Assessing the Future:

The Impacts of Development on Steamboat Springs, Colorado

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Abstract

The residents of Steamboat Springs, Colorado are continually faced with new propositions for accommodating population growth, but do not possess the proper tools for comparing the potential impacts of different options. In this thesis, I construct four alternative futures for Steamboat Springs, based on realistic options of growth trajectories. Using a visual survey technique combined with geospatial impact modeling, I then test the impacts of each scenario on concerns identified as being most important by the community.

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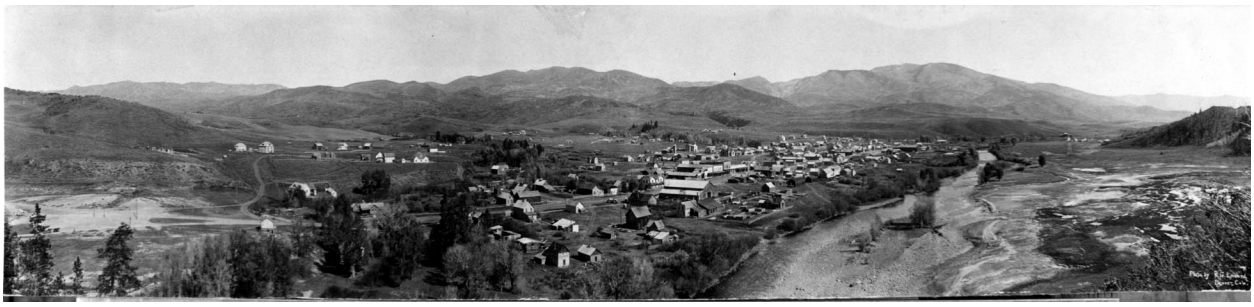


Figure 1: Steamboat Springs, Looking East Towards Storm Mountain, 1910's
Source: Tread of Pioneers Museum

The last few years have been eventful in Steamboat Springs, Colorado. Residents witnessed extraordinary increases in real estate wealth and construction activity during the boom, and have since dealt with a reordering of society and local economic hardship caused by the recession. Even now, many different interests are posing important questions for the future of the Yampa Valley, from a large annexation proposal to ideas on transferring development rights (TDR). With each new proposal comes a host of questions about how a particular project or policy might affect Steamboat Springs and its residents, and the community lacks the proper tools for exploring potential answers.

My interest in these issues comes from two sources: I am a Steamboat Springs local, and I am finishing graduate studies at the Department of Urban Studies and Planning at MIT. In this thesis, I apply the skills I have recently learned as a planner to a cause I care very much about, to provide an example for how residents of Steamboat Springs might think about the potential impacts of future development and growth policies within an ordered and consistent framework. Such a tool could lead to more informed local debate and decision making processes.

To begin exploring how different types of growth might affect our community, four alternative future scenarios are presented here, which represent plausible possibilities for the urban extent and character of Steamboat Springs in 2030. Accompanying each is a simple indicator representation of the impacts of that scenario on five concerns of our community: Open Space, Community Character, Ranching and Farming, Affordability, and quality of views within the Yampa Valley.

The scenarios and impacts presented here obviously do not represent a comprehensive study on the future of Steamboat Springs. They are simple, uncalibrated simulations, and not intended to be used as predictions of the future. This project was undertaken with the goal of providing an effective tool with which to begin a conversation about potential impacts of various assumptions about future growth, and it would be most valuable to the Steamboat Springs community if the process was repeated with active local participation, so that participants would gain a personal understanding of the thinking process involved.

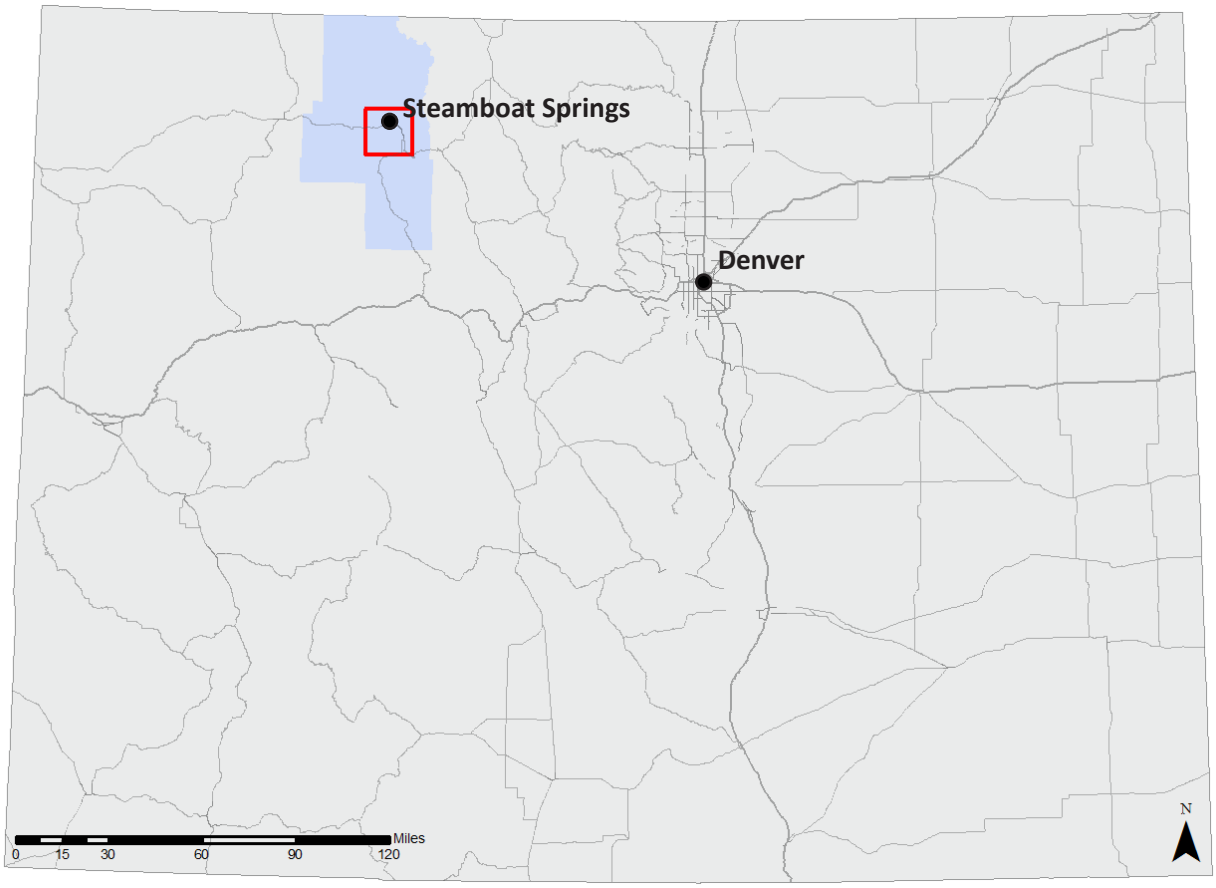


Figure 2: The Study Area

225 square miles around Steamboat Springs, in Routt County, Colorado.

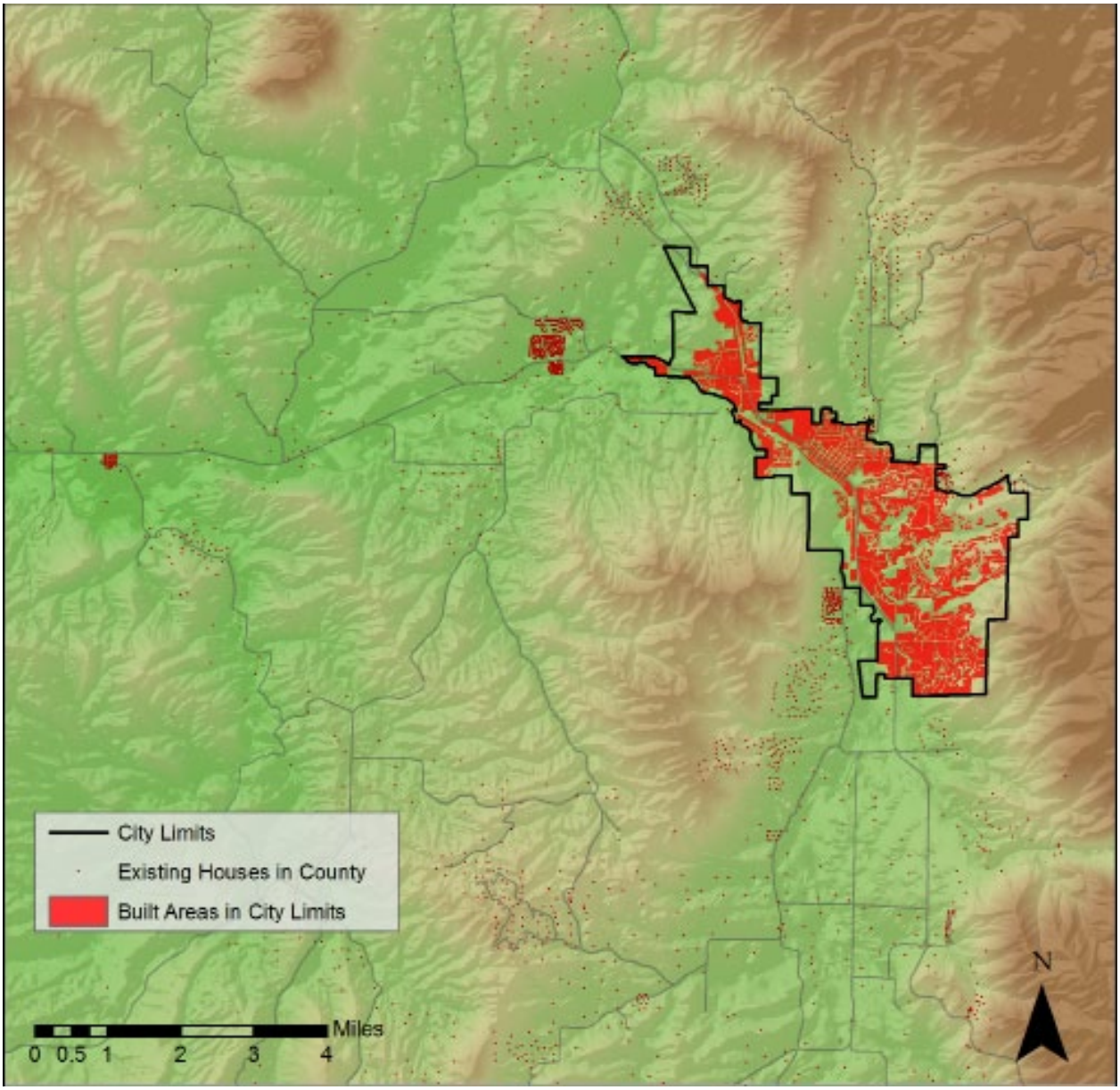


Figure 3: The Study Area, 2010

225 square miles around Steamboat Springs, in Routt County, Colorado.

7,089 housing units and 12,172 people inside city limits
1,895 housing units and 3,260 people outside city limits

Total study area population: 15,442

Planning Methods Used

This study uses tools and techniques from the landscape and urban planning fields to investigate the major uncertainties of future urban growth in the Yampa Valley, and how they will impact those aspects of our community we care most about. I am writing this thesis in the hope that it will inform and stimulate Steamboat Springs' community planning efforts during this critical period of re-visioning our future.

Many are suspicious of the planning profession and planners in general, because of the profession's legacy of regretful decisions. However, planning offers several valuable tools and methods for improving places, and I remain a supporter of planning's founding hypothesis: that if a place is planned, it will be better in the future.[1] There are many ways that Steamboat Springs could use *good* planning to its benefit, including as a "form of local resistance to [the] homogenizing forces"[2] presented by the continuing development pressures we face in the valley. Further, the assumptions and methods used in this paper will be clearly explained, so that readers can judge for themselves how much value to stake in my conclusions.

The analysis in this study is accomplished using a scenario planning technique, working at the landscape scale. For planning purposes, a landscape is considered to be an area "several kilometers wide,"[3] encompassing social, geographic, and ecological components. Landscape planners argue that planning at this scale makes sense because many 'self-organizing' environmental and economic phenomena occur across landscapes, and understanding the nature, trajectory and intensity of these processes requires adjusting one's perspective to consider the whole.[4] Many of the local factors driving change in the Yampa Valley, such as parcelization, population growth, and land use change transcend jurisdictional boundaries, so addressing them comprehensively requires landscape-scale strategies.

The field of landscape planning offers a framework for ordering landscape-scale projects, and has developed a unique set of values and strategies. Landscape planning can be considered a bioregional strategy, considering spatial and temporal scales that transcend political and economic cycles.[5] The goals of landscape planning are to conserve and enhance a place's natural and cultural heritage, plan for the sustainable use of the area's natural resources, and promote sustainable economic and social development.[6] Put another way, landscape planning aims to improve and preserve the "condition, character, functionality, and vibrancy of landscapes."[7] A sustainable landscape in this case would be one where economic value comes from capitalizing on and reinforcing the uniqueness of place.[8]

This study also utilizes alternative futures scenario planning, which was originally developed by Royal Dutch/ Shell in the early 1970s as a way to improve their financial performance in an uncertain future.[9] Scenario planning is a technique where key uncertainties are identified, and different plausible futures are modeled based on different assumptions about input variables.[10] Instead of attempting to accurately predict a likely single future, scenario planning allows communities to test current ideas against a range of possible

1 Neuman, Michael, "How We Use Planning: Planning Cultures and Images of Futures," in: Hopkins, Lewis D. and Zapata, Marisa A. Eds. Engaging the Future: Forecasts, Scenarios, Plans, and Projects, Lincoln Institute of Land Policy, Cambridge, MA, 2007.
2 Selman, Paul, Planning at the Landscape Scale, Routledge, New York, 2006, p 13.
3 Richard Foreman.
4 Selman, p. 49.
5 Selman, p. 102.
6 Selman, p. 149.
7 Selman, p. 168.
8 Selman, p. 173.
9 Phelps, R. et. al., "Does Scenario Planning Affect Performance? Two Exploratory Studies," Journal of Business Research, number 51, 2001, p. 223.
10 Steinitz et. al. "A Sustainable Path? Deciding the Future of La Paz," Environment, vol 47, Iss. 6, 2005, p. 26.

futures, so that decision makers can assess the relative future impacts of taking different actions today.[11] As such, scenario planning provides a broad and useful basis for thinking about uncertainty in the future.[12]

Scenario planning is appropriate when a planning process is considering long time frames and where significant change is likely, but the outcomes are not obvious, and where stakeholders have conflicting and heterogeneous interests and values.[13] The technique can also help when issues under study might cause multiple benefits and costs for different people at different times, resulting in such complexity and uncertainty that deliberate forecasting can be hard or impossible. It is precisely in these complex, difficult situations that scenario planning is most appropriate, when the goal is to understand the range of uncertainty in a situation, instead of searching for straightforward answers. Scenarios can also create unexpected benefit when they are used strategically, by stimulating participants to think about the so-called third area of knowledge, or "things we don't know we don't know."[14]

Scenarios are designed to be used in groups. A single scenario doesn't have much utility, because the assumptions and projected future contained within it will almost certainly be wrong. Scenarios are not intended to present accurate representations of the future, but rather a range of plausible futures that help us think about the ramifications of the decisions we make today.

Although different opinions exist, there seems to be a general agreement that limiting the number of scenarios produced and impacts modeled greatly aids in public comprehension of a study. Some have said that using four scenarios is best- that five adds too much variation and complexity, and that using only three encourages a simplistic low/ middle/ high mentality, where both the low and high scenarios get discounted in people's thinking.[15] The final mix of scenarios should be "a set of reasonably plausible, but structurally different futures,"[16] that group variable values together in ways that form internally consistent stories about the future.

In each scenario, the outcome of the modeled future will be affected much more by the input assumptions than by any level of sophistication in the model.[17] For this reason, scenarios shouldn't be a product developed in a black box and then foisted upon the public, but instead the process of creating them should be used to increase public understanding of how different actions may perform in the future. For this particular study, constant stakeholder involvement was unrealistic up to this point. If, however, the community finds this process useful in making decisions about our future, then this document could become the first phase of a longer, more inclusive process.

There are several criticisms of using scenarios in planning. In the past, some scenario planning processes have presented a "smart-growth" scenario or some equivalent versus a "trend" scenario, using a mix of indicators to show the superiority of the former. Planners' efforts at biasing study results to reflect favorably on their preferred scenarios has even gone as far as failing to use the best data available and manipulating numbers to make their preferred scenarios look

11 Steinitz, Carl et. al. Alternative Futures for Changing Landscapes: The upper San Pedro River Basin, Island Press, Washington D.C., 2003.

12 Deal, Brian, and Pallathucheril, Varkki George, "Developing and Using Scenarios," in: Hopkins, Lewis D. and Zapata, Marisa A. Eds. Engaging the Future: Forecasts, Scenarios, Plans, and Projects, Lincoln Institute of Land Policy, Cambridge, MA, 2007, p. 221.

12 Avin, Uri, "Using Scenarios to Make Urban Plans," in: in: Hopkins, Lewis D. and Zapata, Marisa A. Eds. Engaging the Future: Forecasts, Scenarios, Plans, and Projects, Lincoln Institute of Land Policy, Cambridge, MA, 2007, p. 131.

14 Schoemaker, Paul JH, "Scenario Planning: A Tool for Strategic Thinking," Sloan Management Review, vol. 36, number 2, ABI/ INFORM Global, Winter 1995, p. 38.

15 Smith, Erik, "Using a Scenario Approach: From Business to Regional Futures," in: Hopkins, Lewis D. and Zapata, Marisa A. Eds. Engaging the Future: Forecasts, Scenarios, Plans, and Projects, Lincoln Institute of Land Policy, Cambridge, MA, 2007, p. 98.

16 Avin, p. 107.

17 Klosterman, Richard, "Deliberating About the Future," in Hopkins, Lewis D. and Zapata, Marisa A. Eds. Engaging the Future: Forecasts, Scenarios, Plans, and Projects, Lincoln Institute of Land Policy, Cambridge, MA, 2007, p. 200.

better.[18] This legacy leaves the public understandably distrustful of planning. This is another argument for making the process of scenario creation as transparent and simple as possible.[19] This study will work toward transparency by clearly explaining all the assumptions and modeling strategies that are used to generate scenarios, and by including appendices with information clarifying terminology and process.

18 Avin, p. 106.

19 Moore, Terry, "The Use of Forecasts in Creating and Adopting Visions for Regional Growth," in: Hopkins, Lewis D. and Zapata, Marisa A. Eds. Engaging the Future: Forecasts, Scenarios, Plans, and Projects, Lincoln Institute of Land Policy, Cambridge, MA, 2007, p. 26.

The Dynamics of Growth in the West

The first step in any alternative futures scenario planning study is to define the problem. What follows is a brief summary of the trends that have led to the current development landscape in the West, and a discussion on why their impacts warrant study.

The American West has captured Americans' interests and imaginations since its first exploration by Europeans. The West continues to be the country's fastest-growing region, growing faster than the nation as a whole for nine of the last ten decades.[1] Over the next forty to fifty years, the region's population is expected to double, and half of the West's remaining open lands are slated for development.[2] In western resort communities, the pressure is even stronger: between 1990 and 2000, the ten American counties that experienced the highest growth in median home prices were New York City, Nantucket, and eight western ski resorts.[3]

These statistics reveal a different story of western economic and development history than has been popularly accepted in the past. Whereas western history is popularly conceptualized in terms of boom-and-bust cycles, in reality the western settlement trajectory has been one of cumulative expansion, tempered here and there by passing periods of economic hardship.[4]

An important driver of population growth in the West has been amenity migration. Generally, amenity migration is defined as people moving to places with greater environmental quality and more differentiated culture than where they come from.[5] Mountain areas meet these criteria, presenting both great access to remaining pieces of the earth's natural habitat, and often-lively resort communities. Amenity migrants also defy the accepted rule that population follows jobs. People seeking "quality of life" experiences can now easily work in location-neutral jobs,[6] commute back to major cities on high-speed roadways, or take advantage of convenient and continually expanding air service.[7] Resort communities in Colorado have been described as today's air-travel suburbs of far-away cities.[8]

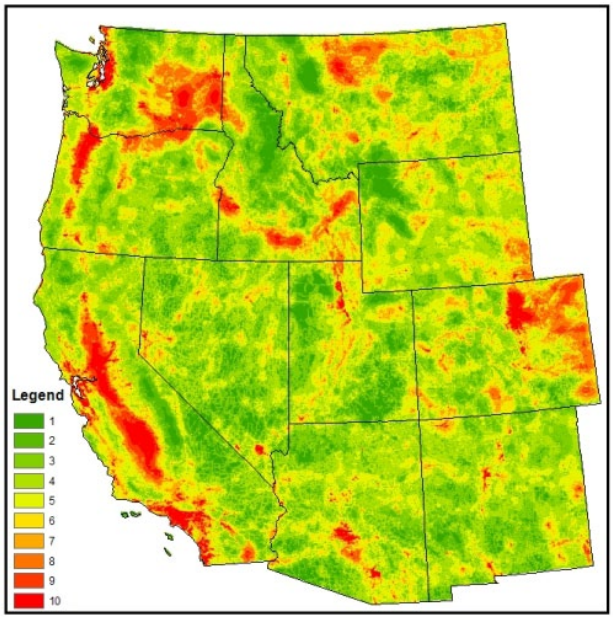


Figure 4: Human Footprint Intensity in the Western U.S.: low in green to high in red.
Source: http://sagemap.wr.usgs.gov/HumanFootprint.aspx

Amenity migration to mountain areas is also facilitated by the rise of comfort amenities in remote areas. Urban dwellers no longer have to leave the comfort of the city behind: many resort communities now boast world-class medical facilities, civil infrastructure and services, and cultural venues and events.[9]

1 Travis, William R., New Geographies of the American West: Land Use and the Changing Patterns of Place, Island Press, Washington D.C., 2007, p. 4.
2 Travis, p. 7.
3 The Charture Institute, www.charture.org.
4 Travis, p. 8.
5 Moss, Laurence A. G., "The Amenity Migrants: Ecological Challenge to Shangri-La," in: Moss, Laurence A. G., The Amenity Migrants: Seeking and Sustaining Mountainsand their Cultures, CABI, Cambridge, MA, 2006, p. 3.
6 Interview with Tom Leeson.
7 Moss, p. 7.
8 Leeson.
9 Moss, p. 13.

