3.6 Wetlands, Other Waters of the US, and Riparian Areas

3.6.1 Introduction

This section describes the affected environment and the environmental consequences to wetlands, springs/fens, other waters of the US, and riparian areas associated with the various alternatives under consideration in this Draft PEIS.

Wetlands Issues

- Loss of wetlands, springs/fens, other waters of the US and riparian areas
- Reduced function of wetlands, springs/fens, other waters of the US, and riparian areas
- Changes in surface and subsurface hydrology and water quality (for example, inflows, sedimentation, winter maintenance) that result in loss of either area or function

Water and wetland-related issues within the Corridor were identified through public and agency coordination. Stream impacts, of which other waters of the US are part, are discussed in section 3.4, Water Resources. Appendix A, Environmental Analysis and Data, provides a description of the assumptions, criteria, and methods employed for wetland identification, mapping, and assessment of impacts. Wetlands are defined for regulatory use as follows:

- Wetlands consist of areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (EPA, 40 CFR 230.2 and CE, 33 CFR 328.3).
- Fens/springs are wetlands that are afforded special protection because of their rarity and the difficulty of mitigation and restoration. Fens and springs were mapped separately from other palustrine emergent (PEM; Cowardin et. al. 1979) wetlands.
- Other waters of the US, also included in this discussion, are classified as either channel/riverine or water storage features. Other waters of the US exist below the ordinary high water mark of each stream system that occurs along the Corridor, as well as some ponds and lakes (for example, Black Lakes Reservoirs).

Wetlands, springs/fens, other waters of the US, and riparian vegetation were mapped in a 2,000-foot wide corridor along I-70 using color infrared aerial photography and field reconnaissance. Map units were ground-truthed to achieve confidence in the aerial photography interpretation and to obtain data on the feature in question.

The topographical constraints in the Corridor have necessitated the construction of most highways and roads in valleys and adjacent to drainage systems. This construction has resulted in appreciable changes to the drainage configurations (flow regimes) and losses of wetland area and functional value from fill placement and changes in hydrology.

Winter maintenance activities for Corridor highways and roads include the use of traction sand and deicers. These activities have caused decreased functional qualities to wetlands due to sand and deicer materials (for example, sodium chloride or magnesium chloride). Runoff from the highway along an 8-mile section of I-70 along Straight Creek contributes approximately 2,700 tons of sand/salt mixture into Straight Creek annually (CDOT 2002a). Runoff from the highway along an 8-mile section of I-70 along Vail Pass contributes approximately 5,000 tons annually in the Black Gore Creek drainage (CDOT 2002b). Winter maintenance and deicer effects on streams and water quality are addressed in section 3.4.

Discussion of the affected environment includes wetland functions. These are provided because a wide variety of wetlands occur in each drainage sub-basin. Functional attributes follow the Wetland Evaluation Technique (WET) of Adamus et al. (1987). See Appendix A for additional wetlands inventory methodology descriptions and detailed impact data tables. Maps of wetland resources within the Corridor are included in the Resource Maps section. Delineations of wetland units that define boundaries using vegetation, soils, and hydrologic data will be conducted as part of environmental analyses for individual projects (Tier 2). Wetlands used in the analysis that follows were not land surveyed, and acreages provided in this document are, therefore, approximate.

Supporting Documentation

- Appendix A, Environmental Analysis and Data
- Appendix F, Biological Resources and Wetlands Documentation
- Resource Maps 3.6-1 through 3.6-22, Wetlands

Classification units for wetlands follow Cowardin et al. (1979) and include palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine forested (PFO), and palustrine aquatic bed (PAB) wetlands.

3.6.2 Regulations and Coordination

Wetlands, springs/fens, and other waters of the US are regulated under Section 404 of the Clean Water Act and through a permit process administered by the US Army Corps of Engineers (COE). For wetlands, the COE's jurisdiction is limited to those wetlands that are considered waters of the US, as defined in 33 CFR Part 328.3, with the exception of isolated wetlands whose sole nexus to interstate commerce is use, or potential use, by migratory birds.

Executive Order 11990, Protection of Wetlands, requires that federal agencies "…take action to minimize the destruction, loss, or degradation of wetlands…" It should be noted that exclusion of isolated wetlands (nonjurisdictional) is not indicated in the Executive Order. FHWA Regulations at CFR 23 Sections 771 and 777 and guidance provided in Technical Advisory T6640.8A (Section V.G.12) direct that impacts on wetlands be avoided wherever possible and minimized to the extent practicable during transportation construction projects.

Jurisdictional waters of the US, subject to regulation under Section 404 of the Clean Water Act by the COE, include interstate waters, intrastate waters with a nexus to interstate commerce and tributaries to such waters, to include wetlands that are adjacent to waters of the US Fen is a category of wetlands that is designated by the COE for special protection. The potential for fens to be affected was included in the impact analysis in compliance with Section 404(b)(1) guidelines. A definitive analysis of impacts on fens will be conducted at the Tier 2 level for each specific project and will require in-depth field studies to identify fens that could be affected. In such cases, project plans will need to be modified to avoid affecting these areas.

CDOT mitigates impacts on all affected wetlands including nonjurisdictional wetlands. As such, while wetlands not connected by surface water to waters of the US were mapped as isolated waters/ wetlands, all wetlands are treated equally for this Draft PEIS. The necessity for separate treatment of jurisdictional and nonjurisdictional wetlands only arises in the Tier 2 level of study, where issues of permitting for a specific alternative are addressed.

CDOT initiated a Stream and Wetland Ecological Enhancement Program (SWEEP) as a streamlining program to identify and address environmental issues related to wetlands, streams, and fisheries in the Corridor. The SWEEP team included representatives from federal and state agencies, watershed associations, Clear Creek County, and special interest groups (see Chapter 6, Public and Agency Involvement, for more information). Clear Creek from the Eisenhower-Johnson Memorial Tunnels

(EJMT) downstream to Floyd Hill was selected to identify areas where aquatic habitats could be improved in conjunction with project alternatives, more specifically at the Tier 2 level.

Means to reduce the impacts of winter sanding operations to area streams are currently being evaluated. Sediment Control Action Plans (SCAPs) are focusing on Black Gore Creek (Upper Eagle River sub-basin) and Straight Creek (Upper Blue River sub-basin) because these systems have already been adversely affected by traction sand. The Colorado Transportation Commission identified these two creeks for immediate remediation action regardless of the outcome of the PEIS. CDOT has led the effort and has coordinated with the Black Gore Creek Steering Committee and the Straight Creek Cleanup Committee. This action will result in new practices to provide a beneficial effect on many of the stream systems and associated wetlands along I-70. Other measures to address winter maintenance are currently being evaluated and include sand retrieval, automated deicing systems, and solar snow storage zones (CDOT 2002a, 2002b).

3.6.3 Affected Environment

Wetlands, springs/fens, other waters of the US, and riparian areas were mapped using color infrared aerial photography and limited field investigations. Wetlands and springs/fens include the vegetated components of waters of the US. Springs/fens were identified based on topographic position and aerial photography signature (that is, relative appearance to other wetlands) and shape. Other waters include all "open waters" such as creeks, streams, rivers, ponds, and lakes.

Riparian areas were identified from color-infrared aerial photography that was obtained in 2000. Ground-truthing was conducted to identify and classify map units.

Existing wetland conditions, including historic impacts and habitat characteristics, are provided by sub-basin in the following sections. Stream systems are discussed in more detail in section 3.4, Water Resources. Stream disturbance and channelization (other waters of the US issues) are also addressed in section 3.5, Fisheries.

3.6.3.1 Initial Wetland and Other Waters Unit Recognition

Wetlands and other waters of the US within the Corridor were initially identified within a 4,000-foot wide area from Dotsero (approximately milepost 134) to C-470 (approximately milepost 260). The project area centers on I-70, and mapping was conducted using geo-referenced ortho-rectified false-color infrared aerial photographs. Additional digitized high-resolution low-altitude geo-referenced ortho-rectified black-and-white or true color aerial photography was used to assist mapping.

The sources and dates of the aerial photography are as follows:

1. 0.5-foot pixel resolution ortho-rectified color infrared photography flown in July 2000 for the entire corridor between C-470 and Glenwood Springs. Flown at variable altitude due to mountainous terrain limitations (between 15,000 and 17,000 feet altitude).
2. Ortho-rectified true color 2-foot pixel resolution aerial photography provided by Clear Creek County, flown in July 1999 (altitude of 12,000 feet or less).
3. Black-and-white high-resolution aerial photographs at a scale of 1:32,000 flown on September 27 and October 18, 1998.

Wetlands and other waters of the US were mapped using the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et. al.1979), as modified and refined by the National Wetland Inventory program.

