly valuable landscapes of which the agriculture structure and practices have produced and maintained (Primdahl 2010, 127).

Following the axonometric overlays will be selections from the Sullivan County swaths, amplifying the view of converting landscapes from 1939, 1959, 2010, 2039, 2059, and 2059 with Marcellus Impacts. Throughout this sequence, it is important to realize that Pennsylvania is being transformed by decisions to act or not to act, and that images of rolling farmlands backdropped with woodlands could become sparse exceptions (Hylton and Seitz 1995).

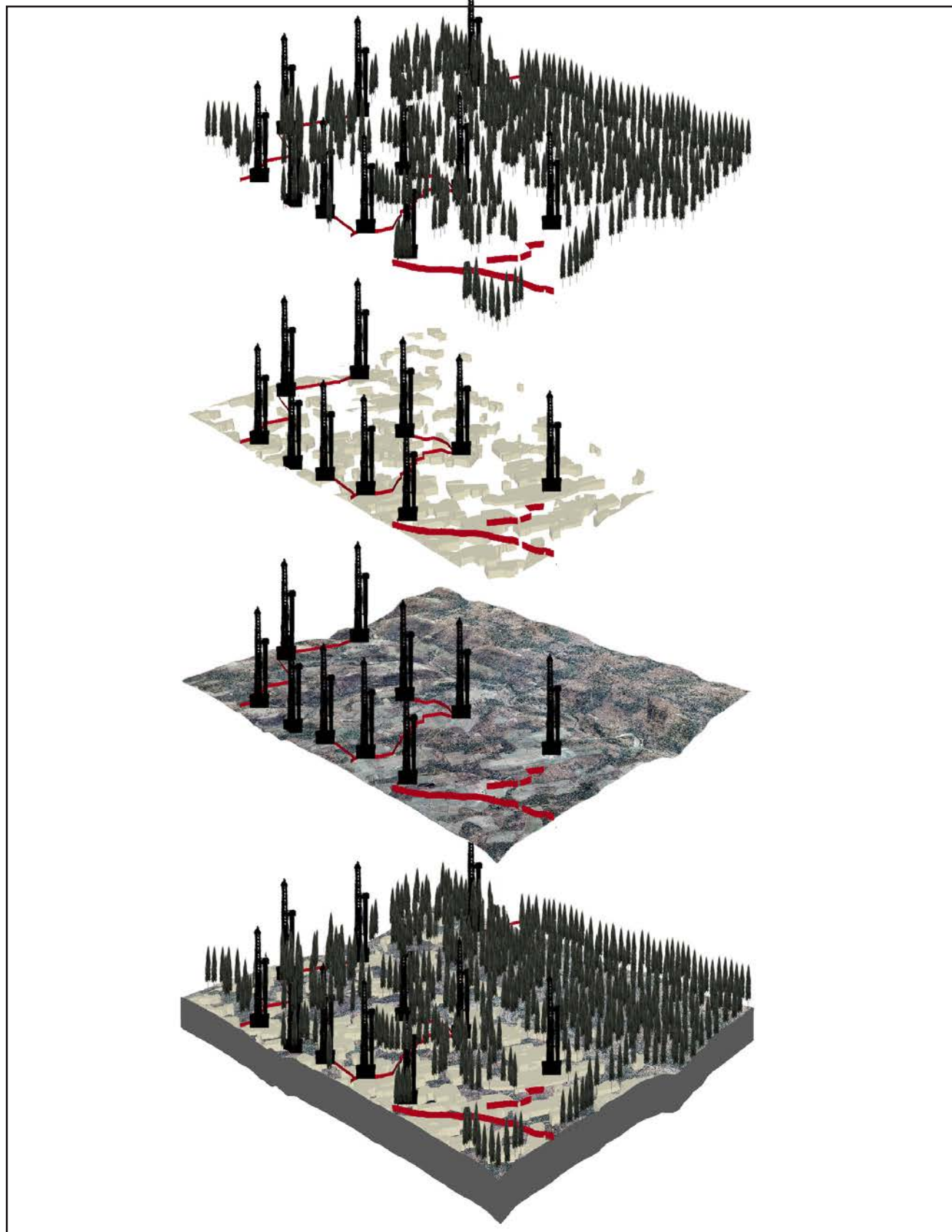
AGRICULTURAL LAND CONVERSION



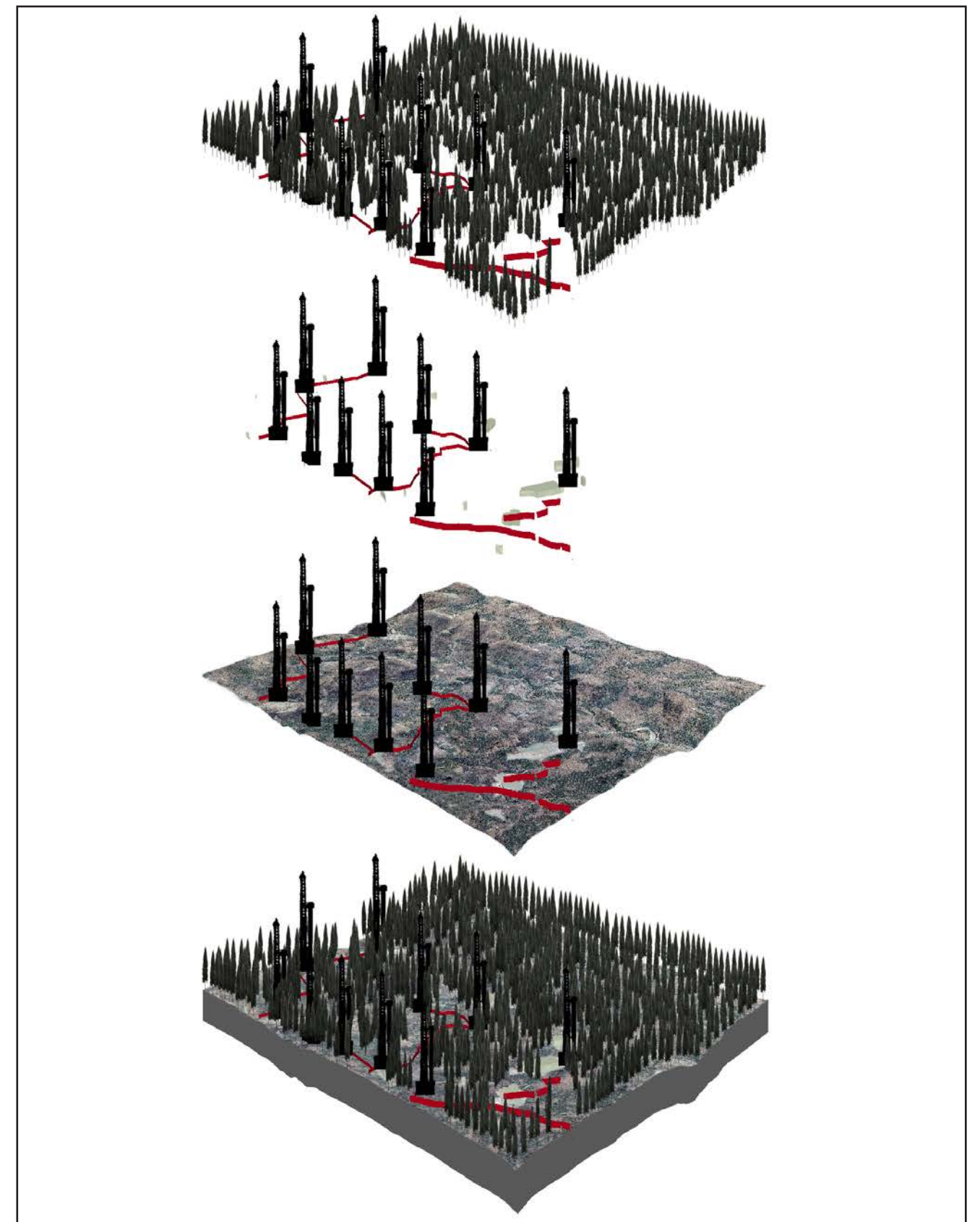
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AGRICULTURAL LAND CONVERSION



