Executive summary

Scenarios and indicators for Ouray County build-out analysis

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The goal of this study is to provide information to the citizens and decision makers of Ouray County about the relative effects of different patterns of residential growth. This information has been generated by conducting a build-out analysis in which a variety of indicators of effects are computed for a range of scenarios that reflect different assumptions about possible land use planning policies. This report focuses on residential development changes and planning processes, and does not address potential build-out or policies that affect commercial or other land use types. *A build out analysis is not a policy document but rather a planning tool intended to inform the planning process and assist decision makers in Ouray County.*

To conduct this build-out analysis we followed a process that involved public presentations, stakeholder workshops, and spatial analysis. A diverse set of representative stakeholders were selected from the community, and members of the stakeholder workgroup identified working assumptions, a variety of indicators, and a range of scenarios to examine. The build-out analysis was conducted and the Board of County Commissioners, Ouray County Planning Director, and stakeholder members provided feedback to help refine and clarify the report. This document is the final report of these efforts.

Currently, roughly half of Ouray County is privately owned, about 30% of this private land acreage is owned by residents of Ouray County, 19% by residents of nearby counties, 18% residents of Colorado, and about 32% residents outside of Colorado. The annual growth rate in housing units was 4.7% between 2000-2005.

Seven scenarios were identified to reflect a range of reasonable planning policy alternatives: (A) existing zoning; (B) doubling of housing units (35 acres at 17.5 acres per unit); (C) modest increase in units (105 acres at 26 acres per unit); (D) concentrating growth around Urban Growth boundaries; protecting scenic corridors by (E) locating housing units at the bottom of the slope or (F) by transferring units to the urban growth boundaries; (G) clustering development on a parcel; and (H) lowering the density (70 acres at 70 acres per unit). The following working assumptions were made: we addressed the land use planning processes only within the *Alpine*, *High Mesa*, and *Valley* zones, development within the other zones were presumed to occur according to

existing zoning. Also, we assumed a 5 acre "footprint" of impact associated with each housing unit (a radius of 80 m).

Eight indicators were selected to represent a variety of possible environmental effects associated with development patterns: (1) number of housing units (each parcel can have 1 residential dwelling units; (2) number of accessory dwelling units; (3) acres of irrigated fields; (4) acres of agricultural land use; acres of (5) economically important wildlife and (6) rare & imperiled habitat; (7) acres of riparian & drainage areas; and (8) vehicle miles traveled per day.

Major findings

- The number of housing units in Ouray County will likely double to about 5,900 in the next 25 years or so if current growth rates continue and existing zoning and planning regulations remain.
- Of the 7 alternative growth scenarios, 4 would result in an increase of about 20% to 100% in the number of housing units, 2 would result in no net change, and 1 would result in a 15% reduction. The build-out scenarios forecast between 5,088 and 11,525 units.
- The acres of irrigated agricultural land lost to development would range from about 1,400 acres (7% of existing) in the cluster and low-density scenarios, to 2,300 (12%) acres for existing zoning and scenic corridor scenarios.
- The loss of habitat for economically-important wildlife species is dependent mostly on the dispersal pattern of housing– doubling housing density (35 ac at 17.5 ac/unit) results in roughly 2 to 3 times the loss of acres as the existing zoning scenario (~18,000 acres). The loss of rare & imperiled species habitat is relatively minor (<6% of existing habitat) and changes very little between scenarios. However, possible limitations on wildlife movement and fragmentation of habitat are likely due to increased automobile traffic. Vehicle miles traveled per day are projected to increase from 80% (low-density scenario) to 280% (existing zoning, urban growth boundary) to 480% (35 ac at 17.5 per unit and clustered scenarios).
- Maintaining the existing zoning would result in 5,900 total housing units (for the county), a moderate reduction (~10%) of current irrigated agricultural land and wildlife habitat, and 2.8 times the vehicle miles traveled (VMT). Doubling the number of housing units allowed on Alpine, High Mesa, and Valley zoning types would result in 9,500 units; a 15-20% reduction of irrigated ag land, wildlife habitat and riparian areas; and result in an estimated 4.8 times the current VMT. Steering growth towards urban growth boundaries would allow an estimated 11,500 housing units, have a moderate reduction (~15%) of irrigated ag land, moderate effects on wildlife habitat, and about 2.8 times the existing VMT. Scenic corridor scenarios would result in moderate effects on wildlife habitat and limit growth in highly-visible scenic corridors. The low-density scenario would result in about 5,000 housing units, minimize the irrigated land and wildlife habitat lost, and limit the VMT to about 1.8 times current levels. Note that estimates of VMT are likely to be conservative, because additional miles of new subdivision roads are not included.