Data Categories

Three principal categories were identified, and further subdivided:

- Waters of the US, three subcategories, including:
  - Riverine – main channel with year-round flow
  - COE jurisdictional tributaries, smaller channels that may or may not have year-round flow
  - Water storage features such as ponds or lakes that were directly linked to channel features
- Wetlands, three subcategories, including:
  - Palustrine emergent (PEM) – herbaceous dominated wetland
  - Palustrine scrub shrub (PSS) – shrub dominated wetland
  - Palustrine forested (PFO) – tree dominated wetland
- Fens/springs – often wetland complexes, mapped as a unit

Areas near Georgetown and on Vail Pass were field inspected on October 22, 2000, to check initial map units, and areas on Vail Pass were field inspected to determine the relative abundance of fens on July 12 and 20, 2004. Appendix F, Biological Resources and Wetlands Documentation, provides a more detailed description of wetlands and other waters unit recognition.

3.6.3.2 Influence of Past Activities

Wetlands, springs/fens, other waters of the US, and riparian areas have been affected by land use development as residential and commercial entities have expanded along with communities. Over the last 40 years, recreational development has included ski areas and, more recently, golf courses. Even if these activities do not directly affect wetlands through infilling/loss, development activities often cause indirect impacts on wetlands from increased sedimentation and runoff. Channelization of streams, sometimes resulting from development, can change flow rates, increasing erosion and lowering water tables. Residential development and golf courses add fertilizers and pesticides/ herbicides, which also affect wetlands, and these areas often introduce urban landscapes and non-native plant species.

The effects of mine development that began in the mid-1800s are still present along many of the streams and wetland complexes, near West Tenmile Creek, and especially along Clear Creek to Floyd Hill. These effects include loss of wetland area, as well as contamination from tailings, overburden and waste rock deposits. Mine waste effects are addressed in section 3.8, Regulated Materials and Historic Mining. Livestock grazing has also affected wetlands, primarily on the Western Slope of the Corridor, although this land use has waned over the last decades as recreation uses have increased.

Past actions have caused loss of aquatic habitat value along the Corridor. For example, Black Gore Creek channel is of low sinuosity (nearly straight), narrow, and confined. The streambed is steep (4 to 10 percent slope) with cascading step pools and substrate consisting predominantly of bedrock, boulders, and cobble. Similarly much of Clear Creek was channelized from past mining activities, community development, and the original construction of I-70. Channelization has reduced the amount of pool/riffle complexes and the aquatic habitat value of Black Gore Creek and Clear Creek. Stream habitat quality information and pool/riffle complex information prepared by Szewczyk and Emerick (2002) will be used as a guide to identify areas where improvements can be made to benefit aquatic habitats in Clear Creek as part of future I-70 activities. These multiple impacts on the Clear Creek channel are addressed in Chapter 4, Cumulative Impacts Analysis.

3.6.3.3 Colorado River Sub-Basin

Wetlands in this segment of the Corridor are limited because of the dry climate, steep river gradient, and narrow canyons with steep slopes. Some seeps occur in this area on the side slopes above the Colorado River and support primarily PSS wetlands. PEM, marshy wetlands (primarily of cattail [*Typha* spp.], and reed canarygrass [*Phalaroides arundinacea*]) occur where the Colorado River floodplain is relatively wide and water velocities are slow. Principal functional values include flood-flow alteration, sediment/toxicant retention, and sediment stabilization.

3.6.3.4 Eagle River Sub-Basin

The lower section of the Eagle River flows through a narrow channel with only sporadic areas of lower terraces, resulting in relatively few wetland areas. This area is also relatively arid, and few adjacent streams or tributaries occur that would also contain wetlands. Relatively large wetland complexes with PEM, PSS, and PFO components, however, begin to develop near Gypsum, and a valued wetland-riparian complex occurs on the wide floodplain between Gypsum and Eagle. Species composition of the PFO wetlands includes narrowleaf cottonwood *(Populus angustifolia),* lanceleaf cottonwood *(Populus* x *acuminata),* river birch *(Betula fontinalis),* and aspen *(Populus tremuloides).* The dominant willow in the disturbance areas along the river-channel scour zone is sandbar willow *(Salix exigua).* Herbaceous species associated with the PEM wetlands are also typical for this elevation, with an increased complement of introduced species associated with wetlands.

The Eagle River segment of the Corridor from the town of Eagle to Wolcott Junction (SH 131) contains alternating areas of dispersed to well-developed wetlands along the river-channel margins on the lower terraces where the floodplain is relatively wide. Species of the PFO wetlands include narrowleaf cottonwood, lanceleaf cottonwood, river birch, and aspen with sandbar willow forming PSS wetlands along the river channels.

The upper section of the Eagle River from Wolcott Junction to Dowd Canyon is greatly incised, resulting in relatively few wetland areas. The Eagle River flows through a relatively arid area from near Edwards to west of Wolcott (piñon-juniper woodland and sagebrush scrub), and few tributaries or valley slope springs contribute to the wetlands of this section of the Corridor. Wetland complexes with PEM, PSS, and PFO components, however, begin to develop on the west end of this section. PFO species are similar to those described previously. More stable PSS areas include species such as sandbar willow, alder *(Alnus incana* ssp. *tenuifolia),* river birch, and red osier dogwood *(Swida sericea).*

The wetlands in the Eagle River sub-basin provide a wide range of functions, of which wildlife habitat (diversity/abundance) is primary. Other valuable functions include groundwater recharge aquatic diversity/abundance, flood-flow alteration, and sediment stabilization.

Gore Creek

Wetlands in the Vail Valley have been modified extensively by golf course development in parts of the floodplain and by general residential and commercial development. Wetlands remain along Gore Creek, however, and are dominated by the PSS type, which is characterized by plainleaf willow *(Salix planifolia),* sandbar willow *(S. exigua),* and alder. Several ponds occur within the floodplain in conjunction with the golf course, and beaked sedge *(Carex utriculata)* and spike rush *(Eleocharis macrostachya)* characterize such areas (PEM) in the shallower water.

Although modified by development through the Vail Valley, these wetlands still provide valuable functions, including flood-flow alteration, sediment bank stabilization, and recreation. The ponds along the golf course provide nutrient removal/transformation and sediment/toxicant retention.

The Gore Creek channel from its confluence with the Eagle River upstream to eastern Vail is of low sinuosity, low gradient, and has an entrenched channel (predominantly of cobble) and narrow floodplain. Gore Creek has experienced localized channel disturbance related to the construction and operation of I-70 and development within the town of Vail. Gore Creek stream discharge is augmented by an estimated 500 acre-feet/year from the Eagle River for snowmaking.

Black Gore Creek

The Black Gore Creek channel is of low sinuosity, narrow, and confined. The streambed is steep (4 to 10 percent slope) with cascading step pools and substrate consisting predominantly of bedrock, boulders, and cobble.

This section includes the Black Lakes Reservoirs and an extensive complex of PSS and PEM wetlands not only along Black Gore Creek in the valley bottom but also on the lateral drainages and valley slopes. Willow species that occur more commonly at these higher altitudes may include the lower-elevation species in addition to plainleaf willow, shortfruit willow *(S. brachycarpa),* and bog birch *(Betula glandulosa).* Herbaceous species typically consist of bluejoint reedgrass *(Calamagrostis canadensis),* spike rush *(Eleocharis macrostachya),* beaked sedge (*Carex utriculata = rostrata*), and tufted hairgrass *(Deschampsia cespitosa).* Principal functions provided are wildlife habitat, groundwater recharge, sediment stabilization (bank stabilization), and flood-flow alteration.

Riparian Communities

Riparian areas along the Corridor are similar in composition to PFO and PSS wetland classes. Lower elevations of the Corridor to approximately Dowd Canyon are dominated by narrowleaf cottonwood stands with thickets of river birch, sandbar willow, red osier dogwood, and alder. The composition changes along Gore Creek to include more willow species *(Salix planifolia, S. monticola, S. drummondiana),* and blue spruce *(Picea pungens),* Engelmann spruce *(P. engelmannii),* and aspen occasionally occur as an overstory of the shrub species. Drummond willow *(Salix drummondiana)* and beaked sedge *(Carex utriculata = rostrata)* communities are the more common riparian communities in the Upper Subalpine Zone on Vail Pass (Kittel et al. 1999).

3.6.3.5 Blue River Sub-Basin

West Tenmile Creek and Tenmile Creek

West Tenmile Creek has extensive areas of PSS and PEM wetlands. Dominated by willow complexes, these wetlands are associated with not only the relatively broad valley bottom but also the lateral channels and the relatively moderate slopes of the valley. The higher altitude produces an environment with higher moisture availability from spring runoff and summer rains and a relatively short growing season with cooler temperatures. These factors combine to produce not only the abundance of wetlands but also the necessary conditions for development of fens with deep organic layers. A preliminary examination of the organic soil horizons in this area indicates that some, but not all, of the springs/fens would be classified as fens with histisols or histic epipedons soil types. Many of the willow-dominated areas that were sampled do not qualify as COE specially protected fens. Fens are most abundant or likely to occur at the higher elevations of West Tenmile Creek, especially near the summit of Vail Pass. Additional locations with some probability for supporting COE specially protected fens are the areas where perennial drainages join West Tenmile Creek.

