NATURAL RESOURCES

VISUAL RESOURCES

The Evergreen Area Community Plan, [1] A Hillside Protection Strategy for Greater Cincinnati, [2] Dealing with Change in the Connecticut River Valley: A Design Manual for Conservation and Development, [3] and Computer Terrain Mapping, Inc. were resources used to create this section of the this Plan.

Background

Crested Butte is in a beautiful natural setting. The Middle Slate River Valley is divided by a sweeping S bend in the Slate River. The towns of Crested Butte and Mt. Crested Butte are separated by the Slate River, open space and larger lot subdivisions. The mountains and peaks surrounding the valley define the Middle Slate River Valley and are focal points for residents and visitors.

The natural hillsides, lakes and ridge lines in the Middle Slate River Valley are increasingly threatened by development. Until the 1970s, most of the development in the region had occurred on the relatively flat valley floors. Construction in these areas was easier, less expensive and usually secure from threat of landslides and avalanches. Portions of Mt. Crested Butte (such as Overlook and the Summit), Glacier Lily Estates, Trappers Crossing, Smith Hill Ranches, and Saddle Ridge Ranch Estates, have increased the pressure for more development on the slopes and hillcrests in recent years. As described below, the views and vistas of the hillsides and ridges are very important to residents and visitors. Development in these locations threatens to change the personality of the valley and to affect the reasons why people live and visit here.

Structures on ridgelines and the hillsides around Crested Butte can degrade the dramatic visual character afforded by our natural setting. In addition, structures on the ridgelines and hillsides cause secondary impacts such as scarring of the slopes with roads, retaining walls, and excavations to build structures. These primary and secondary impacts are compounded by extremely unstable slopes and a relatively dry climate with slow-growing vegetation. Examples of degraded visual character and scarred slopes can already be found in the Middle Slate River Valley.

Preservation of Visual Resources is different than the more black and white issues of avalanches, and floodplains. In those cases we identify where the hazards are located and try to avoid them, or at least try to limit potential safety issues. Visual Resources, on the other hand, are much more subjective. There are many views that are important but part of the purpose of this section is to determine which views should not be disturbed and which ones can be disturbed if done properly.

Prior to Crested Butte's 1993 Three Mile Plan, hillside and hillcrest protection had not been addressed. The 1993 Three Mile Plan tried to protect the upper 40 feet of ridgelines and mountains. The Town found this difficult to achieve because many ridgelines are round hills and the ridgeline is difficult to define. In other instances, such as Crested Butte Mountain, much more than the top 40 feet should be preserved.

Another approach to ridgeline protection was in the 2000 Gunnison County Land Use Resolution (LUR). It tried to protect ridgelines by describing them as hillsides that can be seen from particular places, such as roads. Ridgelines with blue sky behind them should be protected if the proposed development can be seen from particular viewing places. This approach falls short for

ridges that have mountains behind them. The LUR also allows some development if it is shielded by conifer or deciduous trees.

Given this history of ridgeline protection in the valley and the difference between visual resources and other issues addressed in this Plan, the 2005 Three Mile Plan used the following approach for Visual Resources:

1. Determine what respondents to the land use surveys had to say about views
2. Identify priority hillsides for preservation
3. Recommend how to develop on hillsides where development is appropriate

Survey Responses

Three questions in the 2004 Land Use Survey addressed visual resources. The first question asked respondents to identify all the things they value about Crested Butte and the upper East River valley from 22 choices given. "Beautiful scenery" was selected by 96% of the respondents. Beautiful scenery received more support than any other response in the whole survey. In addition, 84% of the respondents selected "Vistas (unobstructed views)."

The second question addressing this issue asked respondents to identify any natural/environmental features that should be preserved or remain undeveloped when a parcel of land is developed. From a list of 16 choices, 79% selected "Top of ridgelines" and 72% selected "Hillsides seen from the Town of Crested Butte. "Natural ponds or lakes" and "Natural creeks and rivers" received even higher response scores, but that may be because there are more reasons to revere these features, such as clean water.

Survey respondents were also asked to identify particular views from particular locations. Respondents wrote in views "of what" and "from where." From Crested Butte respondents, the primary views that respondents identified as those that should be preserved or remain undeveloped in the order they were suggested were:

1. Paradise Divide, Slate River and Oh-be-joyful
2. Crested Butte Mountain
3. The Mountains around the Town
4. Smith Hill
5. Red Lady (Mt. Emmons)

Paradise Divide, Crested Butte Mountain, and Smith Hill were also mentioned multiple times from other locations, as were the Elk Mountains from CB South.

Priority Hillsides for Preservation

Since beautiful scenery and views and vistas rated highly in the survey, the Town mapped the lands that can be seen from the Town Park, near the center of Town. These areas are bright yellow on the Sensitive Visual Resource Areas map. The map identifies everything that can be seen by a person standing in the Town Park.

The mapping technique assumed there were no buildings to block the views and the views were from an elevation of up to 12 feet above the ground. Because the wetlands and floodplain are lower, many of them do not show on the map. The hillsides and mountains are shown.

Based on the survey results and the mapping technique used, Anthracite Mesa, Smith Hill, the north side of Gibson Ridge, the western flank of Crested Butte Mountain, the eastern flank of Mt. Emmons and the mountains surrounding the Middle Slate River Valley are the Visual Resources appropriate for preservation.

Given this information, the private portions of Anthracite Mesa, Smith Hill, the western side of Crested Butte Mountain, the northern side of Gibson Ridge and the eastern flank of Mt. Emmons are the priority areas to preserve as visual resources. These priority areas are outlined in brown on the Sensitive Visual Resource Areas map. Views of important landscape features would be impaired or partially blocked if structures or development were built on the areas labeled "Priority Views That Should Be Preserved" on the Sensitive Visual Resource Areas map.

Paradise Divide, Avery Mountain and Whiterock Mountain do not show on the map, but should also be included since they can be seen from most of town and from the Town Park. These important landscape features outside the Middle Slate River Valley could also be negatively affected if structures or development were built on the mountains or Paradise Divide. However, with the exception of Mt. Emmons, these mountains and Paradise Divide are already protected since they are part of the National Forest.

Recommendations Regarding Development on Hillsides Where Development is Appropriate

The Visual Resource policies are located in the Policies Section. They are intended to preserve the most important Visual Resources, describe how development could occur on less visually sensitive hillsides, and how development could occur on visually sensitive hillsides that cannot be avoided.

A transfer of development rights program is proposed as an incentive to land owners and developers to preserve important Visual Resources. This concept allows a landowner who owns land containing identified priority Visual Resources to sell or trade development rights to a person wishing to develop land in a more appropriate location. A conservation easement, or other appropriate mechanism, could then be used to ensure that the priority Visual Resource area is not developed in the future.

The portions of land forms that are near the skyline or near the top of a ridge, whether or not the sky is behind the ridge, are particularly sensitive from a visual standpoint. Structures that break the skyline or that change the ridgeline from a scenic viewing locale, tend to be conspicuous, and development in skyline and ridge top areas can significantly erode the rural flavor of an area. Development on skylines or ridge tops tends to compete with the visual dominance of the hillside and should be discouraged in the policies.

Other Important Visual Resources

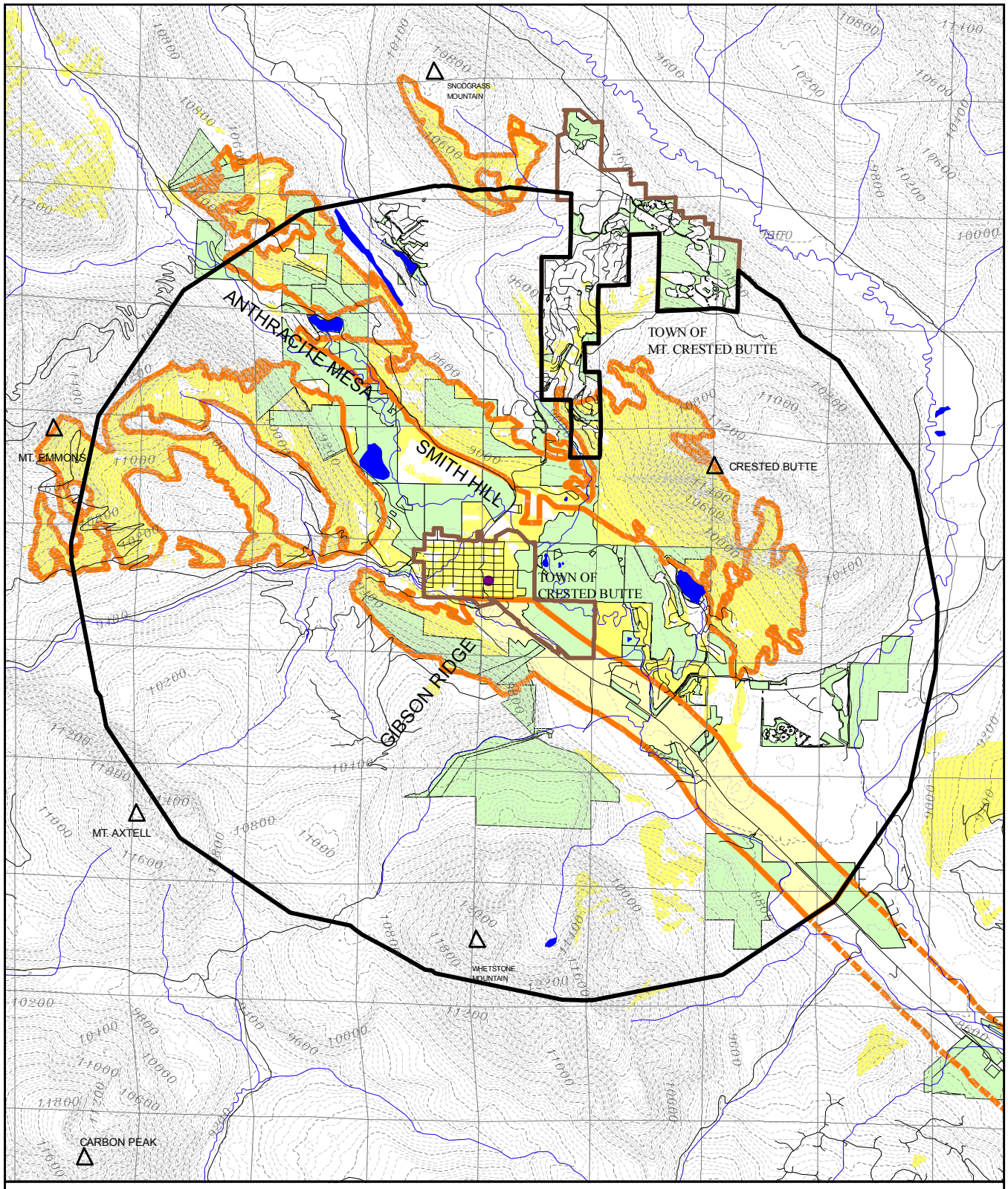
In 2003, the Crested Butte Land Trust began an initiative to preserve the view corridor from Round Mountain to Crested Butte. The views of the mountains and of the agricultural operations along State Highway 135 are the views the Land Trust is targeting. The Land Trust would like to work with land owners to preserve a one-half (1/2) mile buffer on both sides of the Highway as open space by purchasing or accepting donations of land or conservation easements from willing land owners.