Scenarios and indicators for

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Goal

The goal of this study is to provide information to the citizens and decision makers of Ouray County about the relative effects of different patterns of residential growth. This information has been generated by conducting a build-out analysis in which a variety of indicators of effects are computed for a range of scenarios that reflect different assumptions about land use planning policies. This report focuses on residential development changes and planning processes, and does not address potential build-out or policies that affect commercial or other land use types.

A build out analysis is not a policy document but rather a planning tool intended to inform the planning process and assist decision makers in Ouray County.

Process

1. First stakeholder meeting and defining scenarios & indicators (22 March 2006)
2. Preliminary indicators maps and scenarios (10 July 2006)
3. Meeting with BOCC for input on scenarios (9 August 2006)
4. Draft report for quick review to BOCC and stakeholders (5 September 2006)
5. Revisions and final report to BOCC (mid-October 2006)
6. Public presentation of results (late-October 2006)

Current conditions

Roughly half of Ouray County is privately owned, while Forest Service owns 42% and BLM owns 7% (Table 1; Map Land Ownership).

Roughly 30.3% of the private land (in terms of acreage, not individual parcels) in Ouray County is owned by Ouray County residents. Roughly 18.9% is owned by people who reside in nearby

counties (e.g., in cities of Montrose and Telluride), and another 18.4% live beyond adjacent counties but still within Colorado. About 32.3% of land is owned by folks outside of Colorado (including about 0.3% internationally).

Table 1. Major land ownership types within Ouray County.

Owner type	*Acres*	*Proportion*
Private		
- w/in county	168,287	48.8%
- Town of Ridgway	872	0.2%
- City of Ouray	400	0.1%
Colorado Division of Wildlife	3,524	1.0%
USDA Forest Service	145,977	42.3%
BLM	25,752	7.5%
TOTAL	344,812	100.0%

Currently, there are 2,662 private parcels in unincorporated Ouray County (excluding Town of Ridgway and City of Ouray) totaling 162,457 acres[1]. Including conservation easements and exempt parcels, there are 2,708 and 167,247 acres. Currently, there are 1,269 units built (assuming 1 unit per parcel): 769 (60%) on small parcels (<10 acres); 136 (11%) on 10-35 acre parcels, 295 (23%) on 35-160 acre parcels, and 58 (5%) on >160 acre parcels (see Map Parcel Size Classes). Table 2 provides a listing of the current number of housing units by zone. There are about 14,000 acres in mining claims in southern Ouray County.

There are 48.2 miles of state highway and 143.4 miles of county roads in Ouray County (Table 3).

Table 2. Current (2005) housing units by zone.

Zone	*Number of units*	*Acres*	*Number of parcels*	*Notes*[2]
Alpine	239	106,947.6	695	CE/Exempt: 11; 2,291 acres <35: 230; 2,804.1 acres 35–160: 348; 18,215 acres >160: 96; 85,962 acres
Colona	12	5.5	18	
High Mesa	132	20,620.7	260	CE/Exempt: 6; 998.4 acres <35: 41; 816.8 acres 35–160: 197; 9,595.7 acres >160: 22; 10,513 acres
North Mesa	74	2,975.8	111	CE/Exempt: 1; 0.8 acres <35: 70; 762.3 acres 35-160: 37; 1,753.5 acres

[1] Using parcel data from Ouray County dated 20060405

[2] CE/Exempt – Parcels that have a conservation easement (actual easement acres may be less than actual parcel acres) on them or are exempt (e.g., Home Owners Association, cemetery, etc.).

				>160: 2; 459.2 acres
Public lands	3	50.1	7	CE/Exempt: 1; 41.4 acres <35: 6; 8.7 acres 35-160: 1; 41.4 acres >160: 0; 0 acres
South Mesa	281	4,118.9	760	CE/Exempt: 10 parcels, 295.7 acres <35: 720; 2,317.0 acres 35-160: 28; 1,131.6 acres >160: 2; 373.9 acres
South Slope	72	1,563.0	127	CE/Exempt: 10; 510.1 acres <35: 107; 640.6 acres 35-160: 10; 412.2 acres .160: 0; 0
Valley	448	30,965.6	730	CE/Exempt: 21; 657.5 acres <35: 568; 3,345.2 acres 35-160: 120; 7,642.6 acres >160: 42; 19,977.7 acres
City of Ouray	445	400.6	596	147 additional parcels, 71 vacant residential 25.6 acres, 0.36 ac mean (133 acres unknown); includes Oak Creek Highlands
Town of Ridgway	341	872.3	643	93.7 ac unknown; 193 vacant residential lots for 231.7 acres; 69 vacant commercial lots 45.8 acres
County (unincorporated only)	1 269	167,247.2	2,708	<10: 769 units, 1,475 parcels 4,004.9 ac 10-35.0: 136 units; 289 parcels; 6,554.0 ac 35-160: 295 units; 730 parcels 38,053.9 ac >160: 58 units; 154 parcels; 113,839.0 ac
County (+ cities)	2,047	168,520.1	3.947	