AGRICULTURAL LAND CONVERSION

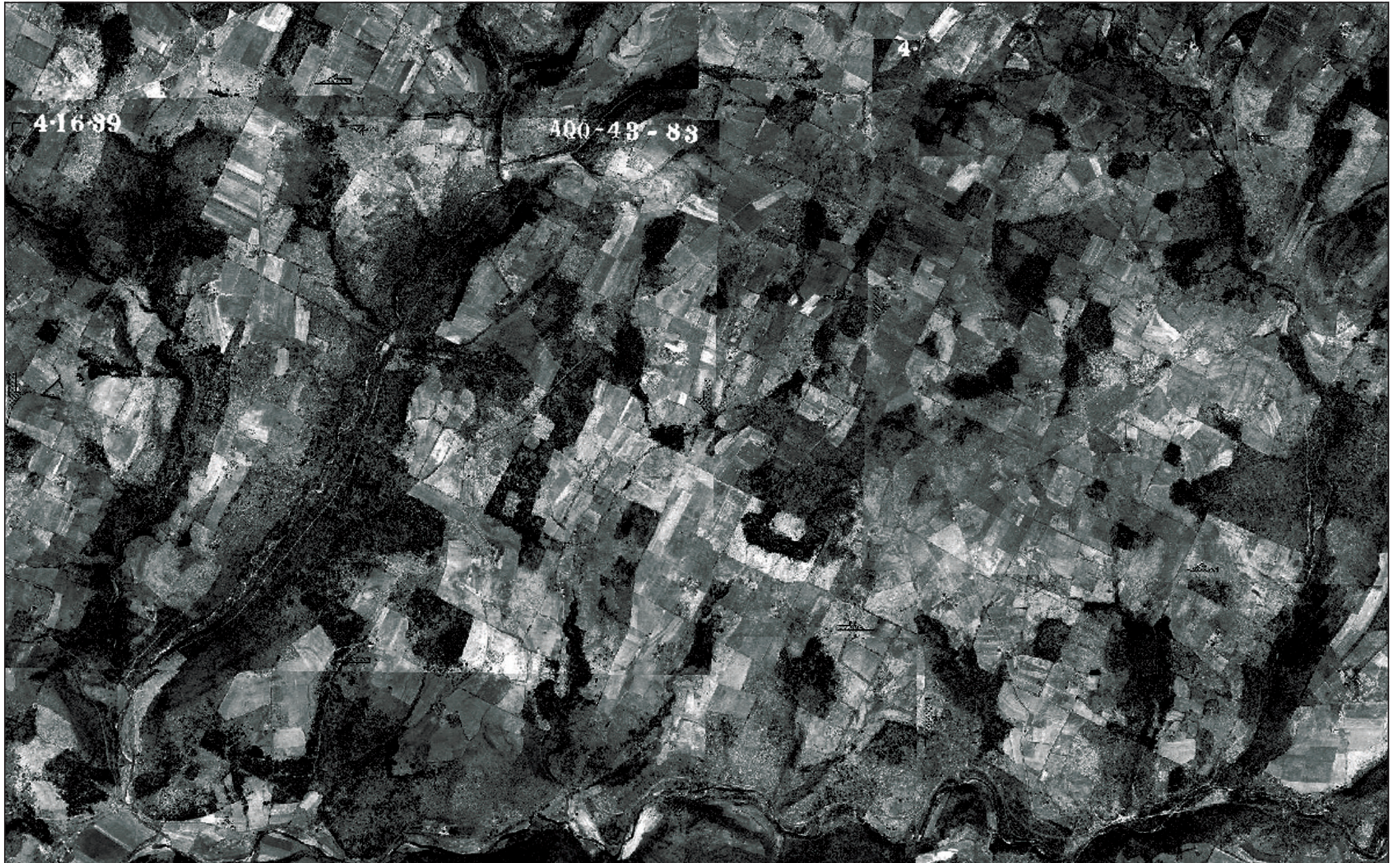


AGRICULTURAL LAND CONVERSION

1939

1959

2010



AGRICULTURAL LAND CONVERSION

1939

1959

2010



AGRICULTURAL LAND CONVERSION

1939

1959

2010



AGRICULTURAL LAND CONVERSION

2039

2059

MARCELLUS IMPACTS

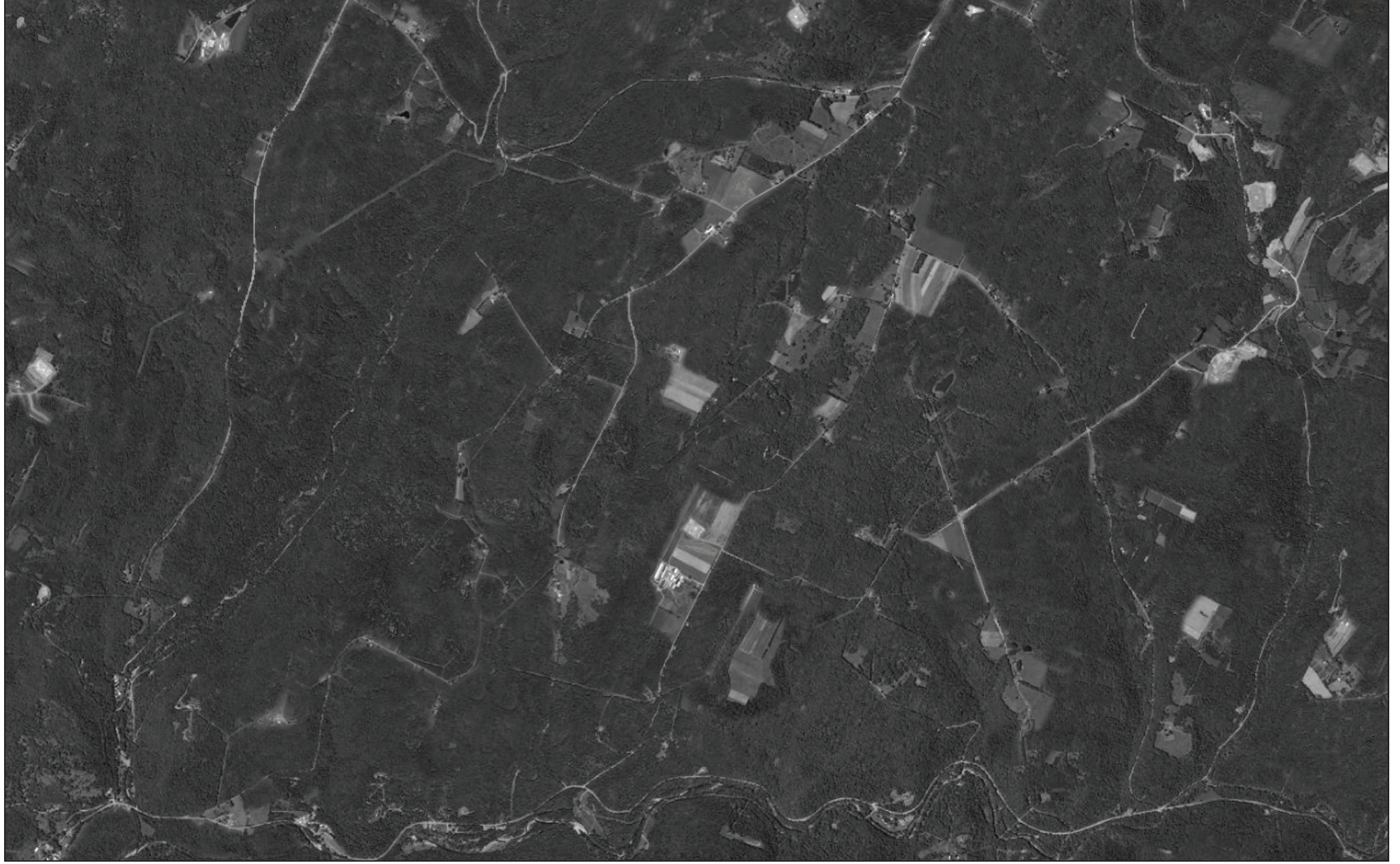


AGRICULTURAL LAND CONVERSION

2039

2059

MARCELLUS IMPACTS

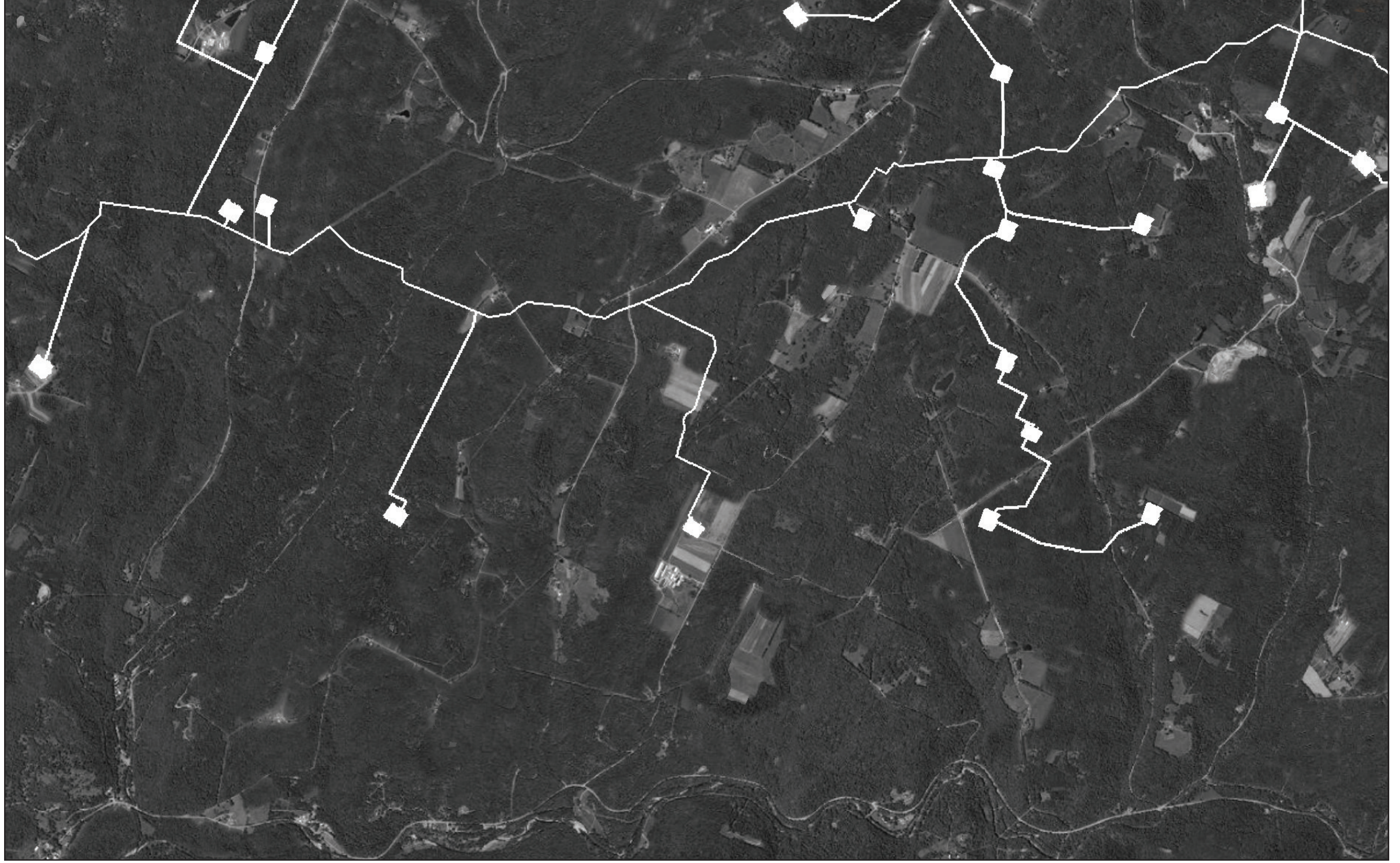


AGRICULTURAL LAND CONVERSION

2039

2059

MARCELLUS IMPACTS



LAND CONVERSION AS A PLAN FOR FUTURE RESILIENCE

Landscapes are not always perceived as remarkable places, and sometimes what is important may be invisible to those who inhabit them daily. This in conjunction with the societal tendency to be comfortable in thinking of the present, considering trends as separate pieces and entities, often times can cause disconnection. When pieces are finally connected, “it’s hard to miss the crisis looming” (Dramstad 1996, 9). The potential crisis on the loom is a relapse of an energy boom-bust cycle due to natural gas drilling in land exploited communities and counties, such as Sullivan County.

