Chapter 3 — Threats to and Status of Resources

Threats to Resources

The land cover of the San Luis Valley was largely unaltered, except by natural processes, until the 19th century, when human land use associated with settlers of European origin began to alter the landscape. During this period, livestock grazing, farming, and water development also began to affect ecosystem processes such as the historic hydrological regime. Since then, Colorado has lost nearly 50 percent of its wetlands (Dahl 1990, 2000). The highest remaining concentration of wetlands in Colorado occurs in the San Luis Valley, and their protection is a high conservation priority.

Development

Population growth, primarily exurban development, led to habitat fragmentation in the San Luis Valley in the latter part of the 20th and first part of the 21st centuries. The population of Colorado increased by nearly 17 percent between 2000 and 2010 (U.S. Census Bureau 2010a). During a period of particularly rapid population growth in the San Luis Valley from 1990 to 2003, the population of Mineral County increased by 57.9 percent and Saguache County increased by 45.2 percent. The absolute population numbers and densities are still low in those counties, but habitat loss and fragmentation due to residential and commercial development have been the greatest recent threat to trust species in the SLVCA. This rapid growth has tempered somewhat during the current economic downturn, with relatively stable populations in the counties of the San Luis Valley from 2000 to 2010 (U.S. Census Bureau 2010a). However, that same downturn, coupled with depressed agricultural markets and pending expensive changes to Colorado's ground water law, have forced many farmers and ranchers to subdivide their properties in order to continue operating. This proliferation of 5-, 10-, and 40-acre parcels that have appeared on the market is likely to exacerbate the ongoing impacts of exurban housing development on the habitats of the SLVCA.

Energy development is also an emerging threat to wildlife in the SLVCA. The impacts to wildlife populations from solar energy development are of particular concern in the San Luis Valley, as interest in industrial solar-electric generating facilities has increased during the last decade. In fact, one of the largest photovoltaic plants in the United States is in the San Luis Valley. Economically viable wind energy potential is generally quite low in most of the valley (Hanser 2010) and thus unlikely to be an issue in the near term. Hydrocarbon potential is low throughout the valley (Copeland et al. 2009), although some oil has been found during mineral exploration (Watkins et al. 1995). There is potential for further oil and gas exploration in this region, which the Service has determined is unlikely to have significant impacts on the living resources of the valley (USFWS 2011). Reviews of hydrocarbon development impacts on ground nesting birds (Naugle et al. 2011), ungulates (Hebblewhite 2011), and songbirds (Bayne and Dale 2011) have all found some evidence of mortality and/or behavior modification (such as avoidance of an area) associated with petroleum extraction. If commercially exploitable hydrocarbons are found during the planned exploration, petroleum extraction could be an additional threat to the living resources of the SLVCA.

Fragmentation

Changes in land cover due to exurban development, energy development, roads, and changes in agricultural land use (such as transition from flood irrigation to center-pivot irrigation) not only cause a loss of habitat, they also fragment the remaining habitat. There is a robust body of literature on the effects of habitat fragmentation, summarized eloquently by Collinge (2009). Countless manipulative and observational studies have shown that habitat area and connectivity among types of similar habitat are important for everything from soil decomposers (Rantalainen et al. 2005) to passerine birds (Telleria and Santos 1995). Corridors between fragments promote use of, and persistence in, those habitats by migratory birds (Haas 1995), large carnivores (Shepherd and Whittington 2006, Tremblay 2001), and ungulates (Tremblay 2001) that are native to the SLVCA. Perhaps the most obvious way to protect corridors throughout the SLVCA, while protecting valuable habitat at the same time, is to focus on the conservation of the riparian corridors and wetland complexes that cross and connect existing protected areas. This action would protect wildlife movement corridors for both seasonal migration and colonization following large-scale disturbance or environmental change.

Invasive species

Increased human disturbance associated with development has also been shown to negatively affect adjoining habitat due to the invasion and establishment of invasive plant species. Invasive plants can have numerous detrimental effects; besides displacing native vegetation, they can alter nutrient cycling and soil chemistry, modify hydrology, increase erosion, and change fire regimes (Dukes and Mooney 2004). Noxious weeds, such as tall whitetop, Canada thistle, and Russian knapweed, can have severe negative effects on wildlife habitat (such as reducing the quality of nesting and foraging areas) when these weed species begin to replace native vegetation. The San Luis Valley already has one of the densest concentrations of Russian knapweed in the State of Colorado (Goslee et al. 2003). Other invasive species that could threaten resources in the SLVCA include New Zealand mudsnail, quagga and zebra mussels, and Asian clam. Diseases such as white nose syndrome, chytrid fungus, whirling disease, and chronic wasting disease also threaten wildlife and fish in the San Luis Valley.