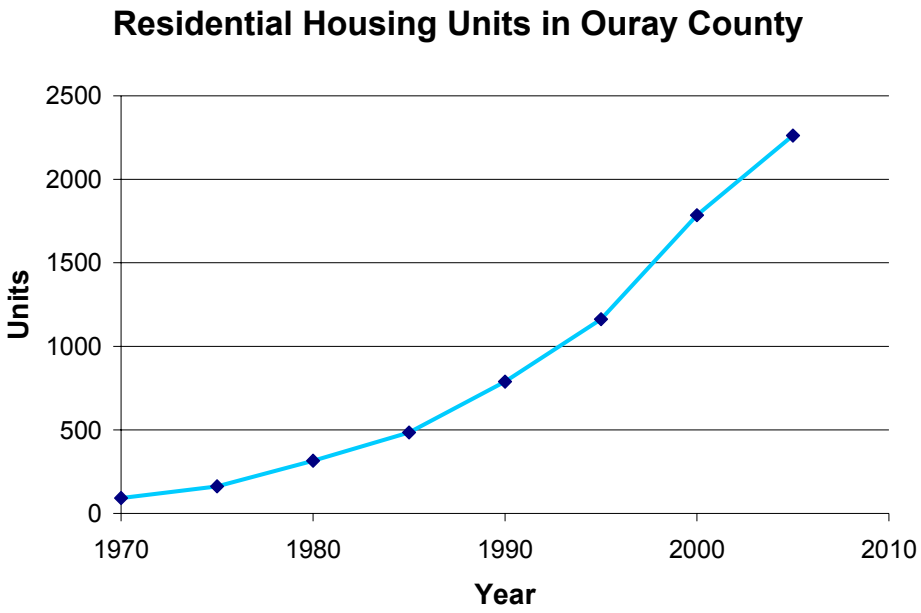
Table 3. Miles of roads in Ouray County by major road type.

Road type	*Miles*
County road	143.4
Forest Road	57.6
State Highway	48.2
Subdivision	71.6
Unknown[3]	93.4
TOTAL	414.2

[3] Unknown roads are most likely to be subdivision or forest roads.

Although the parcel database did not have a "year-built" field, an alternative database from the Ouray County assessor's office did provide this information. Below is a graph of housing units since 1970 (Figure 1). The annual growth rate in the number of housing units between 2000-2005 was 4.7%.[4]

Figure 1. The number of residential housing units in Ouray County from the "Year-built" field of the Assessor's database.



Scenarios

Why use build-out scenarios? A scenario is defined as "a hypothetical sequence of events constructed for the purpose of focusing attention on causal processes and decision points"[5]. Scenarios are plausible, but unverifiable accounts which represent a process of change over some time frame; they show "what could be…" not "what will happen or what should be." Generally, scenarios organize information within explicitly defined frameworks. Working through the process of explicitly defining a scenario often leads people to consider implications that might have been missed otherwise. Also, this will allow decisions to be based not only on what has happened in the past, but other possible "surprises" that may occur. Finally, they facilitate and coordinate discussion among stakeholder groups that may not have otherwise engaged in constructive discussions.

The Stakeholder Committee developed the following scenarios[6].

A. Existing zoning (baseline)

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4 Note that this includes both un-incorporated and incorporated areas of Ouray County.

5 Kahn, H. and A.J. Weiner. 1967. *The year 2000: a framework for speculation on the next thirty-three years*. MacMillan, New York.

6 10 July 2006 –Scenario G "Valley bottom" was removed because it was found to be quite similar to Scenic Corridor scenario. Also, on 9 August 2006 we added two additional scenarios: Cluster development and Lower density (1 per 70 acres).

B. 35 acres at 17.5 acres per unit

C. 105 acres at 26 acres per unit

D. Urban Growth boundaries

E. Scenic corridor

F. Scenic corridor w/transfer to Urban Growth Boundaries

G. Cluster development

H. Lower density (1 per 70 acres for parcels at least 70 acres)

We made the following general assumptions for all scenarios:

- We addressed the land use planning processes only within the *Alpine*, *High Mesa*, and *Valley* zones. Development within the other zones were presumed to occur according to existing zoning. Two sets of tables (below) show results for just the 3 zones being addressed (*Alpine, High Mesa,* and *Valley*), as well as a county-total (for all zones).
- Parcels that were created as part of a previously approved subdivision were not considered to be eligible for further subdivision.
- Parcels that are at least 35 acres and contiguous with other parcels at least 35 acres were considered to be grouped together into a larger group, regardless of the current ownership (because it is possible that parcels in the future could be owned by the same owner and consolidated).
- Although mining parcels that occur predominately in the southern part of the county and are considered legal parcels, they are in most cases very difficult to develop because of limited accessibility. Also, the spatial data on these parcels are not very complete. As a result, we did not include these mining claim parcels in the build-out analysis. There are about 14,000 acres of mining claim parcels in southern Ouray County.
- Parcels that have some form of protection on them, such as a conservation easement or are exempt, were presumed to preclude the construction of additional units in the build-out scenarios. We do not have detailed information for each conservation easement about the specific limitations (or allowances) on development.
- Land uses that would be specifically allowed or precluded were specified by current zoning – no other changes such as placing "open space" portions of the parcels or specifying building envelopes should be inferred.
- The build-out analysis results presented here were based on parcel data from Ouray County, updated to April 5, 2006. About 50 (~2%) of parcels did not have attributes assigned to them, so we were unable to distinguish whether parcels had a housing unit or the land use designation.