The settlement patterns and demographic profiles of amenity migrants vary widely. Some purchase homes, while others are serial migrants, only remaining in a specific place for a short period of time. The migrants' level of impact on the communities they move to can also be variable: in Jackson Hole for instance, the twenty-something's who moved to town right out of college generally rented and declined to participate in the community. Retirement age migrants, however, were much wealthier, purchased homes, and were actively involved.[10]

Amenity migrants are a complex stakeholder group, but generally bring and attempt to maintain their urban values and behavioral norms.[11] Because of this, especially when they are wealthy, amenity migrants can upset old rhythms and community traits through changing cultures and engaging in conspicuous consumption to a degree out of reach for most locals.[12] While these new residents do bring benefits like job creation with them, important questions remain: How many jobs? Of what type? And, serving whom?

Amenity migration has also helped fuel the latest in a series of booms in development and real estate speculation that have driven most of the historical change in the West.[13] Indeed, in most western resort communities, real estate now dominates economies over skiing and other

Figure 5: Second Homes In Steamboat Springs

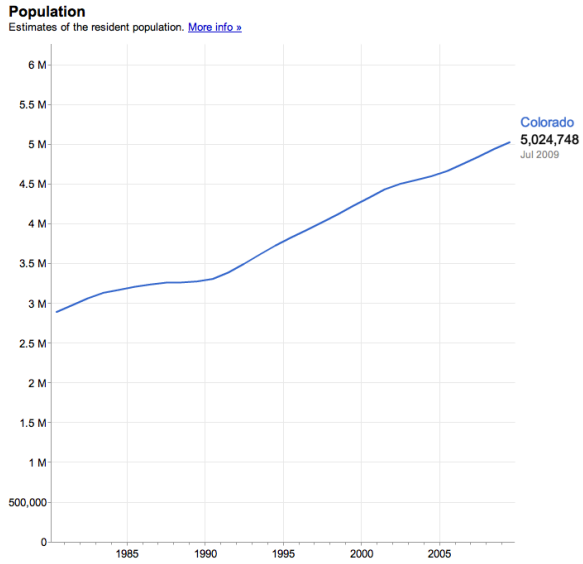


Figure 6: Population Growth in Colorado, 1980 - 2010

Source: http://www.google.com/publicdata

tourist draws.[14] While amenity migration has contributed to the increasing commoditization of mountain cultures and environments,[15] the local private sector, and especially the real estate and land development professions, have also chased short-term profits, regardless of long-term consequence.[16] It is incredibly difficult to stem the development trend, when western agricultural land is worth on average $500 per acre under current use, but could be worth on average $80,000 per acre if converted for residential development.[17]

Through what has been described as the "house-building industrial complex,"[18] the destruction of place and fragmentation of landscape have become such normal conditions of everyday life in resort communities that to question them seems to be taking a step away from the real world.[19] In many communities, residents and planners alike still feel that any and all "growth" means progress, and that that's good. However, through a series of incremental and non-strategic decisions about growth, this attitude has helped transform the mountain landscape in a way that is detrimental

10 Lynch, p. 98.
11 Moss, p. 21.
12 Moss, p. 17.
13 Wright, John B., Rocky Mountain Divide: Selling and Saving the West, University of Texas Press, Austin, 1993, p. 251.
14 Travis, p. 153.
15 Moss, p. 7.
16 Moss, p. 20.
17 Travis, p. 150.
18 Travis, p. 179.
19 Wright, p. 252.

to both mountain ecologies and local communities.[20] What is needed is a conceptual decoupling of growth from development, where "growth is a quantitative increase in the physical dimensions of an economy by accretion or assimilation of material, while development is the qualitative improvement of the physical stocks of wealth that results from greater knowledge of technique and purpose."[21] While everyone wants the latter, many confuse the means of obtaining it with the former. It is clear that the commoditization of the West for consumption, consumerism, and material accumulation degrades local community character and environmental health, but successfully addressing the issue will require a cultural shift.[22]

Planning and zoning have had only marginal effect on regulating growth to date. Between 75% and 95% of all subdivided parcels in the West have been platted and sold without any evaluation of environmental, social or economic impacts.[23] Even where planning happens, it isn't effective for several reasons. There is no integration of physical, socio-cultural and economic concerns in land planning. Jurisdictional differences impede effective control on land use,[24] and state-level governmental help is absent even though many growth dynamics happen at regional scales that cut across multiple jurisdictions.[25] Western culture also leaves many suspicious of planning efforts, perceiving another instance of government interference with the market and individual rights.[26] Citizens are also confused about what constitute realistic expectations. A Park City focus group revealed that people wanted to simultaneously limit growth *and* promote private property rights, regulate development *and* promote a free market, and retain a healthy and diverse community without subsidizing housing.[27]

Even though the West harbors a predominantly urban population, people are still moved by the myth of the western frontier, and want to live as close to open space as they can afford. Unfortunately, this dynamic often results in linear patterns of sprawl that have much more edge per unit of urbanized area than more compact forms of development, and therefore much greater negative impact on the wild-urban interface.[28] Planning to regulate this type of suburban and exurban development is difficult, because its incremental impact makes it hard to coherently picture the cumulative effects and draft regulations before the damage has been done.[29]

What is needed is a new, comprehensive landscape approach to planning that emphasizes both community and the commons: Public decision-making should be re-established as a strategic societal value over individualism.[30] Ideally, land use planning should help create desirable community development patterns while meeting peoples' expectations for quality of life,[31] and to accomplish that goal, plans must have the support of officials, citizens, and developers alike.

Currently, local governments make most planning decisions in relative isolation, resulting in inefficient land use patterns.[32] If instead we could coordinate land use planning between communities and integrate strategies across landscapes, a much more efficient, and ultimately sustainable, land use arrangement could be achieved. This can be accomplished in part by increasing community engagement, and by improving the use of data and simulation tools to communicate planning ideals to the public.[33] An important complement to this public sector planning is to assist NGOs and voluntary efforts that create land trusts and purchase development rights to work toward planning goals through the market.[34]

20 Moss, p. 21.
21 Moss, p. 20.
22 Moss, p. 314.
23 Wright, p. 252.
24 Moss, p. 21.
25 Travis, p. 182.
26 Moss, p. 21.
27 Travis, p. 150.

28 Travis, p. 105.
29 Travis, p. 130.
30 Moss, p. 314.
31 Travis, p. 180.
32 Travis, p. 191.
33 Travis, p. 198.
34 Wright, p. 252.

Steamboat Springs

Figure 7: Steamboat Springs from Crawford Hill, late 1800s
Source: Tread of Pioneers Museum

Steamboat Springs has experienced many of the above dynamics, though obviously with local variations. According to data from the Census bureau, over the last twenty years, Routt County's population grew by 9,381 people, or 67%, from 14,088 people in 1990 to 23,469 in 2009. Steamboat Springs' share of that population remained relatively constant, growing from 50% to 52% of the county total over the same period, or from 7,109 people in 1990 to 12,172 people in 2009.[1]

To many, the magnitude of development that has been transforming Steamboat Springs during the last decade seems to far outweigh what would be expected for accommodating the two thousand new residents that moved to the city over the same period. Explanations include a shift toward the construction of more high-end second homes that helped drive Steamboat Springs' vacancy rate up from 40.27% in 2000 to 45.32% in 2009.[2]

The real estate boom also drove over-building of both commercial and residential property as speculative interests artificially inflated demand. At the peak of the bubble, Steamboat Springs had 450 real estate brokers, or one broker for every 27 residents. The result has been a significant change in the built character of Steamboat Springs over a relatively short period, which has led many city residents to develop a mistrust of local planning processes and fatigue for accepting new development projects.

After the recent voter rejection of a major annexation in March, the community has much to consider about the future growth trajectory of Steamboat Springs. According to Tom Leeson, former director of planning for Steamboat Springs, the "Steamboat 700" annexation proposal adhered almost perfectly to the West of Steamboat Springs Area Plan (WSSAP), which had been drafted by the city and county in 1999, and later updated in 2006. The city felt they had

1 Steamboat Springs Department of Planning and Community Development, Population Estimate Report.
2 Steamboat Springs Department of Planning and Community Development.

Figure 8: Steamboat Springs Looking West Toward the Sleeping Giant, 1960s
Source: Tread of Pioneers Museum

negotiated the best deal possible for the community, holding their ground on all of their demands in return for granting the annexation. The Steamboat 700 developers, who were proposing a 2,000 unit, masterplanned, New-Urbanist community adjacent to city limits, had agreed to either pay all costs of improving and expanding infrastructure to serve the development, or else to bring in state-level funding partners such as CDOT, to minimize costs paid by the local community.

Voters rejected the Steamboat 700 annexation by

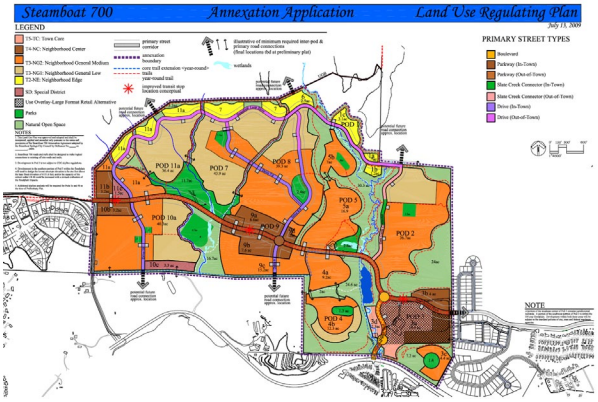


Figure 9: The Steamboat 700 Annexation Proposal
Source: Steamboat 700, LLC

a margin of 61% against to 39% in favor. Was this firm rejection really only because people were nervous about the size and other details of the project, or is it because voter values have somehow shifted from the strategy set out in the WSSAP?

Two key assumptions informed arguments in favor of the Steamboat 700 annexation. The first was that significant new demand would indeed emerge, and the second was that there is not sufficient capacity to accommodate that new demand inside city limits. The Steamboat 700 was argued to present an ideal means of increasing Steamboat Springs' housing supply.

Moving forward, assuming new demand will continue to materialize, Steamboat Springs' character must change in one of two ways. If we decide not to accommodate new growth, we will continue losing the middle class as prices climb and decent housing becomes more unaffordable. The other choice is to accommodate all new demand, thereby keeping prices low, but changing the community by adding significant new population. Either option would significantly alter the character of Steamboat Springs.

In 2008, the Colorado State Demographer's Office projected 71% growth in Routt County by 2030, increasing the total population to 39,964 people, from 23,402 in 2008.[3] Assuming that Steamboat Springs' share of the total county population and its vacancy rate continue to remain constant, these numbers represent a need for over 5,000 new housing units within the study region by 2030. In 2008, this projection seemed to be reasonable: Steamboat Springs approved entitlements for 497 new housing units in 2007, bringing the total to 1,541 units approved between 2004 and 2008, and the pace of development was accelerating at an average rate of 18% year over year during the same period.

At the same time growth was exploding in town, city officials and citizens alike had a feeling that little additional population could be accommodated within city limits. The 2004 Steamboat

3 http://dola.colorado.gov/dlg/demog/index.html

Springs Area Community Plan predicted a total remaining infill capacity of only 313 units. It seemed that Steamboat Springs would quickly become the next Telluride or Aspen if something wasn't done to relieve the pressure.

The infill prediction turned out to be wrong, as 1,845 building permits were issued within city limits between the beginning of 2004 and July 1, 2009. A more recent buildout analysis undertaken by city planning staff found room for an additional 3,112 new housing units and 1,207,359 sq. ft. of non-residential building space within city limits as of January 1, 2008. This left room for 2,808 additional units as of July 1, 2009. These numbers are much higher than previously predicted, but also don't consider redevelopment opportunities, so the actual capacity to add housing in Steamboat Springs would be even higher.

Another important component of Steamboat Springs' ability to accommodate new population lies in the existing supply of housing. There are currently 1,025 dwelling units listed for sale on the Multiple Listing Service (MLS) in the Steamboat Springs area, excluding Hayden, Oak Creek, and Stagecoach. (The actual number would be a couple hundred units higher, because of large-scale projects like Edgemont and One Steamboat Place that sell units directly, instead of listing with MLS.) Anecdotally, based on the current local absorption rate, just these units represent 27 years of supply. A closer look, however, reveals that the median listing price of the homes on the market is $585,000. The census bureau estimated Routt County's median household income to be $63,085 in 2008. At that income level, a 6% 30-year mortgage would be unaffordable at $2,800 per month; even assuming a family could come up with the $117,000 for a 20% down payment. Another important factor to consider is how many of the houses for sale actually represent an accommodation resource for new population, and how many are locals trying to "downsize" and move somewhere else in town.

Luckily for lower-income families, real estate prices in Steamboat Springs are coming back down. This is in keeping with the economic theory that elasticity in supply prevents real price appreciation. A real-estate economic study that analyzed trends in real estate prices at Loon Mountain ski resort, in New Hampshire, found long-term prices were actually negative when adjusted for inflation, because every positive demand shock was followed by excessive development.[4] This is the same dynamic we are now witnessing in Steamboat Springs, and it suggests that if we keep building the way we have been, we should expect prices to eventually return to equilibrium somewhere around an inflation-adjusted long-term price average.

As for the demand side of the equation, development of new housing has also slowed considerably, with only 13 building permits issued in the first half of 2009. The recession has deepened in Steamboat Springs since then. The most recent population estimate by the Steamboat Springs planning department showed a population loss and growing vacancy rate beginning in January 2009, and the rate of loss has surely increased as more local jobs have been lost.[5][6] Though this trend will surely change at some point in the future, it suggests a reconsideration of population projections is in order. The decision on how and when Steamboat Springs should accommodate growth should be determined by how long the current supply of housing and infill capacity will continue to meet demand.

When supply does run out, there are several options for how to create more. Inside city limits, several possibilities exist to create more room. Setback rules could be relaxed, in anticipation of higher values and growing intensities in the mixed-use zones in town. These areas could conceivable densify to 15-25 units per acre. There is also the possibility of reducing the minimum lot size in town to 4,500 square feet from the current 6,000. These options would affect Steamboat Springs' urban character and could divide

4 Wheaton, William C. "Ski Resort Real Estate: Does Supply Prevent Appreciation?" Journal of Real Estate Research, Volume 27, No 1, 2005.

5 Steamboat Springs Department of Planning and Community Development, Buildout Analysis, 2008.

6 Steamboat Springs Department of Planning and Community Development, Population Estimate as of July 1, 2009.

the community. However they aren't unrealistic either: at the community meeting held to collect data for this thesis in January, 43% of participants indicated that they would be willing to allow another house to be built between them and their neighbor.

Beside higher density's direct effect of making it possible to put more housing units into the same land area, it also allows developers to build more cost-effectively, where economies of scale make building affordable housing possible. A recent example can be found in the construction of Howelsen Place, where a 4th floor was allowed because it became affordable housing.[7]

Looking outside of Steamboat Springs' city limit, there are several options for accommodating new growth. One possibility is evidently the transfer of development rights from large agricultural parcels in the county onto five-acre lots in a demarcated receiving zone West of town. It should be noted that TDR could also be used to transfer rights onto smaller parcels, or even into Steamboat Springs. Another possibility is the creation of new growth centers in the county like Steamboat II or Stagecoach. Lastly, Steamboat Springs has many annexation options. The most recognized is the Steamboat 700 property, but there are a number of smaller parcels ringing city limits that could also provide new area for the town to grow.

Ultimately, any new growth strategy will probably incorporate both infill and annexation elements in the long run, and growth in unincorporated areas of Routt County will also surely occur. The key questions revolve around successfully anticipating and managing the local real estate market to maximize beneficial social outcomes, while retaining the highest level of freedom in future decision making.

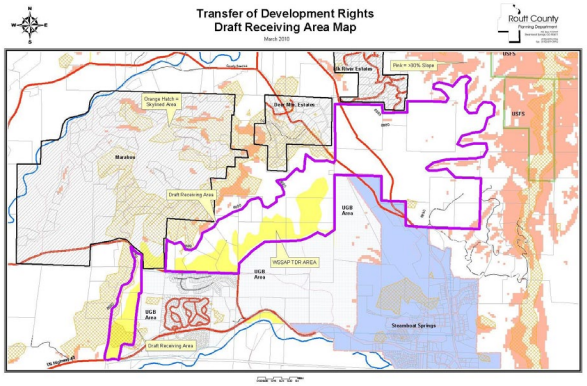


Figure 10: Draft TDR Receiving Area West of Town
Source: Routt County Planning Department

7 Tom Leeson.

Study Overview

As mentioned above, this is an alternative futures/ scenario planning project, using visual preference and spatial indicators to model the impacts of different future development outcomes. Studies like this one are dependent on stakeholder involvement for generating input assumptions and finding utility in local decision making processes. And, if stakeholders trust a study because they helped dictate its parameters, they will be more likely to use it.

To gather community input, a public meeting was held in Olympian Hall at Howelsen Hill on January 14, 2010. While the main purpose of the meeting was data collection, it also served to familiarize a group of citizens with the study. The meeting was advertised in the Steamboat Pilot along with an article outlining the study motives and content, and around 140 people came.

As meeting attendees filed in, they were each given a copy of a worksheet and a random identification number, and instructed to wait to begin filling anything out until after the presentation. The meeting lasted around two hours, and was broken down into two parts. First, I gave a brief PowerPoint presentation to review the dynamics of growth in Steamboat Springs and familiarize attendees with the study process and objectives. Then, after taking questions, the meeting was split up for people to fill out the worksheets they had been given, and take turns participating in the visual survey.

(For a complete reproduction of the meeting worksheet, please see the appendix) The worksheet had several sections for participants to fill out. There was a blank at the top for people to write in their assigned identification number, so that they could remain anonymous and their worksheets could still be linked to their visual preferences. The first section consisted of a list of 14 community characteristics or concerns that had been identified as being most important during the earlier Routt County Vision 2030 process, with a 5-value Likert scale next to each. (see figure on next page)

Participants were to score each characteristic 1-5, according to how important the concern was to them. Each value could be assigned a maximum of three times, so that participants would be forced to assign all five scores evenly. Next to the Likert scale was a column where participants were directed to rate the current community performance in addressing each concern/ protecting each asset, etc. For the performance column, each characteristic could be given a value between 1 and 10, with no restriction on how many of the same score could be assigned.

The Likert section of the worksheet was used to determine what the community cared most about, so that modeling efforts in this study could be most effectively allocated. The performance field revealed an approximation of how critical each concern was: for example, a characteristic that people rated as essential and that scored a very low performance value would be most critical. On the other hand, a characteristic that scored low in importance and high in performance would be least critical. The two values taken together show how well the community is managing its own interests, and later helped to calibrate the indicators used to measure scenario impacts.

The second page of the worksheet asked several demographic questions: age, sex, and income, about what section of town participants lived in, and whether they owned or rented their homes. These were followed by open-ended questions asking about the participants' thoughts on whether and how growth should be accommodated in town. These questions were also very important, because the answers were interpreted to either confirm or reject the plausibility of different possible alternative futures in Steamboat Springs.