Much of West Tenmile Creek was heavily affected by mining activities in the past. With the construction of I-70 in the late 1960s, the Curtain Ponds, between I-70 and Tenmile Creek, were restored to conditions before mining as part of the construction work (Goff, ICOET field trip 2001). This restoration of Tenmile Creek included channel realignment and placement of log drop structures

and willows to improve habitat diversity. Lakes and ponds that are used for recreation dominate the wetlands in this section. Some PEM and PSS wetlands are associated with the ponds and adjacent creek.

Urban development has encroached along the area near Dillon Reservoir. However, PSS wetlands are associated with the margin of the reservoir and some lateral drainages, for example, Salt Lick Gulch. The wetlands in this sub-basin provide several valuable functions, including wildlife habitat, flood-flow alteration, sediment/toxicant retention, nutrient removal/transformation, groundwater recharge, and recreation.

Straight Creek

This section of the Corridor is west of the Continental Divide and includes a wide zone of elevation change; it extends from the Upper Montane-Subalpine ecotone into the Subalpine-Alpine ecotone. The steeper channel gradient and narrow valley bottom supports fewer PSS wetlands. There are, however, some alpine willow complexes near the west portal of the EJMT. Wetlands along Straight Creek have been inundated by sand from winter maintenance activities, and sand has accumulated in level areas where wetlands have been impaired or destroyed. These lower alpine PSS wetlands are more commonly dominated by plainleaf willow and wolf willow *(S. wolfii).* There is some potential for COE specially protected fens to occur in this section; soil organic matter content of sites inspected, however, was observed to be insufficient to form fibric soils. Principal wetland functions provided are sediment stabilization, production export, groundwater recharge, and wildlife habitat.

Riparian Communities

PSS wetlands also provide the bulk of the riparian areas in this sub-basin. Willow complexes characterize the riparian vegetation along Tenmile Creek and also along Straight Creek. The principal species include plainleaf willow and wolf willow. Aspen and alder communities also occur in some of the creeks through this area (Kittel et al. 1999).

3.6.3.6 Clear Creek Sub-Basin

Clear Creek

The elevation zone of Upper Clear Creek (EJMT to the town of Georgetown) has an abundance of willow-dominated PSS wetlands along Clear Creek, with some large areas of PSS wetlands in lateral drainages and on moist slopes with seeps that support the willow species, including plainleaf willow and shortfruit willow, as well as bog birch. An emergent component that typically interfaces with shrub communities consists of Baltic rush, bluejoint reedgrass, spike rush, sedges (especially Nebraska sedge and beaked sedge), tufted hairgrass, and, at the higher elevations or cooler sites, water sedge, marsh marigold (*Psychrophila leptosepala*), and elephantella (*Pedicularis groenlandica*).

Typical shrub species for this class at lower elevations from Georgetown to Empire Junction include sandbar willow, alder, river birch, and red osier dogwood. There is also an area near milepost 231, near the US 40/I-70 junction, with a reduced stream-channel gradient and slightly wider valley bottom that supports PEM (herbaceous) wetlands. The elevation gradient from Empire Junction to Floyd Hill spans the Lower Montane Zone region (Marr 1961) to the Middle Montane/Upper Montane ecotone region. The PSS wetlands class dominates this section because of the steep gradient and narrow canyon, generally characterized by sandbar willow, alder, river birch, and red osier dogwood at the lower elevations. Mountain willow *(Salix monticola),* Geyer willow *(S. geyeriana),* Drummond willow *(S. drummondiana),* and whiplash willow *(Salix lasiandra* var. *caudata)* are more common at higher elevations and cooler sites such as shaded valley bottoms and north-facing canyons.

PSS wetlands of this sub-basin that border active stream channels primarily provide sediment/bank stabilization, wildlife diversity (habitat), recreation, and groundwater recharge functions.

Riparian forest vegetation occurs in conjunction with drainage systems in all of the life zones along the Corridor. Riparian shrub vegetation is dominated by willow species and occurs throughout the Corridor, often forming a shrub layer of the riparian forest vegetation. Willows, especially, dominate the drainages of the Corridor above approximately 9,500 feet elevation, along with bog birch. In addition, narrowleaf cottonwood, often accompanied by blue spruce, typify riparian forests between elevations of 7,000 to 10,000 feet. Other characteristic species include alder, river birch, mountain maple, and numerous herbaceous species including arrowleaf senecio, bluebell, and cow parsnip.

Mount Vernon Creek

Several small PSS/PEM wetlands were mapped within the Mount Vernon Creek portion of the Corridor. Sandbar willow and sedges that border small drainages and seeps characterize these wetlands (for example, at Exit 247). Several small areas of cattail marshes that have formed where drainage has been impounded also occur in this area of the Corridor from approximately the Lookout Mountain exit to the top of Floyd Hill.

The upper elevation riparian areas (higher than 9,000 feet) are characterized by thickets of willow that were noted earlier (for example, mountain willow, Geyer willow, Drummond willow, and whiplash willow). Alder, river birch, and sandbar willow become more prominent as elevations decrease, and with narrowleaf cottonwood becoming dominant through much of Clear Creek between US 40 (milepost 232) and Floyd Hill (milepost 244).

3.6.4 Environmental Consequences

This section addresses direct and indirect impacts on wetlands, springs/fens, other waters of the US, and riparian areas, for each alternative being considered in this PEIS. Other waters of the US are also included in section 3.5, Fisheries, in context to aquatic habitats.

3.6.4.1 Impact Methodology

Impacts on wetlands, springs/fens, other waters of the US, and riparian areas were determined through a GIS overlay process in which three impact zones – the alternative footprint (fp), area of construction disturbance (cd), and adjacent sensitivity zone (sz) – were superimposed onto each of the above-mentioned resources within the Corridor.

Impacts associated with the footprint would be considered permanent because the given resource would be covered by the transportation facility (such as additional traffic lanes, rail, or guideways). Impacts associated with construction disturbance would be considered temporary because this area could later be reclaimed. However, impacts on some wetlands, namely fens, may be permanent depending on other site conditions such as soils and hydrology. Special mitigation would be required to avoid impacts associated with the footprint, construction disturbance, and sensitivity zone to avoid fens. Removal of riparian vegetation due to footprint or construction activities is also considered to be a long term impact. Mitigation would vary in timeframe depending on the affected resource.

The sensitivity zone, which would extend 15 feet from the edge of the construction disturbance zone, would be established to identify the likelihood of additional construction-related impacts affecting wetlands, spring/fens, other waters of the US, and riparian areas from the alternatives. Impacts may also extend beyond the sensitivity zone into adjacent and downstream locations. Such impacts would include material that is not controlled by erosion control measures from construction sites, inadvertent encroachment into these areas by construction activities (personnel and equipment), and the

installation of exclusion fencing and siltation fencing and other erosion control material in the edge of the work areas.

The sensitivity zone was also established to identify the likelihood of wetlands, springs/fens, other waters of the US and riparian areas being affected by roadway operations, including runoff from the road that includes winter maintenance material, other contaminants such as heavy metals, and fuel-based organic compounds. This area also provides a measure of possible effects on functions of adjacent areas.

Impacts were quantified for each impact zone within each sub-basin. In determining potential effects on wetlands and other waters of the US from the alternatives, direct effects (footprint, construction disturbance zone) and indirect effects (as represented by the sensitivity zone) were included to meet the intent of 404(b)(1) guidelines. Impacts by alternatives to wetlands, springs/fens, other waters of the US, and riparian areas are addressed in the following text and are graphically illustrated in Chart 3.6-1 to Chart 3.6-3.

3.6.4.2 Direct and Construction-Related Indirect Impacts

Wetlands

Chart 3.6-1 provides a visual summary of direct (footprint and construction disturbance) and construction-related indirect (sensitivity zone) impacts on wetlands. Table 3.6-1 provides a tabular summary of impact data for wetlands by alternative, by sub-basin, and by direct and indirect construction disturbance and sensitivity zone.

No Action

The No Action alternative would consist of several planned or permitted projects, which are described in detail in Chapter 2, Description and Comparison of Alternatives. Impacts associated with these projects are addressed in other environmental documents, including the *Eagle County Airport Interchange EA*, the *SH 9 EIS*, the *Gaming Area Access EIS*, and the *Hogback Parking Facility EA*, and are not reported in Chart 3.6-1 or Table 3.6-1. No additional direct impacts on wetlands on I-70 are anticipated to occur under the No Action alternative.

Minimal Action

Implementation of the Minimal Action alternative would result in impacts on wetlands within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Minimal Action alternative would result in among the least impacts. Permanent impacts within the Minimal Action footprint would result in a loss of 1 acre of wetlands. Temporary impacts would affect 1.4 acres of wetlands within the construction disturbance zone, and 2.2 acres of wetlands within the sensitivity zone could also be affected.

Transit

Implementation of the Rail with IMC alternative would result in impacts on wetlands within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Rail with IMC alternative would result in intermediate impacts. Permanent impacts within the Rail with IMC footprint would result in a loss of 4 acres of wetlands. Temporary impacts would affect 3.7 acres of wetlands within the construction disturbance zone, and 4.3 acres of wetlands within the sensitivity zone could also be affected.

Implementation of the AGS alternative would result in impacts on wetlands within the Eagle River, Blue River and Clear Creek sub-basins. In comparison to other alternatives, the AGS alternative would result in among the least impacts.

