DOCUMENTATION OF RIPARIAN AND WILDLIFE IMPACTS FROM CONSTRUCTION OF THE LOWER CRYSTAL RIVER RECREATIONAL TRAIL, GARFIELD AND PITKIN COUNTIES

Draft Report by the
Crystal River Caucus
Trail Task Force

MAY 7, 2010

Wildlife and Riparian Impacts of the Crystal River Trail Construction
Prince Creek to Seven Oaks Subdivision (BRB Campground)
May 9, 2010
Crystal River Caucus Trail Task Force

Executive Summary

Work on the Crystal Trail from Prince Creek Road to the BRB Campground began in the fall of 2009. The total trail length is 4.4 miles. Although many think that recreational trails are benign, their construction and location can damage the environment. This report documents the significant impacts to riparian areas and wildlife habitat that occurred because of the trail and associated work, including diversion structures and staging areas. Part 1 discusses these impacts; Part 2 contains five tables documenting these impacts with references to photographs; and Part 3 contains photo documentation of the impacts.

Specific impacts include:

- A total of 0.69 miles in 4.4.miles of the trail is within 100 feet of the river.
- In most cases vegetation was removed so there are no roots left to regenerate.
- Riparian impacts along this reach result in a loss of 1.18 acres of riparian vegetation.
- Extrapolated riparian vegetation loss based on an average riparian vegetation removal width of 14.1' per lineal foot equals 1.68 acres /stream mile.
- A total of 0.09 miles (0.05 acres) of riparian vegetation along ditches more than 100 feet from the river was removed.
- Because of the limited extent of wetlands in the lower Crystal River valley, even small, lower quality wetlands provide important habitat functions and are essential to wildlife survivability.
- A total of 0.05 acres of wetlands were filled to construct the elevated trail prism. There may be additional wetlands that were filled to build the trail that are no longer visible.
- An isolated wetland associated with trail and pipeline construction was disturbed for half to two-thirds of the 0.47 acre wetland. A drain was installed in the wetland increasing water loss,
- Cumulative effects from numerous small impacts that occur as a result of the trail construction result in stream, wetland, and riparian degradation.
- A total of 9 elevated trail sections totaling 0.74 miles out of 4.4 miles limit wildlife's ability to cross the highway. Some of these elevated trail sections pose a more significant barrier to wildlife than others.
- A total of 1,285' of 5-foot-high wood fence limit wildlife's ability to cross the highway.

- CDOT documented 11 mule deer killed by cars between March 5 and April 5, 2010 along the trail construction zone.
- From Prince Creek south there is a combination of wood fence, 2 elevated trail sections, and the Crystal River Bridge that severely limit wildlife movements for 0.43 miles.
- There is permanent loss of vegetation, water infiltration, and runoff alteration from the paved trail prism for a total of 6.4 acres in this 4.4 mile trail section (12'width). One acre out of the 6.4 total acres is within 100' of the river which negatively impacts the riparian area function, water quality and quantity.
- These disturbed areas provide an avenue for noxious weeds to become established necessitating the increased use of herbicides adjacent to the Crystal River.

Part 1 Findings

Work on the Crystal Trail from Prince Creek Road to the BRB Campground began in the fall of 2009. The total trail length is 4.4 miles. Although many think that recreational trails are benign, their construction and location can damage the environment. This report documents the significant impacts to riparian areas and wildlife habitat that occurred because of the trail and associated work, including diversion structures and staging areas. The report also discusses the importance of riparian areas, existing conditions in the Crystal River, impacts of the trail to wildlife, and legal requirements.

Riparian Areas

Riparian areas have greater ecological significance than a similar extent of upland ecosystems. The State of the Roaring Fork Watershed Report (2008) describes the benefits of riparian areas. Riparian systems have the highest species richness of all major ecosystem types in Colorado, but cover only one to two percent of the land area (Fitzgerald et al., 1994). Riparian vegetation:

- stabilizes stream channels,
- provides shade to moderate high and low stream temperatures,
- helps controls flooding,
- increases bank water storage,
- provides a sources for the large wood that creates pool habitat for fish,
- enhances the structural diversity of instream habitat,
- helps maintain a naturally sinuous channel shape,
- contributes to variable stream bottom, depth of water, and flow velocity, and
- provides wildlife cover, thermal protection, foraging resources, nesting habitat and, during migration, essential travel corridors and stopover habitat where birds rest and replenish in preparation for their continued migration.

Extensive riparian areas are found throughout large alluvial complexes. Such complexes, where the river slows down and meanders through the floodplain, are biological "hot spots." It is here that fish and birds are found in high numbers because of the plentiful food resources, low gradient stream, and complex habitats. These areas provide excellent dam building opportunities for beavers and areas for large wood to accumulate adding additional complexity to the channel or floodplain. Four large alluvial "hot spots" occur along the Crystal River: Placita, Redstone, the historical town of Janeway, and north of the BRB Campground (Figure 1, in the vicinity of the present trail construction). Of the four only Placita is in relatively good condition.

Figure 1. The lower Crystal River downstream of BRB. September 19, 2009

The riparian and instream areas of the lower Crystal River have been severely degraded by past and current land uses and the cumulative effect from upstream impacts. Four key findings for the Crystal River address and quantify this degradation (State of the Roaring Fork Watershed Report (2008) :

- Throughout much of its length, the Crystal River has been channelized. Road cuts have resulted in the removal and degradation of streambank vegetation and habitat loss on 27 percent of the segment. Agricultural and residential development in the riparian zone has impacted 39 percent of native riparian habitat. Weeds impact more than 50 percent of the surveyed reaches.
- Both historic and recent land uses have altered the condition of riparian habitat, leading to degradation of ecosystem functions and alteration of the river channel. Riparian habitat on both banks is heavily modified or severely degraded on more than 70 percent of the surveyed reaches (Figure 2).
- Along much of the surveyed segment, native narrowleaf cottonwood woodlands that historically lined the river banks are dying and not being replaced. Nesting by Lewis's Woodpecker, considered a species of concern by the National Audubon Society, has been documented in a few of those sites where mature cottonwood stands remain.

- Vegetation degradation, channelization, and flow reduction have impacted instream habitat quality.

Several impacts to the ecologically important alluvial areas of the Crystal River are "permanent" (i.e., built on or cut- off from the river by Highway 133 and old Crystal River Railroad bed - Redstone, BRB Campground, and Placita). Placita was restored in 2008 by removing the culverts under the old railroad bed, but the bed was left for historic reasons. Highway 133 parallels the Crystal River from the base of McClure Pass to Carbondale. Roads sever the connection between upland and riparian ecosystems, can change groundwater flow, constrain a channel's ability to meander, and impact the ability of wildlife to safely access water, forage, and cover. Roads cause erosion, damage roots of nearby trees, change soil density, soil temperature, and soil water content, increase light levels, create dust, pollute surface waters, change patterns of runoff and sedimentation, and add heavy metals, salts, organic molecules, and nutrients to roadside environments (Trombulak and Frissell, 1999).

Farming and ranching moved into the valley in the mid to late 1800's. Land was cleared and irrigation ditches were used to provide water for the crops. Many of the irrigation ditches in the lower Crystal River and throughout the Roaring Fork Watershed have provided excellent riparian corridors in more upland habitats for over a hundred years. This created riparian ditch habitat has helped mitigate the loss of historic riparian corridors from road construction, railroads, and now recreational trails.

The Stream Health Initiative assessment (Malone and Emerick, 2006), identified areas in the watershed that are, or have the potential to be, especially valuable to wildlife, but are at risk due to current or potential threats to stream and wildlife values. These were designated as Conservation Areas of Concern and should be given high priority with regard to conservation efforts in the watershed. Some of these areas are currently in ecologically sustainable condition, while others are not and are in need of management action to restore ecological health. Regardless of the current condition, each area has especially important wildlife potential. Two Conservation Areas of Concern were designated on Reach CR2-9, the section of the Crystal River impacted by the new trail (Figure 2):

1) Downstream of "BRB" Campground – Could benefit from restoration and conservation, and
2) Expansive hay meadows - Potential breeding bird habitat and winter bald eagle roost habitat is undermined by current agricultural practices that have greatly decreased the width of the riparian zone and inhibit cottonwood recruitment. It was recommended that stakeholders work with landowners to develop wider, more sustainable riparian setbacks.

