INTRODUCTION

Within the planning area, riparian areas and wetland ecosystems occur at all elevations. They occur on valley floors, and in other low-lying landscape positions, and are primarily associated with perennial streams. Although small in area, they represent a very important ecological component of the planning area. There are approximately 95,900 acres of riparian areas and wetlands ecosystems throughout the planning area (which is approximately 2.5% of the total acreage of SJPL).

Riparian areas and wetland ecosystems are defined together in this section, as the interface between the riverine aquatic ecosystem and the upland terrestrial ecosystem (where the water table is usually at, or near, the land surface (Gregory et al. 1991; Risser 1990; Knopf et al. 1988; Brinson et al. 1981; Cowardin et al. 1979). They are frequently flooded, or at least seasonally saturated by a fluctuating water table, and have plant species, soils, and topography that differ considerably from those of the adjacent uplands (Elmore and Beschta 1987; Jones 1990).

In relation to the historical range of variation (HRV), there is little information pertaining to the condition of riparian areas and wetland ecosystems within the planning area during the reference period. More than likely, most evergreen forests, perennial forbs, and perennial graminoids types looked much like they do today, especially since these types probably have been the least affected (impacted) by human impacts. The deciduous forest, mixed-evergreen deciduous forest, and deciduous shrubland types, which have probably been the most affected by human impacts, generally displayed more trees and shrubs during the reference period than they do today.

LEGAL AND ADMINISTRATIVE FRAMEWORK

LAWS

- ***The National Forest Management Act of 1976***: This act states that forest plans must "provide for the diversity of plant and animal communities."
- ***The National Environmental Policy Act of 1969***: This act promotes efforts designed to prevent or eliminate damage to the environment and biosphere, and enrich the understanding of the ecological systems and natural resources important to the nation.

EXECUTIVE ORDERS

- ***Executive Order 11990***: This EO requires Federal agencies to provide leadership; to take action to minimize the destruction, loss, or degradation of wetlands; and to preserve and enhance the natural and beneficial values of wetlands.

EXISTING CONDITIONS AND TRENDS

The variability of riparian areas and wetland ecosystems within the planning area at the subclass level (which is based on the predominant leaf phenology of the life-form in the upper canopy layer) includes evergreen riparian forests, deciduous riparian forests, mixed-evergreen deciduous riparian forests, deciduous riparian shrublands, perennial forbs, and perennial graminoids (Redders 2003).

Human impacts to riparian areas and wetland ecosystems that have occurred within the planning area since the reference period include urbanization, agriculture, logging, livestock grazing, mining, and recreation; road, dam, and diversion construction; and the introduction of non-native species (Blair et al. 1996, Dick-Peddie 1993). These impacts have reduced native hydrophytic species (most notably cottonwood and willows), increased invasive species, changed dominant life-forms from trees and shrubs to herbs, reduced water flow, and lowered water tables. The deciduous forest and mixed-evergreen deciduous forest types have probably been the most affected by human impacts (because they occur in places that offer relatively easy access).

During the last 25 years, there have been fewer adverse impacts to riparian areas and wetland ecosystems within the planning area. This is because most management activities have avoided these areas. Improved livestock grazing management has resulted in the improvement in the ecological condition of some riparian areas and wetland ecosystems that were adversely impacted as the result of historic livestock grazing (as evidenced by the increase of willows along many streams). The impacts related to cattle grazing may continue to be a concern in relation to riparian areas and wetland ecosystems within the planning area. This is because cattle have ready (easy) access, and tend to spend a disproportionate amount of their time in this vegetation type. Some fens found within the planning area have been adversely impacted by management activities, especially road construction, road maintenance, and off-road vehicles.

The exotic shrub tamarisk has invaded much of the Dolores River Canyon and its lower tributaries, as well as other areas within the planning area. Tamarisk out-competes native cottonwoods and willows, limiting the regeneration success of those native species (Finch et al. 1995).

Proper Function Condition (PFC) analysis (BLM TR1737-15, 1998) of riparian areas and wetland ecosystems within the planning area have determined that 61% of the BLM-administered lands are in proper function condition; 31% of the BLM-administered lands are in a functional-at-risk (FAR) condition; and 8% of the BLM-administered lands are in a non-functional (NF) condition.

DIRECT AND INDIRECT IMPACTS

The impacts described below may occur in the future if, and when, specific projects are identified and implemented. In relation to expected impacts, it is assumed that the direction and design criteria described in the overall DLMP/DEIS, as well as the stipulations for oil and gas activity, would be followed and implemented. Under all of the alternatives, design criteria would be applied at the project level in order to protect resources. Management activities with the greatest potential to impact riparian areas and wetland ecosystems within the planning area may include oil and gas development, livestock grazing, timber harvesting, and recreation development. Potential impacts to riparian areas and wetland ecosystem (as described below), are expected to be minor and mostly short-term. This is due to the fact that riparian areas and wetland ecosystems would be avoided in most cases, and because the design criteria described in the DLMP/DEIS would be implemented.