Results of the 2004 Land Use Survey support that initiative, but it also identifies other important lands to preserve. When asked "what density is appropriate if development occurs", 27% of the respondents selected the choice of "Medium density, like Riverbend, or Crested Butte South, with substantial open space" and 18% selected "Primarily open space" for the area south of Riverland Industrial Park.

When asked where is it important to preserve open space, the top three "Number One" choices were: the wetlands, 33%; the land beyond the end of plowed roads (e.g. past Nicholson Lake, past Mt. Crested Butte, past the East River bridge towards Brush Creek), 32%; and the entrance to Crested Butte from Round Mountain north, 12%.

The Sensitive Visual Resource Areas map shows the location of a one-quarter-mile buffer and that buffer is also outlined in brown indicating it is a priority view that should be preserved. It also shows the properties that have been preserved so far indicating significant progress toward the goal.

(1) The Evergreen Area Community Plan, Golden, CO, Jefferson County Planning Department, 1987.
(2) A Hillside Protection Strategy for Greater Cincinnati (Vols. 1, 2 and 3), Cincinnati, OH, the Hillside Trust, 1991.
(3) Dealing with Change in the Connecticut River Valley: A Design Manual for Conservation and Development, Amherst, MA, the Lincoln Institute for Land Policy and the Environmental Law Foundation, 1989.



Sensitive Visual Resource Areas

- 3 Mile Boundary (MSRV)
- Town Boundary
- Streams
- Lakes
- Roads
- Section Lines
- Town Park
- Priority Views That Should Be Preserved
- 1/4 mile buffer - Gunnison County Comprehensive Plan
- Preserved Parcels
- 1/4 mile buffer around HWY 135
- Town Park Viewshed @ 12'

40' Topographic Contours

- index
- interval

N W E S

CRESTED BUTTE, COLORADO • A National Historic District •

0 0.5 1 2 3 Miles

SOURCE: Gunnison County MIS Dept. February, 2011
Town of Crested Butte Planning Department, 2011

Drawn by: Hilary Mayes Date: June 24, 2011
Filename: ~area_plan/2011/viewshed2011.mxd

WETLANDS

The wetlands of the Crested Butte area were mapped and analyzed by David J. Cooper, Ph.D. in 1992. The study area included most of the lowlands in the Middle Slate River Valley, including the Coal Creek watershed. Most of the information that follows is from the Cooper wetlands study.

For purposes of this Plan, wetlands are saturated or flooded, at least seasonally. The abundant water creates unique ecosystems that provide some or all of the following functions:

1. water quality enhancement
2. fish and wildlife habitat
3. ground water recharge
4. flood water retention, detention and storage
5. shore line anchoring
6. sediment trapping
7. food chain support
8. places for active and passive human recreation

The abundant water also allows primary and secondary biological production to be significantly higher in wetlands than in most surrounding uplands.

Crested Butte uses the wetland definition found in the Subdivision Regulations section of the Town Code (17-1-100).

Background

Approximately 1,880 acres of wetlands were mapped in the Middle Slate River Valley. They are divided into 25 separate areas which are described by the functional values of each.

Wetlands in the Middle Slate River Valley are the result of two primary geologic functions. The first is water moving through the glacial till on valley slopes until it meets the saturated soils of the valley floor. At this point it surfaces and flows across the surface to the streams, creating permanently saturated soils. Roots and leaves do not fully decompose in this area so they accumulate and form peat soils.

Deposits from glaciers and debris flows are the second cause of wetlands in the area. These deposits dammed the Slate River. A glacial moraine deposited material near the State Highway 135 bridge over the Slate River. A series of debris flows from Baxter Gulch, across what is now the Whetstone Mountain Ranch, also deposited material.

Below the dammed area the river runs faster than upstream. Above the dammed area the Slate River flows through relatively flat lands in the Middle Slate River Valley and it is therefore a slow-moving river. Because it is slow-moving, beavers can affect it by building dams. The beaver dams are integral to the wetland system because they hold back the water and raise the water table so lands that might otherwise be dry are wet.

The consequences of these two conditions are soils that are inundated with water for weeks at a time, and vegetation that can only survive because it transports oxygen through the stem to the roots. Wetland vegetation in the Middle Slate River Valley is dominated by geyer willow, mountain willow, and beaked sedge. Other major vegetation types include submerged aquatic

vegetation in beaver ponds, lakes and slow-moving streams, grass, and herb-dominated wet meadows and peatland communities at seeps and springs and on lake and pond edges.

Cooper estimated that, in the relatively dry year of 1992, 840 acre feet of water were stored in the wetlands in the Middle Slate River Valley. During a wet year, the amount of water could be 50% greater. Much of this water is released during the summer, particularly July, as the water table and stream levels drop. The released water provides some of the water that down-stream users divert from the Slate, East and Gunnison Rivers. Additional water is stored again in the summer months, during rain events, and this water is discharged in late summer.

Cooper suggested 10 priority wetlands in the study area. They are shown on a map, from Cooper's wetland study, on the following page. Some are very high quality wetlands while others could be restored to be the high quality wetlands they once were. Other areas of wetlands not included in the priority wetlands can be important, can function very well as wetlands, and should also be protected.

Impacts to the Wetlands

- **Water Quality**

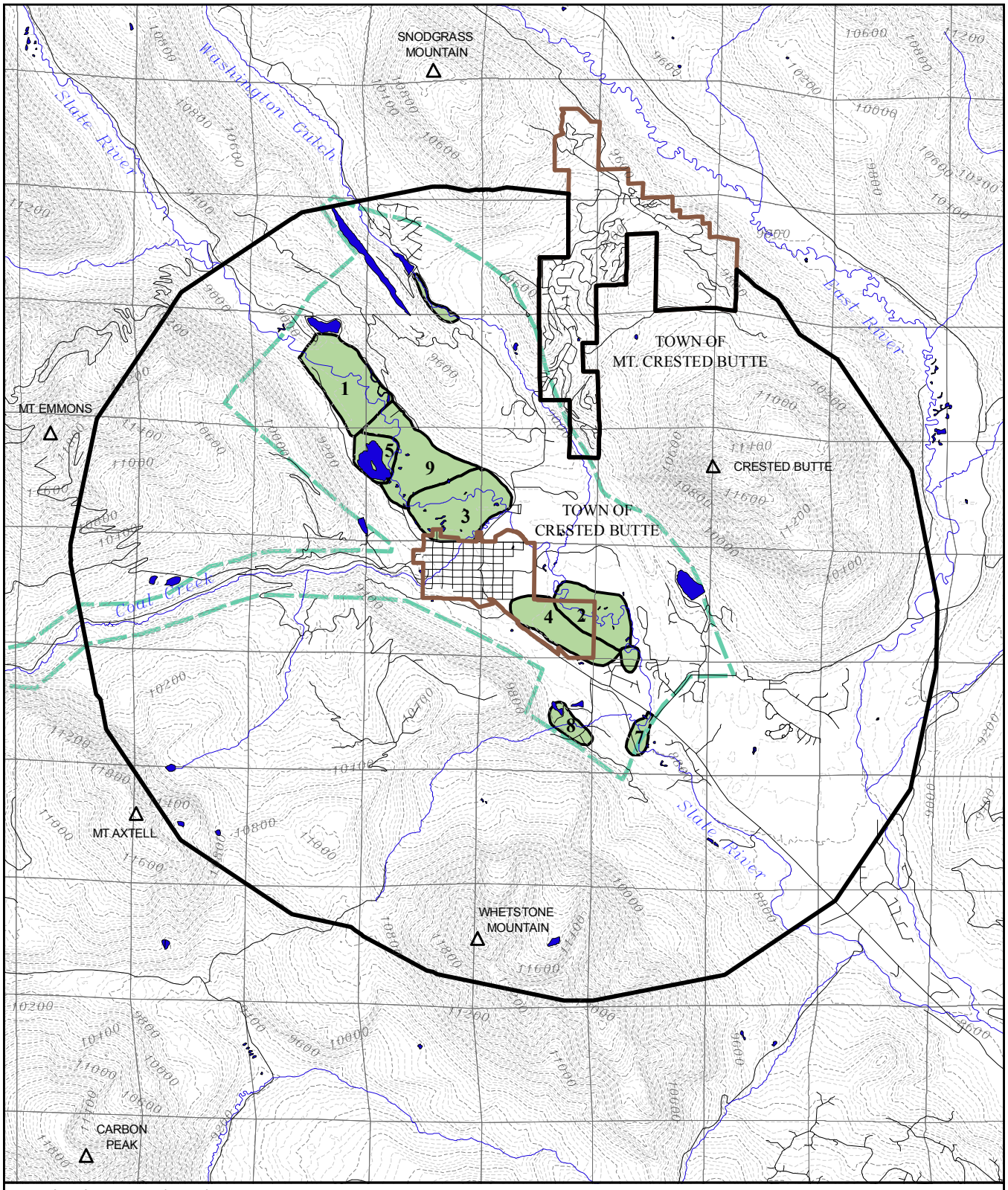
  Water quality is an issue in the wetlands. Cooper said: "The Peanut Lake area, in the Slate River valley, is an area with great potential wildlife habitat value. It is also an area where mining has occurred…. During July, 1992, I (Cooper) identified three potential sources of pollution.... The data...indicate that water running from the Peanut Mine, mine portal and mine adit all contain significant concentrations of heavy metals." [(1)]