Permanent impacts within the AGS footprint would result in a loss of 2.4 acres, and temporary impacts may affect 0.8 acre of wetlands within the alternative's construction disturbance zone and may potentially affect 3.1 acres within the sensitivity zone.

Implementation of the Bus in Guideway alternatives would result in impacts on wetlands within the Blue River and Clear Creek sub-basins. In comparison to other alternatives, the Bus in Guideway alternatives would result in among the least impacts. Permanent impacts within the Bus in Guideway footprint would result in a loss of 0.7 acre of wetlands for each alternative. Temporary impacts would affect 1.3 acres of wetlands within the construction disturbance zone, and 1.8 acres of wetlands could also be affected within the sensitivity zone for each alternative.

Implementation of all Transit alternatives would likely affect a large PSS-riverine complex that occurs along Straight Creek (mileposts 212.0 to 212.4), and a PSS wetland along Straight Creek on the north side of I-70, at milepost 213.4.

Implementation of all Transit alternatives could also affect a large PSS wetland that exists south of I-70 along the Clear Creek floodplain near the Loveland Ski Area at milepost 216 due to proposed improvement of the Loveland Pass interchange.

Highway

Implementation of the Six-Lane Highway 55 mph alternative would result in impacts on wetlands within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Six-Lane Highway 55 mph would result in among the least impacts. Permanent impacts within this Highway alternative's footprint would result in a loss of 1.1 acres of wetlands. Temporary impacts would affect 2.8 acres of wetlands within the construction disturbance zone, and 4.1 acres of wetlands could also be affected within the sensitivity zone.

Implementation of the Six-Lane Highway 65 mph alternative would result in impacts on wetlands within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Six-Lane Highway 65 mph would result in among the least impacts. Permanent impacts within this Highway alternative's footprint would result in a loss of 1 acre of wetlands. Temporary impacts would affect 2.9 acres of wetlands within the construction disturbance zone, and 4.3 acres of wetlands could also be affected within the sensitivity zone.

The Six-Lane Highway 65 mph alternative would require tunnel construction at Floyd Hill and, therefore, may affect wetlands at the east portal at milepost 246.5. This construction would occur near a large diverse wetland complex south of I-70 of PAB, PSS, and PEM. A small PEM/PSS wetland is located in Jackson Gulch near the culvert that takes the drainage beneath the I-70 fill just east of the Highway 119 junction at milepost 245.

Implementation of the Reversible/HOV/HOT Lanes alternative would result in impacts on wetlands within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Reversible/HOV/HOT Lanes alternative would result in intermediate impacts. Permanent impacts within the footprint would result in a loss of 1.4 acres of wetlands. Temporary impacts would affect 3.3 acres of wetlands within the construction disturbance zone, and 4.9 acres of wetlands could also be affected within the sensitivity zone.

Implementation of all Highway alternatives could affect a large PSS wetland south of I-70 along the Clear Creek floodplain near the Loveland Ski Area at milepost 216 due to proposed improvement of the Loveland Pass interchange.

3.6 Wetlands, Other Waters of the US, and Riparian Areas

Table 3.6-1. Impact Data Table

			No Action Alternative	Transit Alternatives				Highway Alternatives			Combination Highway/Transit Alternatives			
			1	2	3	4	5	6	7	8	9	10	11	12
			Minimal Action Alternative	Rail with IMC	Advanced Guideway System	Dual-Mode Bus in Guideway	Diesel Bus in Guideway	6-Lane Highway 55 mph	6-Lane Highway 65 mph	Reversible/ HOV/HOT Lanes	6-Lane Highway with Rail and IMC	6-Lane Highway with AGS	6-Lane Highway with Dual-Mode Bus in Guideway	6-Lane Highway with Diesel Bus in Guideway
											9 - Combination Built Simultaneously	*10 - Combination Built Simultaneously*	*11 - Combination Built Simultaneously*	*12 - Combination Built Simultaneously*
											9a - Transit with Highway Preservation	*10a - Transit with Highway Preservation*	*11a - Transit with Highway Preservation*	*12a - Transit with Highway Preservation*
											9b - Highway with Transit Preservation	*10b - Highway with Transit Preservation*	*11b - Highway with Transit Preservation*	*12b - Highway with Transit Preservation*
WETLANDS	acres of disturbance in footprint/construction zone/sensitivity zone	Eagle River	N/A	0.4 / 0.5 / 1.0	2.1 / 1.4 / 1.5	1.4 / 0 / 1.3	0 / 0 / 0	0 / 0 / 0	0.4 / 0.5 / 1.0	0.1 / 0.4 / 0.8	0.4 / 0.5 / 1.0	2.2 / 1.5 / 1.7	2.7 / 1.2 / 2.1	0.4 / 0.5 / 1.0	0.4 / 0.5 / 1.0
		Blue River	N/A	0.07 / 0.4 / 0.8	0.6 / 0.8 / 1.1	0.3 / 0.4 / 1.1	0.1 / 0.5 / 0.8	0.1 / 0.5 / 0.8	0.1 / 0.5 / 0.8	0.1 / 0.5 / 0.8	0.5 / 0.8 / 1.1	0.4 / 0.5 / 1.1	0.1 / 0.5 / 0.8	0.1 / 0.5 / 0.8
		Clear Creek	N/A	0.6 / 0.8 / 1.0	1.4 / 1.9 / 2.2	0.7 / 0.7 / 1.2	0.6 / 1.1 / 1.6	0.6 / 2.2 / 2.8	0.8 / 2.4 / 3.1	0.9 / 2.6 / 3.7	1.7 / 4.2 / 4.9	1.5 / 3.9 / 4.9	1.3 / 3.5 / 4.4	1.3 / 3.5 / 4.4
	Summary	**FP / CD / SZ**	N/A	**1.0 / 1.8 / 2.8**	**4.0 / 4.1 / 4.8**	**2.4 / 1.1 / 3.6**	**0.8 / 1.6 / 2.4**	**0.8 / 1.6 / 2.4**	**1.2 / 3.2 / 4.6**	**1.0 / 3.2 / 4.8**	**1.5 / 3.6 / 5.5**	**4.4 / 6.5 / 7.8**	**4.5 / 5.6 / 8.2**	**1.8 / 4.5 / 6.2**	**1.8 / 4.5 / 6.2**
		FP + CD + SZ	**0**	**5.6**	**12.9**	**7.1**	**4.8**	**4.8**	**9.0**	**9.0**	**10.6**	**18.7**	**18.3**	**12.5**	**12.5**
		Rank	**1**	**3**	**7**	**4**	**2**	**2**	**5**	**5**	**6**	**8**	**8**	**7**	**7**
SPRINGS/FENS	acres of disturbance in footprint/construction zone/sensitivity zone	Eagle River	N/A	0 / 0 / 0	0.1 / 0.2 / 0.2	0.1 / 0 / 0.2	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0.2 / 0.2 / 0.2	0.2 / 0.2 / 0.2	0 / 0 / 0	0 / 0 / 0
		Blue River	N/A	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0
		Clear Creek	N/A	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0
	Summary	**FP / CD / SZ**	N/A	**0 / 0 / 0**	**0.1 / 0.2 / 0.2**	**0.1 / 0 / 0.2**	**0 / 0 / 0**	**0 / 0 / 0**	**0 / 0 / 0**	**0 / 0 / 0**	**0 / 0 / 0**	**0.2 / 0.2 / 0.2**	**0.2 / 0.2 / 0.2**	**0 / 0 / 0**	**0 / 0 / 0**
		FP + CD + SZ	**0**	**0**	**0.5**	**0.3**	**0**	**0**	**0**	**0**	**0**	**0.6**	**0.6**	**0**	**0**
		Rank	**1**	**1**	**3**	**2**	**1**	**1**	**1**	**1**	**1**	**4**	**3**	**1**	**1**
OTHER WATERS OF THE US	acres of disturbance in footprint/construction zone/sensitivity zone	Eagle River	N/A	0.8 / 0.5 / 0.9	1.2 / 0.6 / 0.7	0.9 / 0.1 / 0.9	0.1 / 0.1 / 0.2	0.1 / 0.1 / 0.2	0.8 / 0.5 / 0.9	0.5 / 0.3 / 0.4	0.8 / 0.5 / 0.9	2.0 / 0.8 / 1.1	2.4 / 0.6 / 1.4	0.8 / 0.5 / 0.9	0.8 / 0.5 / 0.9
		Blue River	N/A	0.2 / 0.4 / 0.6	0.3 / 0.5 / 0.7	0.3 / 0.4 / 0.7	0.2 / 0.4 / 0.6	0.2 / 0.4 / 0.6	0.2 / 0.4 / 0.6	0.2 / 0.4 / 0.6	0.2 / 0.4 / 0.6	0.3 / 0.5 / 0.7	0.3 / 0.4 / 0.7	0.2 / 0.4 / 0.6	0.2 / 0.4 / 0.6
		Clear Creek	N/A	0.4 / 1.8 / 3.5	1.0 / 3.9 / 7.0	0.9 / 2.2 / 4.8	0.5 / 1.9 / 4.3	0.5 / 1.9 / 4.3	0.6 / 2.1 / 5.4	2.1 / 2.4 / 5.7	0.7 / 2.4 / 6.6	0.7 / 4.8 / 8.7	0.6 / 4.2 / 7.5	0.5 / 3.9 / 8.1	0.5 / 3.9 / 8.1
	Summary	**FP / CD / SZ**	N/A	**1.3 / 2.7 / 5.0**	**2.5 / 5.0 / 8.4**	**2.1 / 2.7 / 6.4**	**0.8 / 2.4 / 5.1**	**0.8 / 2.4 / 5.1**	**1.5 / 3.0 / 6.8**	**2.7 / 3.1 / 6.6**	**1.6 / 3.4 / 8.1**	**3.0 / 6.0 / 10.6**	**3.3 / 5.2 / 9.6**	**1.4 / 4.8 / 9.6**	**1.4 / 4.8 / 9.6**
		FP + CD + SZ	**0**	**9.0**	**15.9**	**11.2**	**8.3**	**8.3**	**11.3**	**12.4**	**13.1**	**19.6**	**18.1**	**15.8**	**15.8**
		Rank	**1**	**3**	**7**	**4**	**2**	**2**	**4**	**5**	**6**	**9**	**8**	**7**	**7**
RIPARIAN AREAS	acres of disturbance in footprint/construction zone/sensitivity zone	Eagle River	N/A	3.6 / 2.0 / 2.0	2.2 / 1.5 / 1.8	1.8 / 1.0 / 1.8	1.1 / 1.0 / 1.1	1.1 / 1.0 / 1.1	3.6 / 2.0 / 2.0	4.6 / 2.2 / 2.2	3.6 / 2.0 / 2.0	4.3 / 2.4 / 2.4	4.6 / 1.9 / 2.4	3.6 / 2.0 / 2.0	3.6 / 2.0 / 2.0
		Blue River	N/A	1.1 / 1.3 / 1.5	3.2 / 1.9 / 1.9	2.7 / 1.4 / 2.0	1.1 / 1.3 / 1.5	1.1 / 1.3 / 1.5	1.1 / 1.3 / 1.5	1.1 / 1.3 / 1.5	1.1 / 1.3 / 1.5	3.2 / 1.7 / 2.0	2.7 / 1.4 / 1.9	1.1 / 1.3 / 1.5	1.1 / 1.3 / 1.5
		Clear Creek	N/A	1.8 / 1.5 / 1.6	2.9 / 1.9 / 2.2	2.4 / 1.5 / 2.0	1.9 / 1.7 / 2.3	1.9 / 1.7 / 2.3	2.3 / 2.7 / 4.3	2.7 / 2.8 / 4.6	2.5 / 4.2 / 4.8	3.1 / 6.3 / 5.4	2.8 / 5.4 / 5.0	2.7 / 5.4 / 5.2	2.7 / 5.4 / 5.2
	Summary	**FP / CD / SZ**	N/A	**6.5 / 4.8 / 5.1**	**8.3 / 5.3 / 5.9**	**6.9 / 3.9 / 5.8**	**4.1 / 4.1 / 4.9**	**4.1 / 4.1 / 4.9**	**7.0 / 6.0 / 7.8**	**8.3 / 6.3 / 8.3**	**7.2 / 7.5 / 8.2**	**10.6 / 10.4 / 9.8**	**10.1 / 8.7 / 9.3**	**7.4 / 8.6 / 8.7**	**7.4 / 8.6 / 8.7**
		FP + CD + SZ	**0**	**16.4**	**19.5**	**16.6**	**13.1**	**13.1**	**20.8**	**22.9**	**22.9**	**30.8**	**28.1**	**24.7**	**24.7**
		Rank	**1**	**3**	**4**	**3**	**2**	**2**	**5**	**6**	**6**	**9**	**8**	**7**	**7**
SUMMARY WETLAND RELATED RESOURCES	acres of disturbance in footprint/construction	**FP / CD / SZ**	N/A	**8.9 / 9.2 / 12.8**	**14.9 / 14.6 / 19.3**	**11.6 / 7.7 / 16.0**	**5.6 / 8.1 / 12.4**	**5.6 / 8.1 / 12.4**	**9.6 / 12.2 / 19.3**	**12.1 / 12.6 / 19.8**	**10.2 / 14.4 / 21.9**	**18.2 / 23.2 / 28.4**	**18.1 / 19.8 / 27.3**	**10.6 / 17.9 / 24.5**	**10.6 / 17.9 / 24.5**
	Summary	**FP + CD + SZ**	**0**	**30.9**	**48.8**	**35.3**	**26.1**	**26.1**	**41.1**	**44.5**	**46.5**	**69.8**	**65.2**	**53.0**	**53.0**
		Rank	**1**	**3**	**6**	**4**	**2**	**2**	**5**	**6**	**6**	**9**	**8**	**7**	**7**