Impacts Related to Timber Harvesting

Effects from Timber Harvest

Timber harvest activities have the potential to effect riparian areas and wetlands on the SJPL through habitat modification, by mortality of individual plants, and by soil disturbance. Since project design and design criteria that avoid or minimize effects to riparian areas and wetlands within a timber sale project area will be implemented, there will be no effects or negligible effects on riparian areas and wetlands.

The impacts related to timber harvesting may be negligible. This is due to the fact that these areas, as well as the upland areas adjacent to them, would be avoided during project design and implementation.

DLMP/DEIS Alternatives: Impacts described above could occur to all the alternatives. Alternative A proposes the most acres for timber harvest and therefore has the highest potential to adversely affect riparian areas and wetlands, as described above, compared to the other alternatives. Alternative D has the next highest potential to adversely affect riparian areas and wetlands, followed by alternative B. Alternative C has the least potential to have adverse impacts to riparian areas and wetlands from timber harvest activities, as described above, since it proposes the least acres for timber harvest.

Impacts Related to Livestock Grazing

Compared to adjacent upland areas, cattle, given the opportunity, will spend a disproportionate amount of time in riparian areas and wetland ecosystems. (Clary and Webster 1989). Potential impacts related to livestock grazing may include grazing, overgrazing, and trampling of soils and plants. The significance of these impacts would depend upon the timing, duration, and intensity of grazing. Livestock will graze (consume the leaves and shoots of plants), and sometimes overgraze (continued heavy grazing that exceeds the recovery capacity of the community), forage plants. This can decrease the photosynthetic abilities of the plants by decreasing the leaf areas necessary for performing this function (Heitschmidt and Stuth 1993, Caldwell et al. 1981). A reduction in photosynthesis decreases the vigor and root reserves of these plants, and decreases their chances for survival by decreasing their ability to reproduce, compete, and withstand drought, disease, fire, insect impacts, and grazing. A decrease in the abundance, distribution, and vigor of plant species resulting from livestock grazing may, in turn, decrease the amount of ground-cover (vegetation and litter) and soil organic matter, and increase the amount of bare soil. This, in turn, may lead to soil compaction, run-off, and erosion. Ground disturbance may also result in conditions conducive to the establishment of invasive plant species that can compete with native species, and may lead to a reduction in the abundance and distribution of native species. The reduction or elimination of woody riparian species (cottonwoods and willows) by livestock is particularly detrimental. This is due to the fact that such species stabilize banks and hold systems together (Glinski 1977, Carothers 1977, Kauffman et al. 1983, Kauffman and Krueger 1984), as well as the fact that the reduction of such species creates opportunities for invasive species (Russian olive and tamarisk) to become established and to out-compete native cottonwoods and willows (Finch et al. 1995).

Impacts to riparian areas and wetland ecosystems related to livestock grazing may also include channel degradation and widening, bank sloughing (leading to erosion and stream sedimentation), high coliform bacteria counts, and higher stream temperatures (Platts and Raleigh 1984).

Within the planning area, livestock grazing practices would continue to be designed in order to protect the ecological integrity of the ecosystems that are impacted by these practices. Adverse impacts are more likely to result if the timing, intensity, and duration of livestock grazing are not appropriate or sustainable. Impacts to riparian areas and wetland ecosystems related to livestock grazing are expected to be minor, if the direction and design criteria (as described in the DLMP/DEIS and in the allotment management plans) are adhered to.

DLMP/DEIS Alternatives: The impacts related to livestock grazing may occur under all of the alternatives. Since Alternative D would propose the most suitable acres for livestock grazing; therefore, it may have the greatest potential to result in impacts to riparian areas and wetlands ecosystems (as described above), when compared to the other alternatives. Alternative A may have the next highest potential to impact riparian areas and wetland ecosystems, in relation to livestock grazing, because it would propose the second largest amount of suitable acres (followed by Alternative B). Alternative C may have the least potential to impact riparian areas and wetland ecosystems, in relation to livestock grazing, because it would propose the least amount of suitable acres.

Impacts Related to Oil and Gas Development

Oil and gas development activities are expected to impact riparian areas and wetland ecosystems within the planning area (due to resulting habitat modification, mortality of individual plants, and soil disturbances). Project design, design criteria, and stipulations for protecting these resources that avoid or minimize impacts to riparian areas and wetland ecosystems within oil and gas development project areas would be implemented; therefore, there may be no impacts, or negligible impacts, to these areas. The no lease alternative would essentially result in no change from existing conditions related to current oil and gas development activities, and would have the lowest level of potential impacts to riparian areas and wetland ecosystems.

