

**APPENDIX Z - BIODIVERSITY MONITORING
FOR LOWER ELEVATION SYSTEMS**

Lower-elevation focal systems effectiveness monitoring framework

The Nature Conservancy facilitated three workshops with the San Juan Public Lands Center staff to develop a monitoring framework, a prioritized menu of indicators for monitoring the integrity of key ecological features on BLM-managed lands within the San Juan Planning Area. The purpose of the monitoring framework is to provide the basis for effectiveness monitoring and adaptive management in the conservation of biodiversity. With this purpose in mind, the monitoring framework seeks to identify the monitoring priorities that will enable SJPLC and partners to assess whether they are successfully

- ❖ Maintaining or improving resource health at appropriate scales;
- ❖ Minimizing impacts to resource health; and
- ❖ Achieving objectives for biodiversity conservation.

Table Z.2 - Lower elevation - Very high & high-priority focal systems monitoring framework¹

Targets	Indicator	Priority	Status	Methods	Frequency and Timing	Who monitors
Semi-desert Shrublands	Presence of rare plants (G1, G2, and all BLM special status species) in semi-desert shrublands	High	Ongoing	CNHP standard occurrence ranking	5-10 years	CNHP with BLM support
Semi-desert Shrublands	Cover (acres) & type (moss, lichen, cyanobacteria) in semi-desert shrublands	High	Ongoing	Long-term trend studies. Sensitivity for monitoring change for crusts is relatively low. Need a baseline. Ratings extreme to none to slight are from Indicators of Rangeland Health version 3 (2000); Technical reference 1734-6;	5-10 years	BLM
Semi-desert Shrublands	Soil/site stability indicator summary ratings in semi-desert shrublands	High	Ongoing	Indicators of rangeland health version 3, Technical reference 1734-6 (2000).	5-10 years	BLM
Semi-desert Shrublands	Relative dominance and diversity of bunchgrasses (Indian ricegrass; needle-and-thread; salina wild rye;) in semi-desert shrublands	High	Ongoing	Consistent with Indicators of Rangeland Health version 3, Technical Reference 1734-6 (2000) assessment of functional groups (examination of relative dominance compared to reference sites). Consider also monitoring winterfat and four-wing saltbush for project-level indicators.	5-10 years	BLM
Semi-desert Shrublands	Proportion of high and very high indicators that are being assessed	High	Planned	Compare annual monitoring efforts against plan	Annually	BLM

¹ Developed using the Nature Conservancy Conservation Action Planning model. See [San Juan Planning for Biodiversity Model Project Phase 2 Report to BLM September 29, 2006](#)

Targets	Indicator	Priority	Status	Methods	Frequency and Timing	Who monitors
Semi-desert grassland	Fragmentation in grasslands	High	Planned	GIS assessment; unclear what the best methods for this might be, this may need some research; maps need to be improved to detail social trails and roads, updated frequently to show change in new roads, oil and gas and other surface disturbance.	Determined by expected rate of change, but not more than every 5-10 years	BLM
Semi-desert grassland	dominance and diversity of bunchgrasses in grassland	High	Ongoing	Indicators of rangeland health version 3. Technical reference 1734-6 (2000) In hard soil types, blue grama should naturally dominate. In most places, bunchgrass should be the dominant species present.	5-10 years	BLM
Semi-desert grassland	Presence of annual invasive species in grasslands	High	Planned	Mapping is being done for perennial species and similar efforts need to be completed for annual invasives.	Annual mapping efforts as well as mapping of any control or management efforts	BLM in coordination with state and county weed specialists
Semi-desert grassland	Presence of perennial invasive species in semi-desert grasslands	High	Ongoing	Perennial species are mapped; these maps should be updated regularly as well as documenting control and management efforts.	Annual mapping efforts as well as mapping of any control or management efforts	BLM and state and county weed partners
Semi-desert grassland	Proportion of high and very high indicators that are being assessed	High	Planned	Compare annual monitoring efforts against plan	Annually	BLM