Legend:
= Least Impact
= Intermediate Impact
= Greatest Impact

FP = Footprint
CD = Construction Disturbance
SZ = Sensitivity Zone

Notes:
Range of numerical rank varies by resource/receptor. The rank does not imply a level of environmental significance
While the footprint, construction disturbance, and sensitivity zone of select alternatives occur in fens, impacts to fens are considered avoidable based on assumptions described in this section.

Combination

Implementation of any of the Combination alternatives would result in impacts on wetlands within the Eagle River, Blue River, and Clear Creek sub-basins.

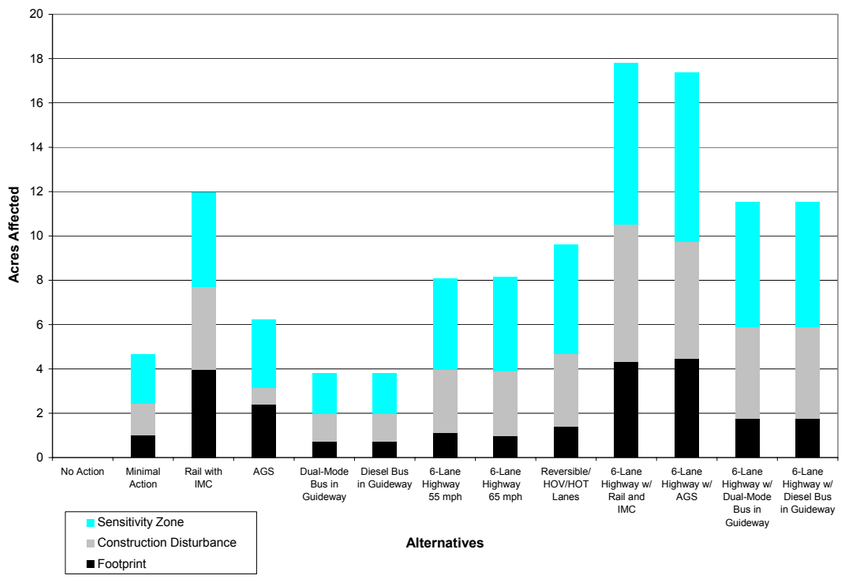
In comparison to other alternatives, the Combination Six-Lane Highway with Rail and IMC alternative would result in among the greatest impacts. Permanent impacts within this Combination alternative's footprint would result in a loss of 4.3 acres of wetlands. Temporary impacts would affect 6.2 acres of wetlands within the construction disturbance zone and have the potential to affect 7.3 acres of wetlands within the sensitivity zone.

The Combination Six-Lane Highway with AGS alternative would result in among the greatest impacts on wetlands in comparison to other alternatives. Permanent impacts within this Combination alternative's footprint would result in a loss of 4.5 acres of wetlands. Temporary impacts would affect 5.3 acres of wetlands within the construction disturbance zone and have the potential to affect 7.6 acres of wetlands within the sensitivity zone.

The Combination Six-Lane Highway with Bus in Guideway alternatives would result in intermediate impacts in comparison to other alternatives. Permanent impacts within the footprint of these alternatives would result in a loss of 1.8 acres of wetlands for each alternative. Temporary impacts would affect 4.1 acres of wetlands within the construction disturbance zone, and 5.7 acres of wetlands could also be affected within the sensitivity zone for each alternative.

Implementation of all Combination alternatives would likely affect a large PSS-riverine complex that occurs along Straight Creek (mileposts 212.0 to 212.4), on the north side of I-70, at milepost 213.4. Implementation of all Combination alternatives could also affect a large PSS wetland that exists south of I-70 along the Clear Creek floodplain near the Loveland Ski Area at milepost 216 due to proposed improvement of the Loveland Pass interchange.

Chart 3.6-1. Direct and Construction-Related Indirect Impacts on Wetlands



Springs/Fens

Fens are a COE specially protected resource. The USFWS considers fens irreplaceable in this region and, furthermore, considers that there is no acceptable mitigation of impacts on this resource. Springs/fens would have the most potential to be affected in the Vail Pass area. Preliminary field inspections were conducted along Vail Pass to identify fens within the spring/fen map unit that are near I-70. The Minimal Action, Bus in Guideway, Highway, and Combination Six-Lane Highway with Bus in Guideway alternatives would all avoid fens. While the footprint, construction disturbance, and sensitivity zone of the other alternatives occur in fens, impacts would be avoidable based on the following assumptions for the alternatives.

