

Appendix A - Forest Plan Monitoring and Evaluation Plan

Forest Plan monitoring is an integral part of the adaptive management cycle that guides future management decisions and actions. Adaptive management includes defining measurable objectives, monitoring, learning and changing, and recognizing uncertainties that may affect achievement of objectives and achievement or maintenance of desired conditions.

Periodic evaluations summarizing the monitoring results will be reviewed by the Forest Supervisor and other managers to determine if any changes are needed in management actions or plan guidance.

The monitoring plan describes the program area associated with the monitoring, monitoring questions, associated indicators or performance measures, a cross-reference to the plan component(s) being monitored, and the frequency of monitoring and reporting (annual or other time period). It also documents the source (i.e. who does the monitoring), which may be the LTBMU, the Pacific Southwest Region, or a collaborative effort.

This monitoring plan is intended to inform resource management on the unit, by testing relevant assumptions, tracking relevant changes, and measuring management effectiveness and progress toward achieving or maintaining desired conditions or objectives.

Although inventories and implementation monitoring are important and will continue to be implemented on the LTBMU, they are not included in this monitoring plan because they only indirectly inform progress towards the objectives and desired conditions in the Forest Plan. Inventories describe how much or how many of a given resource is present, while implementation monitoring describes how well management direction and intent was followed in projects and activities.

Lake Tahoe Basin Management Unit

Desired Conditions	Indicator/Measure	Monitoring Question(s)	Responsible Agency	Monitoring Time Frame	Frequency of Monitoring	Frequency of Reporting
Air Quality	O3 injury to pine	What is the status and trend of O3 injury to pine?	USFS (RO), TRPA	Life of plan	4 to 5 yrs	4 to 5 yrs
Air Quality	N compounds, O3 concentrations, and lichen analysis	What is the status and trend of N compounds and O3 ?	USFS, USFS (RO)	Life of plan	4 to 5 yrs	4 to 5 yrs
Air Quality	Acid deposition	What is the status and trend of acid deposition?	USFS, USFS (RO, PSW Station)	Life of plan	4 to 5 yrs along with N compounds monitoring	4 to 5 yrs
Air Quality	California Regional Haze State Implementation Plan goal	Is visibility improving and data following the Regional Haze glide path?	USFS (RO), TRPA, CARB	Life of plan	Continuously	Annually
Soil Quality	bulk density, soil cover	Are desired soil conditions being maintained within vegetation management project areas?	USFS	Life of plan	Project dependent	Annually, when conducted
Soil Quality	BMPEP Evaluations (also addresses DC2-WQ).	To what degree are best management practices implemented and effective in protecting soil and water resources for LTBMU management activities?	USFS	Life of plan	Annually	Annually
Water Quality	Lake Clarity	What is the status and trend of Lake Tahoe Clarity?	TRPA	Life of plan	Annually	Annually

Desired Conditions	Indicator/Measure	Monitoring Question(s)	Responsible Agency	Monitoring Time Frame	Frequency of Monitoring	Frequency of Reporting
Water Quality	tributary sediment and nutrient concentrations	What is the status and trend of sediment and nutrients loads in Lake Tahoe Tributaries	TRPA/USGS	Life of plan	Annually	Annually
Water Quality	geomorphic assessment of road condition and connectivity (also addresses DC2-Soils)	To what degree are best management practices implemented on roads effective in protecting soil and water resources ?	USFS	Life of plan	Project dependent	Annually, when conducted
Water Quality	urban stormwater - turbidity, flow, suspended sediment, and nutrients	What is the status and trend of sediment and nutrients loads in Lake Tahoe urban runoff?	Lahontan, Local Jurisdictions	Life of plan	Annually	Annually
Water Quality	urban stormwater sediment and nutrient concentrations	How effective are urban stormwater BMPS in reducing urban stormwater pollutants?	LWRQCB, Local Jurisdictions	Life of plan	Annually	Annually
Hydro & Geomorphic Process	Region 5-Stream Condition Inventory Metrics, Vegetation Transects/Plots, Photopoints	To what degree have restoration efforts been successful in restoring floodplain connectivity and channel/riparian habitat, improving water quality, stabilizing stream banks and sediment transport regimes.	USFS	Life of plan	Depends on metric and project	5 yrs
Hydro & Geomorphic Process	multiple, see WCA protocol	Is watershed condition improving in the Lake Tahoe Basin, as evaluated through Watershed Condition Ratings.	USFS	Life of plan	5 yrs	5 yrs