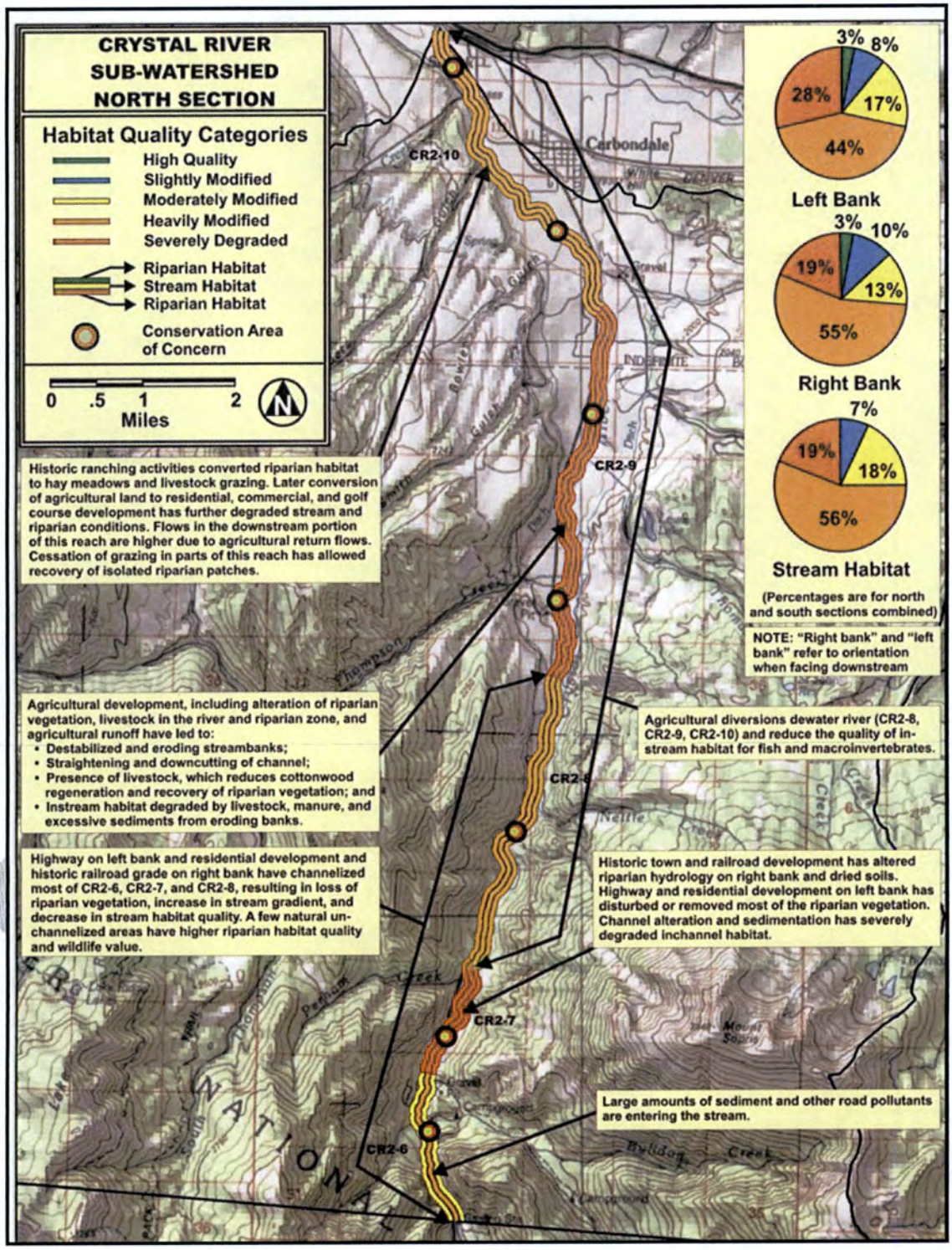

Figure 2. Crystal River Habitat Quality Categories (State of the Roaring Fork Watershed Report, 2008)

Trail Construction Impacts to Wildlife

Birds

The lower Crystal River is important winter habitat for bald eagles (Figure 3). The environmental review provided by the county's wildlife report (Colorado Wildlife Science, 2007) indicates that there is to be no activity within a quarter mile of areas where eagles winter. In addition, no trees that were used by eagles or other raptors were to be cut (Colorado Wildlife Science, 2007). Work began in the late summer of 2009. The section of trail from town to Prince Creek was paved before snowfall. Work on the rest of the trail prism increased after this section was done. Heavy equipment worked throughout the winter of 2009/2010. Several large, mature narrowleaf cottonwood trees that were known to be used by eagles and other raptors were cut. The removal of these large cottonwood trees occurred south of the Crystal River Bridge and continued south approximately 2 miles.

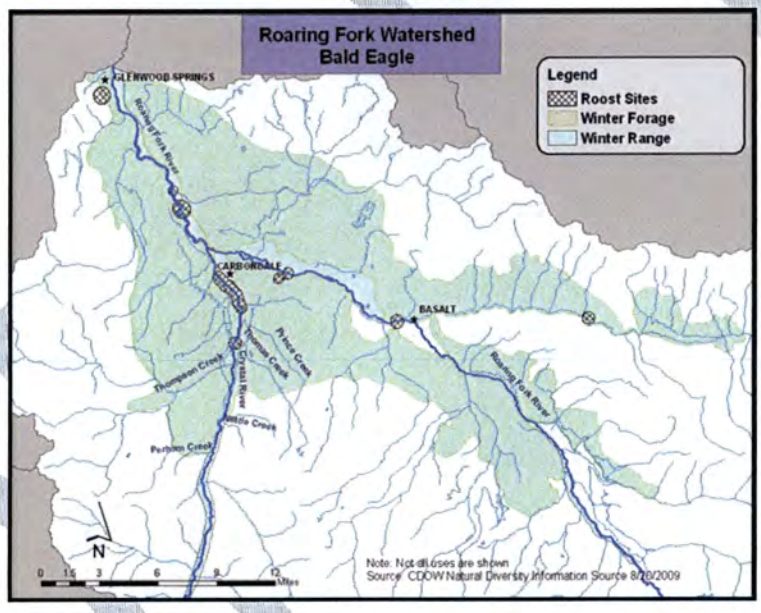

Figure 3. Bald Eagle Habitat Map.

Ospreys are a common visitor to the lower Crystal River valley as shown in Figure 4, where they commonly forage along the Crystal River. Although there are no known nesting sites in the Crystal Valley, there is suitable habitat. In addition to eagles and osprey there are many other birds of prey including Peregrine Falcon and Northern Goshawk, as well as neotropical songbirds such as MacGillivray's warbler, Olive-sided Flycatcher and Willow Flycatcher, woodpecker species such as Lewis's Woodpecker and Red-naped Sapsucker, shorebirds such as Common Snipe and Spotted Sandpiper and herons including Great Blue Heron and, in migration, Black-crowned Night Heron These species commonly nest and forage throughout the lower Crystal River Valley. The loss of even a few of

these large cottonwood trees in the lower valley is a significant impact on all of these bird species. Fields associated with ranching are the dominant land cover in the lower valley, so these trees served as valuable habitat for birds.

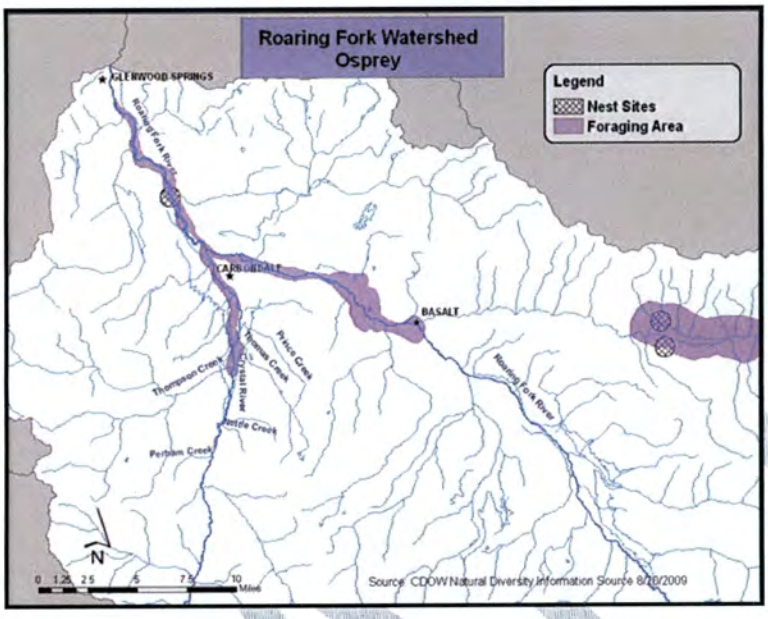

Figure 4. Osprey Habitat Map

Mule Deer

Mule deer intensively use the lower Crystal River (Figure 5). Deer begin congregating in the fields adjacent to the highway and river beginning in mid October, depending upon forage and snow conditions in higher elevations. When snow depth hinders foraging, deer move to more suitable winter range on south facing hill slopes in the lower Crystal and Roaring Fork valleys. Deer move back to the fields during spring melt-out and green-up. During the day they tend to stay on the fringes of the fields, towards late afternoon they begin to congregate in the fields, leaving the next morning. Deer cross the highway anytime of the day or night, most frequently at dusk and dawn; during the fall and spring migration periods; and throughout the summer months.

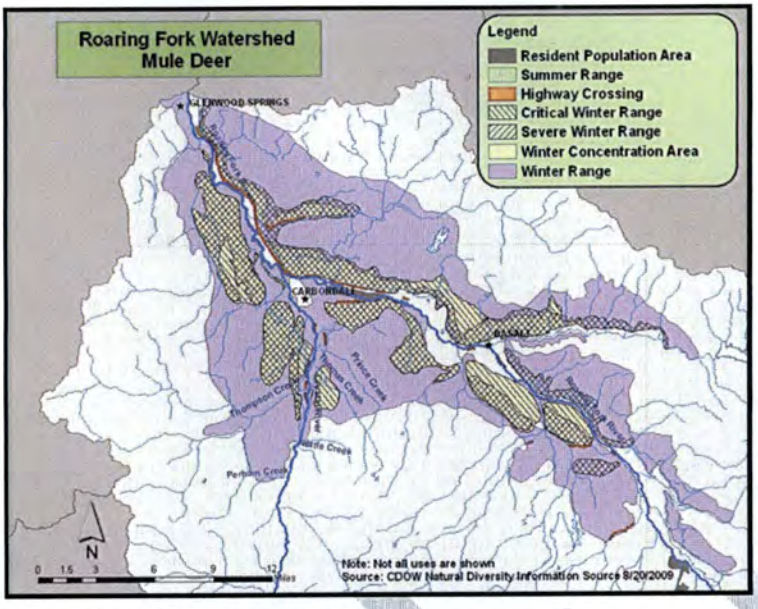

Figure 5. Mule Deer Habitat Map.