  In 1996 the Crested Butte Land Trust hired Resource Engineering to evaluate the water quality and the sediments of Peanut Lake prior to purchasing most of the land around the lake. Their report found that, "The dissolved concentrations of all sampled metals were extremely low or absent in the water…. Peanut Lake water is of excellent quality with the exception of dissolved manganese (Mn) which…exceeded aquatic life standards and also exceeded concentrations reported by Copper in 1992." [(2)] For analysis, Peanut Lake sediments were compared to Nicholson Lake sediments. A relatively high presence of Aluminum, Cadmium, Chromium, Copper, Manganese, Molybdenum and Zinc trace metals were found in Peanut Lake when compared to Nicholson Lake. The report concluded that because the pH of the water is high, it forces the metals coming to the lake, in surface water, to precipitate out into the sediments.

  Data collected by the Colorado Division of Minerals and Geology (DMV) in 2001 for the Peanut Mine cleanup found that the water coming out of the Peanut Mine adit was good quality. However, after it crossed the tailings ponds on the mine/mill site it picked up heavy metals and transported them to Peanut Lake. Water samples taken by DMV in 2006, after the Peanut Mine cleanup, indicated concentrations of most heavy metals had decreased.

- **Filling**

  While there is some filling of the wetlands in the area, most of the filling has had little impact. Much more important issues are ditching, draining and river down-cutting. Approximately 35% of the wetlands in the study area had been lost over the 26 years prior to Cooper's study.



Priority Wetlands

- 3 Mile Boundary (MSRV)
- Town Boundary
- Streams
- Lakes
- Roads
- Section Lines

40' Topographic Contours
- index
- interval

- Limit of Study
- Priority Wetlands

0 0.5 1 2 3 Miles

N W E S

CRESTED BUTTE, COLORADO
A National Historic District

SOURCE: Wetlands of the Crested Butte Region, Mapping, Functional Evaluation, Hydrologic Regime, David J. Cooper, PhD Ecologist, March, 1993

Drawn by: Hilary Mayes
Date: April 3, 2006
Filename: areaplan/prioritywetlands.mxd

- **Ditching**
  "Ditching involved the construction of a trench to depths below the water table, capturing groundwater in the trench and allowing it to flow to the river, or another conveyance structure. Typically, groundwater is flowing from upvalley or upslope toward the valley center or downvalley. Ditching can intercept this flowing water and effectively dry out down-gradient areas, removing important hydrologic support to wetland plant species. Three large ditches have been constructed in the Slate River valley between approximately one-half (½) and one (1) mile upriver from Crested Butte." "These ditches have essentially collected all groundwater on the north side of the Slate River just downstream from Peanut Lake, thereby drying up the entire area below."[(3)] Since Cooper's report was written, the Crested Butte Land Trust (CBLT) purchased the Rice Parcel where the most northerly ditch was located. With the help of Crested Butte Mountain Resort, which needed to mitigate the loss of wetlands, that ditch was filled and groundwater may now flow down-gradient within the wetlands in that location.

- **Stream Channelization**
  Stream channelization has occurred north of Crested Butte. "Some of this has apparently been caused by human intervention to straighten stream sections, protect bridges and remove gravel. However, the entire reach is now unstable and downcutting. The downcutting has brought the stream channel below the rooting depths of trees, willow shrubs and the herbaceous plants that line the stream bank. These plants are no longer effective for stabilizing the banks and lateral erosion is occurring. This is easily seen in the area of the Wild Bird Estates bridge. Once the stream channel degrades to the point where beavers no longer can divert water on the flood plain, and the willows are ineffective at bank stabilization, the Slate River is disconnected from its floodplain. Once that happens, further deterioration of the wetlands and stream channel habitat is inevitable." [(4)]

  The Slate River is naturally repairing some of the damage caused from channelization. For instance, just below Wildbird Estates the river makes a right angle turn on the CBLT Rice Parcel. Where the river runs fast, on the outside of the turn, it has been cutting into the bank and moving the river in the direction of the outside bank. On the inside of the turn, the river runs more slowly, and therefore, rock and sand are allowed to drop out of the moving water and a point bar (a deposit of gravel on the inside of river curve) is growing on the inside bank. The elevation of this point bar is lower than the surrounding riverbanks, creating a new, lower floodplain where new wetland plants are starting and where high flows can flood the new floodplain. If this process is allowed to continue throughout the wetlands north of Crested Butte, the wetlands can be restored to their former healthy state. This process is also occurring on the Kapushion Annexation open space north of town, but to a lesser degree. In this area the straight river is beginning to make some turns and point bars but not as dramatically as on the Rice Parcel.

- **Vegetation Destruction**
  Vegetation destruction has occurred throughout the study area. Cooper estimates that 40% of the willows have been removed to clear land for agriculture. Willows are the most important wetland plant in the area because they provide:
  - essential stream bank stabilization
  - important habitat for wildlife
  - essential food for beavers

- essential food for aquatic invertebrates, which form the base of the food chain for trout

- **Eutrophication**
  "Eutrophication results from excessive nutrients concentrating in water bodies." It is occurring on the Peanut Mine property, the Gunsight Bridge parcel and at Skyland. "The nutrients allow algal growth and the invasion of nutrient demanding plant species such as broad leaf cattail. The most important nutrients are nitrogen and phosphorous….The three important nutrient sources found in the Crested Butte area are fertilizers applied to lawns, municipal waste water, and septic systems with leach fields located near water bodies."[(5)]

Mitigation of Impacts to Wetlands

- **Buffers**
  Buffers around wetlands have become a recognized method for protecting wetlands and their inhabitants. In a 1995 letter to John F. Hess, Crested Butte Director of Planning and Community Development, Howard H. Whiteman, Ph.D. stated:

  > "It is well documented that many wetland species, such as amphibians, reptiles, certain mammals, and insects, often use both the aquatic and terrestrial habitats during part of their life cycle. Thus both the wetlands and the surrounding habitat must be preserved to ensure that populations of these organisms are not affected. Biologists now realize that a wetland does not end where the water stops, but rather requires a larger amount of the surrounding terrestrial environment to remain biologically viable."
>
> Dr. Whiteman went on to say that chorus frogs and tiger salamanders, found in the Slate River valley "... spend much of their lives in the terrestrial environment around wetlands, and tiger salamanders are particularly likely to move much farther than 100 feet."
>
> Dr. Whiteman adds, "Typically, salamanders are only moving between the terrestrial environment and the aquatic habitat for breeding purposes. Adults migrate to the ponds soon after ice melt, breed, remain in the ponds for several weeks, and then return to the terrestrial environment to continue foraging and to search for overwintering burrows. Although it is currently unknown how far tiger salamanders in Colorado travel to find such burrows, Semlitsch (1983), observed an eastern tiger salamander move 163 meters from the edge of a wetlands.... Research at the Mexican Cut Nature Preserve indicated that adult salamanders commonly move between ponds in search of food, often several hundred meters at a time." "In fact," Dr. Whiteman observed, "during a two day period several marked individuals traveled approximately 300 meters in elevation, through very rough terrain."[(6)]

  "In most cases, an arbitrary (buffer) width will not reflect the highly variable circumstances found along the length of any given corridor (riparian greenway)." "…in the Pacific Northwest of the United States, a minimum recommended buffer of 30 meters (100 feet) on each side of streams is cited often in the papers reviewed by W. W. Budd and colleagues (in a 1987 study). E. S. Corbett and colleagues (1978) also suggest that a 30-meter strip of riparian vegetation protects stream ecosystems from the effects of logging in the eastern United States. In numerous California streams, J.D. Newbold and

colleagues (1980) showed that most or all of the logging impacts on invertebrate life were prevented by buffer strips of 30 meters or more. The Washington State Shorelines Management Act protects land within 60 meters (200 feet) of a creek, within the 100-year floodplain, or within the creek's associated wetlands, whichever is greater (Morrison 1988). The plan includes an ostensibly inviolate 15 meter (50 foot) buffer adjacent to the stream or wetland…In Maryland, the Chesapeake Bay Critical Area Commission designated land within 300 meters, (1,000 feet) of the bay as critical area and requires intensive review of proposed development (Davis 1987). For all regions, R. E. Togh (1990) recommends that activities within a zone of 150 meters (500 feet) on both sides of riparian corridors be subject to agency and public review for their effects on the stream." [(7)]

- **Setting Buffers**
  "Before setting widths (of riparian greenways and their buffers) identify and understand the surrounding land uses on the integrity of the stream communities and riparian corridors. This understanding should ideally be gained through comprehensive study of sediment and nutrient flows, hydrology, and local biotic integrity…. Include…at a minimum, the stream's geomorphic floodplain, the riparian forest, wetlands, and the stream's shallow groundwater system. Also include other critical areas such as intermittent tributaries, gullies and swales, aquifer recharge and discharge areas, adjacent slopes beyond the point of topographic leveling, and potential and actual areas of erosion (steep slope, unstable soil areas). All of these can have a major impact on the riparian ecosystem.