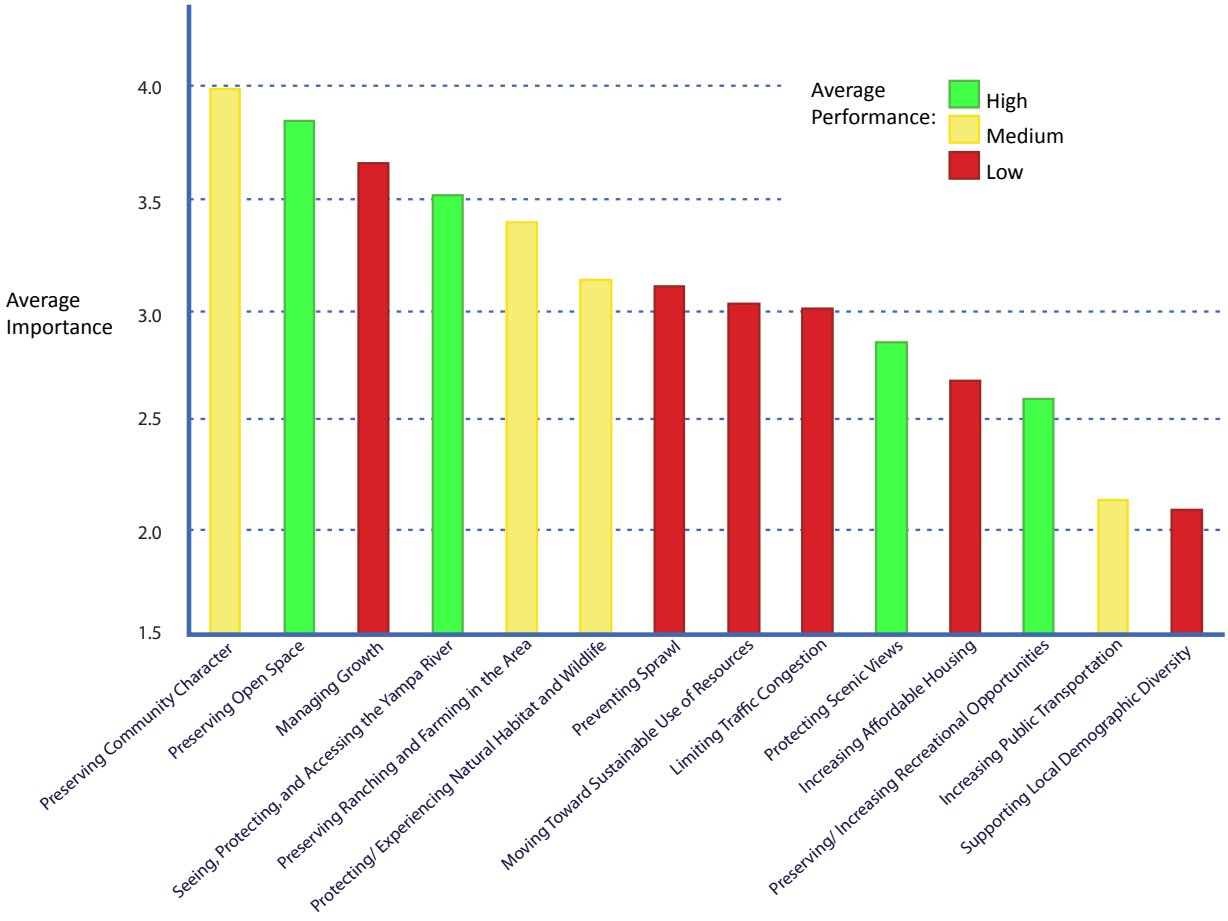


Figure 11: Ranking of Community Concerns

For a full discussion of the visual survey portion of the meeting, please see the Visual Preference section of this report.

The group that attended the meeting was older and wealthier than the average citizen of Steamboat Springs, with an average age of 52.4 years, and a median income of $80,000. They were 48% male and 52% female, and have lived in Steamboat Springs for an average of 23.6 years. 27% were from outside of Steamboat Springs' city limits, and the rest lived fairly evenly distributed between the different areas in town.

The rated concerns fell into three general levels of importance. The five in the most important group were "Preserving Community Character," "Preserving Open Space," "Managing Growth," "Seeing, Protecting, and Accessing the Yampa River," and "Preserving Ranching and Farming in the Area." The high ranking of these five speaks to general concern for the built, social, and aesthetic character of Steamboat Springs. All five factors are inter-related: the vitality of each depends on that of the others.

The average performance values for these top concerns are shown in the figure on the next page. "Managing Growth" was the only concern in the top five ranked in the lowest performance category, while performance for "Preserving Community Character" and "Preserving Ranching and Farming" was rated at a medium level.

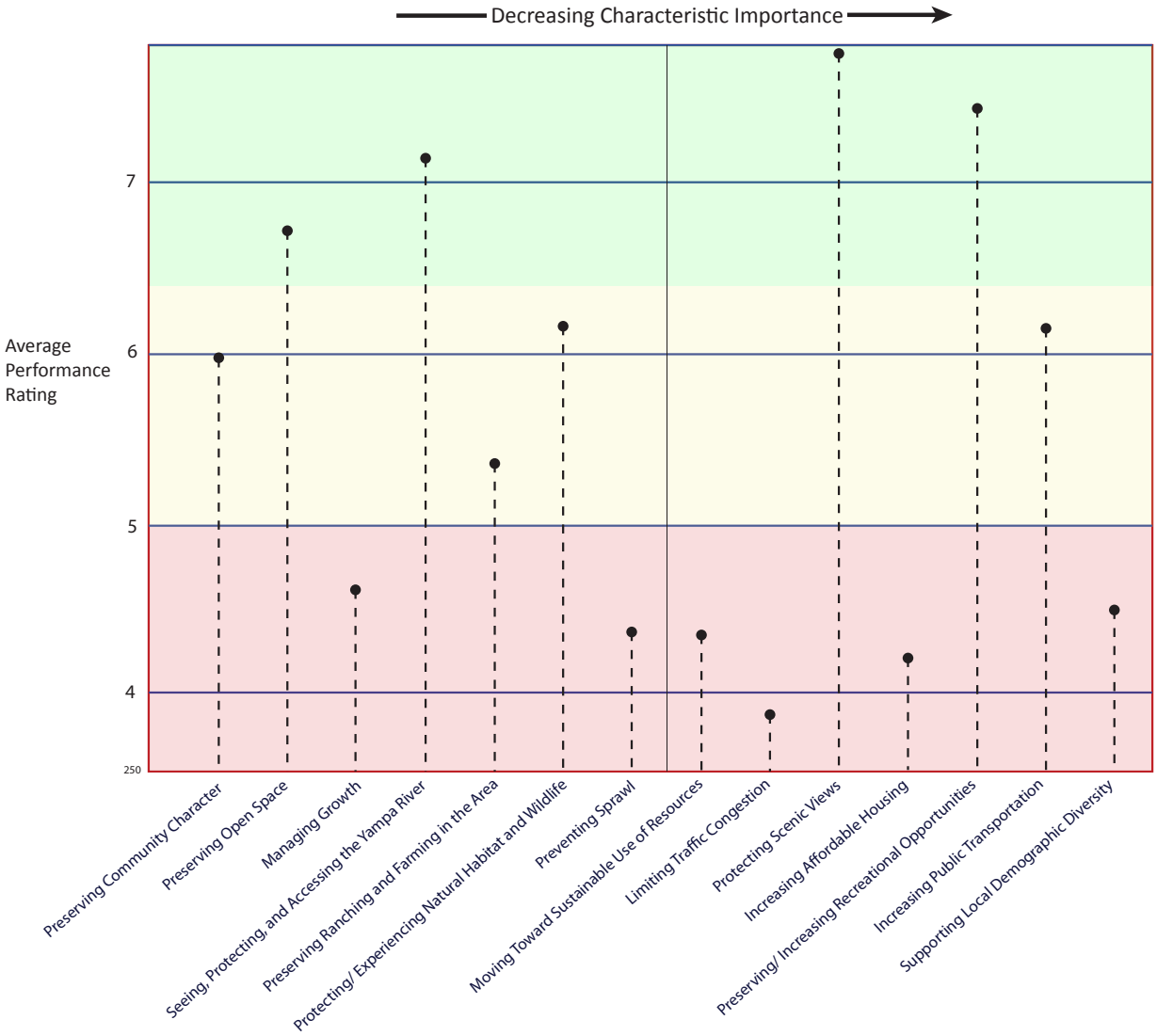


Figure 12: Performance Ratings of Community Concerns

These ratings may be in response to recent real estate and growth dynamics in Steamboat Springs: over the last few years, many have felt like growth in Steamboat Springs was out of control- that the market was an unstoppable force, where profit trumped community consequences. The loss of ranching and farming livelihoods has been tied to the real estate boom, where the economic appreciation and subsequent taxation on agricultural lands makes it economically unfeasible to continue using the land for agricultural purposes.

The 'boom' has also taken a toll on the social and demographic makeup of town, earlier by pushing the lower income segment of the community out because of affordability issues, and lately by continuing to push the working-class population out, because of a lack of jobs. The rest of the community has been affected as well: many of Steamboat Springs' leading families, who provided financial support in recent years for cultural activities, are also struggling heavily. There is some feeling in the community however, that the real estate bust could actually be good- that it is an equalizing force, bringing everyone together again. People are congregating at neighborhood potlucks instead of going out, creating a social environment that harkens "back to the way it was in the old days." The recession has also provided breathing space for consideration of the future. New projects are on hold, and the community

has begun taking a more active hand in determining its own built future, as evidenced recently by the rejection of the Steamboat 700 proposal, and tabling of proposed TDR legislation.

The next five concerns, which were ranked with medium importance, are "Protecting/ Experiencing Natural Habitat," "Preventing Sprawl," "Moving Toward Sustainable Use of Resources," "Limiting Traffic Congestion," and "Preserving Scenic Views." These five encompass environmental concerns and additional aspects of growth management. "Protecting Scenic Views" was given the highest performance value of all concerns, and "Protecting/ Experiencing Natural Habitat" scored a medium performance value. "Preventing Sprawl," "Moving Toward Sustainable Use of Resources," and "Limiting Traffic Congestion" were given performance values among the lowest of all the concerns.

The high score of "Protecting Scenic Views" highlights the scenic quality of the landscape around Steamboat Springs. Most of the higher elevation areas around town are publicly owned and safe from development, and ridgeline development rules and design guidelines help ensure that any new development on private land won't be overly detrimental to views. "Protecting/ Experiencing Natural Habitat" scored a medium performance value, likely because encounters with wildlife are very common in Steamboat Springs, but not necessarily because of deliberate efforts for habitat protection.

"Preventing Sprawl," "Moving Toward Sustainable Use of Resources," and "Limiting Traffic Congestion" were given performance values among the lowest of all the concerns. "Preventing Sprawl" was rated so lowly in January, when a "smart-growth" proposal was on the table, probably because a majority of participants supported infill development. More recently there has been discussion of allowing five-acre subdivisions to be built across a much larger area through TDR, arguably a much more sprawling form of development, which threatens to push performance for this concern even lower.

"Limiting Traffic Congestion" was also given a very low performance rating. Unfortunately, traffic congestion is correlated with Steamboat Springs' economic vitality, being partially created by tourists driving into the valley, especially in the summer. However, A recent study found that 80% of the everyday traffic in Steamboat Springs was from local day trips, at an average rate of 12 trips per family per day.[1] If the working class doesn't find a place to live in Steamboat Springs and has to commute from farther away, that will put additional stress on the roadways. Steamboat Springs will remain car-dependent for the foreseeable future, and traffic will continue to deteriorate with population growth until there are large enough incentives to take public transit, or dense enough neighborhoods to encourage more walking and biking.

"Moving Toward Sustainable Use of Resources" also scored very lowly perhaps because so much of the recent economic activity in Steamboat Springs has been about conspicuous consumption and capital and material accumulation. The recession is already catalyzing a cultural shift toward scaled-down lifestyles and values, but only time will tell if this change is sincere, or if we will revert to profit obsession as soon as the economic environment becomes accommodating.

The four concerns rated least important were "Increasing Affordable Housing," "Preserving/ Increasing Recreation," "Increasing Public Transportation," and "Supporting Local Demographic Diversity." "Increasing Affordable Housing" and "Supporting Demographic Diversity" both scored very low performance values, but whether this presents a problem for the community is unclear because of the low importance ratings. "Preserving/ Increasing Recreation" scored highly, while "Increasing Public Transportation" was given a medium performance score.

"Preserving/ Increasing Recreation" might have been rated so lowly because Steamboat Springs is such a recreation-oriented community that our recreational assets are taken for granted, and no one feels that they are threatened. Looking

1 Tom Leeson.

forward, there is a risk that increased use may stress certain recreational areas. “Increasing Public Transportation” is something that no one is concerned about, but it rated in the middle range of performance probably because we do have a free city bus system, even though ridership is very low.

Demographic Dimensions	Correlation Score (R-Squared)
Young (21-53) vs Old (53-78)	0.83
Male vs Female	0.9
Higher Income (>$85k) vs Lower Income (<$85k)	0.82
Long Residence (>23 years) vs Short Residence (<22 years)	0.97
Old Town Resident vs Other Areas	0.88

Figure 13: Statisical Correlation of Concerns by Demographic Dimension

It is interesting that “Increasing Affordable Housing” and “Supporting Demographic Diversity” scored so low in importance. The community correctly identified that we aren’t supporting these two goals very well at all, rating both with low performance, but it’s also interesting to note how low these concerns were ranked, when so much of the public growth debate in town has centered on questions of affordability and the need for a socially diverse community. Because the Likert scale forced participants to make a choice and rate some concerns lowly, this result doesn’t mean that the Steamboat Springs community doesn’t care at all about affordable housing and demographic diversity, just that it cares less about these concerns than all the rest that were rated higher. There is a tradeoff at hand between maintaining (or improving) our diversity, and managing growth, and it seems that Steamboat Springs is confused about which way it wants to go. Apparently there is a gap between public and privately stated opinions on these issues, which is something that needs to be confronted as we continue planning for the future.

In order to examine the validity of the worksheet results, the characteristic/ concern rankings of various demographic groups were compared against one another to see how well they correlated, or in other words, to see how well different groups’ opinions were aligned or divergent. The rankings were sequentially divided by age, sex, income, length of residency, and geographic location of residence, and then averaged. Correlation analyses between the resulting averages revealed consistent opinions. The lowest correlation was between high and low income participants at .82, meaning that 82% of one group’s rankings could be predicted from those of the other.

An important question was whether older, higher income participants would rate a concern like affordable housing very low, and pull the average down for the whole group. Not so, as it turns out: lower income participants rated affordable housing an average of 2.51 out of 5, while higher income people rated it 2.91. Younger people rated affordable housing at 2.66, while older people rated it 2.77. This is an interesting result, because those groups who would be more likely to need or benefit from affordable housing actually rated it lower than others. This reinforces the point that the overall concern rankings weren’t skewed by one demographic, but are representative of community sentiment overall.

At the end of the performance section, all of a participant’s assigned performance scores were summed, to give some approximation of how satisfied that person was with the way things are going in Steamboat Springs. This rating found that younger participants were more satisfied than old, at 81.5 points to 72.88, women more satisfied than men, at 79.58 to 75.91, and higher income participants are more satisfied than those with lower incomes, at 82.77 to 73.09.

Demographic Dimensions	Performance Sum (Satisfaction)
Young (21-53)	82
Old (53-78)	74
Higher Income (>$85k)	83
Lower Income (<$85k)	73
Male	76
Female	80
Residence <10 years	85
Residence >30 years	77

Figure 14: Performance Sums by Demographic Dimension

The last questions on the worksheet related to how meeting participants preferred to see growth accommodated in Steamboat Springs. These answers varied widely- because it was the lead up to the Steamboat 700 referendum, there were many answers that were specifically in support of or against the Steamboat 700, others that said we have to accommodate growth and need better planning, and others who literally said that we should close Rabbit Ears Pass to stop any new residents from coming.

Lastly, in an effort to determine whether or not certain types of infill development are viable options in Steamboat Springs, one question asked whether participants would support infill. Of those who answered, 33 said they wouldn't support infill development, while 52 said they would. The concept of infill can be a bit vague (Where? When? How?), and NIMBYism (Not In My Back Yard) might have skewed participants' answers, so a follow-up question asked whether participants would allow another house to be build between them and their neighbors, if the required zoning changes were legalized as a means of creating additional housing supply within city limits. Of those who answered, 43 said no and 40 said yes. This result is significant. It shows that infill development is politically possible. An examination of the answers shows that those who said no were 49.6 years old on average, while those who said yes were 56.3 years old on average. The average income of those who said no was $104,000, and $86,000 for those who said yes.

Taken together, the results of this survey provide a broad summary of residents' concerns and opinions about growth in Steamboat Springs, and importantly indicate broad agreement within the community across normal divides. Participants were in very high agreement with one another, regardless of demographic profile. They seemed most concerned with protecting the amenities that make the Yampa Valley a great place to live, are less concerned with environmental goals, and comparatively indifferent to issues of social and demographic diversity. Again, forcing choices leads to a clearer expression of potential behavior, but doesn't imply that the lower ranked concerns are unimportant. The results are significant because they show the strength of the community's concerns in relation to one another: It's not that no one cares at all about increasing demographic diversity, for instance, just that they would rather have plenty of open space. The results reflect the community's values, and may provide insight into the outcomes of growth decisions, recent and future.

Figure 15: Landscapes Around Steamboat Springs

Visual Preference

Figure 16: Open Views West of Town

As discussed above, Steamboat Springs lies in an exceptional landscape; the visual quality and character of which drives much of the local economy and cultural narrative, and represents a key determinant of quality of life.[1] The purpose of a visual preference survey rests on the belief that the visual quality and perception of landscape is very important to determining the quality of place. A case in point: Ranching and farming, for instance, play a very small economic role around Steamboat Springs directly, but the character of the agricultural landscape in Routt County is effectively used to market the town and resort to the world, and plays a large role in our local culture and vision of ourselves, and therefore in the character of our town. For reasons like these, measuring a new development's impact on visual quality is an important part of gaining an understanding of the impact overall.

The first step in measuring visual impact is to establish the "landscape baseline"- the pattern, landform, land cover, and land use that determine the character of the landscape today.[2] This includes cataloging and characterizing the landscape in terms of local values- is it in good condition or poor condition? Pretty or ugly? Liked or disliked? Etc.[3] Landscape visibility is also important in determining impacts from landscape change- Can you see the change or not? How do

1 Selman, p. 147.

2 The Landscape Institute with the Institute of Environmental Management and Assessment, Guidelines for Landscape and Visual Impact Assessment, Spon Press, London, 2002, p. 66.

3 The Landscape Institute, p. 69.

Figure 17: Sorting Photographs

people move through and perceive the landscape, and from where are they looking? [4]

The relative importance of a specific change in landscape is also determined by its duration, nature, and scale. Sensitivity to these changes can come from several factors: the visibility of the site, or the size of it's "zone of visual influence," the nature of the existing landscape pattern, and the degree of value that people place on a particular landscape. People are much more sensitive to small changes in wilderness views than urban views, for instance.[5]

To identify how Steamboat Springs community members value and perceive the landscape, this study employs a technique for surveying visual preference that has been developed and refined by Carl Steinitz and others, and tested in many previous studies.[6] The basic concept is that the

4 The Landscape Institute, p. 73.

5 The Landscape Institute, p. 74, 96.

6 Steinitz 2003, 2007, Flaxman 2010.

researcher assembles a group of photographs that represent the landscape under study, and then has survey participants rank those photographs from least preferred to most preferred. While traveling around Steamboat Springs and its environs, I took almost one thousand pictures of the landscape. Artistic compositions and flattering/detracting lighting were avoided where possible. This group of photographs was then reduced to a set of sixty that best represented the range of landscape conditions around Steamboat Springs, including land use and land cover types at differing scales, ranges, and intensities.

The range of photographs was necessarily limited to winter scenes because of the timeframe within which they were taken. Also, it is important to note that several additional photographs were added that represented housing typologies that don't yet exist in Steamboat Springs. This was to test whether and how meeting participants would accept future forms of development.

At the community meeting held in January, ten tables were set up, and colored cards denoting preference columns were taped to the table tops. (See photos on previous page.) Participants were given a deck of all sixty photos in random order, and asked to arrange them on a table into ten columns of six photos each, in order from least preferred to most preferred images, with corresponding preference scores of 1 (least preferred) to 5 (most preferred). The sorting was ordered into a normal distribution, with one column each for most and least preferred landscapes (dark green and red), two columns each for slightly-preferred and slightly-unpreferred (light green and orange), and four columns for photos about which participants felt indifferent (yellow). After the sixty photos were sorted, a volunteer documented the distribution by photographing it, and then asked the participant to first choose the six photos that they felt best represented the Steamboat Springs landscape today, and then the six photos that best represented what they wanted the landscape to look like in the future. Both of these arrangements were also photographed, and then the volunteer collected the photos and handed them to the next participant.

Each arrangement of photographs was photographed with the participant's identification number so that their preferences could be linked to the demographic and opinion data collected in the survey sheets. While over 100 people participated in the visual survey, only 81 of them could be linked to a completed survey sheet, and those made up the final sample. The survey results were recorded in a spreadsheet, for later tabulation and comparison against the other descriptive data about the participants.

Figure 18: The Most Appreciated Landscapes

The most preferred photographs are characterized by views of less intensely developed landscapes, including natural landmarks, the Yampa River, and unimpeded views across the valley. Old Town Steamboat Springs and our ranching and skiing heritage also figured prominently.