Rail with IMC and AGS

Implementation of the Rail with IMC and AGS alternatives could result in impacts on fens within the Eagle River sub-basins. However, it is anticipated that fens would be avoidable by the footprint through elevating the guideway, carefully siting the alignment, and strategically placing piers. In addition, special mitigation would be required to avoid impacts on fens associated with the construction disturbance and sensitivity zone.

Combination

Impacts associated with the Combination Six-Lane Highway with Rail and IMC and Combination Six-Lane Highway with AGS would be the same as those described for the single-mode alternatives above; however, they would include construction of a 10-mile auxiliary lane along Vail Pass. The location auxiliary lane would have to be modified to avoid impacts on fens.

Design and mitigation details to avoid fens will be considered in detail at the Tier 2 level of study.

Other Waters of the US

See Chart 3.6-2 for a visual summary of direct and construction-related indirect impacts on other waters of the US. Table 3.6-1 provides a tabular summary of impacts data for other waters of the US by alternative, by sub-basin, and by direct and indirect construction disturbance and sensitivity zone. It is important to note that while this section includes the acreage evaluation of other waters of the US, section 3.4, Water Resources, includes an evaluation of stream disturbance impacts in linear feet that complements the evaluation of other waters of the US in this section. For a definition of other waters of the US, see section 3.6.1.

Note that while project alternatives have varying termini, they all follow the existing I-70 alignment, and no new crossing of other waters of the US would occur by any alternative.

No Action

The No Action alternative would consist of several planned or permitted projects, which are described in detail in Chapter 2, Description and Comparison of Alternatives. Impacts associated with these projects are addressed in other environmental documents, including the *Eagle County Airport Interchange EA*, the *SH 9 EIS,* the *Gaming Area Access EIS*, and the *Hogback Parking Facility EA*. No additional direct impacts on other waters of the US are anticipated to occur under the No Action alternative.

Minimal Action

Implementation of the Minimal Action alternative would result in impacts on other waters of the US within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Minimal Action alternative would result in among the least impacts. Permanent impacts within the Minimal Action footprint would result in a loss of 1.3 acres of other waters of the US. Temporary

impacts would likely affect 2.7 acres of other waters of the US within the construction disturbance zone and have the potential to affect 5 acres of other waters of the US within the sensitivity zone.

Transit

Implementation of the Rail with IMC alternative would result in impacts on other waters of the US within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Rail with IMC alternative would result in among the greatest impacts. Permanent impacts within the Rail footprint would result in a loss of 2.5 acres of other waters of the US. Temporary impacts would affect 5 acres of other waters of the US within the construction disturbance zone and may also occur within 8.4 acres of the sensitivity zone.

Implementation of the AGS alternative would result in impacts on other waters of the US within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the AGS alternative would result in among the least impacts. Permanent impacts within the AGS footprint would result in a loss of 2.1 acres, and temporary impacts may affect 2.7 acres within the construction disturbance zone and 6.4 acres of other waters of the US within the sensitivity zone.

Implementation of the Bus in Guideway alternatives would result in impacts on other waters of the US within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Bus in Guideway alternatives would result in among the least impacts. The Bus in Guideway footprint would result in 0.8 acre of permanent impacts on other waters of the US. Temporary impacts would affect 2.4 acres of other waters of the US within the construction disturbance zone and have the potential to affect 5.1 acres of other waters of the US within the sensitivity zone for each alternative.

Highway

Implementation of the Six-Lane Highway 55 mph alternative would result in impacts on other waters of the US within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Six-Lane Highway 55 mph alternative would result in among the least impacts. Permanent impacts within the footprint of this Highway alternative would result in a loss of 1.5 acres of other waters of the US. Temporary impacts would affect 3 acres of other waters of the US within the construction disturbance zone, and 6.8 acres of other waters of the US could also be affected within the sensitivity zone.

Implementation of the Six-Lane Highway 65 mph alternative would result in impacts on other waters of the US within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other Highway alternatives, the Six-Lane Highway 65 mph alternative would result in intermediate impacts. Permanent impacts within the footprint of this Highway alternative would result in a loss of 2.7 acres of other waters of the US. Temporary impacts would affect 3.1 acres of other waters of the US within the construction disturbance zone, and 6.6 acres of other waters of the US could also be affected within the sensitivity zone.

Implementation of the Reversible/HOV/HOT Lanes alternative would result in impacts on other waters of the US within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Reversible/HOV/HOT Lanes alternative would result in intermediate impacts. Permanent impacts within the footprint would result in a loss of 1.6 acres of other waters of the US. Temporary impacts would affect 3.4 acres of other waters of the US within the construction disturbance zone, and 8.1 acres of other waters of the US could also be affected within the sensitivity zone.

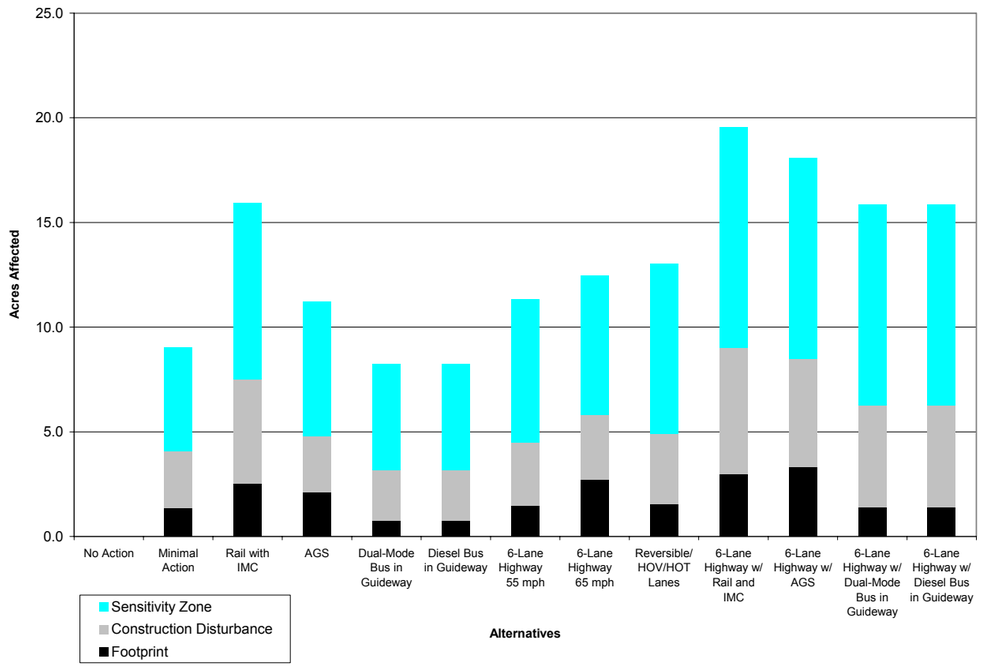
Combination

Implementation of the Combination Six-Lane Highway with Rail and IMC alternative would result in impacts on other waters of the US within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Combination Six-Lane Highway with Rail and IMC alternative would result in among the greatest impacts. Permanent impacts within the footprint of this Combination alternative would result in a loss of 3 acres of other waters of the US. Temporary impacts would affect 6 acres of other waters of the US within the construction disturbance zone and have the potential to affect 10.6 acres of other waters of the US within the sensitivity zone.

Implementation of the Combination Six-Lane Highway with AGS alternative would result in impacts on other waters of the US within the Eagle River, Blue River, and Clear Creek sub-basins. The Combination Six-Lane Highway with AGS alternative would result in among the greatest impacts in comparison to other alternatives. Permanent impacts within the footprint of this Combination alternative would result in a loss of 3.3 acres of other waters of the US. Temporary impacts would affect 5.2 acres of other waters of the US within the construction disturbance zone, and 9.6 acres of other waters of the US could also be affected within the sensitivity zone.

Implementation of the Combination Six-Lane Highway with Dual-Mode or Diesel Bus in Guideway alternatives would result in impacts on other waters of the US within the Eagle River, Blue River, and Clear Creek sub-basins. The Combination Six-Lane Highway with Dual-Mode or Diesel Bus in Guideway alternatives would result in intermediate levels of impacts in comparison to other alternatives. Permanent impacts within the footprint of these alternatives would result in a loss of 1.4 acres of other waters of the US for each alternative. Temporary impacts could affect 4.8 acres of other waters of the US within the construction disturbance zone and have the potential to affect 9.6 acres of other waters of the US within the sensitivity zone for each alternative.

Chart 3.6-2. Direct and Construction-Related Indirect Impacts on Other Waters of the US



Riparian Areas

See Chart 3.6-3 for a visual summary of direct and construction-related indirect impacts on riparian areas. Table 3.6-1 provides a tabular summary of impacts data for riparian areas by alternative, by sub-basin, and by direct and indirect construction disturbance and sensitivity zone.