Targets	Indicator	Priority	Status	Methods	Frequency and Timing	Who monitors
Sagebrush Shrublands	Distribution and condition of habitats that support key life history stages for grouse	Very High	Ongoing	Mapping of habitat by life history stages for grouse. This was done as a part of the individual Gunnison sage grouse working group reports. Unclear whether this will continue to be done. Information on what the habitat should look like and monitoring methods is located in the Gunnison Sage Grouse Rangewide Plan.		Colorado Division of Wildlife in partnership with grouse working group
Sagebrush Shrublands	Amount of effective grouse habitat as indicated by surface disturbance near leks	Very High	Planned	GIS assessment of the percentage of area within 0.6 miles of leks that is not impacted by roads, powerlines, fences and other surface disturbance	Annually in areas of high change; every 3-5 years in areas that are not changing;	Colorado Division of Wildlife in partnership with grouse working group
Sagebrush Shrublands	Gunnison sage grouse population size	Very High	Ongoing	Lek counts are conducted each spring	Annually	Colorado Division of Wildlife in partnership with grouse working group
Sagebrush Shrublands	Sagebrush shrub vigor and reproduction	High	Planned	Indicators of Rangeland Health version 3; Technical Reference 1734-6 (2000). Functional group ratings; Investigate USGS sagebrush mapping.	5-10 years	
Sagebrush Shrublands	Cover (acres) & type (moss, lichen, cyanobacteria) in sagebrush shrublands	High	Ongoing	Long-term trend studies. Sensitivity for monitoring change for crusts is relatively low. Need a baseline. Ratings extreme to none to slight are from Indicators of Rangeland Health version 3 (2000); Technical Reference 1734-6;	5-10 years	BLM
Sagebrush Shrublands	Soil/site stability indicator summary ratings in sagebrush shrublands	High	Ongoing	Indicators of rangeland health version 3, Technical reference 1734-6 (2000).	5-10 years	BLM

Targets	Indicator	Priority	Status	Methods	Frequency and Timing	Who monitors
Sagebrush Shrublands	Presence of annual invasive species in sagebrush shrublands	High	Planned	Mapping is being done for perennial species and similar efforts need to be completed for annual invasives.	Annual mapping efforts as well as mapping of any control or management efforts	BLM in coordination with state and county weed specialists
Sagebrush Shrublands	Presence of perennial invasive species in sagebrush shrublands	High	Ongoing	Perennial species are mapped; these maps should be updated regularly as well as documenting control and management efforts.	Annual mapping efforts as well as mapping of any control or management efforts	BLM and state and county weed partners
Sagebrush Shrublands	Relative dominance and diversity of bunchgrasses (Indian rice grass; needle and thread; muttongrass; salina wild rye) in sagebrush shrublands	High	Ongoing	Consistent with Indicators of Rangeland Health version 3, Technical Reference 1734-6 (2000) assessment of functional groups (examination of relative dominance compared to reference sites).	5-10 years	BLM
Sagebrush Shrublands	understory cover of Gunnison sage grouse habitat	High	Planned	Some information may be gathered with Indicators of Rangeland Health version 3, Technical Reference 1734-6 (2000) assessment of functional groups (examination of relative dominance compared to reference sites); Reference conditions from Rangeland Gunnison Sage Grouse Plan. concerned with height as well as diversity.	5-10 years	BLM?
Sagebrush Shrublands	Proportion of high and very high indicators that are being assessed	High	Planned	Compare annual monitoring efforts against plan	Annually	BLM
Riparian/ Aquatic	proper functioning condition	Very High	Ongoing	"Proper Functioning Condition - The functioning condition of riparian-wetland areas is a result of interaction among geology, soil, water, and	As prescribed by BLM guidelines	BLM

Targets	Indicator	Priority	Status	Methods	Frequency and Timing	Who monitors
				vegetation." Functional—At Risk - Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation. BLM's goal: 75% of sites in PFC by 1997. (BLM TR-1737-9 Process for Assessing PFC for Riparian Systems).		
Riparian/ Aquatic	Dolores River hydrograph	Very High	Ongoing	USGS maintains gage stations and information is on the web. Data needs to be calibrated and a "natural" hydrograph described as well as key aspects of the hydrologic regime that are important will be described - Dolores River Watershed group is doing this?		
Riparian/ Aquatic	% of mainstem and main tributaries dominated by native woody vegetation	Very High	Ongoing	Part of PFC? Or aerial photo assessment	PFC is scheduled on a 10 year frequency	BLM and Tamarisk Coalition, and the Dolores River Action Committee
Riparian/ Aquatic	presence of bats	High	Ongoing	Could be monitored by trapping or sound; Many off site issues could affect these species (wintering ground issues) so presence is all that should be measured rather than trends in population sizes. Might want to know distribution (number of mines occupied) and abundance within mine sites.	Subset annual monit67ring;	Colorado Division of Wildlife is monitoring at mines