Desired Conditions	Indicator/Measure	Monitoring Question(s)	Responsible Agency	Monitoring Time Frame	Frequency of Monitoring	Frequency of Reporting
Forest Veg – Forest Structure	Seral Stage/ Percent	Are the seral stage percentages for a major forest type within the historic reference condition?	USFS (R5-Ecology), USFS (RSL)	Life of plan	5 to 10 yrs	Reported every 5 years as part of TRPA Common Vegetation Threshold
Forest Veg - Forest Composition	Forest Type/ Proportion of Total Acres of Major Forest Types	Are the proportions of each major forest type in the Basin within the historic range?	USFS (RSL)	Life of plan	5-10 yrs	Reported every 5 yrs as part of TRPA Common Vegetation Threshold
Forest Veg - Forest Stand Resilience	Mortality-Actual/ Trees Per Acre	Are levels of tree mortality, by causal agent, at background levels?	USFS (S&PF-FHP)	Life of plan	Annually	Reported annually as the Annual Mortality Report from Forest Health Protection
Forest Veg	Parcel Condition related to forest health, fuels, hydrologic condition	What is the condition of urban forest parcels	USFS	Life of plan	3-6 yrs depending on proximity to developed private lands	

Desired Conditions	Indicator/Measure	Monitoring Question(s)	Responsible Agency	Monitoring Time Frame	Frequency of Monitoring	Frequency of Reporting
Habitat & Species Diversity	MIS habitat and population distribution at the bioregional scale	What are the trends for Management Indicator Species at the bioregional (Sierra Nevada) scale?	USFS / Partners; <i>MIS monitoring is conducted at the Sierra Nevada scale, including sampling on the LTBMU; see DEIS for more information.</i>	Life of plan	1-3 yrs	1-3 yrs
Habitat & Species Diversity	TEPCS Census Counts	What is the status and trend in TEPCS plant populations and communities within the Lake Tahoe Basin?	USFS (LTBMU)	Life of Plan	Annually (not every species or site will be monitored annually)	5 yrs

Desired Conditions	Indicator/Measure	Monitoring Question(s)	Responsible Agency	Monitoring Time Frame	Frequency of Monitoring	Frequency of Reporting
Habitat & Species Diversity	Draba asterophora and Lewisia longipetala: Density & Plant Size, demographic structure	What is the status and trend of plant density and plant size within the Lake Tahoe Basin? What is the status and trend of plant demographic structure within the Lake Tahoe Basin? Are changes in climate (snowpack persistence, total snowfall, timing of spring runoff) influencing the density, demographic structure or transition rates of plant populations? Are changes in inter-specific competition (total vegetative cover) or habitat suitability (ground cover, erosion features) related to density, demographic structure or transition rates of populations?	USFS (LTBMU)	Life of Plan or until species is removed from TES or SI list	5 yrs	6 yrs
Habitat & Species Diversity	Stream Temperature Monitoring: temperature	Are stream temperatures suitable for life history of native aquatic species?	USFS (LTBMU)	Life of Plan	Annually (not every site will be monitored annually)	5 yrs
Habitat & Species Diversity	Groundwater-dependent ecosystems, including fen and meadow habitats, (e.g Hell Hole ecosystems, Osgood Swamp, etc)	What is the status and trend of groundwater-dependent ecosystems found on FS land? Are changes in climate influencing wetland trends?	USFS (LTBMU)	Life of Plan	5 yrs	5 yrs