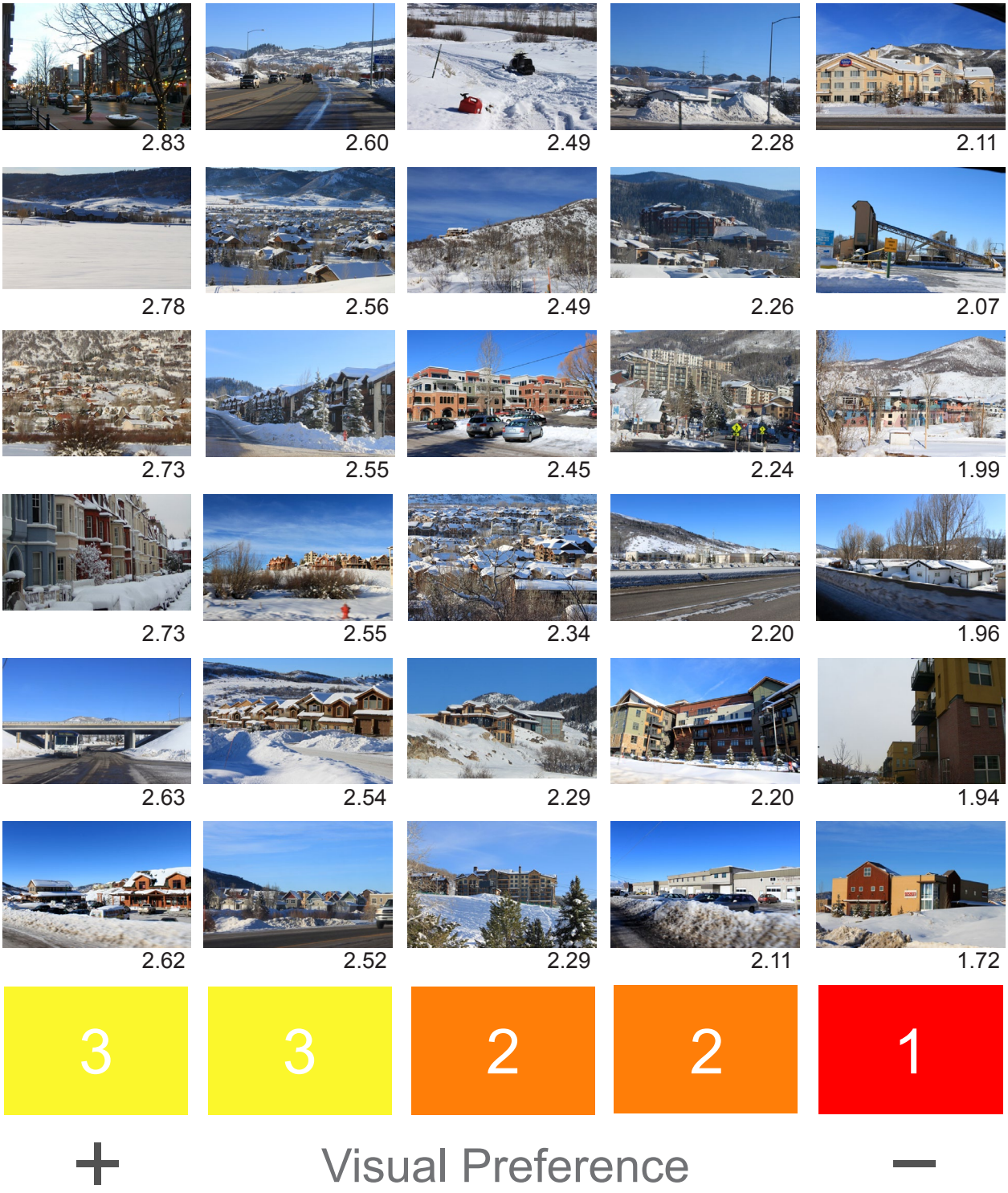


Figure 19: The Least Appreciated Landscapes

The least preferred photographs are characterized by more intensively developed landscapes, including commercial and industrial uses, low-income housing, and accomodation for non-local residents in large resort developments, second homes, and condominium properties.

Figure 20: The Current Image of Steamboat Springs

1 2 3 4 5 6

Meeting participants chose the six images above for best representing the landscape around Steamboat Springs today. These photographs depict:

- The iconic image of historic Steamboat Springs, with traditional architecture and Mt. Werner behind.
- An unimpeded view of Mt. Werner.
- The Yampa River as it flows through town, appearing with a natural riparian edge.
- Traditional ranching and western culture in the South valley.
- The Sleeping Giant, a familiar landmark with open land in the foreground.
- A new, large-scale mixed use development in Old Town.

Residents' choices convey a perception that Steamboat Springs has preserved its historic character, and remains a place defined by skiing, ranching, and open views of nature. The last choice reflects recent local concern about the fast-paced, large scale developments that are changing the face of the town.

Figure 21: The Desired Future Image of Steamboat Springs

1 2 3 4 5 6

Meeting participants chose the six images above for best representing their desired future landscape around Steamboat Springs. These photographs depict:

- The Yampa River as it flows through town, appearing with a healthy riparian edge.
- The iconic image of historic Steamboat Springs, with traditional architecture and Mt. Werner behind.
- An unimpeded view of Mt. Werner.
- Traditional ranching and western culture in the South valley.
- Large, open, active, undeveloped ranchland.
- The Sleeping Giant, a familiar landmark with open land in the foreground.

Residents' choices show a desire to maintain the landscape around Steamboat Springs much as they currently perceive it. The only additional image of the landscape emphasizes a desire to preserve ranching and farming in the Yampa Valley, and the open agricultural land it supports.

Visual preference surveys are problematic in the eyes of many. How do you identify landscape beauty? Is it an objective property of the landscape itself, or a subjective impression on the viewer?[7] Landscape perception is as much a function of our past experiences, knowledge, expectations, and socio-cultural context as of any character or quality of the landscape itself.[8] What are we even looking at? Concepts like place, space, and landscape are bound to our views of nation, culture, and community.[9] Even if you can agree on a definition of what a landscape is, the nature of our individual interactions with and within a landscape also condition and diversify our perceptions of it. In Steamboat Springs for instance, a culture obsessed with real estate often perceived economic opportunity instead of mere scenic surroundings.[10] These perceptual interactions lead to varied outcomes like visual satisfaction, nationalism, or stress, and produce dissimilar opinions about what types of landscape we like to see.[11]

"Scenery" is cognitively ordered and culturally constructed, but to communicate the idea of landscape also requires some form of representation, even if only in the form of pictures used during a visual preference survey. Representations of landscape are also problematic: they are political, biased, and colored by the intentions of those who create them.[12] While local populations are most commonly the 'proprietors' of landscape,[13] landscape representations are usually made for outsiders, presenting a particular image and narrative of a place for consumption.[14]

In undertaking this visual survey process, I decided where to point my camera, and then I chose which photographs formed a comprehensive representation of the landscape around Steamboat Springs. While aiming for impartial objectivity, my own background surely biased my selection, and it goes without saying that someone else performing the same exercise would come out with a different set of photographs than I did.[15] Additionally, the way in which the photographs were presented on tables, during a public meeting, surely affected participant's comfort, thought processes, and ultimately, reported visual preferences. These biases are impossible to escape in this form of qualitative study.

With all the worrisome qualifications about the utility of conducting a visual preference survey, why include one in this study? Even if we don't know the ultimate explanation for why an individual values a particular landscape, we can still predict that they will, with great statistical certainty. As it turns out, groups that make up the majority of stakeholders with an interest in the Steamboat Springs landscape have very similar acculturated views of beauty.[16] The recorded photograph distributions were sorted by demographic, economic, and social characteristics, and correlation analyses were run for opposing groups: men vs. women, high income vs. low income, renters vs. owners, satisfied people vs. unsatisfied people, etc. In all cases, a very high level of correlation of visual preference was found between groups. The lowest correlation coefficient was .85, between renters and people with high income. While this is still a relatively high correlation value, I suspect the low value doesn't mainly represent any significant difference in visual preference between the two groups, but reflects the small sample size of the renting population at the meeting, at 9 cases. With a sample size that small, one person's preferences could have significantly affected the scores for the entire group.

7 Zube, Ervin H. "Landscape Perception: Research, Application, and Theory," Landscape Planning, no. 9, 1982, p. 21.
8 Zube, p. 3.
9 Agnew, John, "Representing Space: Space, Scale, and Culture in Social Science," in: Duncan, James and Ley, David eds. Place/ Culture/ Representation, Routledge, New York, 1993, p. 267.
10 Berger, John, Ways of Seeing, Penguin Books Ltd., New York, 1972, p. 109.
11 Zube, p. 6.
12 Agnew, p. 268.
13 Berger, p. 107.
14 Selman, p. 57.
15 Daniel, Terry C. and Boster, Ron S. "Measuring Landscape Esthetics: The Scenic Beauty Estimation Method," USDA Forest Service, 1976, p. 23.
16 Selman, p. 56.

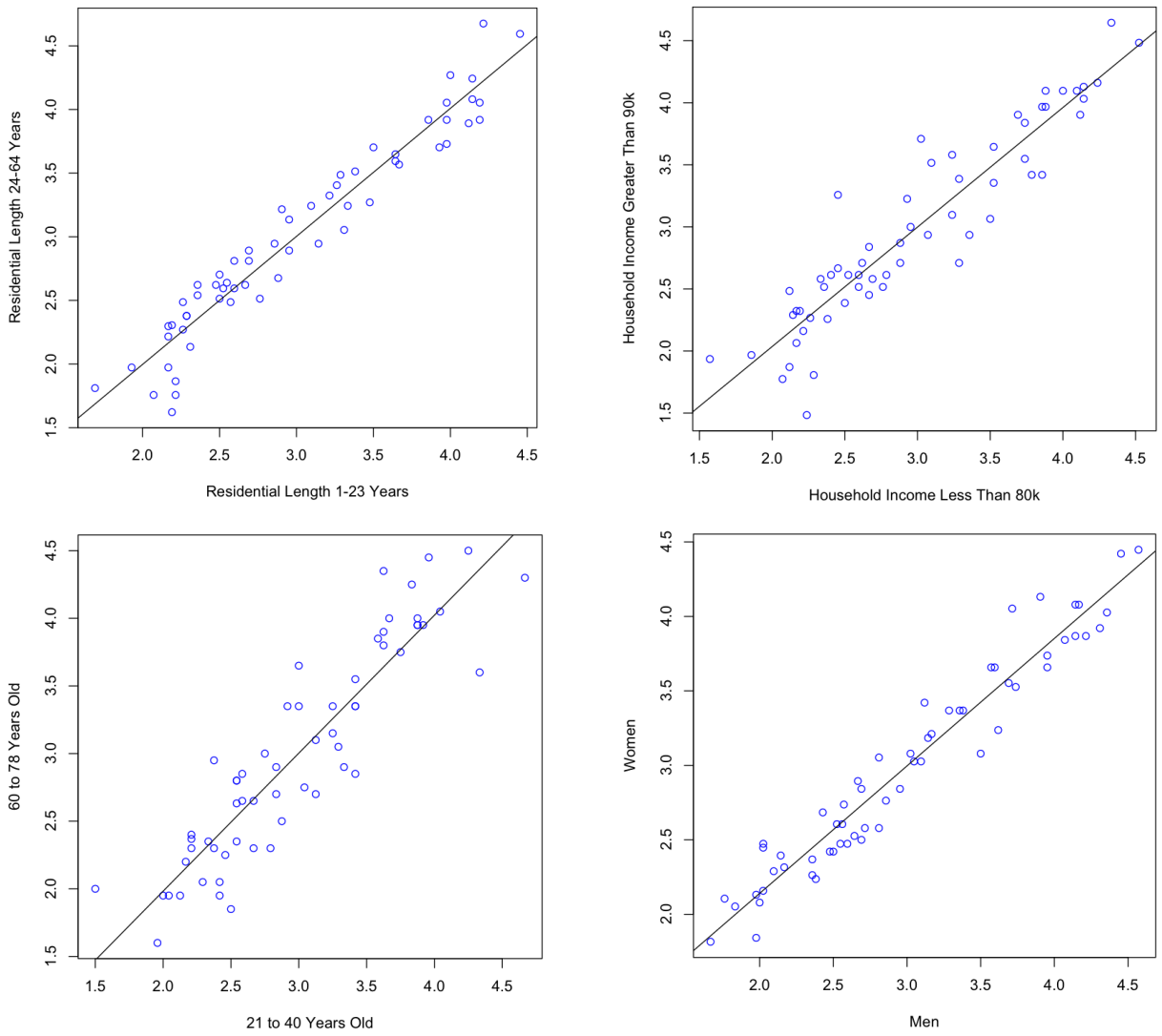


Figure 22: Selected preference scatterplots showing correlation between recent and establsihed residents, low and high income residents, young and old residents, and men and women.

	Men	Women	Income <80k	Income >90k	Renters	Owners	21-40 Years Old	60-78 Years Old	2-20 Year Residence	23-64 Year Residence	Happy (High Psum)	Sad (Low Psum)
Men												
Women	0.9691											
Income <80k	0.9727	0.9800										
Income >90k	0.9757	0.9686	0.9309									
Renters	0.8930	0.9262	0.9439	0.8501								
Owners	0.9913	0.9907	0.9776	0.9845	0.8962							
21-40 Years Old	0.9488	0.9715	0.9580	0.9407	0.9181	0.9637						
60-78 Years Old	0.9784	0.9558	0.9657	0.9517	0.8690	0.9753	0.9105					
2-20 Years in Residence	0.9801	0.9846	0.9669	0.9825	0.8961	0.9906	0.9622	0.9612				
23-64 Years in Residence	0.9829	0.9856	0.9830	0.9602	0.9239	0.9889	0.9580	0.9670	0.9651			
Happy (High Psum)	0.9731	0.9772	0.9546	0.9785	0.8761	0.9851	0.9702	0.9454	0.9826	0.9668		
Unhappy (Low Psum)	0.9777	0.9809	0.9860	0.9506	0.9403	0.9811	0.9442	0.9697	0.9706	0.9855	0.9462	

Figure 23: Correlation matrix showing R-squared values for all dimensions studied

The group that attended the meeting and sorted photographs for this project represented a somewhat limited sample of the total population with interests in the landscape around Steamboat Springs: they were predominantly middle-aged or older, and almost exclusively local. Ideally I could have held additional meetings for tourists and younger citizens in order to capture those groups' preferences, but the amount of time involved pushed that possibility outside the scope of this project. However, previous studies have shown that there is actually a high level of agreement in visual preference between all groups of stakeholders.

In the visual preference survey conducted as part of the Landscape Strategy Planning Process in Valencia, Spain, 865 people participated and sorted photographs. The participants were 20% tourists and 80% residents, and the study found a correlation coefficient of .98 between their preferences.[17] The Alternative Futures Study completed in Telluride also found a correlation coefficient of .89 between resident and tourist preferences, providing a precedent in an area similar to Steamboat Springs. Other past studies have tested correlations more widely, such as one that tested answers from separate groups of students in Oregon and Texas, and again found high correlation.[18]

These precedents, as well as the high correlation of preferences between groups within this study, show that the results from a population subsample can reliably predict the visual preferences of the entire stakeholder population. This quality of the survey means it can be effectively used to build a visual preference model to accurately measure the visual impacts of future development in the landscape around Steamboat Springs.

In order to begin translating recorded visual preferences into a predictive model, several hypotheses of visual preference were developed and tested against the results from the meeting. To test a particular hypothesis, each photograph was scored on a scale from 1 to 5 for how well it represented the qualities of that hypothesis. For example, when hypothesizing that the natural character of the landscape was a key variable in explaining visual preference, a photograph with no sign of any development would score a 5, and a photograph with no natural features would score a 1. If a hypothesis was not applicable to a certain photograph, such as a natural landscape photograph and an architectural hypothesis, the photograph was scored a neutral 3. The hypotheses tested include: the natural character of the landscape, the traditional character of architecture, the absolute depth of view, the depth of the main subject of the photograph, amount of naturally-defined horizon, land use, land cover, the permanence of inhabitation, attractive and unattractive landmarks, and density.

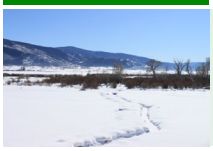
Statistical regressions were run on the preference values predicted by the hypotheses above against the actual preference values to see how predictive each factor was. The factor most predictive of preference was land cover (explaining .494% of variation), followed by density (.464), traditional character of architecture (.460), natural character of the landscape (.454), permanence of inhabitation (.265), depth of subject (.411), landmarks (.357), land use (.306), natural horizons (.253), and depth of view (.175). Different combinations of the above hypotheses were run against the actual preference values until the highest predictive score was obtained, using six factors and achieving an adjusted r-squared of .8. While ten total hypotheses were tested, it is not necessarily best to incorporate all of them, because co-correlation between hypotheses will actually bring the predictive score down when the model result is adjusted to take account of the number of component factors.

Because this study is modeling landscape impact spatially, the next step was to express each hypothesis using related data layers and GIS. Available data for Steamboat Springs includes the Routt County parcel map, Colorado DOW Land

17 Steinitz, Carl et. al. Green Infraestructure: A New Landscape Strategy for the Region of Valencia-Spain, Generalitat- Valenciana, 2007, p. 25.

18 Bishop, Ian D. and Hulse, David W. "Prediction of Scenic Beauty Using Mapped Data and Geographic Information Systems," Landscape and Urban Planning, no. 30, 1994, p. 66.

Figure 24: Hypotheses of Visual Preference



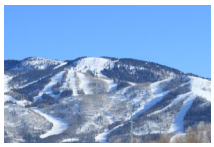
Land Cover
Refers to the overall character of the landscape, whether it is open, forested, or urbanized.

Density
The number of buildings in a given land area. Views with no buildings scored a 5.

Traditional Character of Architecture
This factor considers the scale, form, history, and aesthetics of the built environment. Views with no buildings scored a 3.

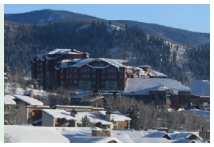
Natural Character of the Landscape
The degree of landscape transformation toward urban or other developed uses.

Permanence of Settlement
This factor assesses the permanence of inhabitation of the landscape, from nightly rentals to multi-generational homes. Views with no direct evidence of inhabitation scored a 3.



Depth of Photograph Subject
Scores with given based on the distance from the camera to the main subject of the photgraph, irrespective of total visible distance.

Landmarks
Considers visually prominent landscape features in view, including cultural, built, and natural landmarks. Views with no landmarks scored a 3.



Land Use
This factor is based on the traditional categorization of landuses. Natural areas scored a 5.

Naturally defined Horizon
The natural character of the visible horizon. Sensitivity was adjusted downward with increasing levels of impeded horizon views. Photographs with no horizon scored a 3.

Total Depth of View
This factor took account of the total depth of view of a photograph, irrespective of the distance from the camera to the main subject.

Hypothesis Factor	Land Cover	Density	Traditional Character of Architecture	Natural Character of Landscape	Depth of Photograph Subject	Landmarks	Land Use	Permance of Settlement	Naturally Defined Horizons	Absolute Depth of View	Total Visual Preference Model R-sq.
Predictive Value	**0.49**	0.46	**0.46**	**0.45**	**0.41**	**0.36**	**0.31**	0.27	0.25	0.18	**0.80**

(Factors included in final model in bold)

Cover and Vegetation map, and a Digital Elevation Model from the USGS. Because only three separate data layers were available, all of the hypotheses couldn't be modeled reliably: There is no information in either the Steamboat Springs or Routt County parcels data that says anything about character of architecture, and the information about how old particular buildings are is very spotty, so it was impossible to reliably map which buildings were more in keeping with Steamboat Springs' traditional architectural character. Landmarks were also not modeled separately, because of ambiguities with how to mark them on the map, how many to mark, and how to value those areas. Instead, landmark characteristics of certain areas were accounted for in the model between the land use and depth of subject layers. See below.

The four hypotheses modeled geospatially are: land use, land cover, depth of subject, and natural character of the landscape. While these four hypotheses probably capture some of the preference variation in the other two factors as well because of internal correlation, the predictive value of the four factor model is still high at an adjusted r-squared of .74.

Each layer was valued according to predicted values from the corresponding preference hypothesis. Land use internalizes the negative side of the landmarks hypothesis into the model. The low preference landmarks consisted predominantly of very large resort buildings that are zoned Gondola 1 and 2, which scored lowest under land use as well. For land use, the values assigned were:

5: Natural areas and agriculture
4: Old Town Steamboat Springs
3: Lower-density detached housing and roads
2: Most resort development, all other commercial, and multifamily or high-density housing
1: Industrial and Gondola 1 and 2 zones

Land cover was harder to hypothesize from the photographs because they were taken in winter, and differences in vegetation were obscured. For this reason, only three categories of land cover were considered: urban, forested, and scrub/grassland. Values assigned were:

5: Grassland/ scrub
3: Forested
1: Urban

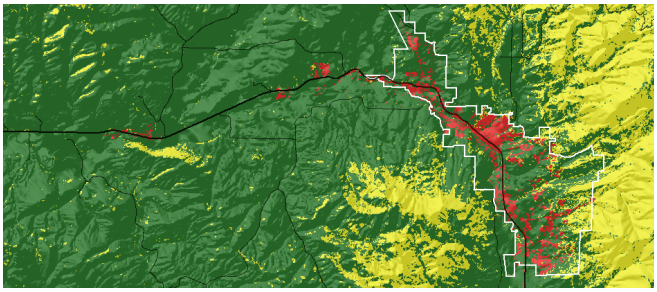
Depth of subject is also a complicated hypothesis to model because there is no single location from which depth is being measured. For this reason, the model tested for view prominence from a random matrix of points spread across the landscape. Because the points were spaced relatively evenly, if a particular landscape feature was visible from more points, then it was necessarily visible from farther away. The 'depth of subject' hypothesis predicted preference based on distance intervals of 200ft, 1000ft, 1 mile, and 3 miles. Because geospatial translation of this hypothesis used the point visibility method, however, it was impossible to exactly preserve the distance intervals. Instead, depth was inferred based on how many points could see a specific landscape feature.

Upon testing this model component with five values, it became clear that assigning low visual preference values for "close" landscapes was skewing the model and predicting too low a preference in various natural areas when compared to scores in urban areas. Upon reconsidering, because many of the close subjects in the visual survey were buildings and because this model only tests depth on landscape, low values were taken out, so that greater depth can add to a landscape feature's preference value, but closer landscapes still receive an impartial score of 3.