Marcellus activity has presented itself to the majority of rural Pennsylvania communities. This Marcellus presence can be viewed as an opportunity for land owners to utilize new fiscal influxes to reinvest directly into planned land conversion practices, allowing for new appropriations and new identities for the future of the land, all the while maintaining their cultural identity.

The future of this landscape depends partly on autonomous decisions and actions taken by the local peoples, and their adaptations and responses to the most current events (Primdahl 2010, 148). In addition, this most recent opportunity has potential to create a more synergistic relationship between two of rural Pennsylvania’s cultural trends of resource extraction and farming, edging out the current adverse trends. Land conversion can serve as a productive landscape intervention. Mutability can be planned, allowing for the most relevant or beneficial appropriations, understanding that landscapes themselves are “shifting, living places” and should be planned for adaptation and flux, not control (Mathur and da Cunha 2010).

PROCEEDING IMAGE DESCRIPTIONS

The proceeding sequences of images represent the possible adaptations by means of planned land conversion driven by Marcellus activity. The images show three conversion stages of the landscape, including active drilling sites, post drilling with a remaining drill pad and access road for maintenance, and post Marcellus activity.

The first perspective represents a traditional landscape in Sullivan County, an open pasture land for dairy farming. The second perspective image represents a likely scenario based on current land conversion trends without Marcellus Shale, turning into a successional forest.

The second set of perspectives features a Marcellus drill with dairy farming still present, showing the character of the landscape with the visual impact of the drill and access road while limiting productive pasture land. The following image represents the persistence of dairy farming, post physical drilling, with maintenance infrastructure left over.

The third sequence of images shows the more likely scenario in which dairy farming ceases amongst the landscape, and the land begins to turn into a scrub successional forest, with and without the presence of the drill rig.

The fourth sequence represents an alternative to the trending scenarios, where the land owner opts to reinvest inherited money from the Marcellus activity back into the land. This scenario suggests that during drilling and during the drilling hiatus, the land could be planned and purposed to become a managed forest, maintaining the agricultural culture and better purposing the land for the future. Post-Marcellus activity, the managed forest could extend out into the landscape areas of the well pad, and the access road could become a pedestrian path for recreational usage. One example shows the managed forest dual purposed for harvest and horse riding.

The final sequence of images substitutes traditional dairy farming with the idea of biomass farming as a less labor intensive agricultural practice. In addition, this option introduces people into the landscape to a more engaging degree through the entirety of the land conversion process. The intent of introducing people is to expose them more directly to the source of their energy. Recently, there seems to be a strong disconnect between people and their point source of energy. In this manner, whether for or against Marcellus activity in the region, people have the opportunity to become educated on it's process, the sacrifices made for energy, and the process of a landscape in conversion. For instance, people may be more inclined to turn their lights off, once they realize the underlying sacrifices made for their house to be lit. This opportunity allows for the landscape to adapt more unseemingly, where the biomass can occupy all areas outside of the well and access road. When drilling activity ceases for good, the biomass can be expand and overtake the once barren scars on the landscape, appropriated for a different usage.