A. Existing zoning

This scenario establishes the baseline case if no changes are made to the currently approved zoning (see Map of Zoning). This is also known as "baseline" or "business as usual" – reflecting the situation if no change is made to the existing policy expressed in the zoning document.

Table 2. Existing zoning categories and their minimum lot size.

Zone	*Minimum lot size (acres)*	*Notes*
Alpine	35	Mining claims are excluded from analysis
Colona	0.137	
High Mesa	35	
North Mesa	6	Assume regular PUD
Public lands	35	
South Mesa	6	Assume regular PUD
South Slope	6	Assume regular PUD
Valley	35	

B. 35 acres at 17.5 per unit

This scenario assumes essentially a doubling of housing units within the Alpine, High Mesa, and Valley zones. Parcels that are at least 35 acres and not created from a previously approved subdivision are eligible for development at this density – other parcels were assumed to build-out at their approved zoning density.

Table 3. Scenario B minimum lot sizes.

Zone	*Minimum lot size (acres)*	*Notes*
Alpine	17.5	Mining claims are excluded from analysis
High Mesa	17.5	
Valley	17.5	

C. 105 acres at 26 per unit

This scenario reflects the assumption of 1 additional or "bonus" unit provided in return for planning at a bigger scale (at a minimum of 105 acres). This would allow the 4 units to be placed anywhere within the 105 acres with a minimum lot size of 1 acre (In other words, two 35-acre parcels could have no units on them, while the 3rd could have all 4 units, though this is not required).

Table 4. Scenario C minimum lot sizes.

Zone	*Minimum lot size (acres)*	*Notes*
Alpine	26	Mining claims are excluded from analysis
High Mesa	26	
Valley	26	

D. Urban growth boundaries

This scenario reflects a possibility of higher density development in the urban growth boundaries (UGB) around Ridgway and Ouray, at higher densities allowed by the cities because of urban infrastructure (Map Urban Growth Boundaries). Here we assumed 7 units per acre build-out in the UGB areas. Note that the circles that depict the disturbance zone around housing units in the Ridgway and Ouray UGB were modified (decreased in size) to adjust for high amount of overlap in urban areas.

E. Scenic corridors

This scenario operates under the assumption of minimizing development in the valley floor (and their agricultural lands) in corridors along Highways 550 and 62 and that portion of County Road 1 lying between County Road 24 and the south intersection of County Road 1A and County Road 1, and County Roads 5, 7, 8, 10, 24 and 24A, and County Road 12 (Cow Creek). Irrigated agricultural land is a large component or factor, but is not the sole consideration for inclusion in this designation. Houses at existing zoning densities will be placed up the slope/escarpment (and some small mesas, e.g., within Cow Creek drainage). The idea of this scenario is to constrain where development will likely occur, but not to restrict the number of housing units (therefore, the number of units in this scenario is identical to Scenario A). Scenic corridors were delineated by first identifying the stretches of public roads as defined above, then finding the viewshed from that road (what is visible based on topography), up to 1.5 miles on either side of a road (Map Scenic Corridors).

F. Scenic corridors with transfer of units to Urban Growth Boundaries

This scenario assumes that additional housing units within the scenic corridors will be moved into the UGBs and near Colona (west into the irrigated fields). This scenario results in 504 units that would be needed to be transferred to a UGB. Note that the circles that depict the disturbance zone around housing units in the Ridgway and Ouray UGB were modified (decreased in size) to adjust for high amount of overlap in urban areas.

G. Cluster development

This scenario reflects constraining the location of housing units rather than restricting the number of units. Clustering would be located to minimize the impact (spatial coincidence) on values that have been identified in the county master plan using three exclusion factors: riparian and drainage areas (Map Riparian Areas), irrigated agriculture (Map Irrigated Agriculture), and ridgelines (Map Ridgelines).[7] This scenario assumes that there may be up to twice the current density (same number of units as Scenario B, 17.5 acres, as an incentive to engage in a clustering process).

H. Low-density (1 per 70 acres)

This scenario reflects the assumption if development occurred only at a density of 1 per 70 acres (roughly 1 per 80, but acknowledging that State subdivision law allows parcels as small as 35 acres rather than 40 acres). Parcels must at least 70 acres to qualify.