Trail Effects on Deer Movements

As a result of the new Crystal River trail there are nine elevated trail sections ranging in length from 150 feet to 923 feet and varying widely in height. Five of the nine elevated trail prisms are relatively benign with regard to deer movements. All nine elevated trail sections are discussed in detail in Table 3. While Units 2, 4, 5, 6, and 7 are not as detrimental to deer as the other four elevated sections they still provide unique and difficult challenges for deer.. At the time of this report, the trail is under construction so all the features are not fully constructed. The following observations were made regarding conditions that existed at the time of the report. :

- The horizontal distance and slope between the guard rail and the elevated trail prism is important. If the distance and slope between them is wide and gentle deer can jump the guard rail and land safely.
- The height from the top of this slope to the trail prism is important; deer can jump several vertical feet if they have adequate take-off and landing space.
- If the guard rail is adjacent to the trail prism and there is a vertical drop of 2' or more to the trail below, the drop makes it very difficult for deer to safely navigate this obstacle. The vertical drop adds to the height of the guard rail effectively doubling the height deer have to jump.
- On the east side of the elevated trail prism, a 5' high trail safety fence is often in place. This is a barrier for deer to jump forcing them to go either up or down the trail to navigate around the fences.
- Vertical walls without guard rails or fences are also barriers for deer.

- Distance and elevation between the river-side vertical wall and the adjacent agriculture field are factors to be considered when evaluating potential wildlife impacts. When the elevation difference between the field and the elevated vertical wall is too high, deer have difficulties; and where the distance between the wall and the agricultural fence is too close there is potential for deer to become trapped and possibly entangled in the fence leading to a slow, painful death.
- Deer will spend additional time confused and physiologically stressed in the highway, trail, or field trying to navigate these obstacle/barriers.

For the remaining four elevated trail Units in Table 3 each one will be discussed separately.

- Unit 1 is located approximately one third mile north of the end of the project at BRB Campground. The Unit is 612 feet long, on a curve, and has a hillslope on the west side of Highway 133. The impacts associated with the guard rail, vertical drop, and a 5-foot high trail safety fence are discussed above. In addition, the unit is located on a curve with moderately thick vegetation limiting line of sight for traffic. . The valley opens up on the north end of the curve. This area is a common place for deer, elk, and other wildlife to cross the highway and the river because the floodplain is wide and the river shallow, braided, and easily waded except in spring run-off. The riparian vegetation was very dense and wide in this reach prior to trail construction. Now much narrower in width, vegetation still provides some cover for the wildlife. However, this elevated trail section further compounds the historic hazards to wildlife crossing here and increases the danger for both wildlife and humans.
- Unit 3 is 475 feet long, located between the Pitkin County Open Space and Trails Property (Mautz Ranch) field to the south (across from Sustainable Settings) and Thomas Creek Road to the north. It occurs at natural geographic pinch point in the valley; opening up to the north and south, and has moderately dense vegetation cover on both sides of the road. The area is a major wildlife crossing, both at the elevated trail section and north and south of it. This Unit has a guard rail, vertical drops, and a 5-foot high fence. In addition, the vegetation restricts drivers' line of sight. This area is used by deer (Photo 32). A deer was killed here in mid-April. The guard rail and the trail immediately below (an average of 4 to 5 feet) poses a significant obstacle for deer, If a deer jumps over the guard rail they will drop approximately 7 feet to the trail prism. A deer will most likely either go back across the highway or travel up or down the highway trying to find a way around the barrier; putting wildlife and humans at risk.
- Units 8, 9, and the wood fence section beginning at Prince Creek and extending south 2,296 feet (0.43 mi) to the south crossing the Crystal River Bridge. This section has the most difficult and longest continuous barrier for all wildlife crossings. Unit 8 begins on the south side of the Crystal River, extends 312 feet before intersecting the Crystal River Bridge, and merges into Unit 9 for an additional 400 feet.

Then there is 200 feet of woven wire fence that only adult deer can jump (if they can even find this section). Finally there is 1,285 feet of a 5-foot high wooden fence that is too high for adult deer to jump. Small mammals such as raccoons can get under the 6 inch gap beneath the wood fence, but fawns and other wildlife cannot get either over or under. Additionally, there is a guard rail along the entire section (photos 28-31) and as previously discussed regarding the elevated trail sections; there is a bridge to cross. The passage for deer from the west is at CR 18 between the hatchery and the pond, and from the east is Prince Creek Road.

Rocky Mountain Elk

Although, elk are not as common as deer in the lower Crystal, they can be observed in the fall and spring with migratory behavior similar mule deer (Figure 6). Elk are most commonly observed from BRB Campground north to the Mautz Ranch field on either side of the highway. Impacts to elk from the trail construction are similar to deer. Elk have been observed crossing the same sections of the Crystal River. An elk calf was observed in June 2008 on Highway 133 right-of-way with the mother on the west side of the fence in the field. They were safely reunited by opening an access gate into the field.

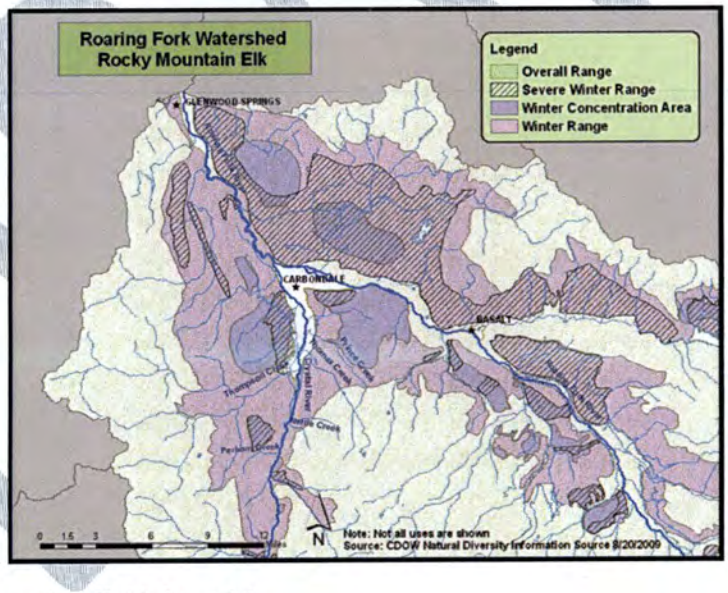

Figure 6. Elk Habitat Map

Legal Requirements

The legal requirements for this project and issues are discussed below. While most of the work is "legal", we feel that it fails to meet the intent of most of the existing laws, rules, and regulations. Pitkin County strives to be an environmental leader and this project is counter to that leadership.

Wetland Delineation Report

The Wetland Delineation Report (EES, 2007) documents the wetland habitats in the project area and as legally required only focuses on jurisdictional wetlands. Jurisdictional versus non-jurisdictional wetlands were not distinguished for our assessments because this administrative distinction is irrelevant for wildlife. Some of the report's photos were useful to assess pre-construction conditions.

US Army Corps of Engineers Nationwide 42 Permit

We reviewed the US Army Corps of Engineer (USACE) Nationwide 42 permit and question whether the actual project that was implemented qualified under a nationwide permit. While this is a USACE decision, we think that an individual 404 permit would have better reflected the impacts to the aquatic habitats.

Wildlife Resources Report

Trail construction did not begin until late summer of 2009. From reading the Wildlife Resources Report (Colorado Wildlife Science, 2007) wildlife report it is questionable if the consultant was provided the specifics of the actual trail prisms and construction plan. The report begins with the following statement "This report includes a description and evaluation of wildlife resources known or suspected to occur within the trail corridor and provides all of the information to qualify the project for Categorical Exclusion status". There is no reference as to how this was determined or what statute was used to verify this statement. The report is very brief and provides no site-specific analysis on elevated trails regarding wildlife movements, riparian removal, neotropical songbird impacts, removal of a large number of cottonwoods, cavity nesting birds, impervious trail surfaces, infiltration, run-off, and irrigation dams and associated pipeline infrastructure associated with constructing the trail. On page 3 the report states: "Impacts to wildlife are significant if species or habitats of high concern are adversely affected over relatively large areas, or if disturbances cause reductions in population size or distribution of a species of high concern. Construction activities will be focused on a relatively small percentage of the overall Project Corridor. Consequently, negligible habitat loss and associated impacts to wildlife populations is anticipated." We would like to know

what these statements actually mean, and to whom, because our report finds significant impacts to a multitude of wildlife species and their habitats along the entire trail prism from Prince Creek Road to the end of the project at BRB Campground.

