

The following section supplements the analysis found in Chapter Three, [Section 3.6 - Terrestrial Ecosystems and Plant Species](#) of the Draft EIS on page 3.103, “Impacts Related to Oil and Gas Leasing”.

DIRECT AND INDIRECT IMPACTS

Impacts to terrestrial ecosystems and plant species (sensitive and highlight plants) from oil and gas development on all currently unleased SJPL within the GSGP area could occur at the project level if oil and gas development (primarily the construction of well pads and roads) occurs on those currently un-leased lands. Impacts to terrestrial ecosystems would be the same as those described in the Draft EIS except that there could be 4 times more ground-disturbance, which has the potential to remove groundcover (vegetation and litter), cause more mortality to native plants, cause more habitat modification, cause more change to the composition, structure, and function of the associated terrestrial ecosystems, cause more soil disturbance, disturb more old-growth ponderosa pine forests, and establish and spread more invasive plants that compete with sensitive and highlight plants.

Ponderosa pine forests (112,300 acres), mountain shrublands (85,100 acres), and pinyon-juniper woodlands (57,900 acres) are the terrestrial ecosystems that would be most affected since they occupy the most acres within the GSGP area. Impacts to sensitive and highlight plants would be the same as those described in the Draft EIS except that there could be four times more ground-disturbance, which has the potential to cause more mortality to sensitive and highlight plants, modify more habitat of sensitive and highlight plants, and establish and spread more invasive plants. Even though the potential for impacts would be greater compared to what’s identified in the Draft EIS, impacts to terrestrial ecosystems and sensitive and highlight plants would still be minimal if design criteria and stipulations in the Draft LMP are properly implemented at the project level (see [Design Criteria](#) in Part Three of the Draft LMP and [Appendix H](#)).

Oil and gas development on currently unleased SJPL within the GSGP area could also cause fragmentation to some terrestrial ecosystems (ponderosa pine forests, mixed conifer forests, pinyon-juniper woodlands, and mountain shrublands) and the landscapes in which they occur, since new well pads and roads would create unvegetated patches and unvegetated linear corridors within the relatively closed-canopy matrices of those terrestrial ecosystems and landscapes, which would change the composition, structure, and function of the affected terrestrial ecosystems. Fragmentation would create more edge and less interior wildlife habitat, which could adversely affect wildlife species, as described in the wildlife sections. Oil and gas development on these lands could also cause contaminants to be released into the environment, which could adversely affect native plants (including sensitive and highlight plants) and their associated terrestrial ecosystems. Revegetation would be difficult in the sagebrush shrublands, semi-desert shrublands, and semi-desert grasslands due to the dry climate and the lack of commercially available native seed associated with these terrestrial ecosystems.

The high amounts of Nitrogen emissions that could potentially result from development of the GSGP (as indicated in the air quality model results) could have impacts to terrestrial ecosystems and sensitive and highlight plants. Studies have shown that the deposition of nitrogen (N) from N emissions could increase N levels in soils resulting in a decrease of native plant species and an increase in invasive plant species which could increase fire risk (Allen et al. 2009, Brooks M. L. 2003, and Floyd-Hanna et al. 2004). Furthermore, monitoring on SJPL shows that N loading is increasing in lakes and across the San Juan landscape. In particular, monitoring at Molas Pass shows that since the 1990s there has been a significant increasing trend in NO₃ concentrations in precipitation; and water chemistry monitoring of pure water lakes in the

Weminuche Wilderness over the last decade indicates that those lakes are becoming seasonally saturated with nitrogen (Musselman and Slausen 2002). These monitoring and modeling results suggest that effects to the vegetation of aquatic, riparian/wetland, and terrestrial ecosystems on SJPL may be occurring (or could occur) due in part to current and future oil and gas development on SJPL. For more information on this topic, see the air quality section.

Project designs (that avoid sensitive and highlight plants) and the implementation of design criteria and stipulations in the Draft LMP would protect and minimize adverse impacts to terrestrial ecosystems and sensitive and highlight plants (see [Design Criteria](#) Part Three of the Draft LMP and [Appendix H](#)).

Alternative Comparison: Impacts to terrestrial ecosystems and sensitive and highlight plants are a function of the amount of ground-disturbance that may occur. The action alternatives are similar in terms of their potential effects. Alternative A would have the highest potential to impact to sensitive and highlight plants within the GSGP (2,111 acres developed), followed by Alternatives D (2,085 acres), B (2,060 acres) and C (2,035 acres). The No Lease Alternative would have no ground-disturbing impacts and no direct or indirect impacts to sensitive and highlight plants within the GSGP.

CUMULATIVE IMPACTS

The Paradox Basin is the cumulative impacts boundary for terrestrial ecosystems. Past management activities on all federal, private and state lands within the Paradox Basin have caused direct ground-disturbance impacts to terrestrial ecosystems as described above. In addition to the potential disturbance from oil and gas development described above for unleased lands, there are also projections for more development on federal lands already leased. An additional 1,786 acres of disturbance could result from future development on lands currently held under lease on BLM and USFS mineral estate (1,166 acres from future gas shale development, and approximately 620 acres from conventional gas development). Direct impacts to terrestrial ecosystems and sensitive or highlight plants from oil and gas development on the already leased lands within the GSGP area (which is about 35% of the GSGP area) could occur and would be the same as those described above. Mitigations for lands currently held under lease would be similar to the mitigations described for unleased lands and would be specified during project level NEPA analysis using COA based on the Draft LMP, Part Three (see [Design Criteria](#) for a listing of these mitigation measures).

Overall, the cumulative impacts to terrestrial ecosystems resulting from the ground-disturbance associated with all past, current, and foreseeable future management activities on federal and nonfederal lands could result in adverse affects to many terrestrial ecosystems on a large amount of acres, and some of those lands could be affected for up to 30 years.

Past management activities on all federal, private and state lands within the Paradox Basin have not impacted sensitive or highlight plants or directly impacted a very small number of sensitive or highlight plants, as described above. Additional direct impacts to sensitive or highlight plants from foreseeable oil and gas development on lands currently held under federal lease and other future management activities would mostly not occur because of restrictive stipulations or design criteria that would avoid the plants and their habitat. Even if all the foreseeable future management activities were to occur, combined with all past and current management actions, the resulting disturbance would only adversely affect a very small number of these plant species and on a very small amount of occupied habitat, because of the avoidance and protections provided through stipulations and design criteria. Furthermore, the impacts would not adversely affect the viability of these plant species.