  Set corridor widths that vary in proportion to the impacts of adjacent land uses. Forest clear-cutting, intensive agriculture, and dense housing development require wider corridors." [(8)]

  Based on the letter from Dr. Whiteman, the more general information from the Ecology of Greenways described above, and many other sources, buffers will be recommended as a means to mitigate the impacts of development near wetlands and other water bodies.

- **Other mitigations**
  This section presents ideas for restoring damaged wetlands and their ecosystems. The list is not intended to be exhaustive. Local governments, developers, land owners and other interested parties can initiate these actions. Anyone interested in pursuing these activities is encouraged to do so by the Town. The list could also serve as a guide for development of a manual of best management practices for wetlands in the Crested Butte area. Some of the following activities are regulated under the Federal Clean Water Act, Section 404.

Water storage capacity of wetlands can be maintained by:

1. analyzing the causes of channel degradation and stabilizing the area
2. directing development to land that is not wetlands, including a 100 foot buffer area around wetlands
3. discontinuing removal of willows in the wetlands
4. planting native willows and other wetlands species in the flood plain and especially on stream banks
5. placing structures in the Slate River that will reduce the speed of the flow and flood additional land
6. minimizing development activities near beaver dams so development does not interfere with construction of structures by beaver that will:

   a. dam water
   b. reduce the speed of the flow
   c. flood additional land by raising the water level
   d. reduce the rate of flow for fast running water
7. filling in drainage ditches so ground water will continue to flow past the former location of the ditches to be absorbed in the soils downstream

Good water quality in the wetlands can be maintained by:

1. building retention ponds to catch runoff and the associated sediment, including heavy metals, from roads, roofs, driveways and mines
2. designing individual sewage systems and by regular monitoring of the sewage systems, to ensure that effluent is not contaminating the wetlands or a 100 foot buffer area
3. diverting treated effluent from sewage systems to land that can become wetlands with the continuous application of effluent
4. maintaining a vegetation buffer around areas where construction will take place to reduce some of the sedimentation that takes place with runoff to nearby wetlands
5. managing agricultural activities to ensure return flows from irrigation do not pass through corrals or other intensive animal pastures prior to entering wetlands
6. conducting best management practices on residential lawns and gardens to minimize the use of pesticides, herbicides, and fertilizers
7. treating mine drainage water prior to allowing it to enter the wetland or a 100 foot buffer area

The loss of wetlands due to filling can be prevented by:

1. discontinuing filling on the wetlands and a 100 foot buffer area
2. reducing upstream sedimentation from poor construction practices and poor agricultural grazing methods

The loss of wetlands because willows have been removed can be mitigated by:

1. planting new willows
2. avoiding willow areas when new development is planned
3. discontinuing removal of willows

Ditching, stream channelization and the further separation of the river from the flood plain can be slowed by:

1. placing drop structures or small dams in the Slate River to slow the flow of water and raise the water level
2. allowing beavers to build additional dams behind man made structures to further raise the water level and increase the area inundated by water
3. discontinuing further ditching and straightening of the stream in the wetlands, and
4. avoiding construction of new roads that require compaction and may impede ground water flow to a wetland

Eutrophication can be minimized by:

1. applying fertilizers with the goal of least impact to adjacent aquatic and wetland ecosystems such as:
   a. applying fertilizers in small doses rather than all at once

b. avoiding application of fertilizers while it is raining

2. more careful construction and maintenance of septic systems and precluding leach fields in areas that could possibly drain into aquatic ecosystems, wetlands or other water bodies
3. working with the County Sanitarian and supporting determinations that a site is inadequate for a septic system
4. maintaining a minimum of a 100 foot buffer between development and wetlands
5. building a wetland near a treatment facility or transporting the waste water via a pipeline to an existing wetland that currently is supported by irrigation or is of low quality. Waste water treatment plants usually discharge nitrogen compounds. The quality of this water could be appreciably improved by a wetland treatment system

Loss of wildlife dependent upon wetlands can be mitigated by:

1. identifying species on a parcel targeted for development
2. determining the habitat required for the continued existence of wildlife
3. maintaining and enhancing the required habitat
4. acquiring lands with such habitat and preserving it as open space for the habitat
5. maintaining a minimum of a 100 foot buffer between development and wetlands
6. mapping, on separate overlays, the habitat of the various species and identifying overlapping important habitat and linkages of habitat for the species (These overlapping habitats and linkages should receive high priority when mitigating and preventing wetland losses.)

Slate River Wetlands Preserve

Since the 1993 Crested Butte Three Mile Plan was adopted, CBLT has developed a concept to preserve the wetlands described above. The Slate River Wetlands Preserve (SRWP) extends from the confluence of Oh-be-joyful Creek and the Slate River to the Rozman Ranch located downstream of the State Highway 135 bridge, near Riverbend. It includes Washington Gulch from Meridian Lake Park reservoir, to the confluence with the Slate River. The wetland complex is as much as one mile wide and over six miles long. In addition to preserving these wetlands, the Slate River will be able to cut new channels and create a new floodplain as the primary tool for restoring degraded portions of the wetlands. The SRWP includes approximately 1,900 acres of wetlands. Combining the efforts of the CBLT, the Town, landowners and subdividers, 1,159 acres have been preserved so far.

During the past five (5) years, 30 to 90 elk have been summering in the SRWP between Peanut Lake and the Gothic Road. They have been seen in the spring, during calving season, and come and go throughout the summer until late fall when they move south for the winter.

Over 80 birds have been identified in the SRWP by Ron Meyers and friends. See Appendix IV for a listing of identified birds.

Colorado Natural Heritage Program

In 2002, the Colorado Natural Heritage Program (CNHP) evaluated wetlands throughout Gunnison County.[9] One of the wetland areas evaluated was the upper portion of the Slate River, from the headwaters to the State Highway 135 bridge near Riverbend Subdivision. CBLT refers to the lower part of this study area as a portion of the Slate River Wetlands Preserve.

CNHP tracks plant communities in North and South America as indicators of biodiversity. Existence or absence of certain plant communities can be used as "coarse-filters" to determine whether a broad spectrum of biological diversity exists. Wildlife habitat would be one example of the biological diversity that may or may not exist. In other words, protecting the diversity of plant communities in a landscape directly and indirectly protects all of the species (from invertebrates to large mammals), which may depend upon or use them as part of their life cycles.

The CNHP labeled the Slate River study area a Potential Conservation Area (PCA) because it supports multiple examples of globally vulnerable and globally secure riparian plant communities in addition to two good examples of globally vulnerable plant species. (See map on the following page.) One of the plant species is an excellent example of Drummond willow/bluejoint reedgrass (Salix drummondiana/Calamagrostis canadensis). In Colorado, less than ten stands have been documented. When Dr. Cooper conducted his wetlands analysis in 1992, he documented the occurrence of these plants near the Rice Parcel, and in the upland Lower Loop wetlands.

An excellent example of Geyer willow/water sedge (Salix Geyeriana/Carex aquatilis) shrubland is also found at this PCA. This association forms a tall-willow shrubland with smaller shrubs often occurring under the canopy. The canopy is nearly closed and a thick carpet of mesic grasses and forbs blanket the undergrowth. The ground surface is often hummocky with willows establishing on the raised mounds and grasses dominating the swales. This association is reported from several western states, but few pristine stands occur and it is relatively uncommon in Colorado. These plant associations are found in the High Quality Wetlands on the Lower Loop parcels, at Peanut Lake, at the Coal Creek and Slate River confluence, and south of the town of Crested Butte.