DLMP/DEIS Alternatives: The impacts described above may occur under all of the alternatives. Alternative A would propose the greatest amount of "standard lease" acres and the least NSO acres; therefore, this alternative may result in the greatest amount of impacts to riparian areas and wetland ecosystems, when compared to the other alternatives. Alternative D may result in the next greatest amount of impacts to riparian areas and wetland ecosystems. Alternatives B and C may result in the least amount of impacts to riparian areas and wetland ecosystems, in relation to oil and gas development, because they would propose the least amount of "standard lease" acres. The No Leasing Scenario would have no ground-disturbing impacts, so it would have no adverse direct or indirect impacts to riparian area and wetland ecosystems.

Impacts Related to Fire

The vegetation of riparian areas and wetland ecosystems is generally high in moisture content; therefore, it is relatively resistant to burning. However, high intensity fire, especially during relatively dry environmental conditions, can consume hydrophytic woody and herbaceous plants. Many of these species, including cottonwood and willows, would re-sprout following fire.

DLMP/DEIS Alternatives: The impacts described above may occur under all of the alternatives. The impacts may be similar for all of the alternatives because the number of acres proposed for treatment would be similar under all of the alternatives.

Impacts Related to Recreation

Recreational uses that are impacting riparian area and wetland ecosystems may include off-road motor vehicles, camping, hiking, mountain biking, and horseback riding. These uses would disturb the ground surface, and may result in the mortality of native plants and destroy their habitat. This may not, however, impact their associated vegetation type. These impacts may be minor because these recreation activities occur on only a small percentage of the planning area.

DLMP/DEIS Alternatives: The impacts described may occur under all of the alternatives. This is because the number of acres that would be proposed for treatment would be similar under all of the alternatives.

CUMULATIVE IMPACTS

Riparian areas and wetland ecosystems within the planning area were settled on, and developed for, townsites, agriculture uses, and road construction. This resulted in vast acres of riparian areas and wetland ecosystems being cleared of vegetation and modified beyond recognition (Blair et al. 1996).

Within the planning area, the construction of dams, reservoirs, and diversions (including Vallecito, Lemon, Williams, and Electra) not only cleared the vegetation and modified the topography, but also decreased and regulated water flow, blocked movements of aquatic organisms, and changed the natural geomorphic stream processes of channel formation and erosion/deposition. The associated drop in water tables, as well as the lack of flooding, has resulted in significant changes to the abundance, distribution, and reproductive mechanisms (germination and seedling survival) of native riparian area plant species, especially willows and cottonwoods (Rood and Mahoney 1993, Glinski 1977, Brady et al. 1985).

The impacts related to livestock grazing on riparian areas and wetland ecosystems are well documented in the literature (Gifford 1981, Knopf and Cannon 1982, Kauffman and Krueger 1984, Platts and Raleigh 1984, Skovlin 1984, Clary and Webster 1989, Clary and Medin 1990, Schulz and Leininger 1990, Kovalchik and Elmore 1992). Platts summarized this body of information as follows, "It is clear from the literature that improper livestock grazing can affect the riparian-stream habitat by eliminating riparian vegetation, widening stream channels, causing channel aggradation through increased sediment transport, changing stream bank morphology, and lowering surrounding water tables." The reduction or elimination of woody riparian species by livestock is especially detrimental to riparian areas and wetland ecosystems that are dependant upon those species to stabilize banks and hold those systems together. Extensive cattle and sheep livestock grazing, as well as the associated adverse impacts, began within the planning area in the 1870s, when Euro-American settlers arrived in increasing numbers (Savage 1991). Heavy grazing continued into the Twentieth Century, with much of this unregulated grazing occurring in forests and meadows in the national forests (DuBois 1903).

Historic timber harvesting has impacted riparian areas and wetland ecosystems throughout the planning area. These impacts are primarily the result of new roads being built and maintained for logging activities. Roads are the dominant cause of soil erosion and stream sediment in forest environments (Swank and Crossley 1988, Reid 1981). Logging, and the associated road building, have taken place extensively throughout the planning areas, as well as on adjacent private lands.

The reduction or elimination of native riparian areas and wetland ecosystem plant species within the planning area resulting from the human impacts described above, has allowed exotic species (including Russian olive and salt cedar/tamarisk) to become established and highly competitive in these ecosystems. Salt cedar and Russian olive can out-compete native cottonwoods and willows, which, in turn, can limit the regeneration success of these native woody plants (Finch et al. 1995).

Foreseeable future impacts to riparian areas and wetland ecosystems resulting from management activities conducted within the planning area are expected to be minor. This is due to the fact that riparian areas and wetland ecosystems would be avoided in most cases, as well as to the fact that project design and design criteria would be implemented. Foreseeable future timber harvesting would occur over the next 20 years; however, their impacts to riparian areas and wetland ecosystems may be minor. This is because riparian areas and wetland ecosystems would be avoided, and because new road construction related to timber harvesting would be minimal. Livestock grazing would continue into the foreseeable future throughout the planning area; therefore, additional adverse impacts to riparian areas and wetland ecosystems may occur.

The attainment of desired conditions, as well as the implementation of design criteria (as described in the DLMP/DEIS) may help to minimize impacts related to management activities conducted within the planning area.