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LAC Indicators: An Evaluation of Progress and List of Proposed Indicators

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One of the most critical, and difficult, steps in the Limits of Acceptable Change (LAC) process is the selection of indicators. To help with this step, this paper (I) briefly reviews some desirable characteristics of indicators and (2) lists indicators that have been proposed or adopted in LAC plans. From a comparison of this list of indicators and desirable characteristics of indicators we briefly evaluate progress to-date and identify three major problems in selecting LAC indicators. Indicators from dispersed backcountry and wild and scenic rivers, as well as from designated wilderness, are included in this discussion.

What is an Indicator?

An indicator is a specific parameter that can be monitored to determine whether management objectives are being met. To be an indicator, a parameter must be stated in a specific enough manner to be monitored unambiguously. Management objectives are often initially stated in quite general terms. For example, many wilderness plans contain objectives related to water quality in wilderness. General categories of concern--such as water quality--have been termed factors by Stankey et al. (1985). For LAC applications, one or more

specific indicators must be selected for each critical factor--such as water quality.. For example, the number of coliform bacteria per 100 ml of water is an indicator of water quality used by many state health departments. The basic rule of thumb is that a parameter is specific enough to be termed an indicator when it is clear how it should be measured.

Desirable Characteristics of Indicators

Both Stankey et al. (1985) and Merigliano (1990) describe desirable characteristics of indicators. Eight desirable characteristics ,,including zhe requirement of specificity, are as follows:

1. Measurable. Indicators should be quantitative--subject to measuremen:

2. Reliable. Indicators should be capable of being measured precisely and accurately (repeatable measures by different personnel).

3. Cost-effective. Indicators should be capable of being measured cost-effectively, generally by field personnel using simple equipment and techniques.

4. Significant. Indicators must relate to significant conditions or features of the wilderness. A good indicator should be capable of detecting changes that, if they occurred, would be considered serious problems. Examples include changes which persist for a long time, disrupt ecosystem functioning or reduce the quality of recreational experiences.

5. Relevant. The types of change that are to be detected through the monitoring of indicators should be confined to changes that result from human activities. This characteristic may not apply outside of wilderness or other places where objectives stress minimal human impact.

6. Sensitive. Indicators should focus on sensitive components of the wilderness resource- -components that provide an early warning system, alerting

managers to deteriorating conditions while there is still time to correct things.

7. Efficient. Indicators are most efficient if they reflect the condition of more than themselves, because this reduces the number of parameters that must be monitored.

8. Responsive. The types and/or causes of change that are to be detected through the monitoring of indicators should be responsive to management control.

Proposed or Adopted Indicators

The indicators compiled in this paper come from responses to a request for information on proposed or adopted indicators. Contact was made with Forest Service respresentatives known to be active in LAC planning or training, from every administrative region. Additionally, contact was made with Bureau of Land Management planners that were known to be active in LAC planning. In all cases, each person contacted was asked for names of others that were at least as far along in the LAC planning process to have generated potential indicators. Two known National Park Service LAC-based plans were also reviewed. This process is likely to have overlooked some LAC planning activities, but, hopefully, not very many. Some of these indicators have actually been adopted, and appear in draft or approved management plans. Others have merely been proposed by LAC task forces and could change when examined more closely. The listing is presented in a way that the sources of indicators can be identified. We did some minor interpretation and clarification and we tried to remove obvious redundancy. However, beyond this we tried to keep evaluation and editing to a minimum.

The intent of this list is not to provide the reader with directly adoptable indicators. We would specifically advise against that. Rather, this list

provides a feeling for the range of factors being addressed and, sometimes, good ideas about indicators which may be linked to these factors. This list also provides a useful perspective on progress toward the development of indicators for the various factors.

A Comparison of Indicators and Desired Characteristics

When we compare our description of desired characteristics of indicators with the potential indicators listed, three types of problems are evident. These problems are (1) difficulty in defining indicators in specific and quantitative terms, (2) difficulty in selecting among known indicators because of lack of understanding about which indicators are most significant, and (3) difficulty in selecting indicators due to the lack of reliable monitoring methods.

An example of a factor for which planners have had difficulty defining specific indicators is "Fish and Wildlife Conditions." Virtually all of the potential indicators listed for this factor are vague and general. None of these indicators are stated in a way that is measurable. Despite these problems, the range of suggested factors shows the importance placed on fish and wildlife values in wilderness.

An example of a factor for which it has been difficult to select one or two most significant indicators is "Water Quality." There are many potential indicators of water quality, such as water temperature, turbidity, coliform presence, and pH. All of these indicators can be stated in specific terms (for instance, the maximum temperature in a 24 hour period, measured at a certain location), and they all have established, reliable measurement protocols. The problem appears to be that planners are unsure about which of these indicators are most significant and related to human activities in wilderness.

A third problem with indicators is a lack of established, reliable monitoring methods. This. is the case with many of the social condition indicators included here. Specific and significant indicators of social condition have been developed. Many of these are quantitative; however, cost-effective means of collecting precise data on visitors to remote, sparsely populated wilderness are poorly developed. Thus, we see many closely related indicators. Many of these have been generated through trial and error by wilderness managers during the course of their work.