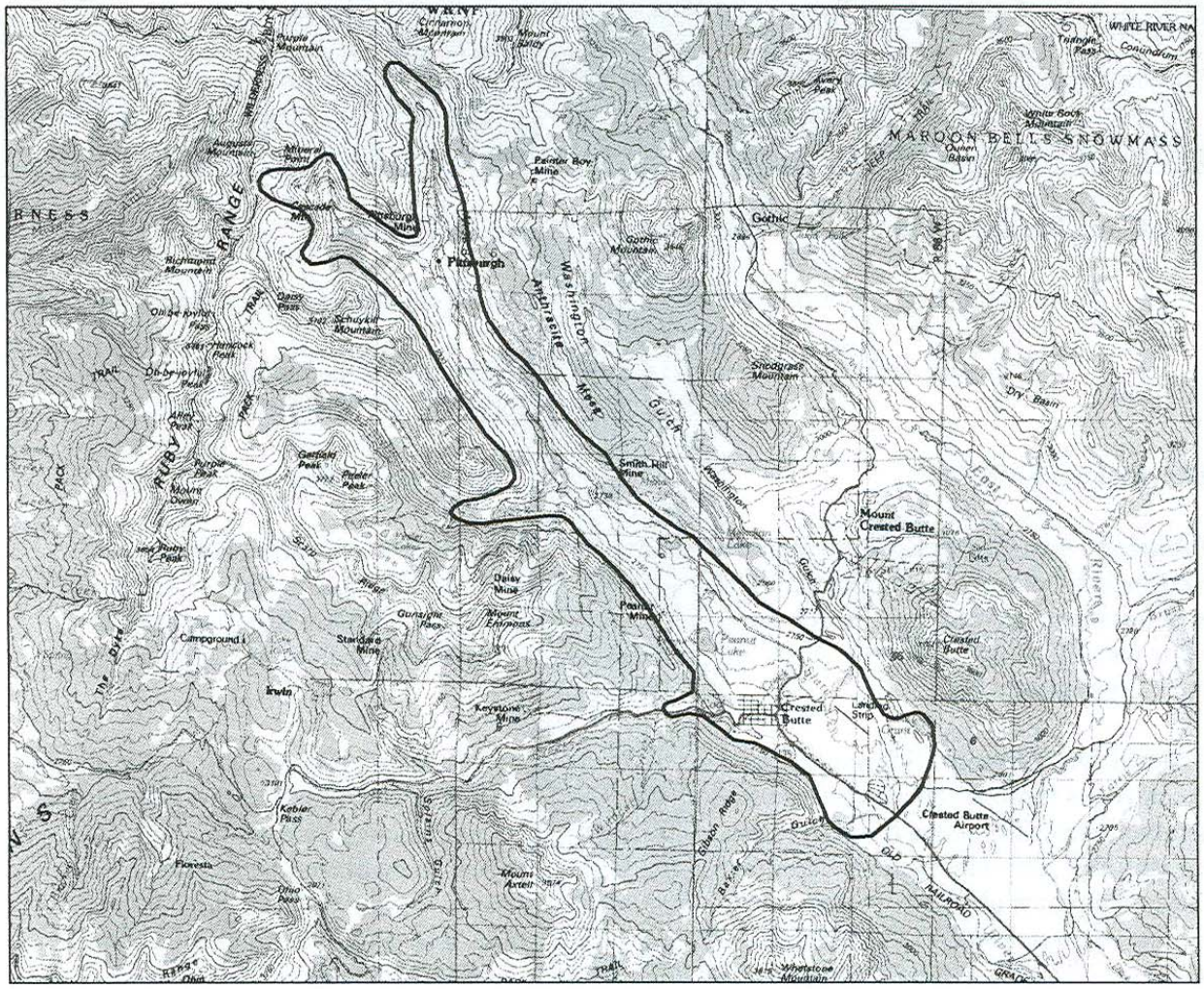
The PCA also supports a good example of the globally vulnerable Rocky Mountain (Serviceberry) willow/mesic forb (Salix monticola/mesic forb) shrubland. This association is only known in Colorado, where over thirty stands have been documented.

CNHP feels that all three of these plant associations are threatened by heavy recreational use, improper livestock grazing, and altered stream flows. This information can be used to prepare better land management plans for affected property.

1) Cooper, D. J. 1992. Wetlands of the Crested Butte Region: Mapping, Functional Evaluation, Hydrologic Regime. Report prepared for the Town of Crested Butte, p. 28.
(2) R. Scott Fifer, 1996, Peanut Lake Water Quality Review, Crested Butte Land Trust, p. 5.
(3) Cooper, D. J. 1992. Wetlands of the Crested Butte Region: Mapping, Functional Evaluation, Hydrologic Regime. Report prepared for the Town of Crested Butte, p. 45-49.
(4) Ibid., p. 49.
(5) Ibid., p. 53.
(6) The previous three paragraphs include excerpts from a letter from Howard H. Whiteman, PhD, to John Hess, Crested Butte Town Planner, September 19, 1995. Dr. Whiteman was a member of the faculty at the Department of Biological Sciences, Purdue University, West Layfayette, IN. Dr. Whiteman is associated with the Rocky Mountain Biological Laboratory and has conducted long-term studies of Tiger Salamanders in the Mexican Cut area.
(7) Daniel S. Smith and Paul Cawood Hellmund, 1993, Ecology of Greenways, (Minneapolis: University of Minnesota Press, 1993) , p.92-93.
(8) Ibid., p. 99.
(9) Joe Rocchio, 2002. Survey of Critical Wetlands and Riparian Areas in Gunnison County. Colorado Natural Heritage Program, Fort Collins, CO.

Slate River

Potential Conservation Area



2 0 2 4 Miles

N

Colorado Natural Heritage Program
Colorado State University
8002 General Delivery
Fort Collins, CO 80523
Phone: (970) 491-1309
Fax: (970) 491-3349

map date: Feb 2003
GIS department: gd

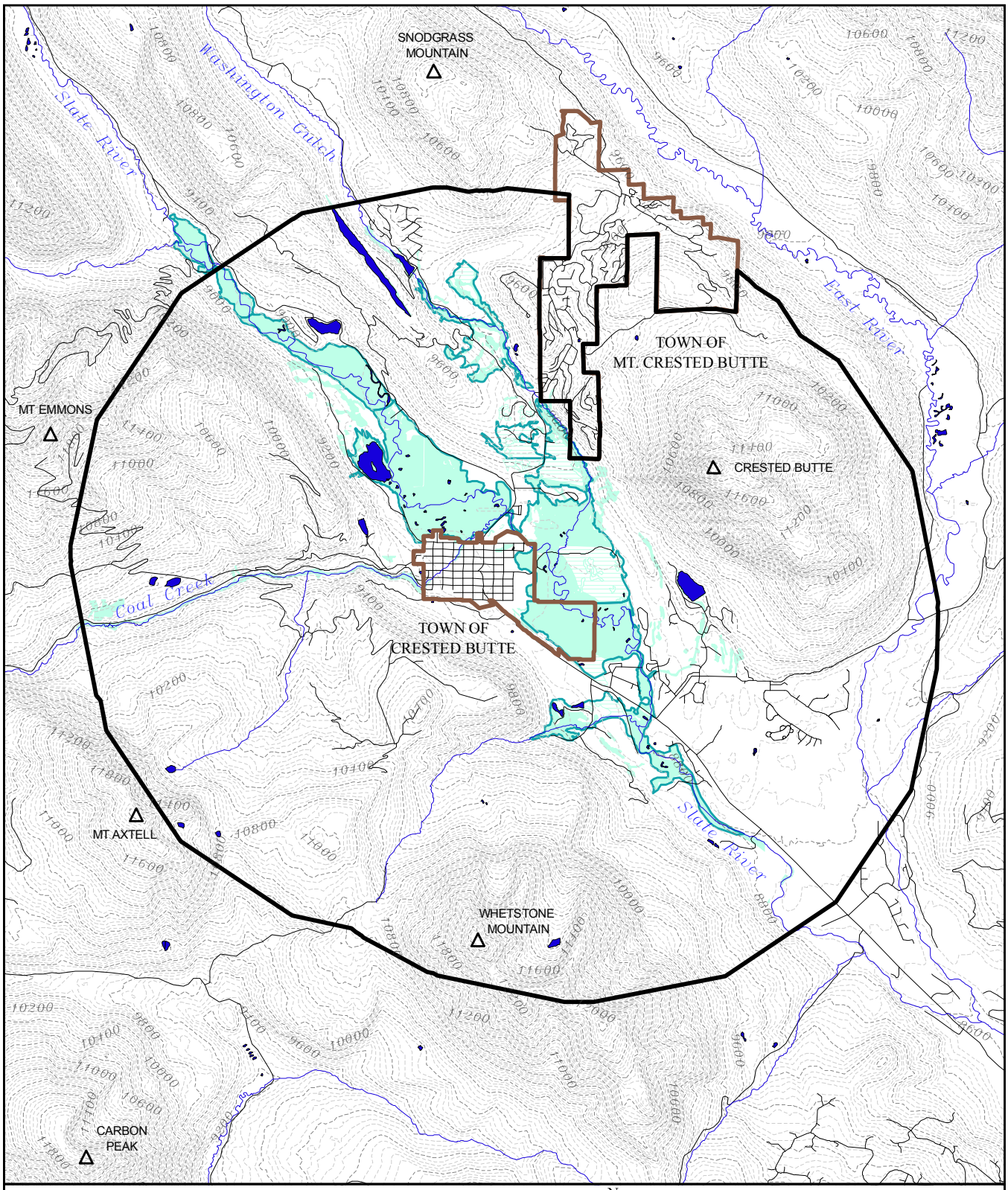
PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles*

Paonia, 38107-E1
Gunnison, 38106-E1

*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996

Location in Project Area



Wetlands

- 3 Mile Boundary (MSRV)
- Town Boundary
- Streams
- Lakes
- Roads
- Section Lines
- 40' Topographic Contours
  - index
  - interval
- Slate River Wetlands Preserve

Wetlands

- Natural
- Irrigated

N W E S

0 0.5 1 2 3 Miles

SOURCE: David J. Cooper, PhD Ecologist, 1993
Wright Water Engineers, 2000
Town of Crested Butte Planning Department, 2002
Bio-Environs, 2004
Western Ecological Resources, 2007

CRESTED BUTTE, COLORADO
A National Historic District

Drawn by: Hilary Mayes
Date: March 10, 2011
Filename: areaplan/wetlands-2011.mxd

WILDLIFE

One of the reasons Crested Butte and the Middle Slate River Valley are special places is the variety and abundance of wildlife in the area. Much of the information that follows is based on discussions with Tom Henry, district wildlife manager, for the Colorado Division of Wildlife (DOW) during the winter of 1993, and Rick Basagoitia, district wildlife manager in 2004.