AGRICULTURAL LAND CONVERSION: DAIRY FARM AS EXISTING CONDITION

EXISTING SITE CONDITION

SITE CONDITION BASED ON CURRENT TRENDS_FOREST



AGRICULTURAL LAND CONVERSION: SUCCESSIONAL FOREST AS TRAJECTED CONVERSION TREND

EXISTING SITE CONDITION_DAIRY FARM

SITE CONDITION BASED ON CURRENT TRENDS_FOREST



AGRICULTURAL LAND CONVERSION:DAIRY FARM REMAINING ACTIVE

DAIRY FARM WITH ACTIVE MARCELLUS DRILLING

DAIRY FARM POST ACTIVE MARCELLUS DRILLING



AGRICULTURAL LAND CONVERSION: DAIRY FARM REMAINING ACTIVE

EXISTING SITE CONDITION

DAIRY FARM POST ACTIVE MARCELLUS DRILLING



AGRICULTURAL LAND CONVERSION: VACATED LAND AS TRAJECTED CONVERSION TREND

CONVERSION TREND WITH ACTIVE MARCELLUS DRILLING

CONVERSION TREND POST ACTIVE MARCELLUS DRILLING

CONVERSION TREND POST MARCELLUS ACTIVITY



AGRICULTURAL LAND CONVERSION: VACATED LAND AS TRAJECTED CONVERSION TREND

CONVERSION TREND WITH ACTIVE MARCELLUS DRILLING

CONVERSION TREND POST ACTIVE MARCELLUS DRILLING

CONVERSION TREND POST MARCELLUS ACTIVITY



CONVERSION TREND WITH ACTIVE MARCELLUS

CONVERSION TREND POST ACTIVE MARCELLUS DRILLING

CONVERSION TREND POST MARCELLUS ACTIVITY

AGRICULTURAL LAND CONVERSION: VACATED LAND AS TRAJECTED CONVERSION TREND



AGRICULTURAL LAND CONVERSION: ALTERNATIVE SCENARIO AS MANAGED FOREST

CONVERSION ALTERNATIVE WITH ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST MARCELLUS ACTIVITY



AGRICULTURAL LAND CONVERSION: ALTERNATIVE SCENARIO AS MANAGED FOREST

CONVERSION ALTERNATIVE WITH ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST MARCELLUS ACTIVITY



AGRICULTURAL LAND CONVERSION: ALTERNATIVE SCENARIO AS MANAGED FOREST

CONVERSION ALTERNATIVE WITH ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST MARCELLUS ACTIVITY



AGRICULTURAL LAND CONVERSION: ALTERNATIVE SCENARIO AS A BIOMASS FARM

CONVERSION ALTERNATIVE WITH ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST MARCELLUS ACTIVITY



AGRICULTURAL LAND CONVERSION: ALTERNATIVE SCENARIO AS A BIOMASS FARM

CONVERSION ALTERNATIVE WITH ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST MARCELLUS ACTIVITY



AGRICULTURAL LAND CONVERSION: ALTERNATIVE SCENARIO AS A BIOMASS AND WIND FARM

CONVERSION ALTERNATIVE WITH ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST ACTIVE MARCELLUS DRILLING

CONVERSION ALTERNATIVE POST MARCELLUS ACTIVITY



CONCLUSION

“The things that truly last when men and times have passed, / They are all in Pennsylvania this morning.” Over a century after Rudyard Kipling stated this as part of a poem, many people today may still have similar outlooks toward the Pennsylvania landscape. While the landscape has inevitably been changed as a result of both human and natural interventions, the pastoral countryside ideal is deeply embedded in the American psyche (Primdahl 2010, 198). In recent years, with the introduction of Marcellus Shale activity upon the landscape, rural communities face new interventions that may additionally accelerate land conversion and changes in the cultural characteristics of the landscape. Along with the most recent pressure upon the landscape come newly founded opportunities that utilize this gas boom in order to design for planned land conversion. Landscapes can be planned so that the connection between farming and the community is revitalized, contributing to a greater well-being and simultaneously diverting a relapse of an energy bust. While unlimited job opportunities and improved migrations of income classes may not be immediately attainable, an improved quality of life is achievable. Land owner awareness of the available planned land conversion opportunities has a direct impact on landscapes and community vitality during and after Marcellus Shale activity. A cohesive relationship between planned land conversion and informed owner decision has the opportunity to improve quality of life in exploited and disenfranchised rural towns while maintaining and expanding cultural amenities of rural Pennsylvania.

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