Water resources

In addition to the threats of the direct loss of habitat and fragmentation that accompany subdivision for exurban development, water rights associated with subdivided parcels are often sold with the property. This results in the loss of wetland habitat and wetland functions not only on the subdivided property, but also on adjoining lands as the water is redistributed off of the property, directly affecting wildlife populations that depend on the wetlands to complete their life cycle. As fragmentation increases, remaining habitats become geographically isolated and wildlife populations with limited dispersal abilities may potentially become genetically and spatially isolated. Existing wetland habitats are shown in Figure 2.

Another threat to the sustainability of wetland and riparian habitat in the SLVCA is the chronic overuse of ground water. Due to legal and political circumstances, new ground water rules have been developed by the Colorado Division of Water Resources and will be applied to water users in the San Luis Valley starting in May 2012. Ground water usage, especially artesian

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Figure 2. Water is a critical resource for breeding and migratory birds in the high desert. Many wetlands and riparian areas have been lost due to ground water pumping and surface water diversion.

well development, started during the early 1900s. The result has been construction of over 7,000 wells and development of one of the world's largest concentration of center pivot irrigation systems, many of which depend solely upon ground water. As a consequence, water users and regulators have acknowledged that annual ground water use chronically exceeds recharge. The SLVCA would contribute to protection of wetland and riparian habitat from degradation by maintaining current water management practices and the associated benefits to the plant community and ground water hydrology.

Cultural resources

The proposed SLVCA is considered an important area for cultural resources due to the abundance of cultural sites that date to almost 12,000 years ago that are located throughout the valley; however, much of the archaeological research associated with the San Luis Valley has been conducted on public lands, such as the Closed Basin, San Juan National Forest, and Great Sand Dunes National Park and Preserve (Jones 2000). Permanent protection of wildlife habitat on private land would benefit the preservation of cultural sites from future disturbance on all acquired lands.

Climate change

Climate change has quickly moved to the forefront of conservation challenges during the 21st century, and the Service has made it a high priority in conservation planning (USFWS 2010b). Mountain ecosystems in the western United States are expected to be especially sensitive to climate change. In fact, data indicate that numerous places in the Rocky Mountains have experienced three times the global average temperature increase over the past century. Measurements have shown that Colorado's temperature has increased by approximately 2˚F between 1977 and 2006 (Ray et al. 2008). The western United States has seen a shift toward earlier spring snowmelt (Karl et al 2009).

Wetland and riparian habitats, such as those found in the SLVCA, that are dependent on snow-melt from surrounding high mountain ecosystems would be expected to be more acutely affected than other ecosystems. The San Luis Valley is predicted to have a 10 to 20 percent reduction in runoff by mid-century compared to the 1900 to 1970 baseline (Karl et al. 2009). As with many areas across the west, it is difficult to predict what the specific effects of climate change may be in a given area, particularly due to the complex interplay between the timing of temperature change and precipitation. The Western Water Assessment predicted that Colorado's ecosystems will be affected by climate change in nine broad ways: increased frequency and severity of forest-insect interactions; increased frequency and severity of wildfires; changes in the hydrologic cycle that impact aquatic species, including reduction in overall stream flow, shift to earlier spring runoff, and warming of water temperatures; northward and upward shift in animal ranges, causing shifts in ecosystem composition; increased range and spread of wildlife pathogens; increase in tree mortality due to drought stress; increased risk of desertification in dryland ecosystems; and an overall reduction in biodiversity because of the above impacts (Averyt et al. 2011). We must be cognizant of the potential impacts that climate change may have on wetland, riparian, and upland habitat in the SLVCA.

The proposed SLVCA intends to maintain and restore habitat connectivity to promote a San Luis Valley ecosystem that will be robust in the face of climate change. Protection of large intact expanses of wetland habitat types where natural ecosystem processes can be sustained will help wetland-dependent species resist some of the impacts of a changing climate. Some of these may not be the same type of wetland in the future, but the use of hydrogeomorphic modeling to assess historic hydrology should allow us to predict where and what kind of wetlands will persist in a potentially warmer and more arid future. We will respond by targeting these habitats for acquisition in the SLVCA. Besides intrinsically providing habitat for wildlife, riparian areas also serve as corridors. As shown in Figure 3, protection of such corridors will preserve a network through which wildlife can recolonize or disperse following disturbance, making the ecosystem more resilient to short term change and increasing its adaptive capacity to long-term change.