Elk

Elk calving areas and winter range are mapped on the wildlife maps. At the time of adoption of the 1993 Crested Butte Three Mile Plan, elk were the only species mapped for the Middle Slate River Valley by the Colorado Division of Wildlife. As many as 200 elk summer in the Slate River area in Wolverine Basin, Coon Basin and Democrat Basin and migrate south to the Ohio Creek area for the winter. This migration corridor is just west of the Middle Slate River Valley but it is not unusual for elk to stop temporarily in the Wildcat Creek area or the Rozman Ranch during hunting season, and on their return to the mountains in the spring. Some elk bulls winter on the south face of Snodgrass Mountain.

As many as 90 elk summer in the Slate River Wetlands Preserve between Peanut Lake and the Gothic Road.

In the summer the area from Mt. Axtell to lower Gibson Ridge supports up to 300 elk and 75 to 100 elk use the east and south sides of Crested Butte Mountain. Another migration corridor exists on the eastern edge of the Middle Slate River Valley, from Crested Butte Mountain south, including the Buckhorn Subdivision area. Most of the elk that summer in the Middle Slate River Valley, winter at Flat Top Mountain, Lost Canyon, Cabin Creek, Ohio Creek and Beaver Creek.

Elk production areas and elk winter range areas are mapped by the DOW and that information is supplied via the Natural Diversity Information System (NDIS) to the Town and shown on the Elk Production Areas and the Elk Winter Range maps.

The DOW assists ranchers with losses of hay when elk begin feeding on hay that is stacked for cows. The DOW is not responsible for losses of plants around houses from wildlife.

Deer

Deer populations are in residence in the Middle Slate River Valley in the spring, summer and fall. The number of deer is commensurate with the amount of habitat available. Most deer migrate to the Almont Triangle, Lost Canyon, Cabin Creek and Signal Peak for winter. DOW maps indicate the whole Middle Slate River Valley is mule deer range.

Black Bear

There have been many incidents between people and black bears in recent years because many human activities in the area cause problems with bears. Examples of human activities that cause problems with bears include:

1. Garbage cans in Crested Butte
2. People being surprised by bears when taking trash to rural outdoor dumpsters or cans
3. Feeding pets outside (Even humming bird feeders attract bears.)

Bear proof dumpsters, frequent garbage collection and garbage locked indoors, help minimize contact with bears. DOW maps indicate the whole Middle Slate River Valley is black bear range.

Mountain Lion
NDIS data indicates the whole Middle Slate River Valley is Mountain Lion range.

Waterfowl
The wetland habitat in the Middle Slate River Valley is excellent for waterfowl. Many pairs of waterfowl summer on the Town Ranch, on Peanut Lake, and throughout the Slate River Wetlands Preserve. Waterfowl are adversely affected by dogs and cats. The DOW would prefer a 100 yard buffer between wetland habitat and development and notes that shorter buffers can be enhanced by planting willows or other vegetative barriers between wetlands and development. Geese habitat areas are shown on the Geese Production Areas map.

Birds
The Crested Butte area is the most productive area for Blue Grouse in the upper Gunnison Basin because Blue Grouse prefer aspen trees and the tall grass habitat. Whitetail Ptarmigan use the willow areas in the winter. Great Blue Heron summer in the wetlands from Crested Butte to Pittsburgh. Despite the fact that DOW maps do not show any Blue Heron rookeries in the area, a Blue Heron rookery has been located in conifer trees in the Slate River Wetlands Preserve for the past few years. Most of their rookeries are located south, near the Roaring Judy Fish Hatchery in cottonwood trees. Bird counts on CBLT land by Ron Meyer, a regionally-recognized bird identification expert; Jim Barry, a retired National Forest Service employee; and friends have identified over 80 species in wetland and upland birds within the Middle Slate River Valley. (See Appendix IV)

Endangered species
Wildcat Creek and Gibson Ridge are prime habitat for Lynx. This habitat is over 9,000 feet in elevation and has extreme north slopes and dense conifer stands. Lynx eat Snowshoe Hares and Pine Squirrels that inhabit these slopes. There were two unconfirmed, recent sightings of Lynx on Snodgrass Mountain in 2004. NDIS data indicates potential Lynx habitat in the Middle Slate River Valley and that area is mapped on the Lynx Potential Habitat map.

Boreal Toads are located in the southern portion of the Middle Slate River Valley.

Bald Eagles use the Middle Slate River Valley, especially the riparian areas during winter months.

Fish
The entire Slate River, including its tributaries, is a fishery.

Brown trout	There is a spawning population of brown trout from Blue Mesa Reservoir to the headwaters of the Slate River. When the DOW conducted an "electroshock" of the Slate River between Peanut Lake and the confluence of Coal Creek and the Slate River in 1990, brown trout as large as 18 inches were observed in the River.
Brook trout	Brook trout are stocked in Coal Creek and the Slate River and are also found near the Rozman Ranch at the south side of the Middle Slate River Valley.
Rainbow Trout	Rainbow trout are abundant in the Slate River upstream of Nicholson Lake and near the Rozman Ranch. Catchable rainbow trout, seven to eight inches long, are stocked in the Slate River above Nicholson Lake.

Lake Trout In the past, Nicholson Lake has had lake trout as large as 11 pounds.

Impacts to Fish Habitat

Keystone Mine Since the Amax Mining Company began water treatment of the Keystone Mine drainage, Coal Creek is much better for aquatic life.

Standard Mine A 2002 report for the Forest Service found that concentrations of cadmium, copper, lead, and zinc were elevated below the Standard Mine on Elk Creek. These elevated concentrations continue to be present in elevated levels at the Crested Butte water intake and through town to the last sampling station on Coal Creek near the Slate River, for a total distance of about 7.5 miles. Aquatic life standards are exceeded for many of the minerals sampled. (1)

Peanut Lake There is conflicting information about Peanut Lake. Peanut Lake is not known for any fish and little fishing takes place there. Tom Henry felt there were few trout in the lake because it is too shallow and acidic. However, Rudy Damjanovich, a local builder and fisherman, has seen fish in Peanut Lake, but has yet to catch any. Dr. David Cooper, who studied wetlands in 1992, expressed concern in his report about the polluted drainage into Peanut Lake from mines. He indicated that the lake was not a healthy habitat for fish because the minimum aquatic standards for cadmium, manganese, copper and zinc are exceeded by the drainages into the lake. He noted the heavy metal levels of the lake water itself are within the limits, but felt that the sediment of the lake may be at elevated levels. This was confirmed in 1996, when the Crested Butte Land Trust (CBLT) conducted sampling of the water and sediments prior to purchasing most of the lake (See Wetlands Section).

Re-establishing the wetlands would help the fish habitat tremendously. District wildlife manager Henry discouraged trails in wetlands because of the impact to habitat and wildlife. He identified mountain bikers as the biggest human problem. A bigger problem than direct human contact is salted runoff water going into creeks. Retention ponds are an effective mitigation measure because they slow the water and allow the salts to seep into the bottom of the pond before the water drains into a creek. However, retention ponds can also be very expensive. Public access to creeks, rivers, ponds and lakes allows the DOW to stock them with trout.

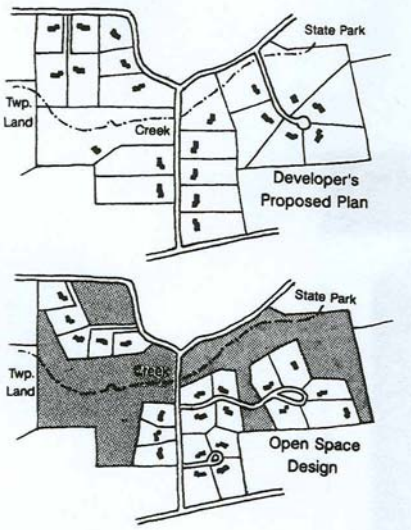
Effects of Development

In habitats where little is being developed or disturbance is minimal, the animal population is stable. As the human population increases and development moves into new areas of previously undeveloped land or wildlife habitats, wildlife will coexist, migrate or die. Many wildlife species are very adaptable and can adjust to changes and disturbances if the habitat components include food, water and shelter (escape cover). The underlying assumption about wildlife migration away from development is that there are other lands that are not at their wildlife capacity. However, since wildlife populations grow in suitable habitat until the population capacity is achieved, the assumption that there is a place for wildlife to move to has no basis in fact.

The effects of subdivisions vary according to species. The wildlife species that generally get the most attention are either economic species (deer, elk and fish) or endangered species (bald eagle, squawfish, etc.). Wildlife species that receive the most attention in human interactions include

deer and bears because people see the consequences of deer and bears in their yards. Deer eat vegetation and are chased by dogs. Bears get into trash and climb trees outside home windows.

Development can have minor affects if it is planned with wildlife as a consideration. The level of impact is highly dependent on the habitat being affected, how wildlife use it, and the juxtaposition of the development and associated human activities with relation to the habitat. The use of land and the amount of disturbance that a development requires is critical. For example, large parcels with development clustered on a small part of the land, can minimize the affects to wildlife if a large percentage of the land remains open. When lots exceed 35 acres, the individual lots can provide adequate amounts of open space for wildlife habitat.