The results section from the wildlife report discusses Federal Listed Threatened and Endangered Species and concluded that there is no habitat within the project area for 11 of the 13 species. Otter and bald eagle were briefly discussed and there were "No Effects" to either of these species within the project area. We find it difficult to believe that the consultant came up with this determination for bald eagles as evidenced in Figure 4 and subsequent discussion regarding the removal of roost trees and work occurring throughout the winter of 2009/2010. Other species that were briefly discussed were deer, elk, bighorn sheep, black bear, and raptors, with each being about 2 to 3 sentences in length. The raptor section states that no raptor nests were found and no breeding or nesting activity was observed. The report was based on two field days (April 17 and 18, 2007); raptor surveys done at this time of year are of little value because the birds are not breeding or nesting then.

Pitkin County Land Use Code, 2006, and as amended in 2008 and 2009

The following parts of the Land Use Code were not followed. The County exempted themselves from some of the standards that the general public is required to follow.

7-20-10 - c: Tree removal. The removal of raptor roost trees seems inconsistent with this subsection as well as the wildlife section in 7-20-70 (d) (1)

7-20-(f) Exceptions – Walls exempt from the standards for development in section 7-20-20, seems inconsistent with wildlife standards for highway crossings in section 7-20-70 (d) (5); additional species specific standards and 7-20-70 (f) Deer and elk winter range(1a), (2a)(3); and (g) Timing of construction (1,2,3).

7-20-30 - Water course and drainage (b) encroachment; (c) (1) drainage. The section of trail downstream of the BRB Campground, including the elevated trail section, encroaches on riparian areas, changes the natural drainage pattern, and increases impervious surfaces. (g) sedimentation. Many areas have no or poorly placed sediment barriers to prevent sediment delivery into waterways. (h) water quality. Impervious surfaces and run-off can affect water quality. (h), (3) inconsistent with maintenance of Stream Classification as identified in the State of the Watershed Plan, 2008.

7-20-70 – Wildlife Habitat Areas. Many of these standards listed were not followed as part of the trail design or implementation. This is evidenced by working throughout the winter; roost tree removal; and

the impact on winter range, migration corridors, highway crossings, important waterfowl and wading bird habitat areas, and wetland and riparian areas. Referenced by 7-20-70 (c)(1) vegetation, (3) woven wire fence, (4) wood fence height, (6) mature trees and snags; (d) general buffers (1) nest/roost tree buffer, (4) waterfowl and wading bird habitat area, (5) wildlife migration corridors; page 33 (1) wetland and riparian areas, (f) (1,2,3,4) Deer and elk winter range, migration corridors; (g) Timing of construction (1,2,3). 7-20-80 River and Stream Corridors and Wetlands. County residents are required to follow the code for stream setbacks for the health of the watershed and water quality. The County has exempted themselves from the code as in Section 7-2--80(c) (1). Riparian, riverine, and wetland habitats are difficult, if not impossible to physically and hydrologically mitigate. Even more difficult is to mitigate the effects to wildlife that rely on these habitats for their survival.

Conclusion

This report documents the ecological consequences of the Lower Crystal Trail Project and is intended to inform Board and staff of Pitkin County Open Space and Trails; elected officials and staff of Garfield and Pitkin counties; Pitkin County Healthy Rivers Board, Great Outdoors Colorado, City of Carbondale, and the public regarding the specific ecological consequences of this recreational trail project. There has been and will continue to be significant environmental and ecological impacts from trail construction and related activities on riparian and wetland habitats and wildlife movements in the lower Crystal River Valley. These impacts are more egregious because of the ecological significance of riparian and wetland areas and the existing impacted conditions of these habitats in the lower Crystal River Valley. Many species and their habitats will be permanently impacted by this project.

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Part 2: Documentation Data and Photo References

Table 1. Crystal River riparian vegetation removal (from BRB Campground downstream to Thomas Creek Road).

Unit #	Unit Description/Comments	Area of habitat alteration caused by vegetation removal. [1] (L x W=sq ft) within 100 feet *within high water mark of river (italicized)*
0 (Photo 0)	• Begin at south end of project area at parking area at subdivision by BRB.	• 3 trees saved as for cavity nesters.
1	• Temporary access road off Hwy 133 downstream located near several < 6 inch spruce. • Silt barrier in place.	(95' x 20') = 590 sq ft • Unknown number of trees removed
2 (Photo 1)	• Spruce to BRB Sign nailed to twin cottonwoods. • Figure 15 from EES Wetland Report. • Significant impacts to riparian area. • Silt barrier in place.	*(256' x 20') = 5,120 sq ft* • *Most of the riparian vegetation removed* • *Was a moderately dense grove of riparian shrubs and trees*
3 (Photos 1 and 2)	• BRB sign to end of guard rail. • Significant impacts to riparian area. • Silt barrier in place.	*(61' x 20') = 1,220 sq ft* • *Similar vegetation removal as discussed in Unit 2*
4 (Photo 2)	• Guard rail to elevated trail. • Silt barrier in place.	(118' x 5') = 2,360 sq ft
5 (Photos 2, 3, 4, and 5)	• Elevated bike path section. • Toe of slope below retaining wall within high water mark for entire length. • 130' of rip rap included as part of the 612'. • Significant impacts to riparian areas. • No sediment barrier	(612' x 5') = 3,060 sq ft • Vegetation includes several cottonwoods • Most of removed vegetation was left in riparian area between wall and river *(612' x 3') = 1,835 sq ft* • *Similar to Unit 2*
6 (Photo5,6, and 7)	• End of rip rap and elevated path to diversion dam. • This section was filled at the headgate infrastructure and slightly upstream to install the new irrigation infrastructure. • No sediment barrier in place when photo taken on March 27, 2010.	• Unknown amount of vegetation was removed from this section. • Vegetation removed provided bank stability and shade *(30' x 10') = 60 sq ft* *Similar vegetation as described in Unit 5.*

[1] Units were measured with a measuring wheel and carpenter's steel tape unless otherwise noted.

7 (Photos 7, and 8)	• Diversion dam into pipe and where it exits into ditch. The original ditch prism was 8' W x 2.5' D. A conservative estimate of 266' of this section is adjacent to the river and portions are within high water mark. • A total of 763' of ditch was placed into pipe. • Although converting the open ditch to a pipeline is a more efficient way to transport water for agricultural purposes the pipeline will reduce ditch seepage that maintained the riparian area. • New vegetation may come back in an upland species mix of serviceberry, choke cherry, oak, juniper and ponderosa pine. • The area is a major deer crossing. Both elk and deer have been observed crossing the river and the highway where the valley opens up. • Silt barrier in place.	(660' x 50')= 33,300 sq ft total area where the ground was disturbed for the pipeline and trail of which (660' x 20') = 13,200 sq ft was woody riparian vegetation • Extensive amount of riparian shrubs and vegetation was removed *An additional (266' x 10') of riparian woody vegetation was removed from within high water area = 2,660 sq ft* • *Primarily willow and shrub removal. (The area was cut in half down to account for the ditch prism)*
8 (Photo 7, 8, and 9)	• End of pipe to old existing ditch profile. • Although the actual width where vegetation was removed is 30', 10' was subtracted to account for the old ditch profile. • Photo 9 is where the new pipeline and ditch meet the existing ditch profile. The old ditch was measured at the old metal headgate/flume as seen in the photo. Flume is 6' wide; 8' width was used in the ditch measurement. • Silt barrier in place.	(103' x 20') = 2,060 sq ft • Photo 7 indicates that extensive amounts of riparian vegetation were removed. *(103' x 2') = 206 sq ft* • *Amount of riparian disturbance that is adjacent to the river.*
9 (Photo 10)	• Thompson Creek Bridge. • EES Report, Figure 12. • Silt barrier in place.	Extensive removal *(10' x 20') x2 sides = 400 sq ft*
10 (Photo 12-16)	• Willow shrub wetland • Elevated path. • Wetland will receive less water because ditch was put into a pipe. • No silt barrier in place. (See also Table 4, Units 1 and 2) • EES wetland report Figure 11.	(175' x 20') = 3,500 sq ft • Unknown number cottonwoods were removed from this section.
10.5 (Photo 17 compared to Photo 16)	• Excellent area to see size difference between cottonwoods that received water from the ditch and those that had not. Photo 17 shows cottonwoods located below the elevated trail footprint that did not receive ditch water (6-12" dbh). Photo 16 shows several greater than 24" dbh cottonwoods that received ditch seepage water. • Loss of ditch seepage will result in crown die back (10-30%) in cottonwoods(photo 16).	
11 (Photos 17 and 18)	• See Elevated trail in Table 3 Unit 3. Begins at north end of Unit 10. Note size difference in the cottonwoods located in this dry section as compared to the large cottonwoods upstream (south) of here where the ditch used to be before it was piped. • This area drains into a large wetland complex located at the toe of the slope and may be identified in the EES wetland report Figure 8 and 9. Water quality from impervious asphalt trail may impact downslope wetland. • Silt barrier in place.	(475' x 10') = 4,750 sq ft • Extensive cottonwoods and riparian vegetation were removed along this section. • Vegetation provided additional buffer from the highway to the wetland adjacent to the river.