Development pattern and effect zone

For each scenario, the number of future housing units is adjusted according to some assumptions of development process (e.g., sometimes only specific parcels are targeted within a zone). These assumptions affect the number of housing units in a parcel that is subject to development according to the assumptions prescribed in a scenario. Within each parcel, the location of the new housing units – or the within-parcel development pattern – will be examined assuming that

[7] Ridgelines were defined by using the Topographic Position Index using an annulus of 200-500 m.

new housing units will be equally distributed throughout the parcel, and therefore the effect of development will also be spread out equally throughout the parcel. That is, the weights for the distributed assumption W_d is even (e.g., 1.0) for all cells within a parcel. This proportion is computed as the ratio of the acres affected to the total acres in a parcel: (# units x 5 acres / parcel acres). This assumes that there is no overlap in nearby effect zones because all houses are spread out evenly (but the effect cannot exceed 100% in a parcel). Also, we assume that the effect zone is 5 acres per housing unit, which is represented on the maps as a circle.

The clustered development scenario (Scenario G) relies on a different assumption – namely that the location of the new housing units will be placed to minimize the impact on ecological, agricultural, and social values expressed in the county master plan. We recognized that it was challenging to specify the site-scale development pattern with much precision, but we believe that on the whole, some reasonable assumptions will help provide more reasonable and useful measures of the effects of patterns of development. We used three maps as exclusion factors, each have a weight of 10.0: irrigated agricultural lands E_i (Map irrigated lands), riparian areas E_w (Map Riparian Areas), and ridgelines E_r (Map Ridgelines). Locations without one of these three factors was given a default weight of 1.0. The three exclusion factors can (theoretically) overlap one another so these factors are summed to form the clustered weights, W_c:

$$W_c = 1.0 / (E_i + E_w + E_r + 1.0)$$

The disturbance effect associated with housing units was then allocated spatially within a parcel based on the weighting factor W_c. This places housing units so that they are situated on a parcel to avoid exclusion factors. This weighting approach was used rather than a simple binary include/exclude because many parcels are completely covered by one or more exclusion factors.

Indicators

For each scenario, a number of indicators were computed. Indicators were used to measure various aspects or characteristics that provide insight into the overall effect or impact from land use patterns that result from a scenario (Table 7). They typically reflect some social, community, or environmental value expressed in the Ouray County Master Plan:

> *"The overall development goal of Ouray County is to allow gradual, long-term population and economic growth in Ouray County in a manner that does not harm the County's irreplaceable scenic beauty, wildlife, air and water resources, and other environmental qualities and that does not unduly burden the County's residents or its government." -- Ouray County Master Plan*

Table 5. A listing of the indicators and what master plan goals they primarily (++) or secondarily (+) address.

	Master plan goals										
Indicator	***Ag lands***	***City/County character***	***Economic development***	***Housing***	***Natural resources***	***Rural character***	***Tourism***	***Transportation***	***Utilities***	***Visually significant areas***	***Wildlife & Plant habitats***
No.housing units		+	+	++							
No. accessory dwelling units		++	+	++							
Acres of irrigated fields[8]	++					+	+			+	+
Acres of agricultural land[9]	++		++			+				+	+
Acres of important wildlife habitat affected			+			+	+				++
Acres of riparian & drainage			+		+				+	++	++
Miles of additional subdivision roads*			+					++		+	x
Vehicle miles traveled - state & county - county only			 +			 + +		 ++ ++		 +	 + +
Acres developed within high wildfire hazard**					+				+		
Road effects on water quality*								++			+
Trailheads**							+				

[8] Irrigated agricultural lands are identified from high-resolution (~1:20,000) aerial photography.

[9] Agricultural land use per assessed designation in parcels database.

* Not computed here due to data limitations and not clear on what additional information this would provide.

** Not computed here because county-wide data on wildland-urban interface and wildfire hazard were not available.

Number of housing units

A basic piece of information is the number of housing units or residential -- here we assume that every parcel can have 1 residential dwelling unit as determined by the density specified for each zone.

Number of accessory dwelling units

Ouray County allows 1 accessory dwelling unit per parcel not to exceed one unit per 35 acres. In addition, the parcel has to be a minimum of 3 acres and if in a PUD, must be allowed by the covenants. Here we will make two assumptions: a) only 33% of parcels would have an accessory dwelling unit, so that rather than randomly assigning which parcel gets an accessory dwelling unit, we simply compute partial ADUs (weighted by proportion of a unit); b) all 100% of eligible parcels will have accessory units. This indicator value is the same for each scenario.