Targets	Indicator	Priority	Status	Methods	Frequency and Timing	Who monitors
Riparian/ Aquatic	Presence of invasive species in riparian areas	High	Ongoing	Perennial species are mapped; these maps should be updated regularly as well as documenting control and management efforts.	Annual mapping efforts as well as mapping of any control or management efforts	BLM and state and county weed partners
Riparian/ Aquatic	Natural hydrological regimes on mesas upgradient from Canyon of the Ancients	High	Ongoing	This is needed because of water rights issue.		
Riparian/ Aquatic	Proportion of high and very high indicators that are being assessed	High	Planned	Compare annual monitoring efforts against plan	Annually	BLM
Ponderosa/ Warm-dry Mixed Conifer	Presence of perennial invasive species in Ponderosa pine/mixed conifer woodlands	High	Ongoing	Perennial species are mapped; these maps should be updated regularly as well as documenting control and management efforts.	Annual mapping efforts as well as mapping of any control efforts	BLM and state and county weed partners
Ponderosa/ Warm-dry Mixed Conifer	Relative dominance of key species (bunchgrasses, Arizona fescue, serviceberry) in ponderosa pine/mixed conifer	High	Ongoing	Consistent with Indicators of Rangeland Health version 3, Technical Reference 1734-6 (2000) assessment of functional groups (examination of relative dominance compared to reference sites).	5-10 years	BLM
Ponderosa/ Warm-Dry Mixed Conifer	FRCC in Ponderosa pine/mixed conifer	High	Ongoing	Compare FRCC maps over time to determine change and rate of change		LANDFIRE partnership
Ponderosa/ Warm-dry Mixed Conifer	Proportion of high and very high indicators that are being assessed	High	Planned	Compare annual monitoring efforts against plan	Annually	BLM

Targets	Indicator	Priority	Status	Methods	Frequency and Timing	Who monitors
Ponderosa/ Warm-Dry Mixed Conifer	Distribution and abundance of ponderosa pine/mixed conifer woodlands	High	Ongoing	GIS assessment - compare land cover maps over time (R2Veg or best available map)		USFS mapping effort
PJ Woodlands	Presence of rare plants (G1, G2, and all BLM special status species) in PJ woodlands	High	Ongoing	CNHP standard occurrence ranking	5-10 years	CNHP with BLM support
PJ Woodlands	Presence of annual invasive species in PJ woodlands	High	Planned	Mapping is being done for perennial species and similar efforts need to be completed for annual invasives.	Annual mapping efforts as well as mapping of any control efforts	BLM in coordination with state and county weed specialists
PJ Woodlands	Presence of perennial invasive species in PJ woodlands	High	Ongoing	perennial species are mapped; these maps should be updated regularly as well as documenting control and management efforts.	Annual mapping efforts as well as mapping of any control efforts	BLM and state and county weed partners
PJ Woodlands	Presence of old-growth PJ	High	Planned	inventory and mapping of old growth over time	Every 10 years or more frequent if projects are planned within these areas	BLM and USGS have proposed doing this
PJ Woodlands	FRCC in PJ woodlands	High	Ongoing	Compare FRCC maps over time to determine change and rate of change		LANDFIRE partnership
PJ Woodlands	Proportion of high and very high indicators that are being assessed	High	Planned	Compare annual monitoring efforts against plan	Annually	BLM

Targets	Indicator	Priority	Status	Methods	Frequency and Timing	Who monitors
Mountain Shrublands	Presence of perennial invasive species in mountain shrublands	High	Ongoing	Perennial species are mapped; these maps should be updated regularly as well as documenting control and management efforts	Annual mapping efforts as well as mapping of any control efforts	BLM and state and county weed partners
Mountain Shrublands	FRCC in mountain shrublands	High	Ongoing	Compare FRCC maps over time to determine change and rate of change		LANDFIRE partnership
Mountain Shrublands	Proportion of high and very high indicators that are being assessed	High	Planned	Compare annual monitoring efforts against plan	Annually	BLM
Canyonlands	Presence of invasive species within hanging gardens	Very High	Planned	Perennial species are mapped; these maps should be updated regularly as well as documenting control and management efforts.	Annual mapping efforts as well as mapping of any control efforts	BLM and state and county weed partners
Canyonlands	Presence of rare plants (G1, G2, and all BLM special status species) in Canyonlands	High	Ongoing	CNHP standard occurrence ranking	5-10 years	CNHP with BLM support
Canyonlands	Proportion of slickrock soil pocket areas with soil crusts in canyonlands	High	Ongoing	Long-term trend studies. Sensitivity for monitoring change for crusts is relatively low. Need a baseline. Ratings extreme to none to slight are from Indicators of Rangeland Health version 3 (2000); Technical Reference 1734-6.	5-10 years	BLM
Canyonlands	Presence of perennial invasive species in canyonlands	High	Ongoing	Perennial species are mapped; these maps should be updated regularly as well as documenting control and management efforts.	Annual mapping efforts as well as mapping of any control efforts	BLM and state and county weed partners

Targets	Indicator	Priority	Status	Methods	Frequency and Timing	Who monitors
Canyonlands	Proportion of high and very high indicators that are being assessed	High	Planned	Compare annual monitoring efforts against plan	Annually	BLM

Lower Elevation Monitoring Framework, with suggested methods and frequency. (Workbook Source: SanJuanBLMlowelevationCAP_v4b9262006.xls)