12 (Photo 18 and 21)	• See Table 4, Unit 2 Vegetation Removal >100 feet from river. Where the ditch/pipeline crosses back to the east side of Hwy 133 in front of house (See photo 18, manhole). The old ditch was converted to a pipeline in front of the house for approximately 200 feet. • The old ditch began at the end of this 200 feet, but the new trail put the ditch into a pipe all the way to Thomas Creek Road.	This removal was done for the new house and not connected to the trail construction, but adds additional cumulative effects to the riparian area. *(200' x 10') = 2,000 sq ft (not included in summary quantities because not part of trail)*
13 (Photo 21)	• Downstream of the house much of the native vegetation has been removed for several reasons: o 20' wide trail prism, o 20' wide buried pipeline prism, and o ditch pipe staging and storage. The section of vegetation removal is several hundred feet in length and 50' to 60' wide.	
14 (Photo 21)	• North side of house downstream with silt barrier. • This section was excavated to install an irrigation pipe. • The trail prism is located on hillslope within 100' of the river. • Converting the ditch to a pipe impacts the riparian corridor along the ditch and dewaters the riparian forest down to the river 1,025' (Sum of Units 14 and 15). Additionally ditch was piped for 200' in front of the house and 475' across the highway for a total length of 1,700' • Dewatering this section will likely result in crown die back within the remaining riparian forest between the trail and the river. • The riparian vegetation that was removed to install the pipeline and create the trail prism will likely convert to more upland species such as scrub oak and juniper. • It is unclear if this section will have the trail on or adjacent to the pipeline as there are two excavated areas. • Silt barrier in place for Unit 14, but no barrier in Unit 15.	(506' x10') = 5,060 sq ft • Removal of mature cottonwood and riparian vegetation where ditch used to be and now trail prism on top of pipeline.
15 (Photos 21,22)	• Unit 14 and Unit 15 are actually one contiguous Unit, but they were separated to distinguish between Unit 14 with sediment barrier and Unit 15 with no sediment The ditch and now pipeline located at the top of this hill slope provided water to grow large cottonwood trees. These trees provide excellent bird habitat, shade, and large wood for input/delivery to the river. • Canopy crown in cottonwoods can be expected to die back 10 to 30 % over time and lose vigor along the entire 1,025' from the loss of sub irrigation provided from the ditch.	(519' x 10') = 5,190 sq ft Removal of mature cottonwood and riparian vegetation where ditch used to be and now trail prism on top of pipeline.
	Total riparian vegetation disturbance/removal	**Total Length: 3,620 ft; 0.686 Miles** **Total Riparian Acreage Removed: 1.18 acres**

Table 2. Narrowleaf Cottonwood Tree Removal Estimates[1] (BRB Campground to beginning of Crystal River Trail in Carbondale).

Diameter Size Classes[2]	< 6"	6 to 12"	12 to 24"	> 24 "	Total Removed	Standing Trees Flagged for Removal Total	Total Extrapolated Number of Individual Tree Removed
Total Numbers by size class	46	41	42	6	135[3]	10[4]	145 plus 10-20% for a Total of 159[5] to 174[5]

[1] Estimates were gathered from counting stumps still in the ground, trees with root boles attached side cast into the riparian area between the trail prism and the river, and miscellaneous piles located throughout the project area. The biggest pile is located in the north end of the Mautz parcel. Stems and tree trunks without a root bole attached were not counted.

[2] Diameters were obtained using standard diameter breast height (DBH) measurements.

[3] The total number of trees removed (135 trees) is underestimated by probably 10 to 20 % because removed trees were stacked, particularly at the extensive tree dump site located at the Mautz parcel. The exact acreage of this removal is unknown.

[4]The total number of trees flagged for removal as of May 3, 2010.

[5]The extrapolated total number of individual trees removed: 159-174. Other riparian vegetation removed ie. Table 1,3,and 4 described in sq ft and acre.

Table 3. Wildlife migration obstacles/barriers, including elevated bike path sections and wood fences (Between end of tail at BRB and Prince Creek Road).

Unit Number (Length)	Description, Length, Comments	Height	Wetland Impacts associated with elevated trail prism
1 (612 ') Table 1, Unit 5; Photos 2, 3,and 4	• This is the first elevated trail section downstream of BRB Campground. Located on a blind curve with the hillslope on the west adjacent to Hwy 133. • This area and areas to the north and south are used extensively by deer and elk to cross the highway and river in the spring, fall, and summer (612 feet). • A guard rail, 2 vertical walls, and a 5' steel fence located on the river side of the trail for trail safety impacts wildlife migration. • Wildlife migration will be blocked Wildlife will have to run back up the hill or run up or down the highway to run around the ends of the guard rail and vertical walls on the trail prism. This exposes wildlife for longer periods of time to traffic and increases their risk of being hit. • Cars are at risk of colliding with wildlife or veering into oncoming traffic to avoid wildlife. • The line of site for drivers on this curve is limited in both directions further compromising humans and wildlife safety. • A dead deer was observed on the hillslope on April 20, 2010.	2 to 8' retaining wall	Yes • Riparian vegetation was removed for the elevated trail prism between the highway and the river in this section. • Some sediment delivery into the river from this section of the trail prism. • Riparian vegetation removal in this section increases solar input to the river and may raise stream temperatures.
2. (150') Photo 9	• Elevated section located adjacent to a manmade pond south of Thompson Creek. • Will have minimal impacts to wildlife passage. If wildlife cross the highway in this section they can quickly move off the highway. • There may still be some risk if road and trails guard rails are installed in this short section.	2 to 8' retaining wall	Yes (150'x2')=300 sq ft • Approximately 2' of the west edge of pond and upstream wetland are minimally impacted from this constructed feature. • Wildlife access to and along the west side of the pond is difficult with the vertical wall in place. • The proximity of the trail to the pond and wetland may increase physiological stress limiting its historic use by wildlife.

3. (475') Table 1, Unit 11 Photos 17, 18, and 19.	• This is an elevated section of trail adjacent to Hwy 133. It is located at a natural "pinch point" between the fields at Sustainable Settings and the fields at Cold Mountain Ranch. • This is a major deer crossing area and the elevated bike path with guard rail, 2 vertical walls, 5 foot human safety railing which will create a barrier/obstacle for wildlife trying to navigate along this 475 foot elevated trail section risk to wildlife and traffic. • A deer was killed by a vehicle 150' south of this elevated trail prism on April 17th or 18th, 2010.	2 to 10' retaining wall	Yes • Similar vegetation removal, sediment delivery, and solar inputs as described for Unit 1.
4 (326') Photo 24	• Located upstream of the white ranch house (Cold Mountain Ranch) on Hwy 133. • Approximately 234 feet will impact wildlife trying to navigate the retaining wall, guard rails, and trail safety fence. Similar wildlife effects as previously discussed. • A section of the trail prism has filled in part of the wetland. This construction effects water infiltration, water quality from water being delivered directly off an oil based asphalt trail, shade from the wall, and overall changing the hydrology of how the wetland functioned before the trail was built. Birds feeding or nesting in the wetland will also be disturbed (physiological stress) from trail users due to the close proximity of the new trail to the wetland.	3 to 6' retaining wall	Yes • 2 to 3' of wetland impacts per lineal foot of construction for a majority of this section of elevated trail for a total length of (250' x 2.5') = 625 sq ft. • There is no buffer between humans and wildlife which will result in disturbance to wildlife and increasing physiological stress.
5 (396') Photo 25	• Located across the highway from the white ranch house (Cold Mountain Ranch). • Similar wildlife impacts as previously discussed. • Additional wildlife hazard due to the close proximity of the trail to the agriculture fence and the elevational distance from the trail prism to the ground on the other side of the fence. Impacts to wildlife are: range from not being able to jump over the fence due to the elevational changes between the trail prism and the ground adjacent to the wire fence, entrapment between the wall and the fence, and becoming entangled in the fence wires leading to injury or a prolonged death. • Three dead deer were noted between field fence and wall on April 17, 2010.	3-8' retaining wall	No
6 (932') Photo 26	• Located downstream of white ranch house (Cold Mountain Ranch). • Similar wildlife impacts as previously discussed. • This elevated section has a small gap between 2 elevated sections.	3-12' retaining wall	No
7 (330')	• Section before the bridge section on the south side of Crystal River. • Similar wildlife impacts as previously discussed. • Similar wetland impacts as previously discussed.	3-12' retaining wall	Yes • 2 to 3' of wetland impacts per lineal foot of construction for a majority of this section of elevated trail for a total length of (300' x 2.5') = 750 sq ft. Similar wetland wildlife disturbance as previously discussed.