Acres of irrigated fields

The number of acres of irrigated fields[10] (Map Irrigated Ag Lands) as mapped from aerial photography (in 2000) within the disturbance zone of each housing unit generated by each scenario. We estimate the disturbance zone to be 5 acres – this includes the building footprint, modification of adjacent vegetation and outbuildings, and driveways.

For the assumption of equal-distribution of effect throughout parcel (unit is not modeled explicitly within a parcel). The acres affected then are computed as the proportion of the irrigated lands in a parcel, times the ratio of the number of units * 5.0. Note that the acres affected could be larger than 5 acres if the parcel is less than 5 acres, which is tested for and limited to the parcel size.

Table 6. Acres of irrigated agricultural land by zone.

Zone	*Acres of irrigated land*
Alpine	1,708
High Mesa	2,266
North Mesa	798
Public Lands	529
South Mesa	208
South Slope	799
Valley	13,271
Ridgway	672
TOTAL	20,255

Acres of agricultural land use

Similar to acres of irrigated land affected, this indicator reflects the value of a variety of land types for the agricultural enterprise (Map Agricultural Land Use; Table 9). The number of acres of agricultural land use was computed using the land use designation for each parcel, as assigned by the assessor's database. These land use types include grazing, meadow hay, and irrigated (but this is a different source and scale of information as compared to the indicator above). Note that this indicator would not count acres affected if a parcel is designated as residential but has some

[10] Source: Irrigated fields layer, from color IR, Ouray County Land Use Department.

agricultural land use, such as a small barn or stable. For parcels that are designated primarily as an agricultural land use, the number of acres affected equals the number of housing units * 5.0 acres (for clustered pattern, 2.5 acres are assumed to be affected).

Note that we do not differentiate the effects by size of parcel – so that our estimates are likely to underestimate possible reduction in the available agricultural lands. This is because smaller parcels (e.g., <35 acres) under management/operation of different owners are likely to be too small to efficiently used for agricultural production.

Table 7. The number of acres of agricultural land use types by zone.

Zone	*Acres of ag land use*
Alpine	
- grazing	75,958
- irrigated	3,278
- meadow hay	13,041
- other	79
High Mesa	
- grazing	10,040
- irrigated	806
- meadow hay	1,924
North Mesa	
- grazing	592
- irrigated	39
- meadow hay	561
Public Lands	
- grazing	3
- other	41
South Mesa	0
South Slope	
- grazing	42
- irrigated	307
Valley	
- grazing	3,896
- irrigated	18,577
- meadow hay	2,135
TOTAL	131,325

Acres of important wildlife habitat affected

Computing the number of acres of habitat affected will help to identify possible impacts of likely development on important wildlife habitat, as identified by CDOW, CNHP, and CSU biologists. We follow a standard conservation biology approach that includes both fine- and coarse-filter data. Fine-filter data include known occurrences of a species of interest, or known distributions of a limiting type of habitat. The coarse-filter approach uses data on rare and/or species-rich vegetation types found in the landscape that are often critically important for a variety of species and communities. We recognize that a full biological inventory of Ouray County has not been done, and that data on private lands are particularly limited. However, we feel there is reasonable data available to generate some basic understanding of the degree of likely effects. Including coarse-grain data (e.g., riparian areas) is particularly useful to provide comprehensive, consistent data across the county.

For this indicator, we estimated the number of acres of important wildlife habitat for both economically-important species (EIS) such as deer and elk, as well as for rare & imperiled species (RIS) such as lynx. The approach taken for generating maps of the EIS was to narrow in on the types habitat for each species that are particularly limiting for a species life stage – rather than identify all possible habitat within an area or county ("painting the county red"). We used data from the Colorado Division of Wildlife's WRIS distribution maps (www.ndis.nrel.colostate.edu). For the EIS, we used data on potential conservation areas available from Colorado Natural Heritage Program.[11]

For each of these habitat maps, we computed values at each location (cell) to be the proportion of the overall habitat, which allows the habitat value (or quality) to vary across the state. This provides abilities beyond a simple binary (yes/no) habitat map, so that a) locations where two or more species have habitat can be weighted appropriately and b) to allow the weight (or quality) to be adjusted according to the landscape context within Ouray County. The summation of all cells in each habitat map sums to 1.0, so that a simple overlay of threats can then generate the proportion of habitat that is affected. Note that the overall acreage that is involved (or affected) can also be computed.

The two composite wildlife habitat maps (Maps Economically Important Wildlife and Rare and Imperiled Species) are composed of data on multiple individual species habitat (Table 10). Each of the individual species habitat maps were adjusted to the proportion of habitat for a given species. By using the proportion of habitat, each species is ranked evenly when combined later – otherwise, species with large habitat areas (e.g., elk) dominate over smaller habitat areas (e.g., sheep). Moreover, for each species, the proportion of habitat in any given location was also weighted by the spatial configuration to identify "nearby" and "interior" portions of a patch, because impacts or development in interior areas that dissect a patch should be counted more than if it is just on the fringe. This also assumed that areas outside of habitat but nearby would be important to identify "encroachment" or proximal effects (e.g., human activities radiating out from housing development). This was implemented in GIS using a window of radius 800 m for elk, mountain goat, and mule deer and 1,000 m for bighorn sheep.