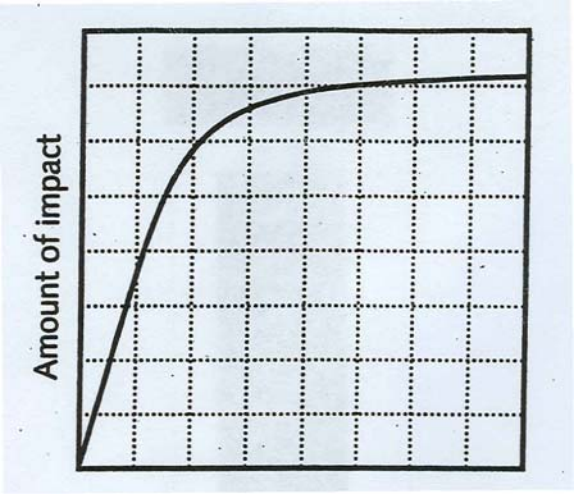


A conventional planning scheme (top), that spreads houses out along two road corridors, compared with an ecological planning scheme (bottom), which also considers habitat connectivity by clustering housing away from the movement corridor along the creek background (Reprinted from Rural by Design)

Protection of critical wildlife habitat such as wetlands, riparian areas, water courses, winter habitat, migration corridors and calving areas is most important. North-facing slopes are also important because they offer the best escape cover for wildlife. Conifers on north-facing slopes provide thermal cover and escape for wildlife of all types including: elk, deer, blue grouse, etc. The open areas, in all tree types, are the areas where wildlife feed during early evening, night, and into early morning. Open areas provide the majority of the feeding spaces used by most wildlife species because of abundant vegetation.

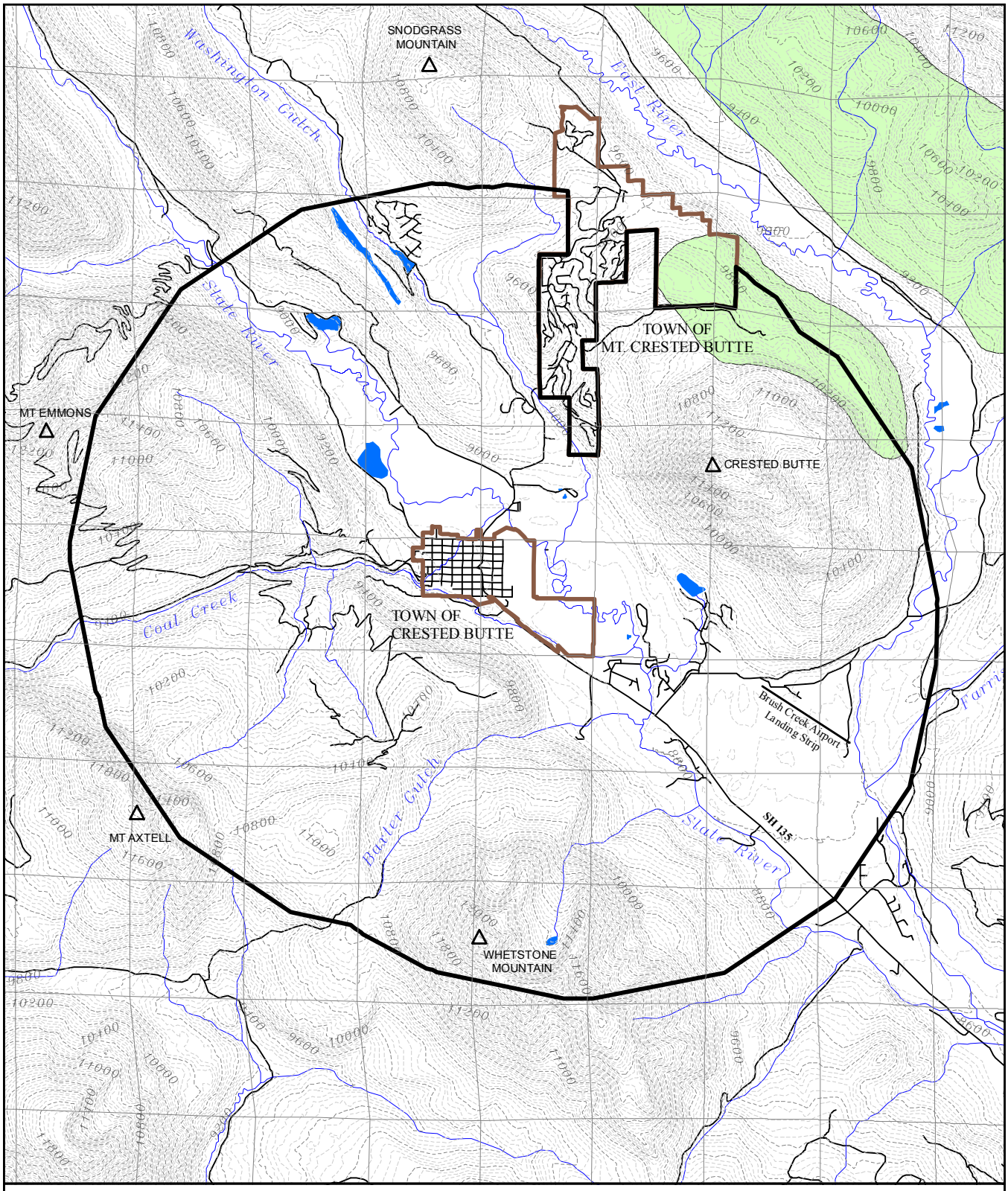
A quick look at the Elk Production Areas map indicates that the new Prospect Subdivision in Mt. Crested Butte overlaps the Elk Production Area.

A generalized model of the asymptotic relationship between the amount of use and the amount of impact.



Where use levels are low, incremental increases in the amount of use have a pronounced effect on the amount of impact. Where use levels are moderate to high, incremental increases in the amount of use have little effect on the amount of impact. Reprinted from *"Ecology of Greenways."*

(1) "Standard Mine, Final Engineering Evaluation/Cost Analysis Report," Science Applications International Corporation, Grand Mesa, Uncompahgre, and Gunnison National Forest, July 9, 2002.



Elk Production Areas

- 3 Mile Boundary (MSRV)
- Town Boundary
- Streams
- Lakes
- Roads
- Section Lines

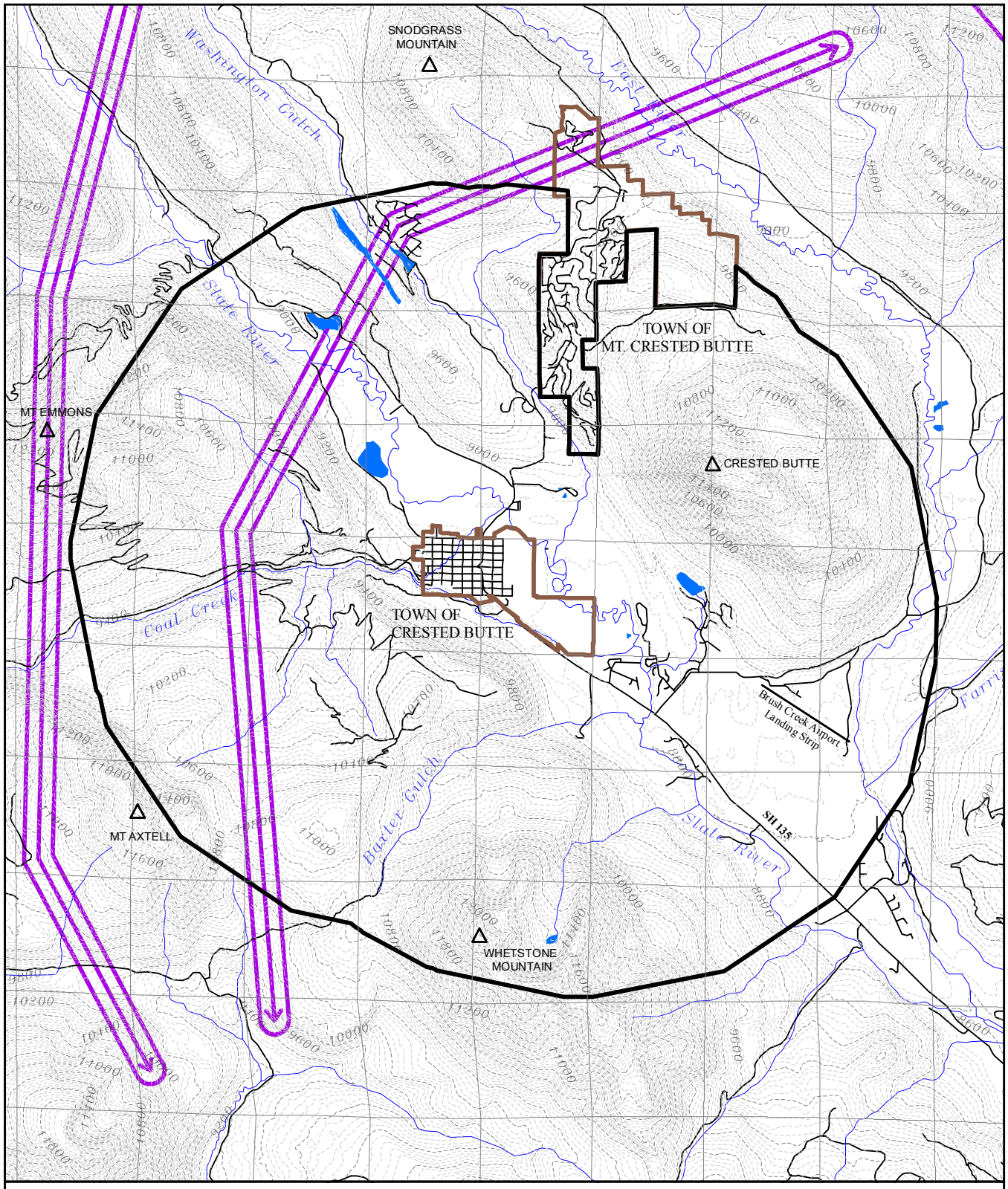
40' Topographic Contours

- index
- interval
- Elk Production Areas

0 0.5 1 2 3 Miles

SOURCE: Colorado Division of Wildlife data from Gunnison County MIS Dept., June 2004