Depth of view internalizes the positive aspect of the landmarks hypothesis, because the highly preferred landmarks were natural or skiing-related landscape features that are very visible from many viewpoints. Preferred landmarks that can be seen clearly in the depth of view model include The Sleeping Giant, Mt. Werner, and Emerald Mountain.

The final values assigned were:
5: Visible from between 49 and 127 points
4: Visible from between 18 and 49 points
3: Visible from less than 18 points.

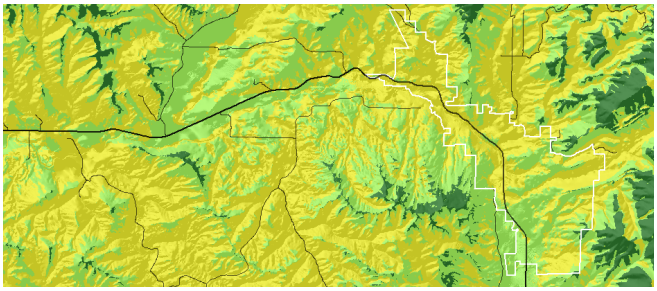
Figure 25: Modeling Visual Preference Hypotheses Spatially



5: Grassland/ scrub
3: Forested
1: Urban

X1

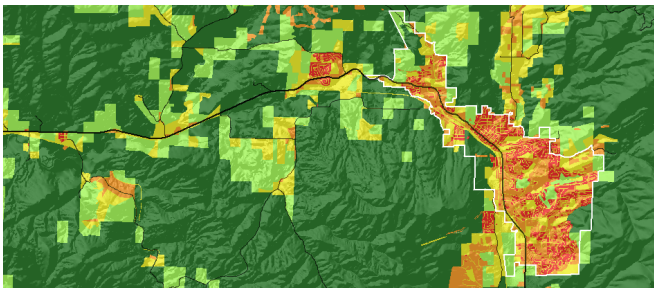
Land Cover



5: Visible from between 49 and 127 points
4: Visible from between 18 and 49 points
3: Visible from less than 18 points

X1

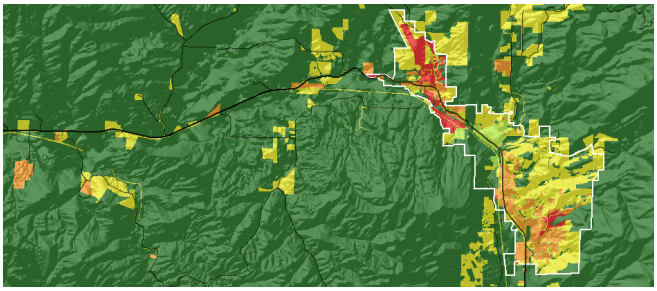
Depth of Subject



5: Greater than 100 acres
4: 35-100 acres
3: 10-35 acres
2: 1-10 acres
1: Less than 1 acre

X1

Natural Character

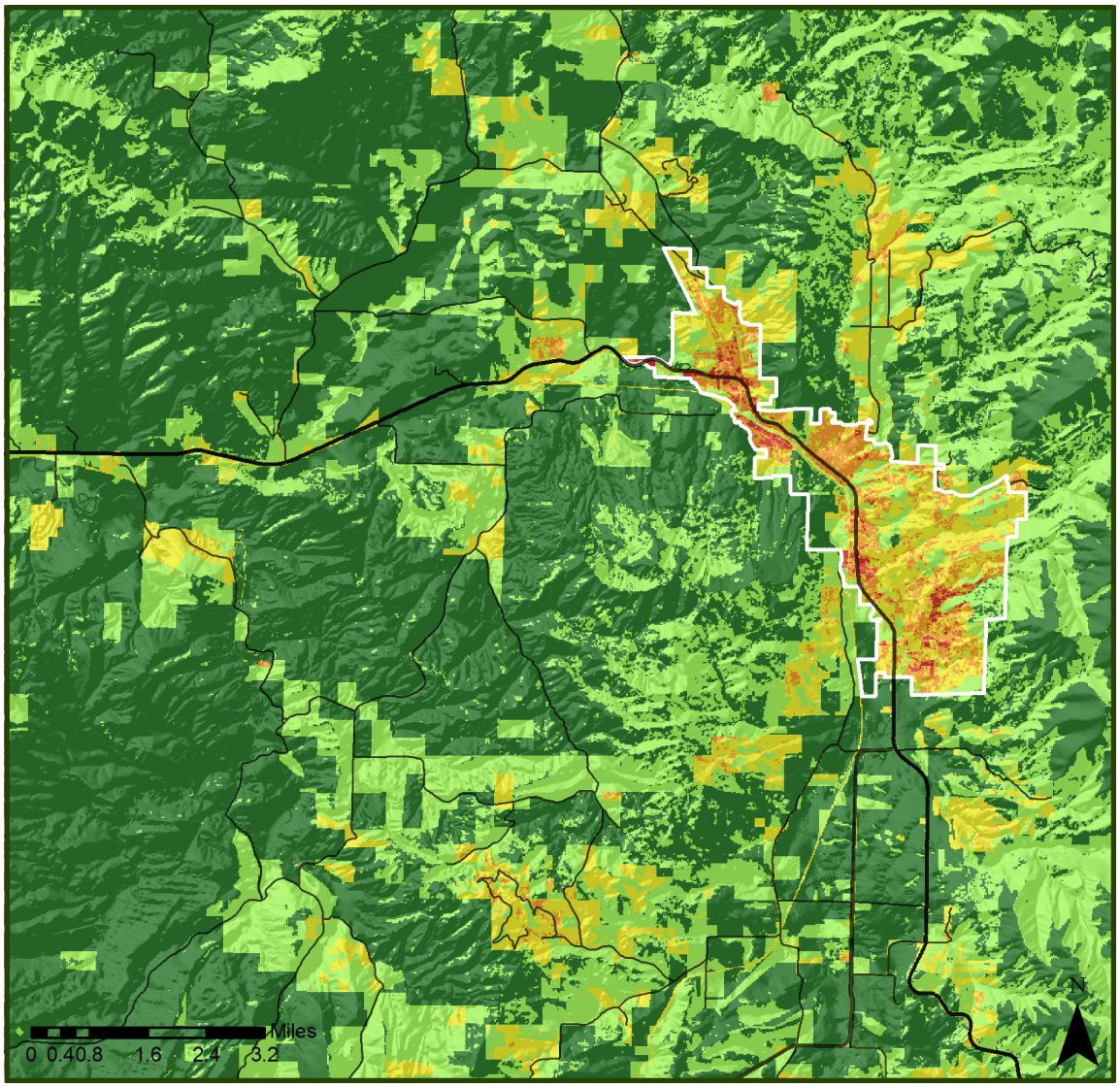


5: Natural areas and agriculture
4: Old Town Steamboat Springs
3: Lower-density detached housing and roads
2: Most resort development, all other com mercial, multifamily or high-density housing
1: Industrial and Gondola 1 and 2 zones

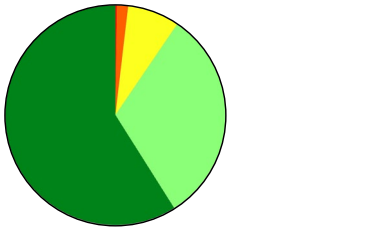
x2

Land Use

Figure 26: Map of Visual Preference

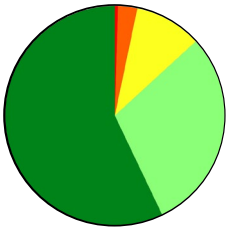


Composite Visual Preference, 2010



Total for Study Region

Very Low	Low	Medium	High	Very High
.21%	1.64%	7.63%	31.56%	58.95%



Total for View from Highway 40

Very Low	Low	Medium	High	Very High
.45%	2.84%	9.88%	29.74%	57.08%

Natural character of the landscape is another complicated quality to model geospatially. Land use and land cover were both already accounted for in the model, but those factors don't capture the difference between houses on single-acre lots and houses on thirty-five acre lots. Even though it didn't make it into the final model because of co-correlation issues, density was also the second-highest ranked predictor of preference. For these reasons, lot size was chosen as a proxy for natural character of the landscape, with the concept that a larger lot accommodating the same development type will preserve more of an area's natural character. While it is possible that a larger lot could be completely covered with a low-preference use, on average across the study region, this is not the case. Values assigned were:

5: Greater than 100 acres
4: 35-100 acres
3: 10-35 acres
2: 1-10 acres
1: Less than 1 acre

After assigning each model component its corresponding values from the respective visual preference hypothesis, the four maps were overlaid to produce a composite visual preference map. All component maps were weighted equally and combined through simple addition, except for land use, which was given double weight, because in the multi-linear regression performed to determine the spatial model's predictive capability, land use contributed twice as much predictability as any other factor. The final values were at last reclassified into 5 values of predicted landscape preference.

The composite visual preference map shows a high-quality landscape with around 90% of territory falling into the high and very high preference categories. This result corresponds well to residents' choices of many of the most preferred photographs to represent the current state of the landscape around Steamboat Springs. The most commonly viewed parts of the landscape, or those areas visible from Highway 40, also rated very well, and very closely to the state of the landscape overall. This reflects good county land use planning and an appreciation for valuable landscapes.

Alternative Futures

Four alternative future scenarios are presented here, and each represents a different possibility for the development extent and character of Steamboat Springs in 2030. The choice and detail of these scenarios was informed by input from the community meeting in January and an interview with Tom Leeson, former director of the Steamboat Springs Department of Planning and Community Development. The final choice of scenarios is meant to facilitate an examination of the range of built outcomes Steamboat Springs may encounter through different choices on future growth policy. The four scenarios are:

1. No new growth accommodation
2. The buildout of the West of Steamboat Springs Area Plan (WSSAP)
3. Transfer of development rights (TDR) to areas outside of city limits
4. Infill development inside city limits

In this project, each alternative future was modeled geospatially in GIS, using both algorithmic and design-oriented methods. Modeling future urban growth in GIS facilitates measuring how each scenario impacts those qualities and characteristics we feel are most important in Steamboat Springs. A summary of these impacts can be found in the next chapter.

The scenarios presented here are not a comprehensive study of every future development possibility for Steamboat Springs, but rather present a reasonable range of possibilities based on current trends. They are also not presented as accurate forecasts of the future, and errors would be found under close scrutiny. There are three components of inaccuracy in the modeling method used. The first is time. The actual pace of future changes along a certain development trajectory will differ from what was modeled. The second is scale. The scenarios may be reasonable representations of growth outcomes at the regional scale, but do not consider parcel-level change on individual bases. Third are data limitations. In the real world, development outcomes are dependent on the irreducible interaction of many complex variables. Besides the problem of complexity, data limitations make it impossible to create a true-to-life model of the world. These limitations do not mean that the scenarios aren't useful, however, because the point of this exercise is merely to stimulate thinking across our range of options, to lend a new perspective to the debate.

Assumptions

Regardless of the sophistication of the models used, the assumptions used as inputs in urban growth modeling processes drive the majority of the outcomes. For this reason, assumptions are a very important aspect of the process. Below are explanations for each of the assumptions used in this study.

Study Area

This project focuses on the future of Steamboat Springs, but this future is intimately tied to the future of the surrounding areas in Routt County as well. An area was defined that represented "Steamboat Springs" as both a concept and delimited area of residential demand. The study area ranges from beyond Milner to the West, South to the base of Rabbit Ears Pass and Lake Catamount, and North to Mad Creek. The areal extent is 15 miles square, or 225 square miles. This area presents a reasonable limit to where if someone lives outside its boundaries, they live "out of Steamboat Springs." The size of the study area is important because certain development impacts were measured based on area ratios, so a larger study area would make the magnitude of development around Steamboat Springs appear comparatively smaller.

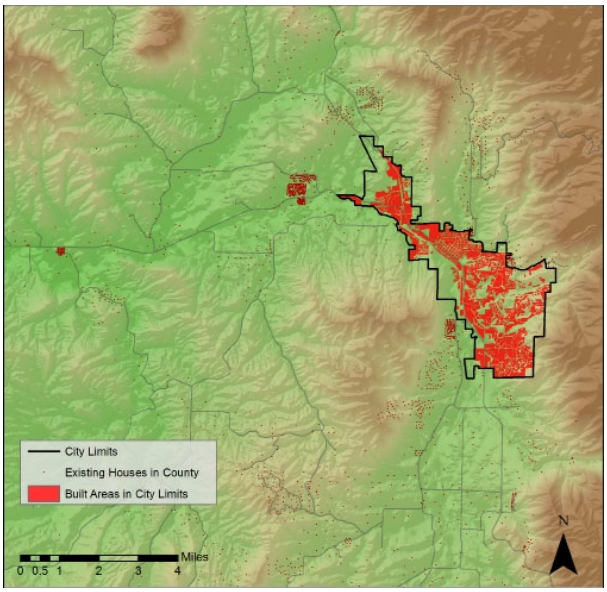


Figure 27: The Study Area, 2010

Future Population Growth

The future population growth of Steamboat Springs is debatable. Rather than using varying population estimates across scenarios however, a single value was chosen and held constant. Changes in future population have a large effect on the impacts measured in this study, and would have clouded the results and made it unclear whether different policies were actually causing different outcomes. The final population estimate chosen reflects a desire to provide the most useful comparisons between different development futures, and is based on assumptions about the future that have driven debate on development around town.

The most recent projection from the Colorado State Demographer's Office predicted 71% growth in Routt County between 2008-2030. This prediction was made before the current extent of the recession was known however, and so has been discounted by 10% here. Using 2008 numbers, Steamboat Springs represented 51% of the total county population. Assuming this percentage population share will persist, the discounted State Demographer projection forecasts a population of 18,631 people living in Steamboat Springs in 2030.

This study's other source of population information comes from the Steamboat Springs Planning Department, using data from the Routt County Building Department and Assessor. An extrapolation of the Planning Department's numbers shows an average rate of 200 housing units added per year, leading to an expected population of 16,375 people living within city limits by 2030.

Because this study isn't only modeling population growth within city limits, but within the entire study area, the higher number was chosen to represent the future demand to live "in Steamboat Springs," meaning anywhere inside the study area. This represents a 2030 population of 18,631 people, and 5,040 new housing units.

The chosen population number is large enough to clearly show differences in development outcomes from differing policies regulating growth. While it does represent a reasonable assumption for 2030, it may introduce the time-related error discussed above. What is important however, is not whether the total population living in the study area reaches 18,631 people by 2025 or 2040, but rather how that population is accommodated along a certain development trajectory.

Demographics

Steamboat Springs' current demographic makeup as reported in the 2005-2008 American Community Survey by the Census Bureau was also held constant. Population was broken down by income into low, middle and high classes, representing 38%, 51%, and 11% of the population respectively. These income groups make less than $35,000, $35,000-$75,000, and $75,000+ per year. When allocating population growth in the scenarios, a simple willingness-to-pay model was used, where wealthier people get first choice. The Planning Department's estimated vacancy rate of 45% was also held constant, and second-homeowners were given the same allocation priority as the wealthy demographic.

Density

Because this study is measuring growth impacts spatially, the density of new development is an important assumption, because it explains how much area new development will cover. Several density values were used in this study, all averaged across the entire study area.

The first value is for the buildout of existing land entitlements in city limits. The total amount of remaining land resources inside city limits was calibrated with the Planning Department's 2008 buildout analysis, which estimated capacity for 2,954 additional housing units as of July 2009, giving an average density of just over 4 units per acre.

This study assumed greenfield development outside of city limits would mimic existing gross density within city limits, at 3.4 units per acre. This value is slightly lower than the one above because it incorporates area for roads and other services.

Because the Steamboat 700 has a projected buildout of 2,000 units, that value was used for new development in that project.

The current MLS listings of properties for sale within the study area was considered. There are currently 1,025 units for sale within the study area. However, it is unknown who the owners of those properties are- they might be locals who want to relocate within the study area, or second-home owners selling to other second homeowners. Because of this ambiguity, these listings were not added to the accommodation capacity for new housing in the study area.

Finally, all new development in the county was allocated at 35 acres per unit, except on existing unbuilt residential parcels of smaller sizes.

Modeling Summary

This study modeled two forms of development: relatively dense residential development inside city limits or in suburban-type TDR neighborhoods, and 35-acre subdivision in the unincorporated areas of the county. The modeling technique was alternately algorithmic or "by design," depending on whether specific plans exist. For the algorithmic allocation, a three step process was used: First, unsuitable areas were restricted to new development, or masked. Second, a model of landscape attractiveness was created for predicting how and when new development would be built in specific areas. Last, using raster-based GIS, development was allocated in order of attractiveness until all demand was satisfied, or until the supply of developable area ran out. For "by design" modeling, existing plans like the WSSAP and Draft TDR Receiving Area were digitized and then nominally allocated.

Existing Developed Areas

The map showing existing developed areas was created from Routt County parcel data. Inside city limits, developed lots were converted to a raster layer in order to obtain average density by area. Outside of city limits, centroid points were calculated for built parcels.

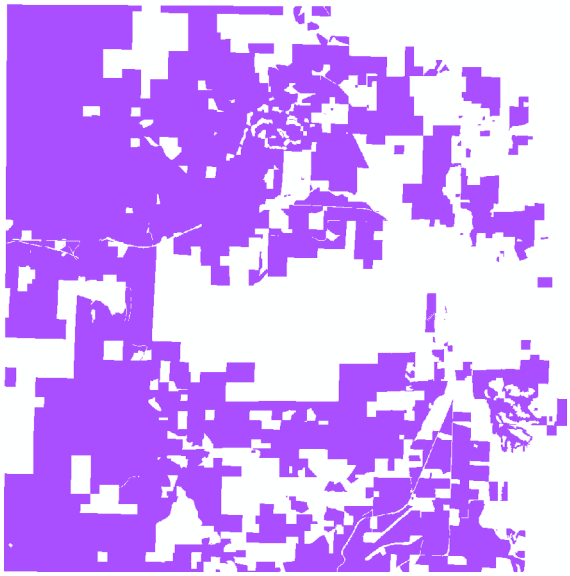


Figure 28: Mask: Area Available for Development in County

Mask

Areas excluded from development include:

1. All public lands
2. Steep Slopes above 30% grade

3. Currently built parcels
4. Roads
5. Rivers, lakes, other hydrology

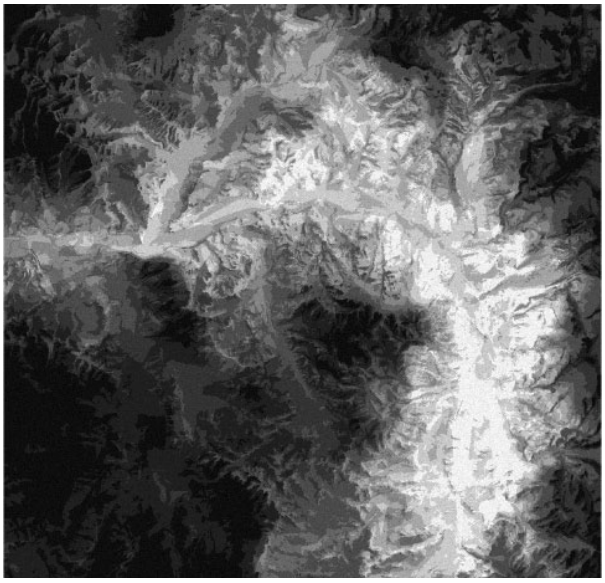


Figure 29: Study Area Attractiveness: lighter areas are more attractive

Attractiveness

Factors considered in determining the attractiveness of the landscape include:

1. Views
2. Accessibility to economic centers in Steamboat Springs

Attractiveness was divided into nine levels, and later randomized within each level. This is because predicted attractiveness with higher resolution than nine steps begins to overstep the accuracy of the model. Because the model can only reasonably predict attractiveness at these aggregated levels, there are large areas that have the same attractiveness score. Deciding which cells within those levels would be allocated first was accomplished with a randomization algorithm, so that few cells have the same attractiveness level and demand can be allocated with sufficient precision.

Dense Residential Development

New residential development was allocated first into existing vacant lots in Steamboat Springs, and then into other scenario features. The second part of the allocation could be either into infill areas in town, the WSSAP, or TDR areas depending on the scenario. This allocation was ordered by area rather than by number of lots, because the new allocation areas were unplatted. Average densities for both infill and greenfield development determined the number of cells required for one unit of new development.

35-acre Residential Development

While the particularities of specific market transactions will vary, the majority of new 35-acre development was assumed to follow landscape attractiveness, where on average, the most attractive areas are developed first. Depending on how much 35-acre development a certain scenario predicts, those available parcels that overlay that threshold of attractiveness are selected, and house points are randomly allocated into them until demand is exhausted or supply runs out. Parcel eligibility was determined based on size, where 35-acres was the minimum for undeveloped parcels, and 70 acres was the minimum for parcels that already have houses on them, assuming they could be subdivided in the future.