8 (312') Photo 27 and 28	• Section associated with the south side of the bridge • Similar wildlife and wetland impacts as previously discussed.	3-12' retaining wall	Yes. • 1 to 2' of wetland impacts per lineal foot of construction for a majority of this section of elevated trail for a total length of 1.5' x 300' = 450 sq ft. Similar wetland wildlife disturbance as previously discussed.
Additional notes for Units 7 and 8 Photo 29	50' -75' across Crystal (River on bridge.		Yes (20' x 5') x 2 bridges = 200 sq ft. • Riparian area adjacent to Crystal River on both sides of river. Limited wildlife use with road and trail bridges.
9 (400') Photo 29	• North side bridge, last elevated trail prism with vertical walls, guard rails, and trail safety fence • Similar wildlife impacts as previously discussed.	3-12' retaining wall	Yes (50' x 1') = 50 sq ft • Small riparian wetland associated with ditch. • Wildlife use will be severely limited due to the infrastructure and fence line.
Between Units9/10 (200') Photo 31	• This 200' woven wire section between Prince Creek Rd (going south across the Crystal River bridge) and continuing to the south end of Unit 8 is where adult deer, but not fawns can cross to the east side of the trail. • From the north end of the wood fence at prince Creek Rd to this wire fence gap is 1,285'. From the south end of the wire fence gap to the south end of Unit 8 across the Crystal River bridge is 787 feet • The total distance from Prince Creek Rd to the south side of elevated trail Unit 8 is approximately 2,272 feet in length (0.43 mi) which for all practical purposes is the amount of wildlife barrier/obstacle in this section of the trail. Adult deer can jump the wire fence section if they can find it, but fawns and other wildlife cannot pass under the fence so they will have to find another way around this barrier/obstacle, either while on the highway or trail prism going north or south or crossing back across Hwy 133. • Ingress/egress to this section of trail from the west in on CR 118 that is narrowed by Fish hatchery on the north and a wildlife pond to the south. This will further confuse wildlife making the crossing difficult and leading to wildlife spending more time on the highway. • The woven wire fence with a stand of barbed wire on the top between Units 9 and 10 is 38-42' high meets CDOW guidelines for wildlife to jump over the fence.	38"to 42" woven wire fence. No passage under fence	No

	CDOW also recommend a 12-inch gap between the ground and the bottom of the fence to pass fawns, young of the year deer, and other wildlife species. There is no bottom gap in this woven wire fence section.		
10 (1,285') Photos 29, 30, 31	• Wood fence section from woven wire to Prince Creek Road going north. • Ingress/egress on the north east side of the wood fence is Prince Creek Rd which is a poor location to funnel deer and other wildlife trying to travel east or west. • A 12' long cattle guard is located near the south end of the wood fence. Adult deer may be able to jump across the cattle guard, but it is a not a good way to pass wildlife. • Additional wildlife issues were discussed in Unit 9/10.	60" high, 6" bottom gap wood fence	No
Conclusion	• **For all practical purposes there is nowhere for wildlife to safely cross Hwy 133 from Prince Creek Road extending south to the elevated trail Unit 8 (0.43 miles).** • **Humans and wildlife are at risk in this trail section.**		N/A
Length and Acres of Impacts From Elevated Trail and Wood Fence Constructed Features	• **3,933'- Nine Walls and Associated Infrastructure** • **1,285'- Wood Fence and Associated Infrastructure** • **24 ' - Cattle guard and 12 foot gate** • **75' - Crystal River bridge** • **200' - Woven wire fence gap in continuous barrier/obstacle section as discussed in Unit9/10.** • **TOTAL LENGTH = 5,442' or 1.03 miles of wildlife barrier/obstacles in 4.4 miles of trail (Prince Cr to BRB) or 23 % of the recreation trail impacts wildlife movements in this major wildlife crossing area along Hwy 133, posing risks to wildlife and traffic.** • **Wetland impacts from elevated trails encroaching into wetlands: 2,375 sq ft or 0.055 acres.**		2,375 sq ft Wetland Impacts or 0.055 acres of wetland impacts from elevated trail units. • This report quantifies habitat loss for aquatic, avian, and terrestrial species. • Jurisdictional versus non-jurisdictional wetlands were not distinguished in this report because wildlife do not make this distinction. • Snipes were observed in several of the elevated trail filled wetlands during site visits. Snipes flew away when approached walking on the trail prism.

Table 4. Crystal River riparian vegetation removal more than 100 feet from the river associated with ditches and or wetlands (Between the end of trail at BRB to Thomas Creek Road).

Unit #	Unit Description/Comments	Area of habitat alteration caused by vegetation removal along ditches and wetlands more than 100 feet from the river. (L x W=sq ft)
1 (Table1, near Unit 10) Photos 10,11,12,13,and 14	• Wetland at north side of the Mautz Ranch (Pitkin Co). willow, shrubland, cottonwood, dogwood, etc where a drain and pipeline were installed as part of the trail project. • The area has been excavated and severely impacted by heavy equipment. From original walk through survey on March 28, 2010 to April 25, 2010 impacts have tripled in size. • This wetland was probably created from flood irrigation. • Part of the wetland is shown in the EES wetland delineation report (Fig.10) • In addition to significant excavation there is a drain in the wetland that drains to the new buried pipeline which will result in dewatering of the wetland, even if wetland is restored after trail construction. • The new pipeline begins at the eastern edge of the wetland from the old ditch and runs along the north side of the wetland. The wetland was recharged from the ditch prior to the pipeline installation. Even if the wetland is restored, the wetland function will be impacted from dewatering. • Just to the south is the main cottonwood tree dump (Photo 10). Pipeline crosses under Hwy 133 approximately 100' north of the wetland.	Calculated wetland area = ~20,560 sq ft (0.47 acres) • Approximately one half to two thirds of the wetland complex has been disturbed (10,280 sq ft) • If this is wetland site 5, Figure 10 described on page 5 of the EES wetland delineation report the reported size was 0.25 acres. • We disagree with this figure and consider it to be larger.
2. (Table 1 between Units 10, 11, and 12) Photo 19	• The old ditch and new pipeline crosses under Hwy 133 on to the west side of the highway and then travels north approximately 475' and crosses back under the highway just south of the new house. • Although placing the ditch in the pipe in this section is efficient for irrigation, it eliminates a water access opportunity for deer and other wildlife that must find another water source on the west side of the highway or cross the highway seeking water. • The ditch sustained a small riparian area on the west side of the highway that has been dewatered and removed. • There are many areas in the lower Crystal River and throughout the Roaring Fork Watershed that have 100 year old riparian corridors associated with irrigation ditches that provide valuable wildlife habitat.	(2' x475') x 2 sides of ditch = 1,975 sq ft • Riparian wetland was created by the ditch. • 2 feet on each side of the ditch was riparian habitat that has been eliminated.
Totals	**Riparian vegetation removed adjacent to ditches and wetlands. (Quantities in addition to amounts identified in Tables 1 and 3).**	**Length 475 feet (0.09 mile)** **Ditch Area: 1,975 sq ft (0.045 acres)** **Mautz wetland: 0.47 acre total size** **Area disturbed: 0.238 acre to 0.318 acre out of 0.47 acre wetland**

Table 5. Summary Table

Unit of measure	Riparian removal within 100 feet of stream[1]	Riparian removal greater than 100 feet from stream[2]	Total feet or miles of riparian removal	Wetland acres filled from elevated trail construction[3]	Other wetland disturbance[4]	Total wetland acres impacted
Length	3,620 ft 0.686 mi	475 ft 0.09 mi	**4,097 ft** **0.77 mi**	N/A	Size 0.47	**N/A**
Acres	51,271 sq ft 1.18 acre	1,975 sq ft 0.045 mi	**53,246 sq ft** **1.18 acres**	2,375 sq ft 0.055 acres	0.24 to 0.32 acre disturbed	**0.29 to 0.37 acre**

[1] **Length and Acres of Riparian Removal Within 100' of the River**

[2] **Length and Acres of Ditch Riparian Removal Greater than 100' from the River**

[3] **Wetland Acres Filled from Elevated Trails**

[4] **Wetland Disturbed for Trail and Pipeline Construction**

Photo 8. Table1, Between Unit 7 and 8. Looking south towards new diversion dam. At the north and south ends of this activity the riparian and other vegetation was removed for more than 50' in width. Pipe exits to the north of the photo, not seen in photo.

Photo 9. Table 1, Unit 8. Ditch size prior to piping is 8' wide x 2.5' deep. Head-gate dimension is 6' wide x 3' deep. This photo compares the old ditch size to the floodplain area and vegetation that was removed to install the irrigation pipe.

Photo 10. Table 3, Unit 2. (EES wetland report Figure 13). Elevated trail section along the wetland and pond. Fill in bottom right of photo and along pond edge. With the new trail adjacent to the wetland and pond, wildlife and wading birds will be disturbed by human activity limiting their foraging ability.

Photo 11. Table 1, Unit 9. (EES wetland report Figure 12). Photo taken north to south which shows bridge abutments and disturbance with this activity.

Photo 12. Table 4, Unit 1. Cottonwood bone yard. 80 root boles counted in pile: < 6" (23); 6"-12" (28); 12"-24" (27); >24" (2). This is probably under counted by 10-20%. Beginning of wetland is shown in the photo that is located at the north end of the Mautz Ranch Pitkin County OS&T property. Wetland probably created from flood irrigation that drained to north end of field. (Also shown in Photos 13, 14, and 15).

Photo 13. Table 4, Units 1 and 2; Table 1, Unit 10; (EES wetland report Figure 10). The wetland is 0.47 acre at north end of field. Extensive excavation was done in the wetland to create the trail and install irrigation pipe to replace the ditch. Although replacing the ditch with a pipeline is a more efficient way to transport water for agriculture it dewaters the wetland that was previously recharged by the ditch. Wetland habitats are very limited in the lower Crystal River Valley; the few wetlands that exist provide valuable wildlife habitat.

Photo 14. Table 4, Unit 1; Table 1, Unit 10. Looking at wetland from the trail prism.