No Action

The No Action alternative would consist of several planned or permitted projects, which are described in detail in Chapter 2, Description and Comparison of Alternatives. Impacts associated with these projects are addressed in other environmental documents, including the *Eagle County Airport Interchange EA*, the *SH 9 EIS,* the *Gaming Area Access EIS*, and the *Hogback Parking Facility EA*. No additional direct impacts on riparian areas are anticipated to occur under the No Action alternative.

Minimal Action Alternative

Implementation of the Minimal Action alternative would result in impacts on riparian areas within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Minimal Action alternative would result in among the least impacts. Permanent impacts within the Minimal Action footprint would result in a loss of 6.5 acres. Temporary impacts would affect 4.8 acres of riparian area within the construction disturbance zone, and 5.1 acres of riparian areas could also be affected within the sensitivity zone.

Transit

Implementation of the Rail with IMC alternative would result in impacts on riparian areas within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Rail with IMC alternative would result in intermediate impacts. Permanent impacts within the Rail with IMC footprint would result in a loss of 8.3 acres of riparian area. Temporary impacts would affect 5.3 acres of riparian area within the construction disturbance zone, and 5.9 acres of riparian area could also be affected within the sensitivity zone.

Implementation of the AGS alternative would result in impacts on riparian areas within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives the AGS alternative would result in among the least impacts. Permanent impacts within the AGS footprint would result in a loss of 6.9 acres of riparian area; temporary impacts would have the potential to affect 3.9 acres within the construction disturbance zone, and 5.8 acres of riparian areas could also be affected within the sensitivity zone.

Implementation of the Bus in Guideway alternatives would result in impacts on riparian areas within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Bus in Guideway alternatives would result in among the least impacts. The Bus in Guideway footprint would result in 4.1 acres of permanent impacts. Temporary impacts would have the potential to affect 4.1 acres of riparian area within the construction disturbance zone, and 4.9 acres of riparian areas could also be affected within the sensitivity zone for each alternative.

Highway

Implementation of any of the Highway alternatives would result in impacts on riparian areas within the Eagle River, Blue River, and Clear Creek sub-basins.

In comparison to other alternatives, the Six-Lane Highway 55 mph alternative would result in intermediate impacts. Permanent impacts within the footprint of this Highway alternative would result in a loss of 7 acres of riparian area. Temporary impacts would affect 6 acres of riparian area within the construction disturbance zone, and 7.8 acres of riparian areas could also be affected within the sensitivity zone.

The Six-Lane Highway 65 mph alternative would result in intermediate impacts in comparison to other alternatives. Permanent impacts within the footprint of this Highway alternative would result in a loss of 8.3 acres of riparian area. Temporary impacts would affect 6.3 acres of riparian area within the construction disturbance zone, and 8.3 acres of riparian areas could also be affected within the sensitivity zone.

The Reversible/HOV/HOT Lanes alternative would result in intermediate impacts in comparison to other alternatives. Permanent impacts within the footprint would result in a loss of 7.2 acres of riparian area. Temporary impacts would affect 7.5 acres of riparian area within the construction disturbance zone, and 8.2 acres of riparian areas could also be affected within the sensitivity zone.

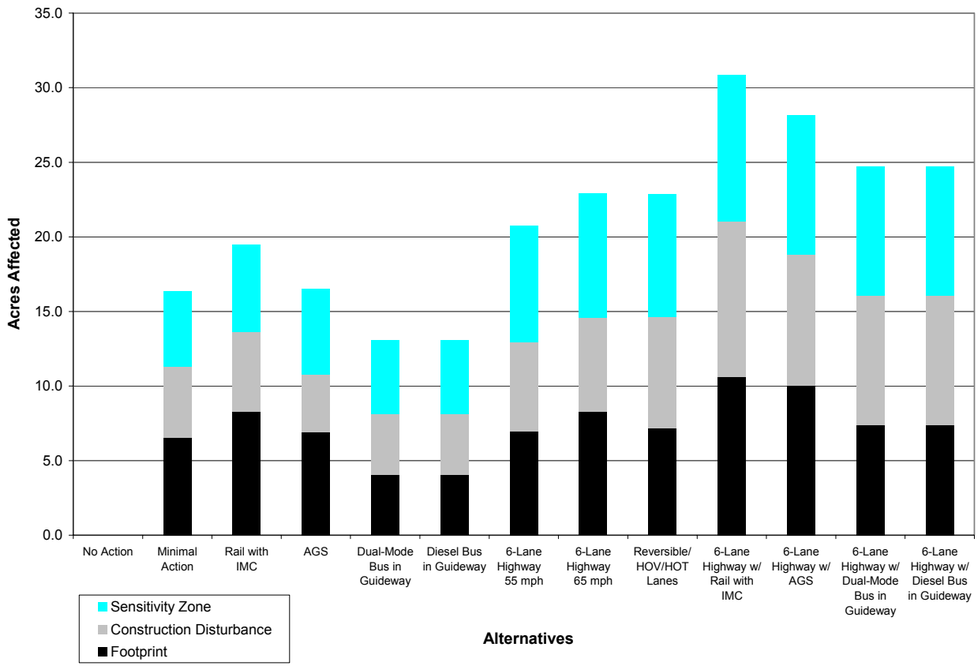
Combination Alternatives

Implementation of the Combination Six-Lane Highway with Rail and IMC alternative would result in impacts on riparian areas within the Eagle River, Blue River, and Clear Creek sub-basins. In comparison to other alternatives, the Combination Six-Lane Highway with Rail and IMC alternative would result in among the greatest impacts. Permanent impacts within the footprint of this Combination alternative would result in a loss of 10.6 acres. Temporary impacts would affect 10.4 acres of riparian area within the construction disturbance zone, and 9.8 acres of riparian areas could also be affected within the sensitivity zone.

Implementation of the Combination Six-Lane Highway with AGS alternative would result in impacts on riparian areas within the Eagle River, Blue River, and Clear Creek sub-basins. The Combination Six-Lane Highway with AGS alternative would result in among the greatest impacts in comparison to other alternatives. Permanent impacts within the footprint of this Combination alternative would result in a loss of 10.1 acres of riparian area. Temporary impacts would affect 8.7 acres of riparian area within the construction disturbance zone, and 9.3 acres of riparian areas could also be affected within the sensitivity zone.

Implementation of the Combination Six-Lane Highway with Dual-Mode or Diesel Bus in Guideway alternatives would result in impacts on riparian areas within the Eagle River, Blue River, and Clear Creek sub-basins. The Combination Six-Lane Highway with Dual-Mode or Diesel Bus in Guideway alternatives would result in intermediate impacts in comparison to other alternatives. Permanent impacts within the footprint of these alternatives would result in a loss of 7.4 of riparian area for each alternative. Temporary impacts would affect 8.6 acres of riparian area within the construction disturbance zone, and 8.7 acres of riparian areas could also be affected within the sensitivity zone for each alternative.

Chart 3.6-3. Direct and Construction-Related Indirect Impacts on Riparian Areas



3.6.4.3 Indirect Impacts

In addition to causing losses of wetlands, construction of alternatives would have the potential to affect wetlands adjacent to and downstream from the alternatives. Highways are widely documented to have impacts on water quality due to inputs of heavy metals, salts, and nutrients associated with the roadway (Jones et al. 2000, Trombulak and Frissell 2000). CDOT is evaluating the use and effects of winter deicing materials on an ongoing basis (Lewis 1999, 2001).

Maintenance activities that have the potential to affect wetlands, springs/fens, and other waters of the US include bridge reconstruction and replacement, roadway resurfacing, shoulder and ditch reconstruction, and winter traction sanding and deicing. Effects on wetlands, springs/fens, and other waters of the US from traction sanding and deicing are observed throughout the Corridor, especially at the higher elevations of the Corridor where applications are more frequent. Such areas include Upper Clear Creek and Straight Creek leading to the EJMT, and the upper area of West Tenmile Creek and Black Gore Creek on Vail Pass.

Changes in hydrological regime and water quality can cause changes in plant dispersal and survival, leading to plant community shifts over time. For example, Findlay and Bourdages (2000) found substantial correlations between lower plant diversity and higher densities of roads within Canadian wetlands. Because these types of disruptions affect basic ecological processes, highway impacts may extend far beyond the roadside, affecting an entire ecosystem's function (Forman 2000).

A sensitivity zone extending 15-feet wide on either side of the construction disturbance zone of each alternative shows some of the area in which road effects would most likely occur. Wetlands, springs/fens, other waters of the US, and riparian areas within the sensitivity zone are tabulated in Appendix A, Environmental Analysis and Data, and discussed in section 3.6.4.2. The sensitivity zone would intersect considerable areas of other waters of the US, especially for the Rail with IMC, Reversible/HOV/HOT Lanes, and the Combination alternatives (see Chart 3.6-2). It is anticipated that the operation of the highway would result in impacts beyond the sensitivity zone, but at this stage no data for alternatives beyond the sensitivity zone are available.