There are 48,610 acres of rare and imperiled species habitat, and 174,652 acres of economically-important species habitat in Ouray County.

Note that a large part of Ouray County is considered to be some type of habitat – for example summer range for elk and mule deer are quite extensive. We chose to focus on critically limiting habitat to narrow down the focus. Also, examining the potential effects of land use change on identified migration corridors is an important consideration, but beyond the scope of this study.

Table 8. Listing of wildlife habitat maps and the species and types of resources that are included.

Factor	*Description*	*Datasets*
Areas providing habitat for species of importance (areas where resources constrain or limit populations)	Mule deer and elk winter concentration areas Bighorn sheep (winter concentration areas)	CDOW WRIS (5 August 2004 version)

[11] This approach is similar to methods developed for the Larimer County Important Wildlife Habitat map (http://www.co.larimer.co.us/planning/planning/master_plan/chapter_6.htm#6.2.2).

Areas known to contain rare and threatened species (species that are listed as Federally or State endangered or threatened)	Bald Eagle (winter concentration areas) Lynx habitat Potential Conservation Areas (misc. species)	CDOW WRIS (5 August 2004 version) Colorado Natural Heritage Program Potential Conservation Areas

Acres of riparian & drainage areas

This indicator examines the extent to which a parcel occurs within riparian and drainage areas (Table 11). Riparian areas were defined by finding the floodplain/valley bottom adjacent to streams of 2nd order or larger (from 1:24k scale), using a "variable-width buffer" that conforms to the geomorphology of the valley bottom (Map Riparian Areas).

Note that although 1st order streams (and smaller, un-mapped creeks) may provide some important resources, these are less important because they have less developed riparian vegetation and cottonwood gallery forests.

Table 9. Acres of riparian and drainage areas by zone.

Zone	*Acres of riparian areas*	*Proportion*
Alpine	3,292	21.8%
High Mesa	876	5.8%
North Mesa	71	0.5%
Public Lands	23	0.1%
South Mesa	139	0.9%
South Slope	53	0.3%
Valley	6,595	43.6%
TOTAL		
- private county	11,051	
- total	15,122	

Vehicle miles traveled per day

The number of vehicle miles traveled (VMT) is a strong indictor of overall air quality and potential impacts on wildlife, including fragmentation of habitat. VMT were estimated, based on a county estimate of 7 trips per day per household using a distance from the Town of Ridgway (Map Vehicle Miles Traveled)[12]. This reflects not only trips taken by the residents of a house, but also trips to provide services to each house (e.g., county and emergency services, construction materials, delivery vehicles, etc.). Currently, we estimate 286,706 vehicle miles traveled per day.

Note, that because we do not model the explicit location of new subdivision roads, we do not compute the VMT on subdivision roads – only on existing county and state highway roads. Therefore, our results are conservative estimates of the effects on wildlife resources. Also, the

[12] Note that RPI's Fiscal Impact Analysis study (July 2006) used a country-wide Average Daily Vehicle Trip value of 9.57 per detached housing unit. Average daily trips are based on direct measures and surveys of a variety of communities. Although the number of trips may not be known precisely, the ball-park figure (7) is a reasonable, robust estimate. Also note that this is one-way trips, not round-trips as was erroneously assumed in an earlier draft.

distance is the *average* distance to all locations within the parcel – not necessarily the shortest or closest distance (e.g., if new houses were placed at the closest place/access point in a parcel). We compute VMT separately for both all roads (state and county) and for just county-maintained roads.

Note that our computation of VMT is tied to our assumption that trips will be to the Town of Ridgway. For some parts of the county, such as City of Ouray or far northwest portion of Ouray County (e.g., Cornerstone development), some portion of the assumed trips might be to a closer "service center" such as the City of Ouray or City of Montrose. As a result, VMT may be slightly overestimated. Also, our computation of VMT does not include trips that are generated by growth and land use outside of Ouray County. As a result, potential increases in trips generated by growth in San Miguel (and commuters to Telluride) and Montrose counties are not accounted for in our approach and so we may be underestimating VMT.

Results

Table 10. Results of indicators for all zones in Ouray County, excluding the City of Ouray and Town of Ridgway.