Photo 15. Table 4, Unit 1; Table 1, Unit 10. Same wetland as in Photos 12, 13, and 14 showing the drain in wetland. A drain was placed in the wetland, draining the wetland into the irrigation pipe further impacting the wetland

Photo 16. Table 1, Unit 10; Table 4, Units 1 and 2. Pipeline excavation at the north end of the wetland shown in photos 12, 13, 14, and 15. Trail prism is in the far upper left of the photograph and adjacent to the highway where the orange cone shows up in the photo. The 3rd elevated trail section begins at the orange cone area. Note the larger cottonwood watered from ditch seepage before it was piped. Compare these cottonwoods with the smaller ones shown in Photo 17 that were not watered because the ditch went under highway. Large cottonwoods provide valuable wildlife habitat, particularly cavity nesters and raptors that use these trees for roosting and foraging. The elevated section of the trail is on the east side of the highway between the highway and the spindly cottonwood section as shown in Photo 17. No sediment fence.

Photo 17. Table 1, Unit 11; Table 3, Unit 3. Silt fence here, but not upstream (south) along irrigation pipeline. 5' to 10' of upland trees were removed for the elevated trail. Existing ditch/now piped and routed under Hwy 133, then north for 475' before crossing back at north end of elevated trail. Wetland down-slope of this elevated trail prism (EES wetland report Figure 8 an 9). Note the smaller size of cottonwoods compared to cottonwood in Photo16 that were watered from ditch seepage. This is a major deer crossing area. The elevated trail with guard rail, 2 vertical walls, and 5' trail safety fence will create a barrier/obstacle for wildlife, posing a risk to wildlife and humans.

Photo 18. Table 1, Unit 11; Table 3, Unit 3. Looking south at elevated bike path. Old ditch now piped crosses back under highway. Note cleanout manhole. Pipeline continues north in front of new house and is piped to Thomas Creek Road. Prior to the trail the ditch was open just north of the house and before the house was built in 2008 the ditch used to run to Thomas Creek Road. Now it is piped for 475', 200' in front of the house and for 1,025' under the new trail prism for a total of 1,700'. Note elevation drop from highway to trail and imagine a guard rail on the highway and a 5' trail safety fence on the river side of the trail. This will be what wildlife will have to navigate around causing physiological stress. There will be more wildlife/traffic interactions because the confused wildlife will spend more time on the highway.

Photo 19. Table 3, Unit 3 to the west and approximately 40' north of Table 4 Unit 2. Deer killed while trying to cross the highway adjacent to the elevated trail section. This is a major area where deer and other wildlife cross the highway. The heavily wooded crossing is located on a natural pinch point between agriculture fields to the north and south. The trail prism on the east side has a guard rail, drops off the highway 3' to 7' to the trail prism, a 5' trail safety fence on the west side of the trail wall, and then drops off the vertical wall that is 2' to 10' above the ground that drops down to the wetland identified in (EES wetland report Figures 8 and 9). Deer will be trapped on the trail if they jump the guard rail to the trail prism because they may be unable to jump the 5' safety fence. If they jumped it they would tumble down up to 15' (5' for the fence plus the 2' to 10' vertical wall. This infrastructure severely limits wildlife's ability to safely cross the highway. Wildlife/traffic interactions will increase due to wildlife spending more time on the highway trying to navigate these new features. Also refer to Unit 4, Unit 2 for additional discussion on wildlife impacts and Photo 20 discussion.

Photo 20. Table 4, Unit 2; Table 1, Units 11 and 12. Ditch rerouted under Hwy 133 onto west side of highway. Additional upland mature cottonwoods removed. Although placing the ditch into a pipeline is more water efficient as discussed in Photo 16, this dried up an additional water source for wildlife on the west side of the highway and destroyed the ditch wetland and riparian vegetation associated with the ditch for 475'.

Photo 21. Table 1, Units 13 and14. This photo is taken mid way between Units 14 and 15 looking south towards new house. 506' long by 20+' wide. Left side is pipeline. Not sure if the trail prism in on the right or on top of the pipeline in this section. Total vegetation removal in this section varies from 40' to 60' wide. Old ditch was 8' x 3'. Although converting the ditch to a pipeline is a more efficient way to transport water for irrigation there are consequences to the vegetation that was recharged by the ditch. A 10 to 30% crown die back in the large remaining cottonwoods and less vigor for the remaining vegetation can be expected. Existing riparian vegetation along the piped ditch will be replaced by more upland species for a totaling of 1,700' (sum of Table 1, Units 11, 14 and 15 plus 200' in front of the new house). Although this segment along Units 14 and 15 is on a bench above the river it is within 100' of the river. Consequently, there will be some shade loss to the river from this vegetation removal for the trail and pipeline. There is permanent loss of vegetation from the trail prism and water infiltration and runoff alteration from the impervious trail in areas within 100 feet of the river. Sediment barrier in this section.

Photo 22. Table 1, Unit 15. Same prism as Photo 21 looking from north to south. In addition to piped length disused in previous photo this section is 519' for a total of 1,025' of piped ditch between the new house and Thomas Creek Road. Including all sections piped this totals 1025' (house north) plus 675' (house south to the wetland located in the northern end of the field north of Thompson Creek) for a total of approximately 1,700'. This will alter the remaining vegetation adjacent to the ditch/pipeline as discussed. In addition, the amount of vegetation removed in this section totals 6.075 sq ft (calculating for a 20' to 30' corridor for the pipeline/trail prism and reducing this by10' to account for the ditch profile). Additional vegetation removal also occurred for pipe storage and staging with an additional 1/3 more of disturbed ground bringing the total to approximately 9,000 sq ft (0.2 acres) of disturbance in this short reach (under 1/4 mile). No sediment barrier was used in this section.

Photo 23. Table 1, Unit 15. Photo taken from same location as Photo 22 looking south to north. Thomas Creek Bridge is on the right side of the photo. Twenty foot wide vegetation removal to pipe an 8' ditch. Vegetation between new trail/pipeline and river will die back from dewatering thus reducing shade, mature cottonwoods, and wildlife trees for cavity nesters. Erosion into the river could potentially increase from vegetation reduction between the trail/ditch and the river. No sediment barrier was used in this section.

Photo 24. Table 3, Unit 4. The elevated trail is a barrier/obstruction for wildlife. The new infrastructure i.e. - the guard rail, the highway elevation drop down to the trail prism, 5' trail safety fence on the east side of the trail prism, and another vertical wall to reach the ground provide significant challenges for wildlife to navigate. Deer will be forced to go around the guard rail or if they jump over the guard rail on the edge of the road they will have an additional fall to the trail prism of 5' to 6'. Since they cannot jump over the 5' trail safety fence on the east side of the trail they will have to go to the end of the fence to reach the field. A section of the trail prism has filled in part of the wetland. Trail construction effects water infiltration, water quality (water running directly off an oil-based asphalt trail), solar input from the wall, and wetland hydrologic function. Birds feeding or nesting in the wetland will be disturbed (physiological stress) from trail users because of the close proximity of the new trail to the wetland.

Photo 25. Table 3, Unit 5. Elevated trail north of Unit 4. Similar impacts as previously discussed regarding wildlife movements. Three deer killed (indicated by arrows) on the highway or from getting caught in the fence. In some sections of the elevated trail there are additional wildlife crossing issues due to the close proximity of the trail to the agriculture fence and the height from the trail prism to the ground on the other side of the fence. These wildlife issues include not being able to jump over the fence due to the elevational changes, entrapment between the wall and the fence, and becoming entangled in the fence wires leading to injury or a prolonged death.

Photo 26. Table 3, Unit 6. This section of elevated trail is 932' long with a break in the center for 50', opposite the irrigation collector. It is not known if this section will also have a guard rail on the highway. Note distance between the pasture fence and the elevated rail vertical wall (discussed in Photo 25). Other barrier/obstacle impacts to wildlife have been previously discussed.

Photo 27. Table 3, Units 8 and 9. Last two elevated trail sections that sandwich the Crystal River Bridge between Units 8 and 9. Some encroachment into wetland impacting the hydrology and birds as discussed in Photo 24. Barrier/obstacle to wildlife previously discussed. Over 787' of barrier to wildlife; from the south end of the elevated trail in Unit 8 (312'), across the Crystal River bridge (50'-75'), continuing on the north side of the river at Unit 9 (400'). There is a 200' section of woven wire fence opposite County Road 118 and a 1,285' solid wood fence that is 5' high to Prince Creek Road that is a significant barrier to wildlife. Except for the 200' section of woven wire, the total length from the south side of the Crystal River to Prince Creek Road (2,244', 0.38 miles) is a continuous obstacle/barrier for a multitude of wildlife species. Adult deer can jump the woven wire, but young deer and other wildlife species cannot pass under the fence so the full length is a barrier. Wildlife that travel north on the highway or trail to reach the end of the fence barrier will exit onto Prince Creek Road. Wildlife will have to navigate this almost half mile section of trail placing wildlife and humans at high risk.

Photo 28. Photo taken near the Crystal River looking south. Same impacts on wetlands and wildlife as previously discussed.

Photo 29. Photo taken from the beginning of the wood fence looking north and across the highway from Crystal Fish Hatchery. There is a 12' cattle guard 60' from the beginning of the wood fence that deer may be able to jump across, but not likely. Deer are unable to jump over wood fence and the fence is 1,285' long. Wood fence begins at the north end of the woven wire fence that is 38"-42" high and 200' long. This is a significant obstruction/barrier for a multitude of wildlife species.