Desired Conditions	Indicator/Measure	Monitoring Question(s)	Responsible Agency	Monitoring Time Frame	Frequency of Monitoring	Frequency of Reporting
Habitat & Species Diversity	Meadow Monitoring Region 5 Range monitoring protocol: Species composition, ground cover, wetland rating, vegetation rating, ecological status	What is the current condition and ecological status and trend of wetlands (e.g., wet meadows, fens, marshes, etc.) in the Lake Tahoe basin, based on key indicators of biological integrity and water quality, and how is that condition changing over time? Are changes in climate influencing wetland trends? What is the ecological condition and trend in meadow systems where grazing has been removed or restoration has occurred?	USFS (LTBMU; RO)	Life of Plan	5 yrs	6 yrs
Habitat & Species Diversity Species Refuge Areas	TYC Interagency Survey - fall census count for population numbers	What is the status and trend of Tahoe yellow cress?	TAG team with LTBMU partner	Life of Plan	Set of conditions based on lake level	Annually when survey is conducted
Invasive Species Management	Invasive species sites/acres	What is the status and trend of invasive species within the Lake Tahoe basin?	Coordination with Basin Invasive groups, LTBMU partner	Life of Plan	5 yrs if treatment does not occurring	5-6 yrs

Desired Conditions	Indicator/Measure	Monitoring Question(s)	Responsible Agency	Monitoring Time Frame	Frequency of Monitoring	Frequency of Reporting
Species Refuge Areas	Amphibian visual encounter surveys: number of amphibians, demographics, presence of Bd (chytrid swab) [includes western toad and MYLF]; number of fish	What is the current status of amphibian populations in the Lake Tahoe basin and how are they changing over time? What is the current status of Sierra Nevada (mountain) yellow-legged frog (SNYLF) populations in the Lake Tahoe basin and how are they changing over time? What is the distribution of Bd around the basin and infection level?	USFS (LTBMU); CA Dept. of Fish and Game	Life of Plan	Annually (not every species or site will be monitored annually)	5 yrs
Species Refuge Areas Habitat & Species Diversity	Ecological condition of streams (including SEZs)- Physical/chemical habitat condition (no. of pools, no. pieces of CWD, % bank instability, w/d ratio, entrenchment, % stream shade, etc) (Rosgen channel/habitat typing)	What is the current ecological condition of streams (including SEZs) and wetlands (e.g. meadows, fens, marshes, etc) in the Lake Tahoe basin, based on key indicators of biological integrity and water quality, and how is that condition changing over time?	Basin M&E; USFS (LTBMU)	Life of Plan	At least twice during the life of the plan selected SCI sites will be visited	10 yrs
Species Refuge Areas Habitat & Species Diversity	Number of self sustaining sub-populations LCT	Have recovery actions resulted in an increase in LCT abundance and associated native non-game species and decrease in non-native salmonides? Does the LCT population have multiple age and size classes as a positive population response to brook trout removal?	US Fish and Wildlife, in collaboration with USFS (LTBMU) and partners	Life of Plan	5 yrs	5 yrs

Desired Conditions	Indicator/Measure	Monitoring Question(s)	Responsible Agency	Monitoring Time Frame	Frequency of Monitoring	Frequency of Reporting
Protected Activity Center	California Spotted Owl; Northern Goshawk	What is the status and trend of California Northern Spotted Owl and Goshawk populations in the Basin?	USFS (LTBMU)	Life of Plan or until species is removed from TES or SI list	3 times in 10 yrs monitoring plan - protocol developed by PSW(each of the 3 times is a 2 year proctocol so 6 times in 10 years), annually known nests	10 yrs
Habitat & Species Diversity	Number of detections, nests, and or roosts	What is the status and trend of TEPCS populations in the Basin?	USFS (LTBMU)	Life of Plan or until species is removed from special status list	Annually (not every species or site will be monitored annually)	Annually
Habitat & Species Diversity	Proportion of terrestrial wildlife habitat (i.e. aspen, marsh, meadows, etc.) by area (e.g. by watershed or similar landscape scale), acres, and relative risk of loss from the landscape.	What is the current distribution, extent, and condition of select terrestrial wildlife habitat within the Lake Tahoe Basin?	USFS (LTBMU)	Life of Plan	5 yrs	6 yrs

Desired Conditions	Indicator/Measure	Monitoring Question(s)	Responsible Agency	Monitoring Time Frame	Frequency of Monitoring	Frequency of Reporting
Recreation Opportunities	Visitor Use/Satisfaction	National Visitor Use Monitoring (NVUM)	USFS (LTBMU)	Life of Plan	5 yrs or agency standard	5 yrs or agency standard
Direction in Desolation Wilderness Management Guidelines	Limits of Acceptable Change	Are conditions in the Desolation Wilderness within the limits of acceptable change?	USFS (LTBMU)	Life of Plan	Annually when conducted	Annually when conducted