



Untrammelled Quality		
Indicator	KIW Measure(s)	Data/Metrics Used
Authorized actions that manipulate the biophysical environment	GUMO: 1. Number of actions to manage plants, animals soil, water or fire 2. Percent of natural fire starts suppressed	GUMO: 1a. Number of plant removal projects 1b. Number of Feral Hog and Barbary Sheep taken 1c. Number prescribed burns 2a. % natural fires starts suppressed
	LAVO: 1. Number of actions to manage plants, animals soil, water or fire 2. Percent of natural fire starts suppressed	LAVO: 1a. Number acres treated for invasive plant species/yr 1b. Number animals collared, banded, or tagged/yr 1c. Number sites where organisms baited/yr 1d. Number native and non-native animals removed/yr 1e. Number visible saw-cut logs on trails 1f. Number prescribed burns 2a. % naturally ignited fires manipulated
	EVER: 1. Number of actions to manage plants, animals soil, water or fire 2. Percent of natural fire starts suppressed	EVER: 1a. Areas of exotic vegetation treated 1b. Number of native fish harvested 1c. Number python eradications 1d. Number animals tagged or banded 1e. Number prescribed burns 2a. Percent natural fire starts suppressed
	BUFF: 1. Number of actions to manage plants, animals soil, water or fire 2. Percent of natural fire starts suppressed	BUFF: 1a. Number of authorized actions to manage flora, fauna, insects, disease, soil, or water per yr 1b. Number of prescribed fires 2a. Number of suppression response(s) to wildland fire starts
Unauthorized actions that manipulate the biophysical environment	GUMO: 1. Number of unauthorized actions	GUMO: 1a. Number of human ignited fires
	LAVO: 1. Number of unauthorized actions	LAVO: 1a. Number of illegal campfires 1b. Number of illegal species takings
	EVER: 1. Number of unauthorized actions	EVER: 1a. Number visitor ignited fires 1b. Total deviance from average Shark River Slough Stage 1c. Total deviance from average Taylor Slough

		Stage
	BUFF: 1. Number of unauthorized actions	BUFF: 1a. Number of unauthorized actions to manage flora, fauna, insects, disease, soil, or water per yr
Natural Quality		
Indicator	KIW Measure(s)	Data/Metrics Used
Plant & animal species and communities	GUMO: 1. Number T&E or sensitive indigenous species 2. Number of extirpated indigenous species 3. Abundance, distribution, or number of invasive-non-indigenous species 4. Change in demography or composition of communities	GUMO: 1a. Number T&E or sensitive indigenous species 2a. Number of extirpated indigenous species 2b. number of reintroduced previously extirpated species 3a. area treated for invasives 3b. number of invasive plant removal projects 4a. Mexican Spotted Owl population status 4b. Status of search for Guadalupe fescue 4c. Average area of vegetation loss around tent pads
	LAVO: 1. Number T&E or sensitive indigenous species 2. Number of extirpated indigenous species 3. Abundance, distribution, or number of invasive-non-indigenous species 4. Change in demography or composition of communities	LAVO: 1a. Number of native species listed as sensitive, threatened, or endangered 2a. Number native species extirpated/extinct since 1972 3a. Number non-native plant species 3b. number non-native fish species 4a. Infection rate of native whitebark pine by white pine blister rust
	EVER: 1. Number of T&E species 2. Change in demography or composition of communities	EVER 1a. Number of T&E species 2a. alligator nesting % success rate 2b. Cape Sable Seaside Sparrow population
	BUFF: 1. Number of T&E or sensitive indigenous species 2. Number of extirpated indigenous species 3. Number of non-indigenous species 4. Abundance and distribution of	BUFF: 1a. Number of native species listed as T, E, sensitive, or of concern 2a. Number of native species extirpated or functionally extirpated 3a. Number non-native species 4a. Abundance and distribution of invasive non-