Drawn by: Hilary Mayes
Date: June 22, 2005
Filename: C:/project/areaplan/2011/elk_pro.mxd



Elk Migration Patterns

- 3 Mile Boundary (MSRV)
- Town Boundary
- Streams
- Lakes
- Roads
- Section Lines

40' Topographic Contours

- index
- interval

- Elk Migration Patterns

0 0.5 1 2 3 Miles

N W E S

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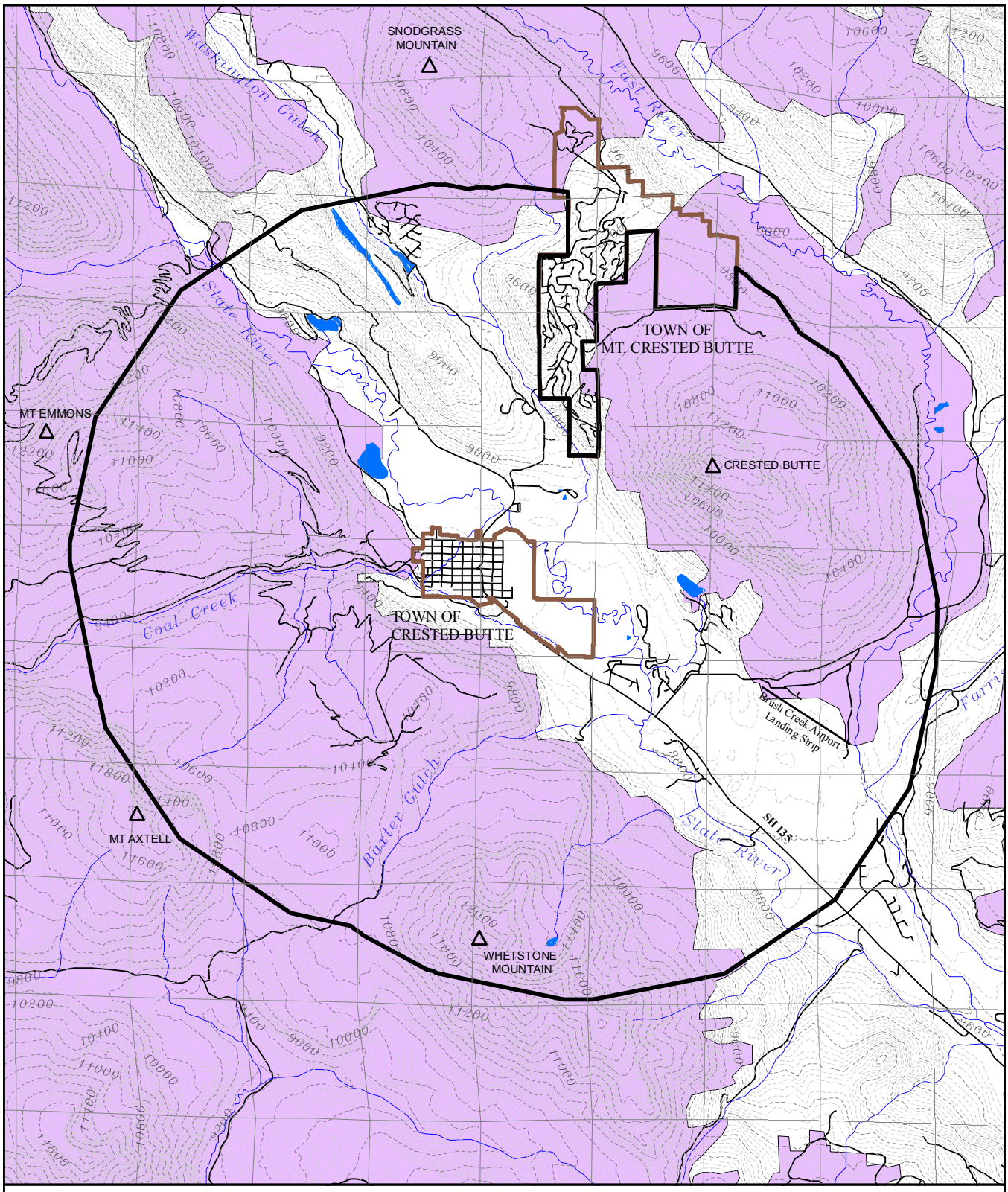
Drawn by: Hilary Mayes
Date: June 22, 2005
Filename: C:/project/areaplan/2011/elk_migr.mxd

SOURCE: Colorado Division of Wildlife data from Gunnison County MIS Dept., June 2004



Lynx Potential Habitat

- 3 Mile Boundary (MSRV)
- Town Boundary
- Streams
- Lakes
- Roads
- Section Lines

40' Topographic Contours

- index
- interval

Lynx Potential Habitat

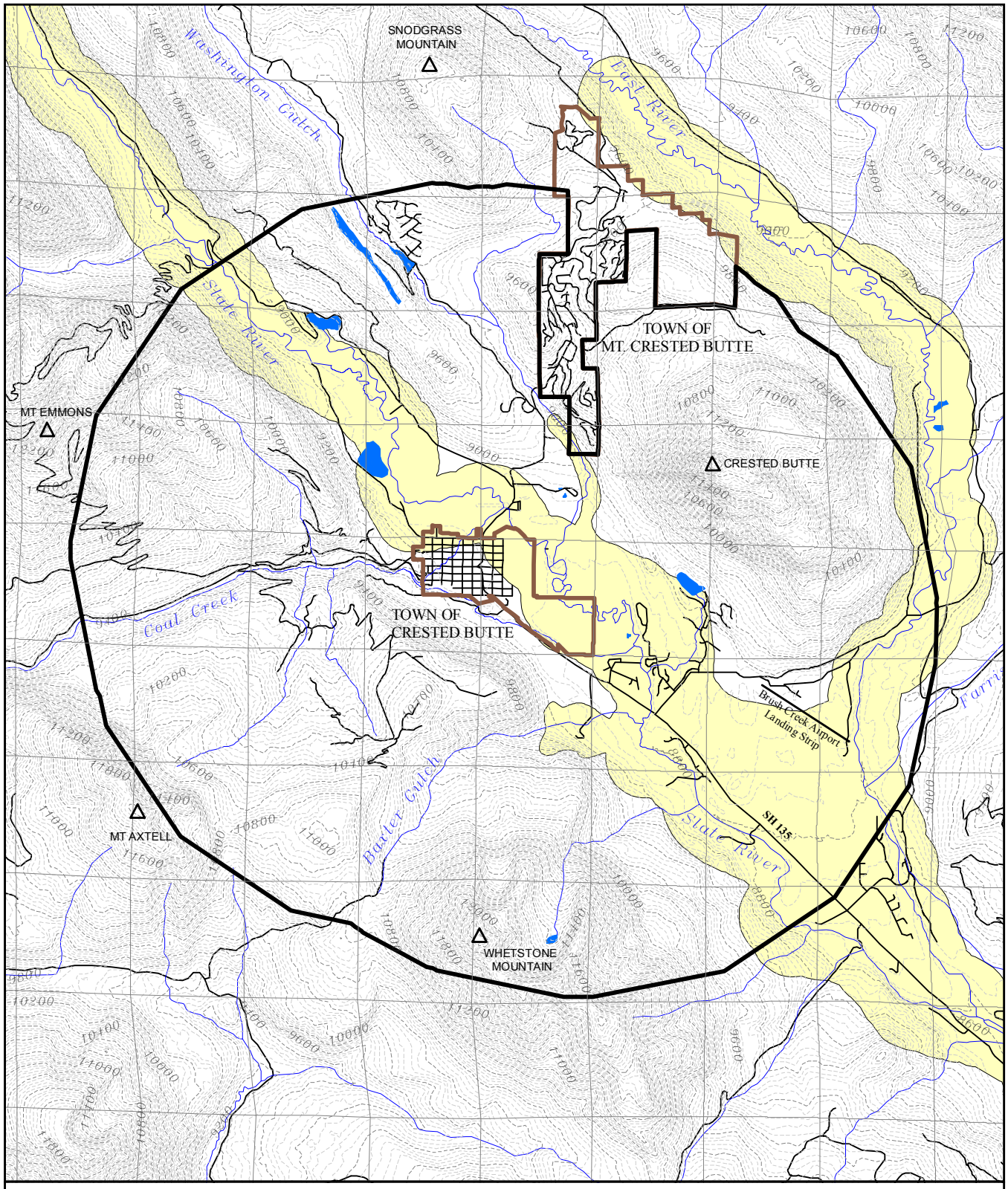
N W E S

CRESTED BUTTE, COLORADO · A National Historic District

0 0.5 1 2 3 Miles

SOURCE: Colorado Division of Wildlife data from Gunnison County MIS Dept., June 2004

Drawn by: Hilary Mayes
Date: June 22, 2005
Filename: C:/project/areaplan/2011/lynx.mxd



Geese Production Areas

- 3 Mile Boundary (MSRV)
- Town Boundary
- Streams
- Lakes
- Roads
- Section Lines

40' Topographic Contours

- index
- interval
- Geese Production Areas

0 0.5 1 2 3 Miles

N W E S

CRESTED BUTTE, COLORADO · A National Historic District

SOURCE: Colorado Division of Wildlife data from Gunnison County MIS Dept., June 2004

Drawn by: Hilary Mayes
Date: June 22, 2005
Filename: C:/project/areaplan/2011/geese.mxd