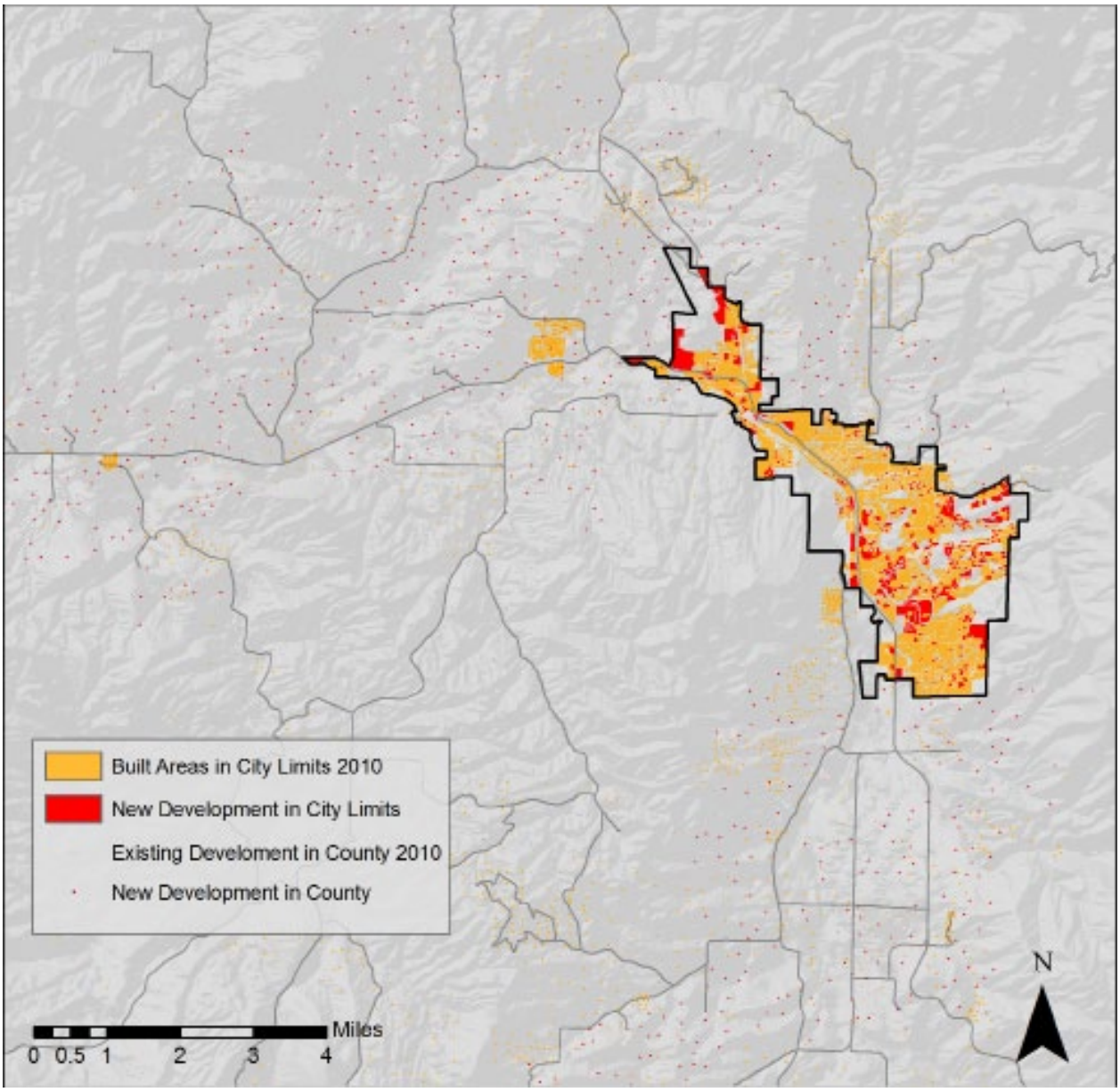


Figure 30: Scenario 1: No New Growth Accommodation

In this scenario, existing vacant lots inside city limits are allowed to build out, and the county continues subdividing into 35-acre parcels, but no new measures are taken to accommodate growth. Because buildable space runs out inside city limits, more wealthy residents and second homeowners decide to build in the county. Even after the more desirable half of available county lands are completely subdivided into 35-acre parcels, there is no room left in town for 63% of the lower/ working class. In this scenario, the visual character of Steamboat Springs changes the least, but the social and economic character of town changes the most.

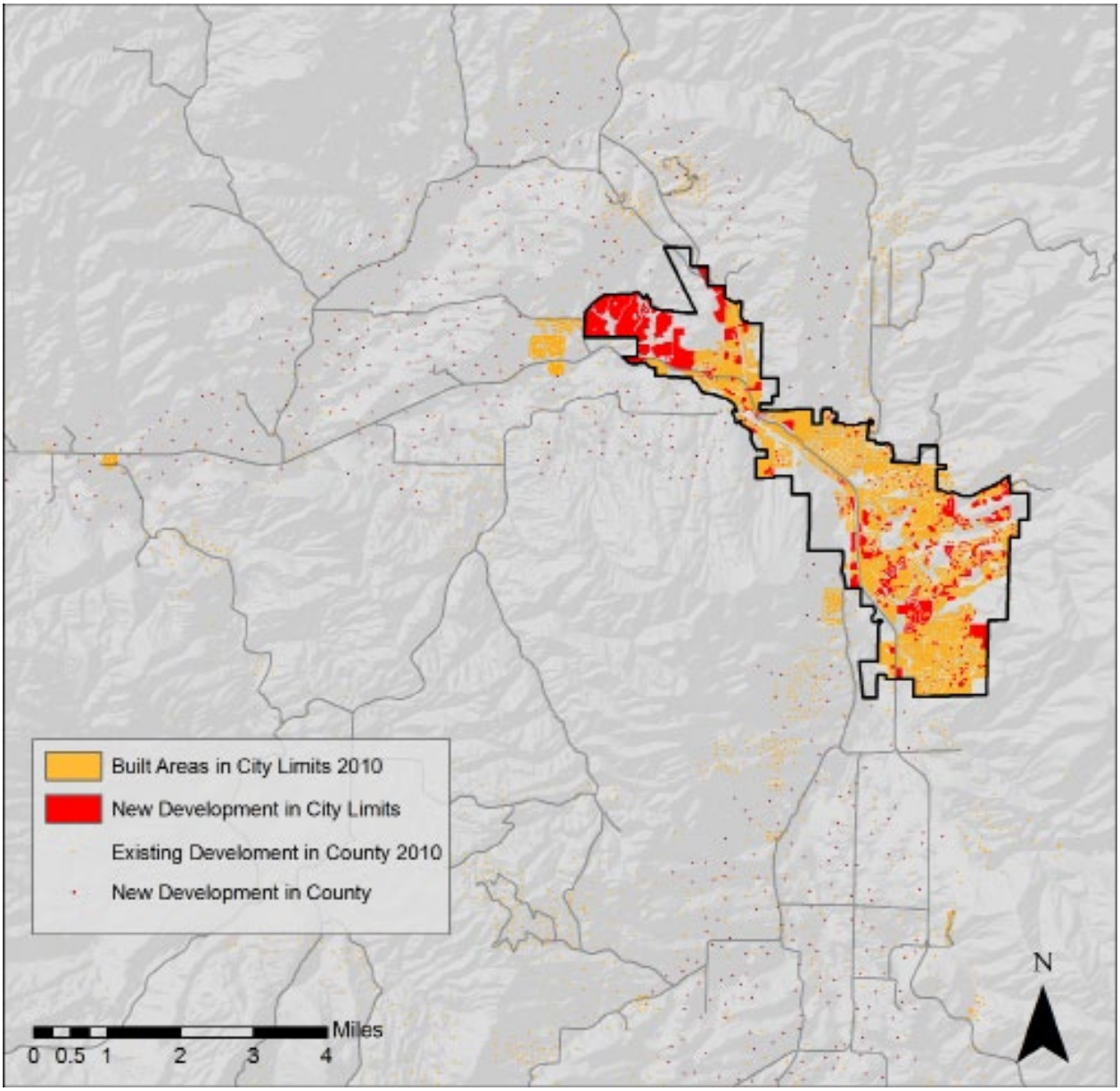


Figure 31: Scenario 2: The WSSAP/ Steamboat 700

In this scenario, the West of Steamboat Springs Area Plan builds out as planned. The buildout footprint is still assumed to resemble the Steamboat 700, regardless of how many smaller annexations are required to achieve it. This creates more housing supply inside city limits, and wealthy residents and second-homeowners are slightly less inclined to move into the county, so only the most desirable third of available county land is subdivided. Assuming the WSSAP creates space for 2000 new housing units, all population growth is accommodated in this scenario with excess capacity remaining for 500 additional housing units inside city limits.

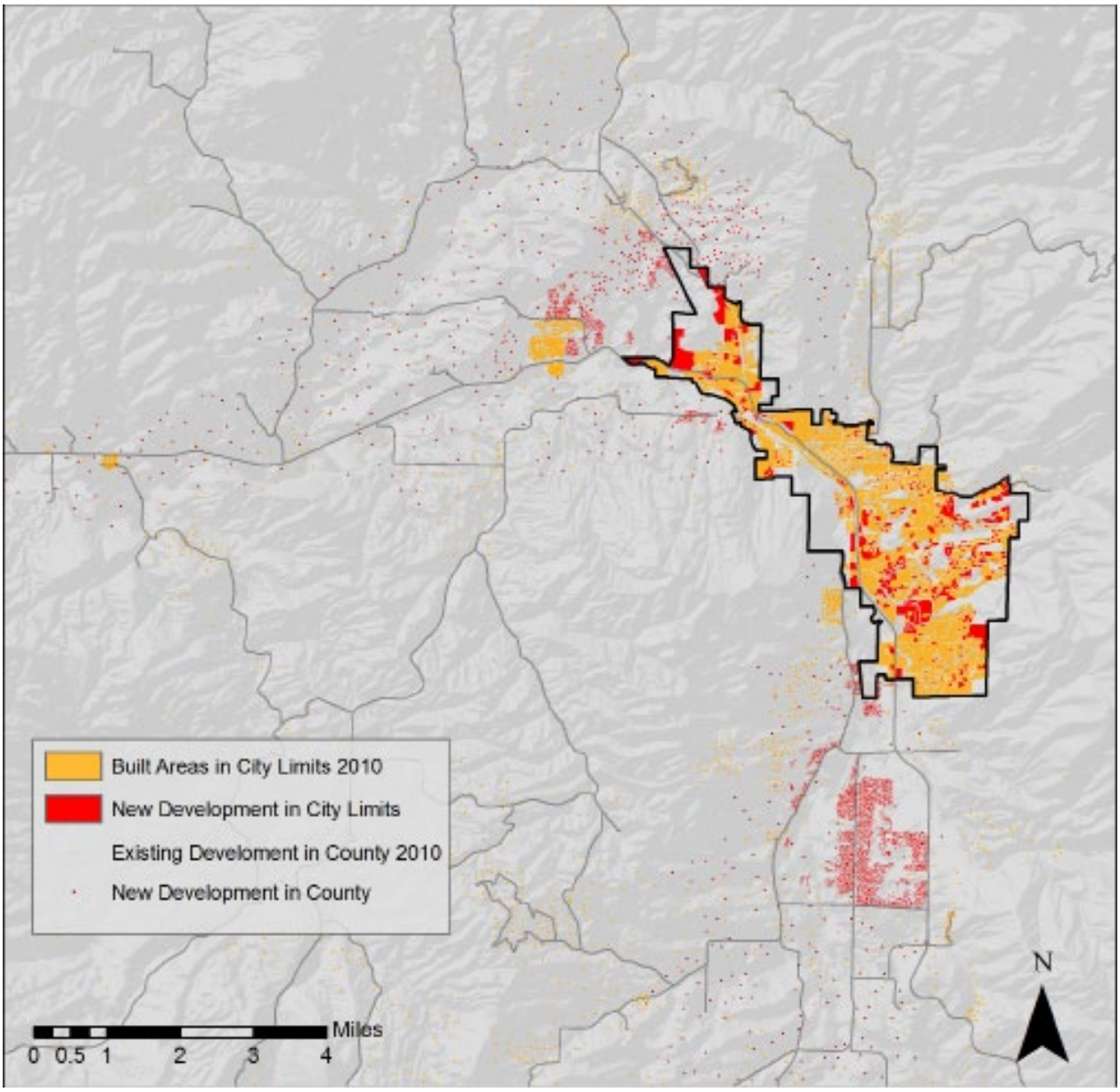


Figure 32: Scenario 3: TDR

In this scenario, the city has taken no new measures to accommodate growth much like in Scenario 1. However, in Scenario 3, the county attempts to meet the new housing demand through transfer of development rights programs West and South of city limits. Five-acre development is allowed in the recently drafted TDR receiving area to the West of town, and half-acre development is allowed in other areas convenient to Steamboat Springs, most notably in the South Valley. In Scenario 3, the top third of available county land is subdivided into 35-acre parcels, Steamboat builds out, and 1177 new housing units are built in the South Valley and West of Steamboat Springs.

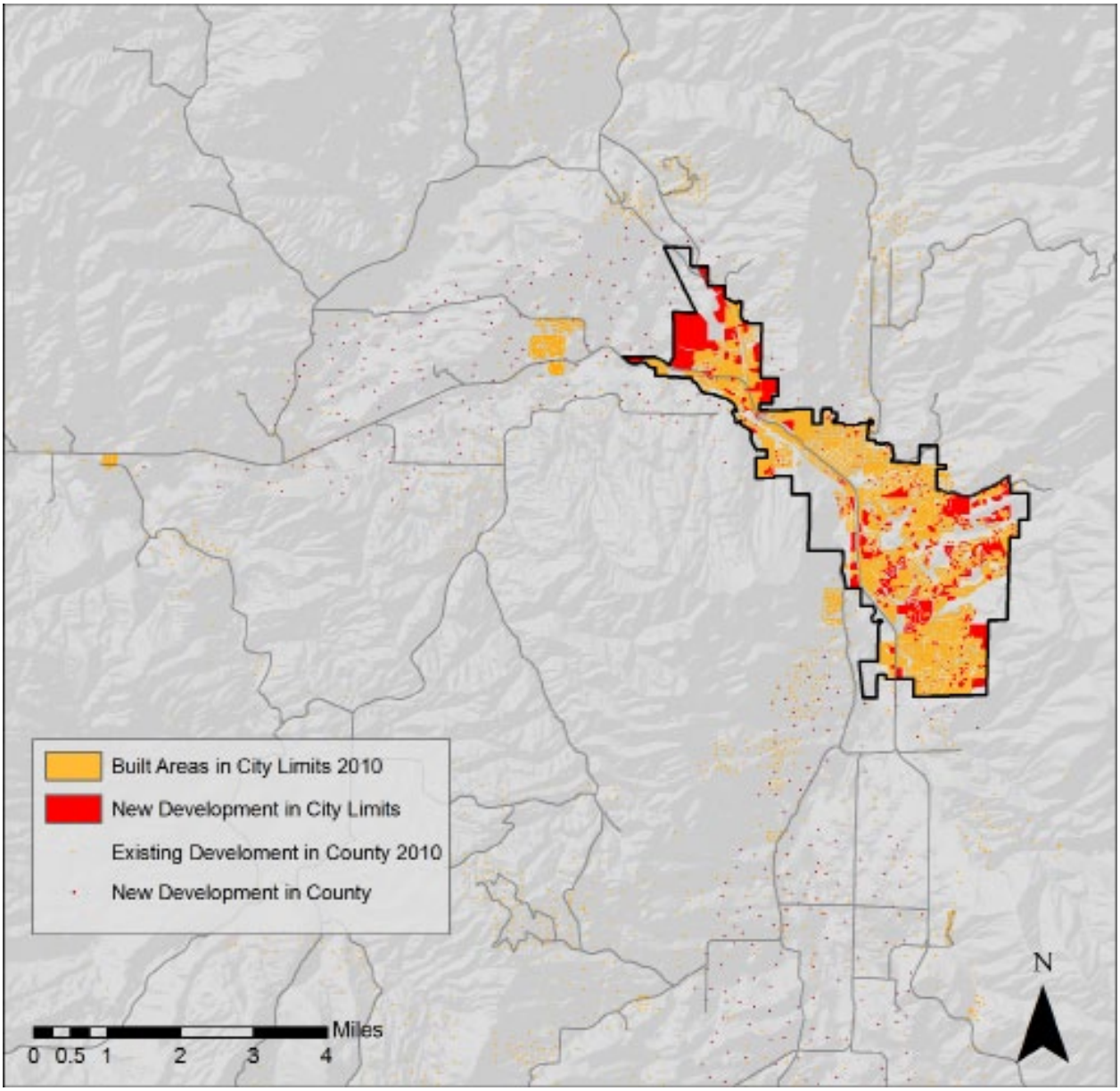


Figure 33: Scenario 4: Infill

In this scenario, as Steamboat Springs builds out, zoning regulations are changed to allow for additional infill development within existing city limits. This infill happens in two ways: first, by rezoning developable land resources within city limits, and second, by allowing more homes to be built in existing neighborhoods. 43% of attendees at the community meeting in January indicated that they would allow another house to be built between them and their neighbor. Assuming this would only apply between single family, duplex, and triplex homes, this represents a space resource for 1317 new units. Because of policies encouraging and easing the choice to live within city limits, only the most desirable 25% of available county lands are subdivided into 35-acre parcels.

Impacts

After looking over the four scenarios above, one may ask: "So what?" There are visual differences between the scenarios, but it is impossible to fully understand what those differences mean without some further form of explanation. To communicate the meaningful differences between scenarios, this study uses spatial indicators that report impacts on the most important concerns/ characteristics of our community, as rated by the participants at the public meeting in January.

Indicators can distill and communicate complex dynamics in a way that the public can readily understand,[1] and they have been effectively used in Steamboat Springs before, communicating both quantitative and qualitative data in the Routt County Livability Index and the Yampa Valley Partners Community Indicators Project.[2] To be useful, indicators should be clear and understandable, suitable to tracking and measurement, and should measure outcomes instead of inputs, i.e. 'graduation rate' instead of 'money spent per student.'[3]

The practice of devising and using indicators is well established. Criterion Planners' Indicator Dictionary lists over 90 indicators related to urban planning, though they are mainly quantitative, reporting values for readily measurable characteristics of the urban environment.[4] Formulating qualitative indicators, such as some used in this study, can be more difficult.

There are several well-known criticisms and qualifications for the use of indicators. First, the quality of an indicator is dependent on the quality of the underlying data, and that connection is sometimes obscured or poorly understood. When employing indicators, biased political decisions are inevitably made when choosing how and what to measure, and how to weight an indicator's component parts.[5] The geographic scale of analysis can also skew an indicator score, because the qualities being reported can vary across space.[6] Some indicators measure subjective quality instead of objective quantity, and there are discrepancies in opinions of what constitutes quality.[7] There are also questions of the perspective of the person interpreting an indicator score: the same score might look horrible to one person, and great to another.[8]

Whether or not groups of indicators should be reduced to form one composite score has also been debated: on one hand, a composite score is easy to see and understand, but composite scores are also much less transparent, and you introduce the additional problem of weighting.[9] Because of this, some argue against composite indices and in favor of reporting schemes that keep indicators separate, such as snowflake diagrams or simple charts.[10]

Similar to what has been suggested about the utility of alternative futures/ scenario planning itself, some have argued that indicators have more potential to help with decision-making processes through user engagement in creating them, rather than through any sophistication of their technical formulas.[11] The indicator values themselves aren't so important, so long as the process of devising them familiarizes stakeholders with the dynamics

1 Cummings, Richard. "Engaging the Public Through Narrative-Based Scenarios," in: Hopkins, Lewis D. and Zapata, Marisa A. Eds. Engaging the Future: Forecasts, Scenarios, Plans, and Projects, Lincoln Institute of Land Policy, Cambridge, MA, 2007, p. 247.
2 Fenton, Grant, project manager. 2009 Routt County Livability Index, Routt County Economic Developing Cooperative, Steamboat Springs, CO, 2009.
3 Cummings, Richard. p. 247.
4 Criterion Planners, Indicator Dictionary, INDEX PlanBuilder Planning Support System, 2008.
5 Wong, Cecilia. Indicators for Urban and Regional Planning: The Interplay of Policies and Methods, Routledge, New York, 2006, p. 22, 67.
6 Wong, p. 73.
7 Wong, p. 78.
8 Wong, p. 95.
9 Wong, p. 96, 81.
10 Wong, p. 88.
11 Wong, p. 23.

of change caused by urban growth, and stimulates thinking about their impacts.

This study uses five indicators to measure relative impacts across the scenarios. They can be most effective if they are considered as a group and attention is paid to the difference between them, instead of their nominal value individually. Each indicator was measured using a different formula; so different indicators cannot be compared with one another. Instead, the value of the same indicator can be compared across scenarios to see how that concern is affected by different development outcomes. The indicators can help make differences between the scenarios comprehensible and meaningful even through their rejection- if the formulas used are judged to be inappropriate, or if better ones are found, these indicators are still useful because even negative reactions stimulate thinking through and understanding how spatial development patterns impact community concerns.

The indicators were calculated using raster-based GIS. Because the indicators are measured spatially, in cases where a concern was non-spatial, such as "community character," spatial proxies were devised to approximate the expression of that concern.

The top five concerns as ranked by the community in January were "Preserving Community Character," "Preserving Open Space," "Managing Growth," "Seeing, Protecting, and Accessing the Yampa River," and "Preserving Ranching and Farming in the Area." These choices guided the final choice of indicators to model in this study, although changes were made for the sake of comprehensiveness and simplicity. Indicators modeled from the community ranking include "Community Character," "Open Space," and "Ranching and Farming." "Affordability" was also modeled because even though it was ranked very low in importance at the meeting in January, the concern has been the center of much debate around town, and drives much of the debate on growth policy. Visual preference was also modeled for each scenario, because it conveys a sense of visual development impact that isn't captured in the other indicators, and that impacts all of them. "Managing Growth" and "Seeing, Protecting and Accessing the Yampa River" were not modeled, because the impacts of growth management are captured by the other indicators, and there was no appreciable difference in river management or use between scenarios.