Road effects could be mitigated to some degree with various controls. CDOT is currently implementing SCAPs for Straight Creek and Black Gore Creek areas to improve control and capture of winter maintenance materials. It is also suggested that sufficient cross-slope drainage structures be included during new construction in areas with nonpoint source hydrology to allow for natural hydrologic conditions to be maintained on both sides of the right-of-way and for structures that do not constrict flows of defined channels. See the mitigation discussion in section 3.2, Biological Resources, for further exploration of these possibilities.

Indirect impacts on wetlands are also expected from possible induced growth associated with alternatives as presented in section 3.9, Social and Economic Values. Induced growth (related to induced traffic from alternatives) might contribute an additional 20 to 45 percent to the projected 2025 population of Eagle County and 18 percent to that of Summit County. The resulting increase in land development would be associated with the following possible impacts on wetlands:

- Water quality impacts from an increase in impervious surface and stormwater runoff and from increased erosion and sedimentation
- Degradation of wetland function (such as wildlife habitat and flood control)
- Drainage of wetlands areas from changes in hydrology, including flow routing, increases or decreases in hydrology, and timing of hydrology
- Additional loss of wetland areas

Transit, Highway, and Combination alternatives would be associated with possible growth inducement and increased development in the Eagle River sub-basin. Induced growth impacts from the Combination alternatives are also indicated in the Blue River sub-basin. Possible impacts on wetland areas and water quality from induced growth have been quantified in relation to planned development and growth in the Eagle River and Blue River sub-basins, as discussed in the analysis of cumulative impacts (see Chapter 4, Cumulative Impacts Analysis).

3.6.4.4 Impact Summary

The least direct impacts on wetlands from build alternatives would occur from the Minimal Action, AGS, Bus in Guideway, and Six-Lane Highway (55 mph and 65 mph) alternatives. AGS construction, which would use piers to elevate the travel platform, would reduce the amount of cut-and-fill that would likely otherwise increase direct wetland losses. Moderate impacts on wetlands would occur from the Rail with IMC and Reversible/HOV/HOT Lanes alternatives, as well as the Combination Six-Lane Highway with Dual-Mode or Diesel Bus in Guideway alternatives. The Combination Six-Lane Highway with Rail and IMC alternative is predicted to have the greatest impact on wetlands, and the Combination Six-Lane Highway with AGS alternative would also have among the greatest impacts (see Chart 3.6-1).

The least direct impacts on springs/fens from build alternatives would occur from the Minimal Action, Bus in Guideway, all Highway, and the Combination Six-Lane Highway with Dual-Mode or Diesel Bus in Guideway alternatives. Intermediate impacts would occur from the AGS alternative. The Rail with IMC, Combination Six-Lane Highway with Rail and IMC, and Combination Six-Lane Highway with AGS alternatives are anticipated to result in among the greatest impacts on springs/fens. Impacts on springs/fens would occur primarily in the Eagle River and Blue River sub-basins.

Fens are a COE specially protected resource. Springs/fens would have the most potential to be affected in the Vail Pass area. Preliminary field inspections were conducted along Vail Pass to identify fens within the spring/fen map unit that are near I-70. While the Minimal Action, Highway, and Combination alternatives would all include an auxiliary lane along Vail Pass, construction of the auxiliary lane is not anticipated to affect fens. The Rail with IMC and AGS alternatives are also proposed along Vail Pass and are not anticipated to affect fens. This sensitive resource will need to be considered in the more detailed design of alternatives at the Tier 2 level of study.

The least direct impacts from build alternatives to other waters of the US would occur from the Minimal Action, AGS, Bus in Guideway, and Six-Lane Highway 55 mph alternatives. Intermediate impacts are anticipated to occur from Six-Lane Highway 65 mph and Reversible/HOV/HOT Lanes. The Rail with IMC and all Combination alternatives are anticipated to have among the greatest impacts on other waters of the US (see Chart 3.6-2).

The least direct impacts from build alternatives to riparian areas would occur from the Bus in Guideway, Minimal Action, and AGS alternatives. The Rail with IMC, Highway, and Combination Six-Lane Highway with Dual-Mode or Diesel Bus in Guideway alternatives are anticipated to have intermediate impacts. The Combination Six-Lane Highway with Rail and IMC and Combination Six-Lane Highway with AGS alternatives are anticipated to have among the greatest impacts on riparian areas (see Chart 3.6-3).

Indirect impacts on wetlands, springs/fens, other waters of the US, and riparian areas would be associated with long-term impacts from winter maintenance, transportation operations, and any Corridor-induced growth. The Minimal Action alternative and Highway alternatives would be associated with the greatest increases in winter maintenance activities because of additional paved lanes. Other indirect impacts would include increased runoff and stream incision/increased erosion and sediment increases. Changes to hydrology are associated with road construction, including impounding flows and downcutting to culverts. All alternatives other than No Action and Minimal Action are anticipated to induce varying levels of growth in the Eagle River sub-basin. Induced growth could cause additional impacts on wetlands, springs/fens, other waters of the US, and riparian areas due to encroachment/loss and construction impacts (erosion/sedimentation).

3.6.5 Mitigation Measures

While mitigation activities are expected to minimize impacts, some impacts on Corridor wetlands and other water resources are still likely. Wetlands and other water resources would have the potential to be affected during construction by erosion-sedimentation material and by runoff from the roadbed during operations. Impacts on wetlands, springs/fens, other waters of the US, and riparian areas will be addressed more specifically for each project that is evaluated during Tier 2. At this time, detailed delineations will be conducted to define and map wetlands as a basis from which to assess impacts, compare alternatives (as part of meeting CWA Section 404(b)(1) guidelines), and establish a framework for 404 permits. CDOT will examine the feasibility of requiring specific mitigation measures at the Tier 2 level of analysis, including the following:

- Ensuring construction contracts include a clause requiring the contractor to not spoil waste/excavated materials into a water of the US or other nonjurisdictional aquatic sites
- Ensuring construction contracts include a clause stating that all aggregates must be acquired from onsite excavation or preexisting aggregate mines
- Identifying areas of the Corridor where there would be opportunities to restore wetlands and/or enhance wetland functional value along the Corridor and also identifying areas where wetlands could be expanded (such as SWEEP coordination)
- Redesigning structures that would impede hydrologic continuity
- Controlling the amount of winter traction sand, liquid deicer, and other roadway runoff that would affect wetlands and stream systems

Efforts to minimize impacts have been made in the design of alternatives with such considerations as using as much of the existing highway footprint as possible and erecting walls to minimize slopes. Impacts on wetlands, springs/fens, other waters of the US, and riparian areas would be avoided where possible through alignment shifts away from the resource. Further mitigation strategies will be implemented in the Tier 2 level of study. CDOT is committed to avoid fens through project planning at the Tier 2 level.

Permanent impacts from expanding the existing transportation template to accommodate transit, additional lanes, or both, would be avoided or minimized to the extent possible during engineering design of specific projects. Areas that could not be avoided would be mitigated by restoring and enhancing wetlands, or if these opportunities do not exist, establishing new wetlands. Sites are being identified for wetland mitigation and have to date included securing a site in Clear Creek County. CDOT recently purchased a 70-acre parcel, the Barry property, which has been set aside for wetland mitigation. This site is located just west of US 40.

Best management practices would be used during construction operations, the specifics of which will be developed for each project in the Tier 2 level of study. Suggestions include:

- Establishing exclusion fencing to protect wetlands from intrusions of equipment
- Establishing silt fencing and other erosion control materials to protect wetlands and stream systems from erosion run-in
- Locating equipment servicing and staging areas at a suitable distance from wetland and drainage systems to protect these areas from contaminants, and placing a berm at the downgradient position between such operations and wetlands-drainage systems
- Revegetating areas used for construction support as soon as possible to curtail erosion and rapid runoff that may affect wetlands and aquatic habitats

- Developing and implementing stormwater management plans for each phase of the project
- Developing noxious weed management plans for each phase of the project
- Following CDOT guidelines for concrete washout areas, locating them well away from wetlands, springs/fens, other waters of the US, and riparian areas, and controlling runoff from these areas
- Maintaining existing vegetated buffers or establishing buffers to protect wetlands and streams
- Protecting wetland and riparian areas during construction through strategic placement of geotextile/straw/soil, and regrading and planting where geotextile is not feasible

Means to reduce the impacts on area streams of winter sanding operations are currently being evaluated. SCAPs are focusing on Black Gore Creek (Upper Eagle River sub-basin) and Straight Creek (Upper Blue River sub-basin) because these systems have already been adversely affected by traction sand. This action will result in new practices to provide a beneficial effect on many of the stream systems and associated wetlands along I-70. Other measures to address winter maintenance are currently being evaluated and include sand retrieval, automated deicing systems, and solar snow storage zones (CDOT 2002a, 2002b).

CDOT completed the SCAP for the Black Gore Creek I-70 corridor in May 2002. This plan analyzes existing sediment conditions and controls and presents options for sediment control improvements and long-term structural controls (further discussed in section 3.4, Water Resources). A covered sand storage structure was recently installed at the CDOT maintenance facility on Vail Pass to control sediment runoff in this area. The importance of this program is that additional sediment control measures could be implemented to improve the capture of winter maintenance material.