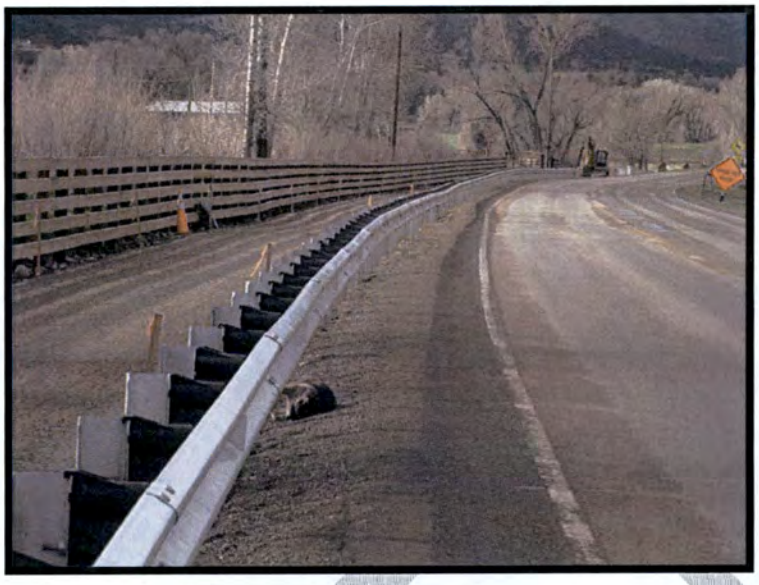

Photo 30. Dead raccoon along road at guard rail and wildlife barrier fence. Wildlife mortality in this reach will probably rise since there is now over 2,044' of wood fence and elevated trail and bridges in a continuous stretch beginning at Prince Creek and continuing to the south side of the Hwy 133 Bridge across the Crystal River. There is a 200' section woven wire fence that is low enough for deer to jump over, but no gap on the bottom to allow young deer or other wildlife to pass under. A raccoon could go under the wood fence, but all this infrastructure probably adds to the confusion of animals already stressed trying to cross the highway. This will cause increased exposure time between wildlife and increase vehicle accidents.

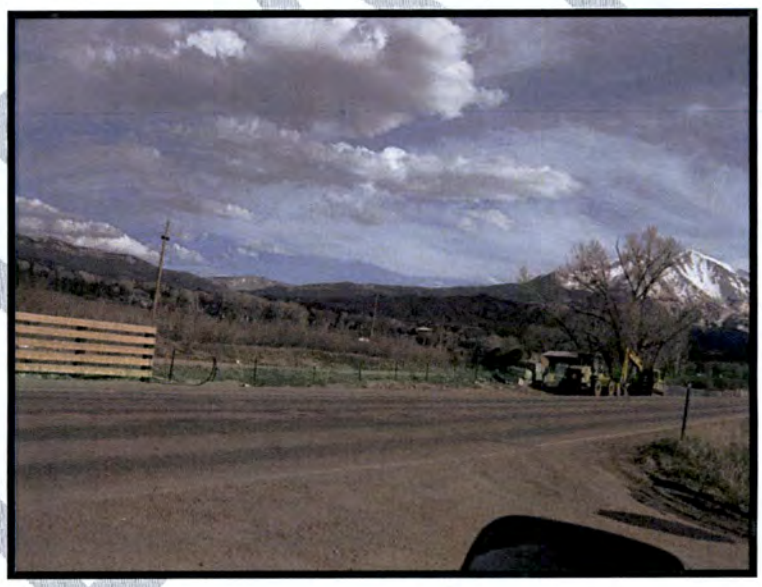

Photo 31. Table 3, between Units 9 and 10. County Road 118 road is across from the 200' section of woven wire fence. Adult deer can jump fence, young deer that are unable to jump it will not be able to go under it. Young deer and other wildlife will have to run up and down the fence trying to find a way through it. The north end of the wood fence is 1, 285' north of the woven wire fence section and if wildlife follow the fence north they are exited onto Prince Creek Road where it meets Hwy 133. Across the highway from the 200' woven wire fence is the CR 118 and south of the road is a wildlife area pond. Wildlife will be forced to use CR 118 due to the pond and hatchery compound. If wildlife cross the highway and travel south they will have to go approximately 800' on elevated trails or on the highway and cross the Crystal River highway bridge and travel to the south end of the elevated trail in Unit 8 to safely cross to the east side of the highway.

Photo 32. General photo showing a deer crossing near the Thomas Creek Road. The deer killed shown in Photo 19 was across the highway from the elevated trail prism in Photos 18 and 19 and referenced in Table 3, Unit 3. This half mile stretch of Hwy 133 is an area where deer commonly cross.

Photo 33. General photo of large cottonwood (greater than 24" DBH) removed and hauled to the cottonwood bone yard in the old Mautz Ranch field. Several of the large cottonwoods that were removed from the trail prism south of the Crystal River Bridge were used by wintering bald eagles, raptors, and other birds. No eagle or raptor trees were to be removed and no work was to occur during the winter December to April within a ¼ mile to protect wintering bald eagles. Work occurred either on the trail or pipelines throughout the entire winter. As stated in the caption for Photo 6 wildlife do not distinguish between trail and pipeline work windows. Eagle/raptor roost trees were removed and disturbance occurred throughout the winter period causing physiological stress, behavioral change, and abandonment of areas to forage for food.

Photo 34. Photo of a bald eagle taken this winter within ¼ mile of BRB. Major excavation and work occurred all winter long, although there was to be no trail construction during the winter within ¼ mile of bald eagle roost areas. Whether the work was for trail or ditch/pipeline conversion the effects on the bald eagles are the same. Without the trail project there would have been no pipeline installed. It is unknown if this tree was removed during trail or pipeline construction.

Photo 35. Dump truck unloading cottonwood removal debris on Mautz parcel.

ARTICLE IV – CAUCUSES

Added 11/3/98

4.0 Preamble

The word "caucus" may derive from an Algonquin Indian term describing their advisory form of representative democracy. In the Pitkin County experience, the word connotes representative democracy at the most local level where policies are formulated and recommended by the people whom they most affect. Once formulated at the local caucus level, these policies provide elected and appointed county officials with recommendations to enact just laws and policies.

4.1 Establishment of Caucuses: Initial Meeting

4.1.1 A caucus may be established by any qualified elector who calls a meeting at a convenient time and place within the proposed caucus area. An information campaign shall be conducted to ensure that all qualified electors and non-resident real property owners in the proposed caucus area know of the date, time, place and purpose of the meeting.

4.1.2 At the initial meeting it shall be decided by majority vote of the qualified electors (and non-resident real property owners) in attendance whether a caucus should be formed.

4.1.3 Each caucus shall adopt its own operating procedures and by-laws within the scope of this Article.

4.2 Recognition of Caucuses

The Board, after satisfying itself that the provisions of this Article have been met, shall recognize the caucus and establish the caucus area by resolution.

4.3 Composition

A recognized caucus shall consist of all the qualified electors who reside in the caucus area, together with the non-resident owners of real property within the caucus area.

4.4 Voting

Each caucus member shall have one (1) vote on all matters appropriate for caucus voting. Voting on any other basis may be conducted on special matters for information purposes only, and must be clearly identified as such.

4.5 Recognized Caucus Area

Recognized caucus areas to the greatest extent possible shall reflect geographically contiguous areas with social, economic, cultural and environmental communities of interest. There shall be only one (1) recognized caucus in each geographic area. Each caucus shall provide proposed definite boundaries for their caucus area to the Board.

4.6 Function

A caucus, upon recognition by the Board, shall have a recommendatory function for all matters directly affecting the caucus area, and shall permit its members to report minority views, as well as majority views, and division of votes with any such recommendation. Further, a caucus shall have a recommendatory function for all planning matters affecting the caucus area, as well as other County matters affecting the caucus area including, but not limited to, budgetary and work program matters.

Added 11/398 **4.7** County Government Support of Caucus

The County Manager, or designee, shall designate staff to be responsible to serve as liaison with the caucuses to facilitate and assist caucus communications and processes. The county may provide such other technical, logistical and financial assistance to facilitate effective caucus activity.

Added 11/3/98 **4.8** Notice of Meetings

The caucuses shall provide notice of meetings through such means as newspapers, Internet, radio, mailings, telephone and local public notice bulletin boards. The county may help in this process by providing up to $1,500.00 annually in cash or in-kind services to each caucus to help provide notification and publication of minutes of its meetings.

Added 11/3/98 **4.9** County Notification of Citizens

The County will annually publish, in at least one (1) local paper, by a one-third page notice, the date, time and place of the annual caucus meeting if that information is known to the County prior to annual caucus meeting.

Added 11/3/98 **4.10** Meetings

Each recognized caucus must designate a set date, time and place for its annual meeting when officers are elected.

Added 11/3/98 **4.11** Master Plans

The County Commissioners and the Planning and Zoning Commission will encourage the development of Caucus Master Plans. The County Commissioners shall specify the criteria for the Caucus Master Plan development procedures, and local caucus approval. Caucus Master Plans which satisfy such criteria shall be recognized by the Planning and Zoning Commission, and County Commissioners. The Caucus Master Plan shall be considered as one of the primary advisory documents in the development of county laws, rules and regulations which affect caucus areas.