Community Character:

(Average Proximity to Community Congregation Points) / (#Community Congregation Points) + (100 - %Change in Built Environment) + (% Demgraphic Constancy)

Community Character is a difficult concept to map, because there are so many qualities about it that don't find spatial expression of any sort. Several aspects of community character were considered, including the physical makeup of town, the demographic makeup of the community, and the ability of the community to congregate and maintain informal social connections. Community congregation points were mapped over centers where people do regular errands around town, including the City Market/ Walmart area, Safeway, Main Street, The Curve Plaza, and the planned town center in the Steamboat 700. The average accessibility to these points from built areas in town was divided by their number, because presumably the more places that people congregate, the less common it will be for people from different areas of town to run into one another. This value was added to the percentage of the built environment that remained the same as in 2010, and to the percentage chance to maintain the same demographic makeup in town. (see affordability below)

Open Space:

(% Open Space in City) + (Average Proximity to Open Space) + (Average Proximity to Trailheads) + 3 * (% Undeveloped Open Space in County)

The preservation of open space was one of the more straightforward of characteristics to measure here. The percent of Steamboat Springs' total land area remaining as open space in 2030 was added to the average accessibility of popular trailheads and all public open space, and finally to

the percentage of visible open space in the county that escaped subdivision into 35 acre parcels. Open space values inside and outside of city limits were weighted equally, meaning that the county value was multiplied by three to balance against the three separate indicators considered inside of city limits.

Ranching and Farming:

(% Unsubdivided Agricultural Land) + (% Unsubdivided Agricultural Land Visible from Highway 40)

Measuring growth effects on agricultural land meant first separating out those parcels which have already been subdivided for homesites, and taken out of meaningful agricultural production. Of all parcels zoned agricultural, only those parcels previously sold for less than $20,000 dollars an acre were considered as candidates for working agriculture. The percentage of these parcels that remained unsubdivided in 2030 was added to the percent of unsubdivided agricultural land within view of Highway 40. This is because while ranching and farming are important to preserve in their own right as economic and social contributors to the community, the agricultural character of the experienced landscape around Steamboat Springs is also important in creating local cultural identity.

Affordability:

% Opportunity to Maintain Current Demographic Makeup

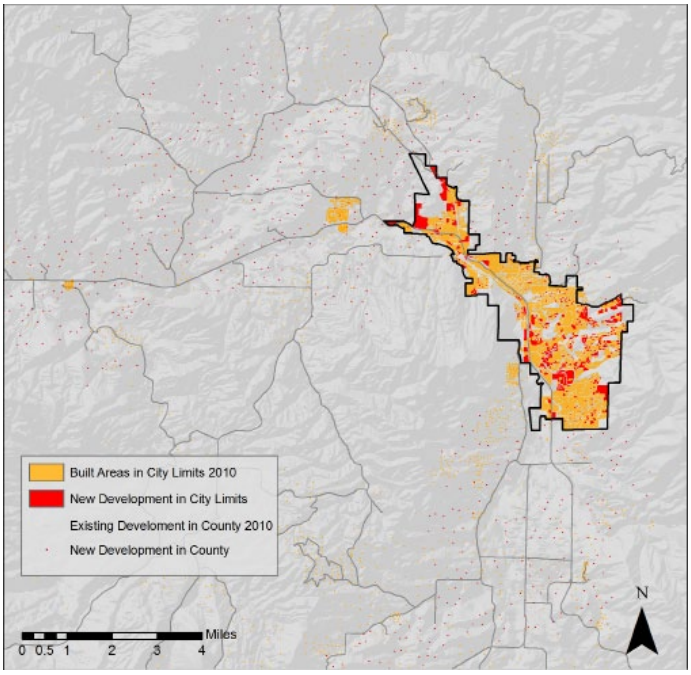
A full econometric housing study with hedonic pricing analysis would take a semester to complete by itself, and so is beyond the scope of this thesis. Instead, this study considered whether there was even a chance for all segments of the population to be accommodated inside the study area. As was discussed above, maintaining a perfectly elastic supply of housing, or in other words, building enough new housing to meet 100% of new demand, will keep the long-term inflation-adjusted average price of housing constant, even in resort communities. (Short-term real estate bubbles and busts notwithstanding.)

Using a willingness-to-pay model, people with more money get first choice of housing, down to the poorest last. In Scenario 1, space ran out, and 63% of the lower/ working class didn't even have an opportunity to try to afford something in Steamboat Springs, but instead were pushed out of the study area. In all three of the other scenarios, all population demand was accommodated. While this metric doesn't go as far as predicting actual housing prices, it does say something about whether there will even be an opportunity for people to try to afford something.

Visual Preference:

The same visual preference analysis performed on the study area for 2010 was also performed for each scenario.

Figure 34: Impacts for Scenario 1, No New Growth Accommodation



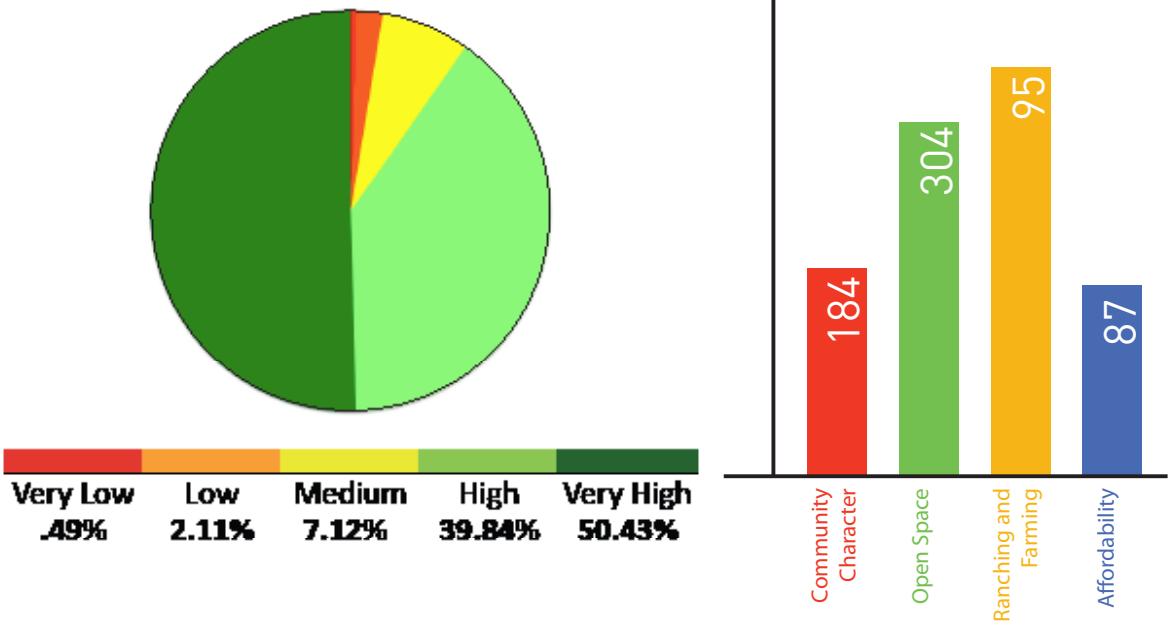
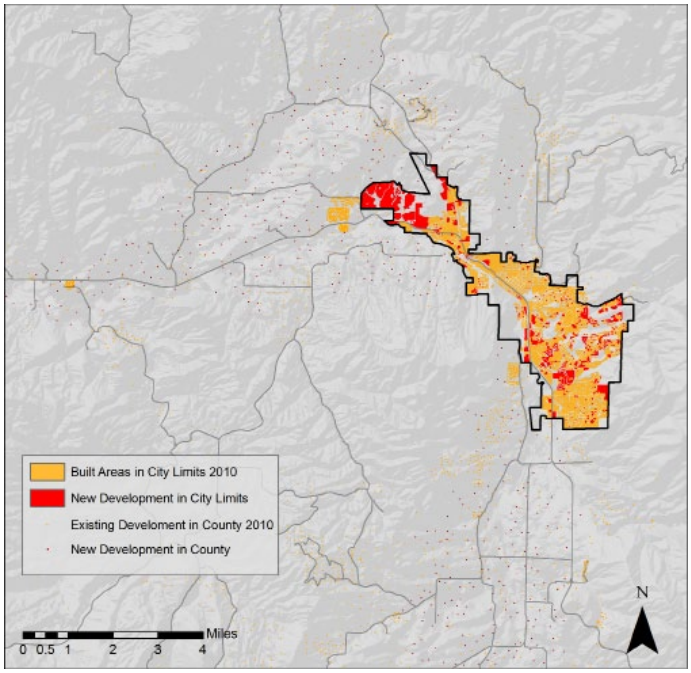
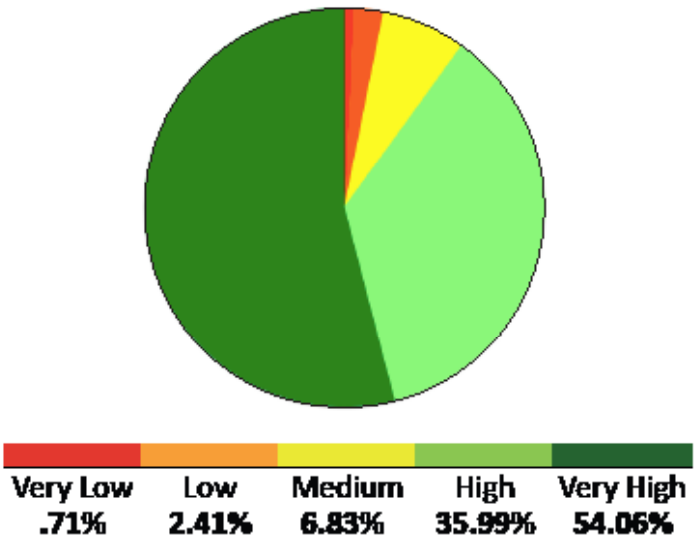


Figure 35: Impacts for Scenario 2, The WSSAP/ Steamboat 700





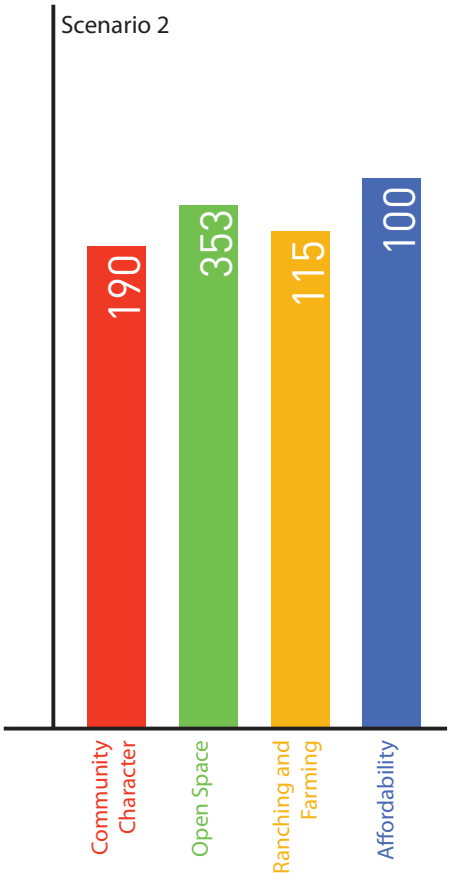
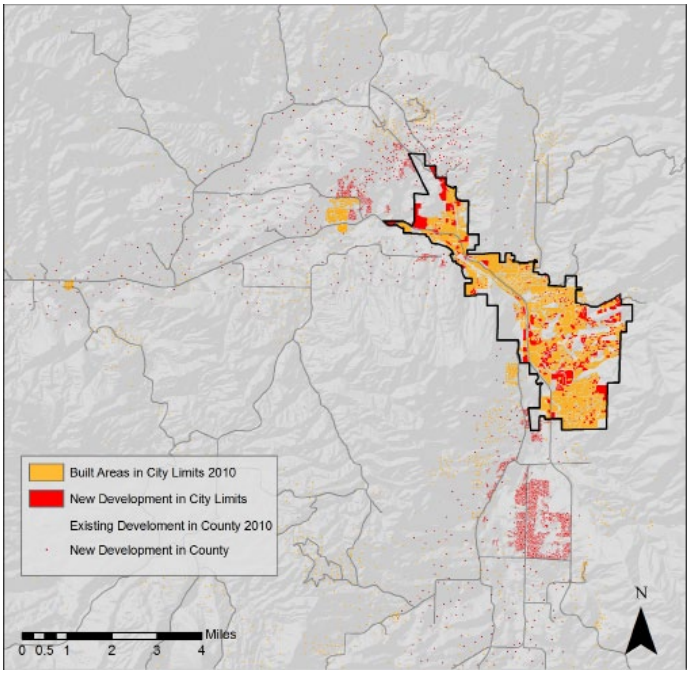
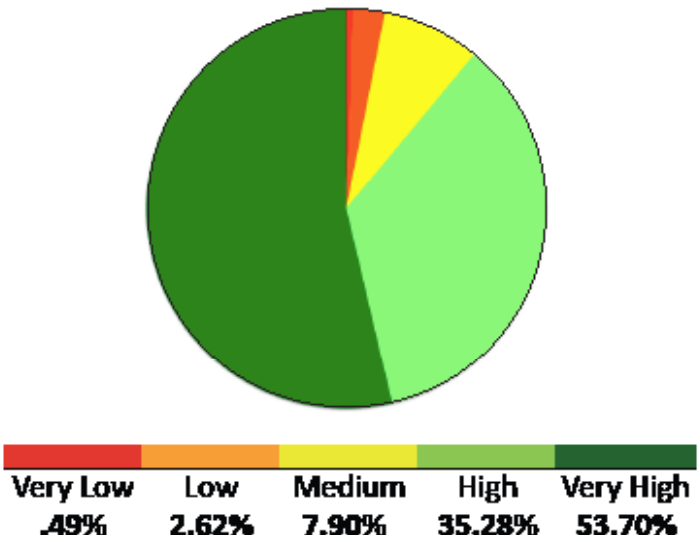


Figure 36: Impacts for Scenario 3, TDR





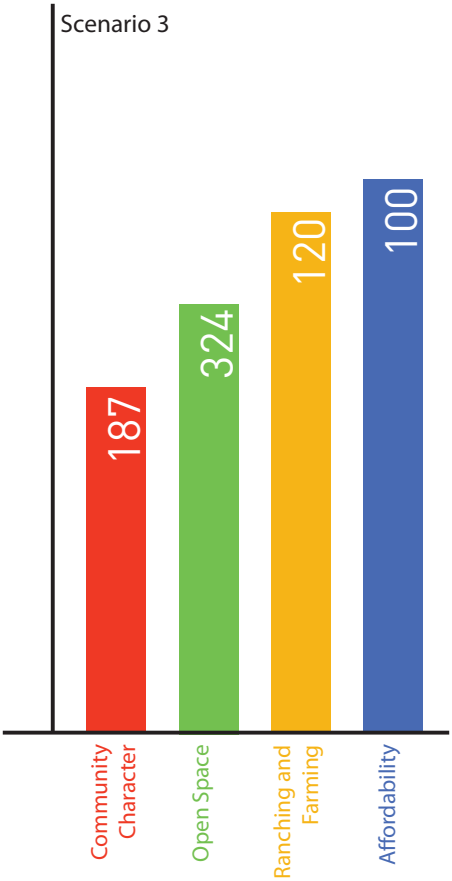
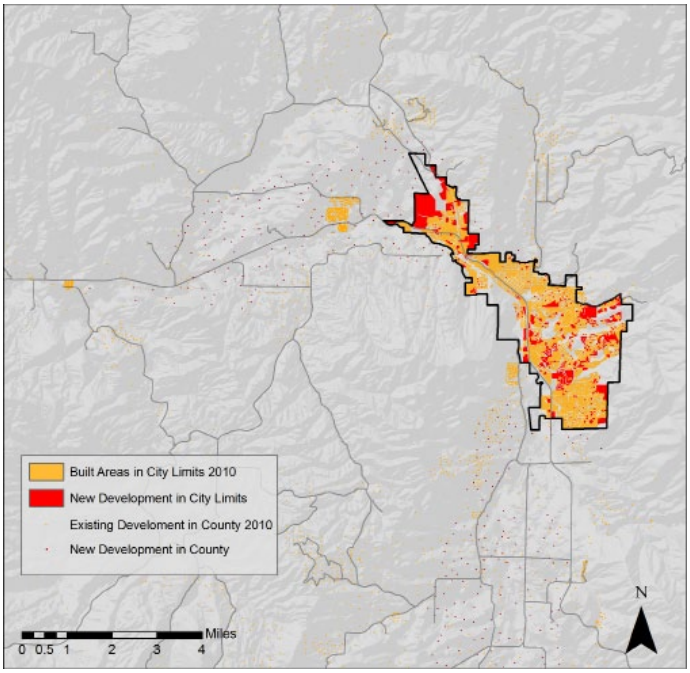
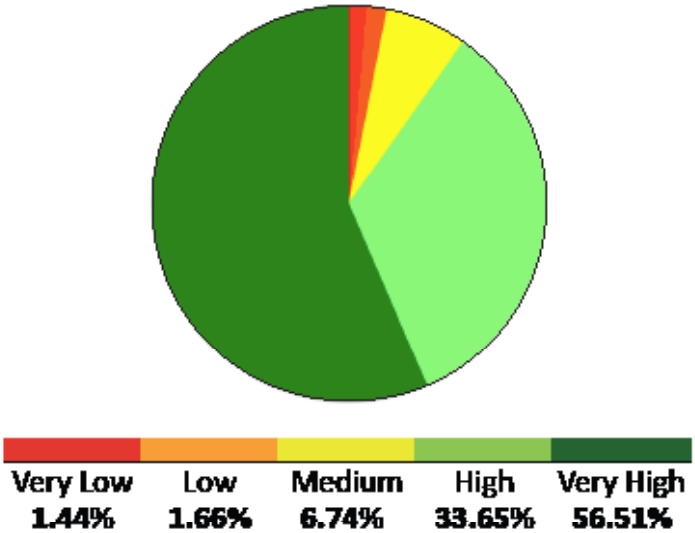


Figure 37: Impacts for Scenario 4, Infill





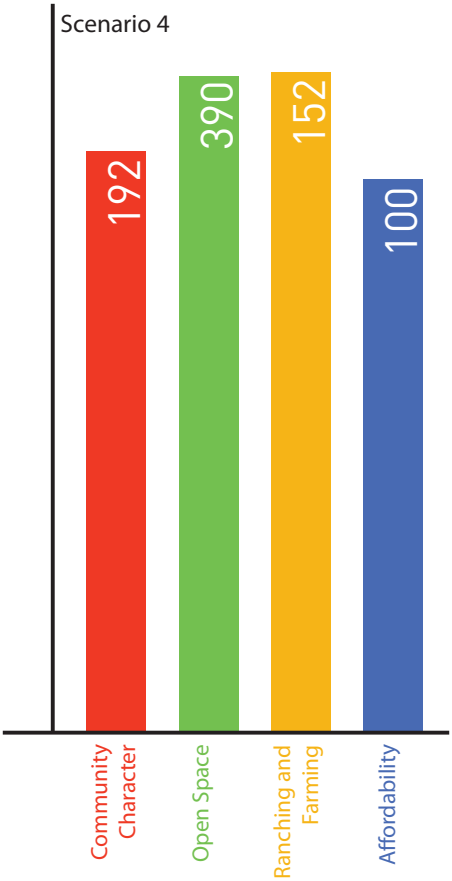
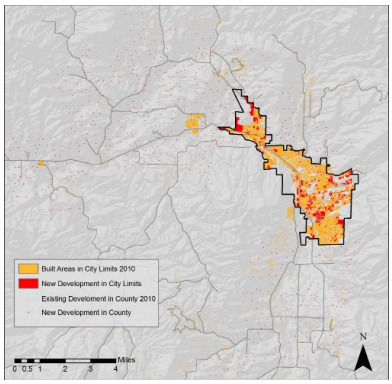
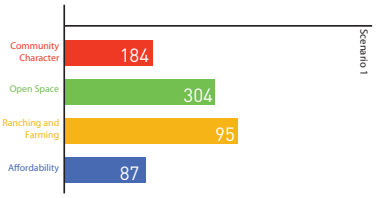
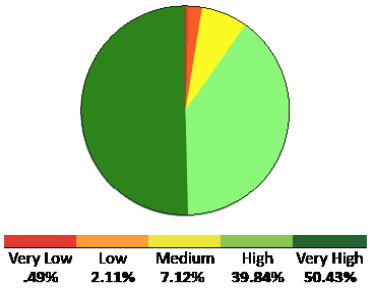