	invasive non-native species	native species every 5 years
Physical resources	GUMO: 1. Visibility based on deciview and sum of anthropogenic fine nitrate and sulfate 2. Ozone air pollution (N100 & W126) 3. Acid deposition (sulfur and nitrogen wet deposition) 4. Change in water quality *5. Status of geologic resources (not a KIW measure)	GUMO: 1a. Deciview 1b. Fine nitrate+sulfate 2a. Highest 8 hr average ozone concentration 2b. W126 2c. # Days \geq 76 ppb (NAAQ standard) 3a. Sulfur wet deposition 3b. Nitrogen wet deposition 4a-f. DO, pH, Hardness (CA), SO4, NO3, P, & Temp 5a. Change in geologic specimen abundance 5b. Geologic research impacts 5c. Cave and karst condition
	LAVO: 1. Visibility based on deciview and sum of anthropogenic fine nitrate and sulfate 2. Ozone air pollution (N100 & W126) 3. Change in water quality 4. *Snowpack (not a KIW measure)	LAVO: 1a. Average annual haziness (deciview) 2a. Number of days/yr ambient ozone is out of compliance 3a. Quality of lake water 4a. Snowpack at Lake Helen
	EVER: 1. Visibility 2. Acid deposition (sulfur and nitrogen wet deposition) 3. Change in water quality	EVER: 1a. Standard visual range of the lowest 20% of days 1b. Standard visual range of the highest 20% of days 2a. Total annual wet nitrogen deposition 2b. Total annual wet sulfur deposition 3a. Water quality
	BUFF: 1. Visibility based on deciview and sum of anthropogenic fine nitrate and sulfate 2. Ozone air pollution (N100 & W126) 3. Acid deposition (sulfur and nitrogen wet deposition) 4. Change in water quality	BUFF: 1a. Visibility based on deciview and sum of anthropogenic fine nitrate and sulfate 2b. Ozone air pollution (N100 & W126) 3c. Acid deposition (sulfur and nitrogen wet deposition) 4a. Concentration of fecal coliform bacteria/yr

Biophysical Processes	GUMO: 1. Extent and magnitude of global climate change	GUMO: 1a. Average yearly temperature (also monthly averages)
	LAVO: 1. Departure from natural fire regimes	LAVO: 1. Departure from natural fire regimes
	EVER: 1. *Persistence of mercury through species interactions (Not a KIW measure) 2. Extent and magnitude of global climate change	EVER: 1a. Persistence of mercury through species interactions 2a. Rate of sea level change
	BUFF: 1. Departure from natural fire regimes	BUFF: 1a. Departure from natural fire regimes
Undeveloped Quality		
Indicator	KIW Measure(s)	Data/Metrics
Non recreational developments	GUMO: 1. Authorized physical development	GUMO: 1a. Number of non-recreational structures
	LAVO: 1. Authorized physical development	LAVO: 1a. Number of buildings 1b. Number of other permanent installations 1c. Length of fire breaks
	EVER: 1. Authorized physical development	EVER: 1a. Number new monitoring or research structures
	BUFF: 1. Authorized physical development 2. Unauthorized non-recreational physical development	BUFF: 1a. Number of authorized physical development every 5 years 2a. Number of non-recreational structures and man-made improvements removed every 5 years
Inholdings	GUMO:	GUMO:
	LAVO: 1. Area and impact of inholdings	LAVO: 1. Area of inholdings
	EVER: 1. Area and impact of inholdings	EVER: 1a. Number of properties 1b. Area of properties 1c. Area of un-acquired mineral rights
	BUFF:	BUFF:
Motorized or mechanical transport	GUMO: 1. Authorized non emergency use 2. Emergency use	GUMO: 1a. Number of MRA documents 2a. Number of emergency uses
	LAVO: 1. Authorized non emergency use 2. Emergency use	LAVO: * <i>Organized differently than KIW</i> Helicopter flights (disaggregated by emergency and non emergency)

	3. Unauthorized motorized/mechanical use	Authorized mechanized tool (disaggregated by emergency and non emergency) Unauthorized use of motor vehicles or motorized equipment
	EVER: 1. Authorized non emergency use 2. Emergency use 3. Unauthorized motorized/mechanical use	EVER: *organized differently than KIW Hours of helicopter use Hours of motorboat and airboat use Number of boat groundings
	BUFF: 1. Authorized non emergency use 2. Emergency use 3. Unauthorized motorized/mechanical use	BUFF: 1a. Authorized non emergency use 2a. Emergency use 3a. Unauthorized motorized/mechanical use
Loss of cultural resources	GUMO: 1. Disturbances to cultural resources	GUMO: 1a. Severity of disturbances to cultural resources (photos/status reports)
	LAVO: * 5 th Quality – see below	LAVO:
	EVER: 1. Disturbances to cultural resources	EVER: 1a. Number of disturbed cultural resource sites
	BUFF: 1. Disturbances to cultural resources	BUFF: 1a. Number/severity of disturbance to archeological sites or resources listed on NRHP 1b. Percent wilderness for which cultural/archeological resources assessment has not been completed 1c. Percent eligible structures not yet evaluated for Historic Places or the NPS list of Classified Structures
Opportunity for Solitude or Primitive and Unconfined Recreation Quality		
Indicator	KIW Measure(s)	Data/Metrics
Remoteness from sights and sounds of people inside wilderness	GUMO: 1. Visitor Use 2. Trail contacts 3. *Unauthorized recreational development (not a KIW measure but similar to condition of campsites)	GUMO: 1a. Annual number of visitors 1b. Number of backcountry nights 2a. Number of trail contacts (visitors/hour) 3a. Average items of trash 3b. Number of fire rings 3c. Number of wind shelters 3d. Number of social trails
	LAVO:	LAVO:

	<p>1. Visitor Use</p> <p>2. Trail contacts</p> <p>3. Acres of wilderness affected by travel routes inside the wilderness</p>	<p>1a. Number overnight visitors per acre of wilderness/yr</p> <p>2a. Average seasonal (summer and winter visitor encounter rate</p> <p>3a. Acres of wilderness affected by travel routes inside the wilderness</p>
	<p>EVER:</p> <p>1. Visitor Use</p>	<p>EVER:</p> <p>1a. Number of visitors</p> <p>1b. Number of backcountry camping nights/yr</p>
	<p>BUFF:</p> <p>1. Visitor use</p> <p>2. Trail contacts</p> <p>3. Number and condition of campsites</p> <p>4. Area of wilderness affected by access or travel routes inside wilderness</p>	<p>BUFF:</p> <p>1a. Number of canoes on the river within wilderness/yr</p> <p>2a. Number of encounters/yr</p> <p>3a. Number and condition of socially established campsites</p> <p>4a. Area of wilderness affected by access or travel routes inside wilderness</p>
Remoteness from occupied and modified areas outside wilderness	<p>GUMO:</p> <p>1. Night sky visibility</p> <p>2. Intrusions on soundscape</p>	<p>GUMO:</p> <p>1a. Night sky readings (mag/arcsec²)</p> <p>2a. Average overflights/hr</p>
	<p>LAVO:</p> <p>1. Night sky visibility</p> <p>2. Intrusions on soundscape</p>	<p>LAVO:</p> <p>1a. Night sky visibility</p> <p>2a. Average nighttime decibel level</p>
	<p>EVER:</p> <p>1. Night sky visibility</p> <p>2. Area of wilderness affected by access or travel routs outside wilderness</p>	<p>EVER:</p> <p>1a. Night sky visibility</p> <p>2a. Area from which outside development is visible</p>
	<p>BUFF:</p> <p>1. Area of wilderness affected by access or travel routes adjacent to the wilderness</p> <p>2. Night sky visibility</p> <p>3. Intrusions on soundscape</p>	<p>BUFF:</p> <p>1a. Area of wilderness affected by access or travel routes adjacent to the wilderness</p> <p>2a. Night sky visibility</p> <p>3a. Number of overflights/yr</p>
Facilities that decrease self reliant recreation	<p>GUMO:</p> <p>1. Agency provided recreation facilities</p>	<p>GUMO:</p> <p>1a. Number tent pads</p> <p>1b. Number recreational signs</p>
	<p>LAVO:</p>	<p>LAVO:</p>

	1. Agency provided recreation facilities	1a. Number of bridges
	EVER: 1. Agency provided recreation facilities	EVER: 1a. number of backcountry campsites
	BUFF: 1. Agency provided recreation facilities 2. User-created recreation facilities	BUFF: 1a. Miles of maintained trails 1b. Number of informational and/or directional signs 2a. Type and number of user-created recreation facilities
Management restrictions on visitors behavior	GUMO:	GUMO:
	LAVO: 1. Type and extent of management restrictions	LAVO: 1a. Percent wilderness where overnight camping is prohibited
	EVER: 1. Type and extent of management restrictions	EVER: 1a. Amount of park closed to recreation
	BUFF: 1. Type and extent of management restrictions	BUFF: 1a. Number of, type ,and extent of management restrictions

**** LAVO has an additional cultural quality:**

Lassen Volcanic Cultural quality			
Wilderness protects features of pre-historical and historical value			
Monitoring question	Indicator	Measure ¹	Data Sources
What are the trends in cultural resources protection inside wilderness?	Actions taken (or not taken) by the National Park Service to protect cultural resources	5-1. Percent of wilderness for which a cultural resources assessment has <u>not</u> been completed	New: Pair RM expertise (Louise Johnson or Mary Gerbic?) with GIS data
		5-2. Percent of eligible structures <u>not</u> listed on the National Register of Historic Places or the NPS List of Classified Structures	RM expertise (Louise Johnson or Mary Gerbic?)
		5-3. Percent of listed structures or features that are <u>no longer used</u> in their historical context	RM expertise (Louise Johnson?)
What are the trends in cultural resources degradation inside wilderness?	Actions that harm cultural resources	5-4. Percent of listed structures that are damaged or vandalized, per year	New: Will require survey