	Scenarios							
Indicators	A. Existing zoning	B. 35 ac at 17.5 per unit	C. 105 ac at 26 per unit	D. Urban Growth Boundaries	E. Scenic corridor	F. Scenic corridor transfer to UGB	G. Cluster development	H. Low-density (1 per 70 acres)
No. of units (county only)	5,937 2.2x	9,557 3.6x	7,011 2.6x	11,525 4.3x	5,937 2.2x	5,937 2.2x	9,557 3.6x	5,088 1.9x
No. of accessory dwelling units	1,667	2,875	2,025	3,430	1,667	1,667	2,875	1,043
Irrigated Ag	2,315 11.4%	3,913 19.3%	2,755 13.6%	2,842 14.0%	2,315 11.4%	3,209 15.8%	1,403 6.9%	1,433 7.0%
Ag Land Use	18,601 14.1%	34,736 26.4%	23,871 18.1%	19,171 14.6%	17,962 13.6%	16,218 12.3%	16,660 12.6%	9,352 7.1%
Economically Important Species Habitat	17,970 9.9%	30,879 17.1%	21,959 12.1%	18,700 10.3%	18,040 10.0%	17,002 9.4%	15,607 8.6%	11,195 6.2%
Rare & Imperiled Species Habitat	1,691 3.4%	2,727 5.6%	1,978 4.0%	2,092 4.3%	1,689 3.4%	1,931 3.9%	1,322 2.7%	1,132 2.3%
Riparian Areas	1,208 7.9%	2,159 14.2%	1,467 9.7%	1,618 10.7%	1,207 7.9%	1,444 9.5%	482 3.1%	693 4.5%
VMT / day (all roads)	803,856 2.8x 135/unit 19 mi/trip	1,396,183 4.9x 146/unit 21 mi/trip	975,000 3.4x 139/unit 20 mi/trip	893,460 3.1x 77/unit 11 mi/trip	803,856 2.8x 135/unit 19 mi/trip	747,044 2.6x 125/unit 18 mi/trip	1,396,182 4.9x 146/unit 20 mi/trip	514,879 1.8x 101/unit 14 mi/trip
VMT / day (not state highways)	169,703	287,546	204,044	175,009	169,703	161,479	287,546	111,735

Table 11. Results of indicators for the Alpine, High Mesa, and Valley zones in Ouray County, excluding the City of Ouray and Town of Ridgway.

	Scenarios							
Indicator	A. Existing zoning	B. 35 ac at 17.5 per unit	C. 105 ac at 26 per unit	D. Urban Growth Boundaries	E. Scenic corridor	F. Scenic corridor transfer to UGB	G. Cluster development	H. Low-density (1 per 70 acres)
No. of units (county only)	4,924	8,544	5,998	10,512	4,924	4,928	8,544	3,058
No. of accessory dwelling units	1,498	2,707	1,857	3,262	1,498	1,500	2,707	875
Irrigated Ag	2,175	3,773	2,615	2,622	2,175	3,069	3,773	1,303
Ag Land Use	18,389	34,524	23,659	18,958	17,749	16,025	16,560	9,139
Economically Important Species Habitat	16,030	28,938	20,018	16,760	16,076	15,047	14,583	9,231
Rare & Imperiled Species Habitat	1,633	2,669	1,920	2,035	1,631	1,873	1,281	1,074
Riparian Areas	1,194	2,145	1,451	1,604	1,192	1,429	466	678
VMT / day (all roads)	730,233	1,322,559	901,377	819,837	730,233	673,652	1,322,599	441,255
VMT / day (not state highways)	141,939	259,782	176,280	147,245	141,939	133,800	259,782	83,971

Discussion

The build-out scenarios forecast between 5,088 and 11,525 units, a 4- to 10-fold increase in the number of housing units in un-incorporated areas of Ouray County. There are a variety of trade-offs between the assumed growth scenario and the increase or decrease of an indicator – but the role of this document is to provide basic information and provide less interpretation of the results.

An important question that has been raised repeatedly during the public discussions leading up to this report is: how urgent is the situation? Will build-out occur in a generation, a lifetime, or ten lifetimes? Using the historical patterns of growth, Figure 2 below shows the results of three assumptions about rates of future growth: (a) the annual growth rate (4.7%) that has occurred most recently, between 2000 and 2005; (b) a 3% annual growth rate that assumes a slight slow-down in growth; and (c) a linear increase through time using the number of new housing units from 2000-2005. These forecasts suggest that within the next 20 to 40 years, continued growth will occur such that the number of housing units assumed by Scenarios A (existing zoning), E

(scenic corridor), F (scenic corridor/UBG), and H (low-density) will be reached. These analyses suggest that a quadrupling of housing units may occur within the next generation.

Note that we limit our analysis of growth pressure to the number of housing units in each time step, but exclude ADUs, because we did not include ADUs in the Year-built dataset.

Figure 2. Historical and possible future housing units in Ouray County. Labels on the right side show the number of housing units forecast by the different build-out scenarios. By extending the arrows horizontally across the graph, one may see the intersection with different growth rate assumptions (following a vertical line down to the x-axis shows the approximate year the scenario will be reached – grey lines show the timeframe for Scenario A, existing zoning).