Effects of the SLVCA on the Natural and Human Environment

For a thorough discussion of the effects of the proposed easement and limited fee-title acquisition program, see Section 4 of the EA in this volume.

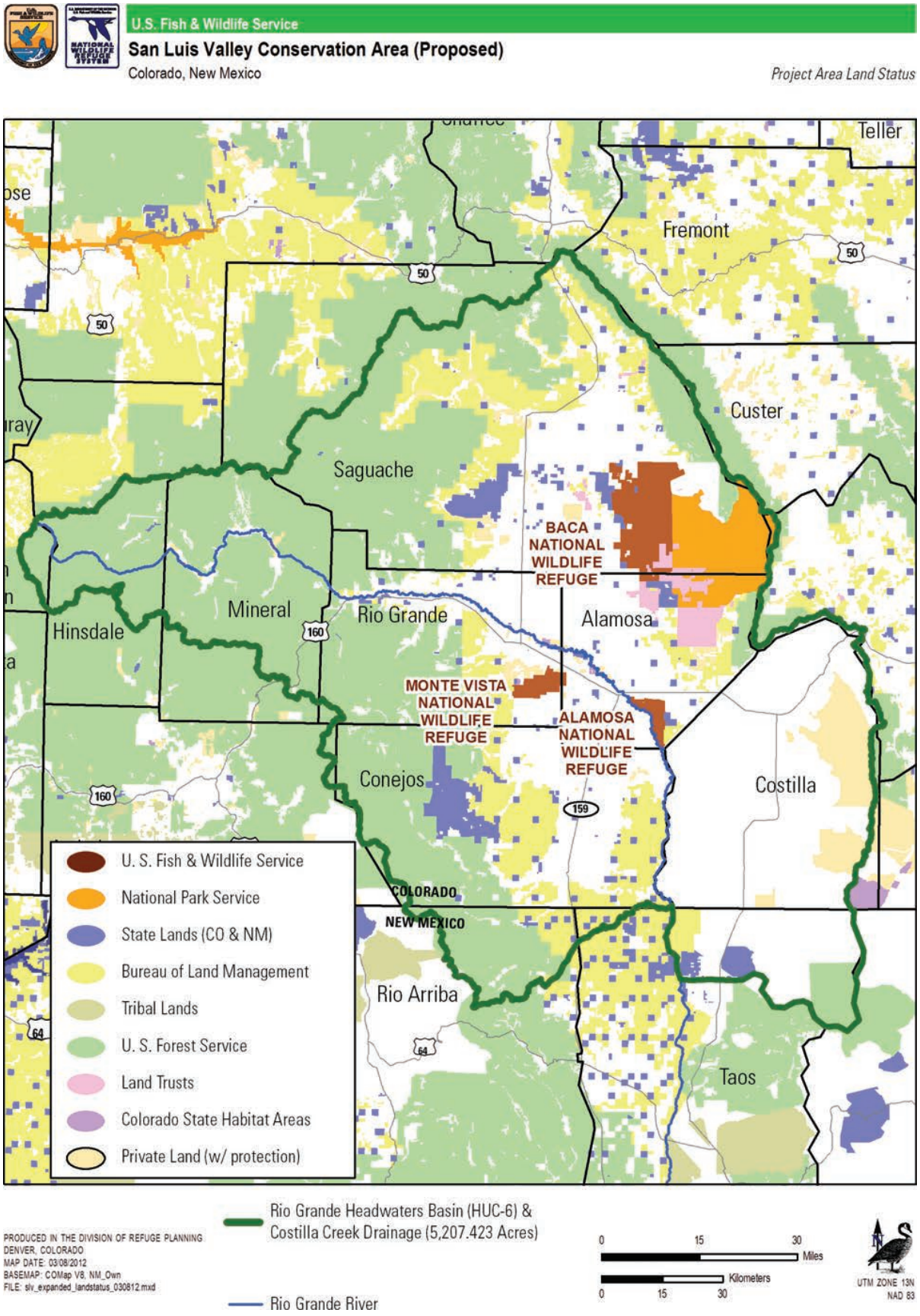

Figure 3. The SLVCA forms part of a broader network of public and private conservation lands, and by further networking these lands will contribute to the ability of the species and habitats of the Southern Rocky Mountains to adapt to climate change.