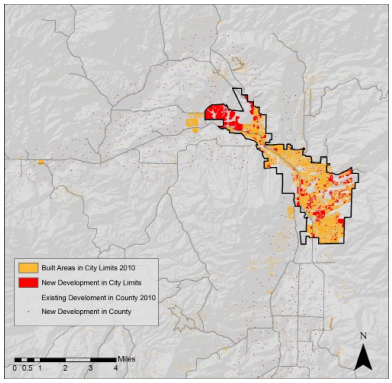
Figure 38: Scenario Impact Summary



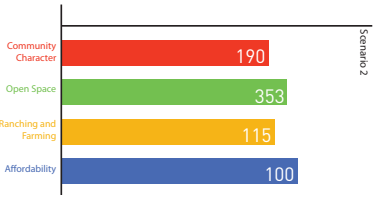
Scenario 1: No New Growth Accommodation

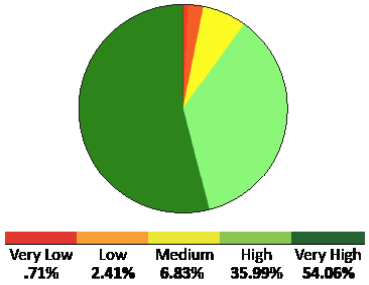


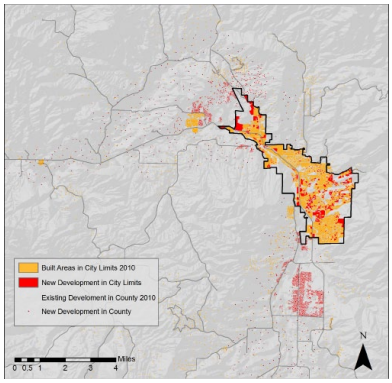




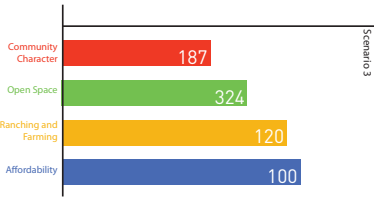
Scenario 2: The WSSAP/ Steamboat 700

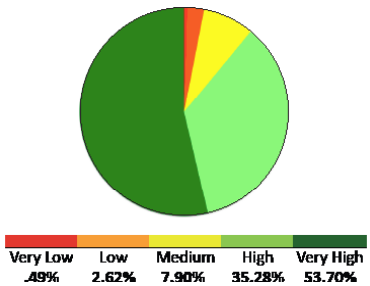


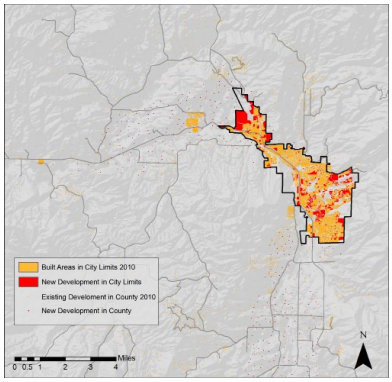




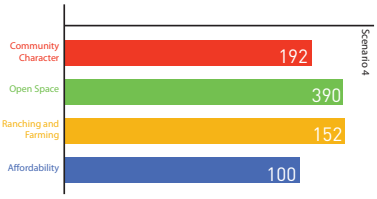
Scenario 3: TDR

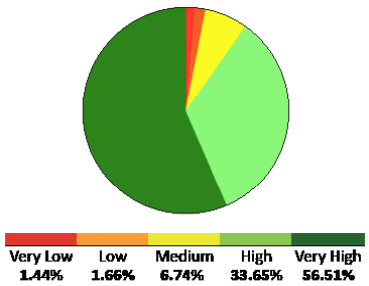






Scenario 4: Infill





Reflections and Limitations

The four scenarios expose the ramifications of different policy trajectories quite clearly. Scenario 1 shows that even if we try not to allow any changes to occur in Steamboat Springs, the town will still change dramatically, and for the worse. Along every indicator measured in this study, scenario 1 scored the lowest marks. The picture of Steamboat Springs in scenario 1 is of an Aspen-like town with higher property values and a gentrified population. Were the future to go this way, there would be many associated issues, including the social transformation of the community, the inability of the working class to find housing near Steamboat Springs, and the further conversion of the county landscape into 35-acre estates for large second homes.

If not accommodating any growth is a mistake, the question becomes: How and where should we accommodate growth? Scenarios 2 and 3 present two possibilities for this accommodation- one with a relatively dense, smart-growth annexation, and the other through county-level policy tools that enable low-density suburban development outside of city limits. In scenario 3, the view on the drive into and out of town would be heavily impacted. It would be demoralizing for the community if the area West of town and the South valley were to fill with suburban sprawl, and cause serious damage to our community's sense of itself- as a rural, agriculturally oriented town. The sprawl would also bring more traffic to our roads, and people would be driving farther because of the more widespread development footprint compared to other scenarios. This form of development would also be very expensive because of the inefficiency of extending infrastructure and services to such a housing arrangement.

In scenario 2, on the other hand, new development is concentrated in one comparatively small area, in the proposed Steamboat 700 annexation. Because the development footprint is so much smaller than in scenario 3, scenario 2 presents a cheaper and more environmentally friendly option for accommodation. New residents moving in would also benefit from a walkable environment, and would have a chance to form a sense of community that would be much more difficult to achieve in scenario 3. Even with the above benefits, however, such a project would still shift the social center of gravity away from existing community centers in Old Town Steamboat Springs and The Mountain. These areas are already hurting for customers- we probably don't need to add yet another center for commerce. The WSSAP proposal would also add a huge volume of traffic driving through town on Highway 40, to access downtown, the ski area, and all the existing services that could not possibility be duplicated in the new development, even if developers did provide a school, grocery store, post office, and a few cafes.

The Steamboat 700 proposal probably presented a best case for growing outside of Steamboat Springs' existing city limits, as long as assumptions about lack of infill capacity and future population growth were true. However, citizens of Steamboat Springs voted solidly against the project in March, suggesting that the community doubts the validity of these assumptions. On closer inspection, it seems that the perception of a need for outside growth came from an inaccurate buildout assessment completed in 2004. In reality, much more infill capacity exists inside city limits. That over 40% of meeting participants said that they would allow a house to be built between them and their neighbor is very significant finding, and shows that a large part of the community would rather accommodate growth by increasing densities.

In scenario 4, this infill capacity is used to accommodate all new housing demand to 2030. Pursuing a policy of infill development within city limits would bring many benefits that the other scenarios do not: First, the economic benefits of land transactions would be spread across the

community, instead of enriching a few large landowners in the county. Getting around would be much easier: By building more densely, sufficient demand would be created to support additional bus lines, which could serve the town on routes more convenient than currently exist. Automobile traffic might also decrease as denser populations pushed demand for walkable jobs and services past a tipping point that made them economically viable. Lastly, if more people could walk to work or to go shopping, there would be many more opportunities for positive social exchange (in comparison with solitary traffic-jam annoyance), and a much tighter community could result.

The population projections that explained the need for a project like the Steamboat 700 were based on trends that died with the real estate bust. Steamboat Springs is currently losing population, and probably will for some time. The rate of demographic, economic and physical expansion witnessed in town during the boom was driven by empty speculation, and will probably not be relived for a long time. The economic vitality of Steamboat Springs also rests on the ability of people and goods to travel into the valley cheaply, and with the risks of resource scarcity and higher energy prices looming in the future, the economic paradigm that casts Steamboat Springs as a four-season resort may be in jeopardy.

This uncertainty about the future has two consequences: first, if housing demand in the coming decades is low, then questions of accommodation become very much less urgent, as even scenario 1 would perform well without demand. Second, it could be foolish to make large investments based on speculative demand projections. For instance, if the Steamboat 700 had passed and been annexed, a large piece of land would have been entitled for development, and investments in infrastructure extension would have been made during early stages of project buildout. This would have exposed Steamboat Springs to a potentially expensive liability had growth failed to materialize on schedule and the developers went bankrupt. Instead, pursuing a policy of infill leaves Steamboat Springs much more resilient, because no new major investments would be needed, and new housing could be incrementally built, proportionate to need. A denser living arrangement would also leave us less reliant on energy for transportation, and give us a potentially crucial leg-up if resource scarcity makes driving uneconomical. Lastly, there is basically no reason to pursue any other accommodation policies, because the infill capacity in Steamboat Springs could meet new housing demand for at least a generation.

While much can be learned from this study's result, there are several important limitations to discuss. Early in the project, I decided to adopt a stakeholder-driven process, where stakeholder input would determine my direction of study. There are both strengths and weaknesses to this approach: I began the process with an open-ended inquiry to determine what was most important to the community. The answers I received consisted mainly of subjective and qualitative characteristics of Steamboat Springs that are difficult to measure with indicators. The open process also kept me from modeling ecological, hydrological, and other biophysical indicators, which aren't in the public consciousness as much as the more qualitative. Modeling biophysical characteristics would have been much more straightforward, but they don't immediately explain the impacts that the community cares about.

On the other hand, the open-ended process did lead to a study of concepts like "Community Character," which are often missed in the more structured planning processes, which avoid them precisely because they are more difficult to model. Successfully characterizing such concepts with indicators is an unanswered problem in planning, and an area where gaps in planning theory need addressing. Measuring subjective concepts was important for understanding the impacts of different scenarios, but without standardized techniques for indicator development, I was forced to devise new formulas to the best of my own abilities.

As with other areas of this study, my indicator development was also limited by time constraints. Ideally, the indicators would have been vetted and

calibrated in an iterative community process. It is unfortunate that this wasn't possible, because such a process wouldn't only have calibrated the indicators, but would have given them more legitimacy in the community's eyes, and would have familiarized participants with the causal thinking involved.

While examining the indicators for each scenario does say something about relative performance of the factors being measured, they also highlight the above issues and more- such as the dependency of the entire study on input assumptions. During the construction of scenarios, an assumption was made about the amount of development that gets pushed into the county- highest for scenario 1, where it was reasoned that higher prices would draw wealthier new residents and create demand for high-end rural estates, and lowest for scenario 4, where infill would increase civic vitality and walkable attractions that would drive demand in town. The Open Space and Ranching and Farming indicator scores were dependent on this assumption, so in effect, they only show how much county development was assumed would occur in each scenario. And, there is not necessarily any link between any of the growth policies modeled and the amount of development that occurs in the county.

The rest of the indicators are also based on assumptions: because they are spatially measured, proxies had to be found that explained each of the concerns of interest. Qualities of subjective concepts like "Community Character" definitely vary with perspective, and for a given reader, those qualities may or may not have been captured here.

For the reasons above, this study cannot be considered to be a scientific report that forecasts future development conditions in Steamboat Springs. Rather, it represents an exploration of various tools that exist for thinking about future urban growth dynamics. It is easy to see why efforts like this one would be most useful if stakeholders were included in the process of creating them- because the value is in learning about the interaction of growth dynamics, and not in the final modeled answers. From the example above, we have no way of knowing how much development might get pushed into the county because of different development policies in town- however, undertaking exercises like this one could prepare us to observe and understand the phenomena in process, and adjust our expectations and actions based on those observations.

While again, they are heavily assumption-dependent, some discussion of the measured indicator values is warranted here. The four spatial indicators show that Scenario 1 performed poorly in return for preserving the current built character of Steamboat Springs. Scenario 1 scored low on Community Character mainly because there wasn't enough housing accommodation for all new growth, which changed the demographic makeup of town as higher-income people outcompeted lower-income people for limited space. The Open Space indicator was pushed down because of all the new 35-acre development in the county.

Scenario 2 performed relatively well, showing high values for accommodating all new residents and pushing slightly less development into the county. Community Character in scenario 2 is slightly lower because there is another center for community congregation introduced West of town, which keeps people from crossing paths and meeting each other as often as with fewer centers.

Scenario 3 had a low score for Community Character, because even though the demographics and number of centers of community congregation stayed the same, people had to travel further to get to them through sprawl that changed the character of the built environment. Scenario 3 did more poorly on Open Space than others, because of the extent of new development.

Scenario 4 got the highest indicator scores of the four. The Community Character was high because of the close proximity of development to centers of community congregation, and because all new housing demand is accommodated. Scenario 4 got high values for Open Space and Ranching and Farming because urban development was concentrated within city limits, and less 35-acre development was pushed into the county.

The visual preference indicator relays a predictable measurement of landscape transformation in each scenario. In scenario 1, with the least amount of change in town, there is also the least amount of very-low preference area. On the other hand, because lack of change pushes more development into the county, there is more area that gets degraded into the high category, with less of the landscape remaining as very highly preferred. On the opposite end of the spectrum is scenario 4, which has the highest amount of very low preference area because of the higher density infill that accommodated most of the growth in the scenario. In scenario 4, however, more of the landscape is preserved in the very high preference category, because less development is pushed into the county. Scenarios 2 and 3 fall in-between these conditions, with a mix of loss of very high preference areas, and gain of very low preference areas.

The results of the visual survey show that people most prefer rural landscapes, with the exception of a photograph of historic mainstreet. This would suggest that the infill development in scenario 4 would be the best option for preserving the visual quality of the Yampa Valley, because the highly preferred landscapes would be preserved, and development would mainly impact those landscapes that are already lowly valued. Any infill strategy aiming to preserve visual quality, however, would also need to take steps to preserve the historic character of mainstreet and other important landmarks in town.

Conclusion and Next Steps

Hopefully this study provides a useful first step toward developing an effective tool with which Steamboat Springs could more clearly consider the impacts of different future growth policies. The work accomplished to this point has been limited by time, resources, and scope. The constrained scale and schedule were necessary of course, because the process was limited to one semester of remote thesis work. However, there are many possibilities for refining and expanding the process in potential future phases that would make this thesis more valuable for the community.

The scenarios modeled in this study were chosen based on potential policy directions Steamboat Springs could take, and were limited to what seem to be realistic options for future growth. This choice is distinct from other studies, which present prescriptive scenarios, and then discuss how to achieve them. A next step here could be to take insights from considering the first four scenarios, and then generate additional prescriptive or proactive scenarios in order to explore the relative benefits of different growth policies more specifically. Such scenarios could be used to show the plausible limits of achieving different proactive policy goals, and what benefit the community might expect from them.

After examining the four scenarios presented above, it seems that a natural next step would be to reduce the scale of analysis, and explore different scenarios for how Steamboat Springs might accommodate infill development inside city limits. The implications of the fact that over 40% of the population would permit a new house between themselves and their neighbor definitely warrant further investigation. In general, some infill strategies would certainly perform better than others, and a second phase of this project could start to measure how and how much. Further, a process like this could go a long way in helping to define what an acceptable infill strategy would be, helping to make an infill goal realistic.

This study was also limited by the choice of scale and medium. GIS is a powerful tool, but the orthogonal, 2D representation fails to fully communicate the character of different scenarios. 3D digital models of transformed streetscapes and landscapes would go much farther in communicating the changes being described. Similarly so with the visual survey- the photographs used in this study were taken of the existing landscape around Steamboat Springs, which biased the process to the present and past. A more thorough, and much more time consuming, process would use computer-generated representations of potential future landscape conditions, so that the visual survey process could be used to test public response to a specific planning agenda.

So far, this thesis has been a valuable exercise for myself, as I have learned much about growth dynamics in Steamboat Springs, and about the planning methods used above. For this thesis to really find its purpose, however, and make a valuable contribution to the growth debate in Steamboat Springs, a subsequent phase is necessary. The next phase would present a different and more targeted set of scenarios to explore a validated range of policy assumptions, based on current proactive thinking around town. The process would ideally involve as large a group of stakeholders as possible, to create an informed core group of supporters who could in turn spread informed conversations through the rest of the community. In the end, when the time comes to make future decisions about how to accommodate growth in Steamboat Springs, the hope is that this study will help facilitate more informed debate and more purposeful decision-making.

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Appendix

CONSENT TO PARTICIPATE IN INTERVIEW

Study Title: Assessing the Future: The Impacts of Development on Steamboat Springs

You have been asked to participate in a research study conducted by Gates Gooding from The Department of Urban Studies and Planning at the Massachusetts Institute of Technology (M.I.T.). The purpose of the study is to find out how future development may impact the qualities of Steamboat Springs that residents value most. The results of this study will be included in Gates Gooding's Masters thesis. As a member of the Steamboat Springs community, your input would be valuable to this study. You should read the information below, and ask questions about anything you do not understand, before deciding whether or not to participate.

• This interview is voluntary. You have the right not to answer any question, and to stop the interview at any time or for any reason. I expect that the meeting will take about one hour.

• You will not be compensated for this interview.

• Unless you give me permission to use your name, title, and / or quote you in any publications that may result from this research, the information you give will be confidential.

• This project will be completed by May 2010, with an advanced pamphlet to be circulated in late February.

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

(*Please check all that apply*)

[] I give permission for the following information to be included in publications resulting from this study:

[] information provided in the form below

Name of Subject _____

Signature of Subject _____ Date _____

Signature of Investigator _____Date _____

Please contact Gates Gooding at 970-846-4834 or gates@mit.edu with any questions or concerns.

If you feel you have been treated unfairly, or you have questions regarding your rights as a research subject, you may contact the Chairman of the Committee on the Use of Humans as Experimental Subjects, M.I.T., Room E25-143b, 77 Massachusetts Ave, Cambridge, MA 02139, phone 1-617-253-6787.

YOUR NUMBER:_____

Assessing the Future: The Impacts of Development in Steamboat Springs

The following is a list of community characteristics and goals for the future identified during the Routt County Vision 2030 process, in no particular order. This is not a comprehensive list of Vision 2030's findings, but rather those characteristics that were ranked highly, and which can be directly impacted by development. Each item may be interpreted alternatively as an important asset to protect, a threat, or a need the community doesn't supply enough of. Please see the appendix on page 3 for a detailed description of each characteristic.

Please rank each of the following items from least important to essential. There are a total of 15 items, and five categories of importance. Please assign no more than three items to each level of importance. Afterward, please indicate how well you feel each item is currently being supported, enforced, how much of the need is being met, etc., using a scale of 1-10; 10 being highest.

	Least	Minor	Somewhat	Significant	Essential	Performance
1. Seeing, protecting, and accessing the Yampa River	[ ]	[ ]	[ ]	[ ]	[ ]	_____
2. Preserving open space	[ ]	[ ]	[ ]	[ ]	[ ]	_____
3. Preserving community character	[ ]	[ ]	[ ]	[ ]	[ ]	_____
4. Protecting scenic views	[ ]	[ ]	[ ]	[ ]	[ ]	_____
5. Preserving/ increasing recreational opportunities	[ ]	[ ]	[ ]	[ ]	[ ]	_____
6. Protecting/ experiencing natural habitat and wildlife in the area	[ ]	[ ]	[ ]	[ ]	[ ]	_____
8. Increasing affordable housing	[ ]	[ ]	[ ]	[ ]	[ ]	_____
9. Increasing public transportation	[ ]	[ ]	[ ]	[ ]	[ ]	_____
10. Preserving ranching and farming in the area	[ ]	[ ]	[ ]	[ ]	[ ]	_____
11. Preventing sprawl	[ ]	[ ]	[ ]	[ ]	[ ]	_____
12. Limiting traffic congestion	[ ]	[ ]	[ ]	[ ]	[ ]	_____
13. Managing growth	[ ]	[ ]	[ ]	[ ]	[ ]	_____
14. Supporting local demographic diversity	[ ]	[ ]	[ ]	[ ]	[ ]	_____
15. Moving toward sustainable use of resources	[ ]	[ ]	[ ]	[ ]	[ ]	_____

16. Other_____

17. Other_____

Personal Questions

Age:____ Sex:____ Length of time living in Routt County:_____

Household Income:_____ Do you own or rent your home, or other_____

Geographic area where you live (i.e. Old Town, Whistler, North Routt, etc.):_____

Routt County's population is projected to grow by 70% between 2008 and 2030. What are your thoughts in general on whether and how we should accommodate this growth?

If growth ***is*** going to happen, where would you most like to see it accommodated? If not in the Steamboat 700, where else in Steamboat Springs or Routt County?

Would you support higher-density infill development inside city limits? What about allowing another house to be built between you and your neighbor?

If you had all the money in the world, where in Routt County would you want to live, on what type of property, and in what type of dwelling?

Other comments:

APPENDIX

1. **Seeing, protecting, and accessing the Yampa River**

This characteristic refers to the ability to see, interact with, and access the Yampa River, and the overall quality of the riparian area.

2. **Preserving open space**

Any unbuilt area, private or public. This criteria addresses both the amount of open space, and how far it is from where you live.

3. **Preserving community character**

Valuing the current built environment in Steamboat Springs, keeping things the way they are, preserving the historic character of Steamboat's old town.

4. **Protecting Scenic Views**

5. **Preserving/ increasing recreational opportunities**

This characteristic refers to recreating in the natural world, so hockey, basketball, etc. do not count. At issue is quality, amount, access and distance to recreational lands.

6. **Protecting/ experiencing natural habitat and wildlife in the area**

Protecting natural habitat in the area that supports wildlife, and limiting habitat degradation.

8. Increasing affordable housing

9. Increasing public transportation

This criteria refers to the viability of public transportation options based on development outcomes

10. **Preserving ranching and farming in the area**

11. **Preventing sprawl**

Sprawl is defined as low-density development that increases the overall development footprint. Preventing sprawl would mean directing new development into denser, more compact configurations.

12. **Limiting traffic congestion**

13. **Managing growth**

This criteria refers to size of the population of the community.

14. **Supporting local demographic diversity**

Ensuring that all ages, classes, and ethnicities can live and work in Steamboat Springs.

15. **Moving toward sustainable use of resources**

Reducing greenhouse gas emissions, managing our use of resources such as oil and water as efficiently as possible through development outcomes.