References

Stankey, George H., David N. Cole, Robert C. Lucas, Margaret E. Petersen, and Sidney S. Frissell. The limits of acceptable change (LAC) system for wilderness planning. General Technical Report INT-176. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1985. 37 p.

Merigliano, Linda. Indicators to monitor the wilderness recreation experience. In: Lime, David W., ed. Managing America's enduring wilderness resource. Minneapolis, MN: University of Minnesota; 1990: 156-162.

LIST OF FACTORS WITH CORRESPONDING INDICATORS

The indicators that were submitted or found in plans were classified under the following factors: (A) Campsite conditions, (B) Trail conditions, (C) Social conditions, (D) Soil conditions, (E) Vegetation conditions, (F) Stream/Wetland/Lakes conditions, (G) Fish and wildlife conditions, (H) Developments, (I) Management setting/presence, (J) Vandalism, (K) Aircraft/watercraft, (L) Fire, (M) Domestic livestock, (N) Cultural resources. (0) Air quality.

The number(s) in parentheses following each indicator identifies the source of that particular indicator. The key to those sources appears here.

KEY TO INDICATOR SOURCES

1. Rattlesnake National Recreation Area and Wilderness LAC Task Force, Lolo National Forest, Missoula, MT (proposed)
2. Mt. Rainier National Park Wilderness Management Plan, Washington
3. North Cascades National Park Service Complex Wilderness Management Plan, Washington
4. Sturgeon River Gorge Wilderness Opportunity Area Analysis and Implementation Schedule, Ottawa National Forest, Ironwood, MI
5. McCormick Wilderness Opportunity Area Analysis and Implementation Schedule, Ottowa National Forest, Ironwood, MI
6. Kings River Special Management Area Draft EIS and Plan, Sequoia National Forest, Porterville, CA
7. USFS Region 10 Workshop ideas, Juneau, AK
8. White River National Forest Plan, Glenwood Springs, CO
9. Mt. Baldy Wilderness LAC Task Force (proposed), Apache-Aitgreaves National Forest, Springerville, AZ

10. Bob Marshall Wilderness Complex LAC Plan, Flathead National Forest, Kalispell, MT

11. Allegheny Islands LAC Task Force (proposed), Allegheny National Forest, Warren, PA

12. Hickory Creek LAC Task Force (proposed), Allegheny National Forest, Warren, PA

13. Bear Trap Canyon (USFS/BLM), Dillon, MT

14. Bridger-Teton National Forest Plan, Jackson, WY

15. Gros Ventre Wilderness Plan, Bridger-Teton National Forest, Jackson, WY

16. Mt. Shasta Wilderness Plan, Shasta-Trinity National Forest, Redding, CA

17. Region 8 (proposed), Atlanta, GA

18. Selway-Bitterroot Wilderness LAC Task Force (proposed), Nez Perce National Forest, Grangeville, ID

19. Hells Canyon-Snake River Draft Plan, Wallowa-Whitman National Fores:. Baker, OR

20. White Salmon Wild and Scenic River (proposed), Columbia Gorge National Scenic Area, Hood River, OR

21. Lee's Ferry Area (BLM), Vermillion Resource Area, St. George, UT

22. Mt. Trumball/Mt. Logan Wilderness Management Plan (BLM), St. George, UT

23. Table Rock Wilderness Management Plan (BLM), Salem, OR

24. Carson-Iceberg and Mokelumne Wildernesses (proposed), Stanislaus National Forest, Sonora, CA

FACTOR A. CAMPSITE CONDITIONS

RELATED TO CAMPSITE CONDITION/IMPACT LEVEL

Highest acceptable Frissell rating for existing sites (4,5)
Frissell campsite condition class (8,14)
Level of campsite development (19)
Condition class rating on all campsites encountered [based on severity and number of impacts] (9)
Percent of occupied Frissell Class 1 or higher campsites within sight or sound of each other (90% of the time) (4,5)
Number of campsites by development level (eg. fire ring, grate, table) (7)
Barren camp area - barren core size (21)
Maximum number of sites at a particular impact rating/sq. mile.(18)
Campsite area (including the core and sleeping area) (21)
Size of use areas (7)
Total number of campsites at a particular impact level/opp. class (13)
Trees mutilated or stripped of limbs (2)
Trenching around tents (2)
Number of impacted sites per 640 acres (10)
Number of human impacted sites above a particular condition class per 640 acres (10)
Square feet of barren core (10)
Number of campsites of a particular condition class within 150 feet of a lake or stream (24)
Number of impacted sites/500 acre area exceeding a given impact rating (22)
Amount of denuded ground vegetation as a result of camping activities (2)

RELATED TO CLEANLINESS

Fire rings and charcoal [percent of camps free of charcoal and firerings] (18)
Site cleanliness (15)
Campsite inventory [percent of campsite free of charcoal and fire rings, free of human waste, free of litter, and free of livestock waste] (19)
Occurrence of fire rings, litter and human waste and animal parts.[percent of river corridor free of fire rings, litter and human waste and animal parts in the spring, late fall and winter] (19)
Partially burned materials (2)

RELATED TO NUMBER/DENSITY OF CAMPSITES

Total number of campsites/opportunity class (13)
Density of sites by type (7)
Number of permitted temporary camps per area (7)
Number of campsites/(30 a., 500 a., 640 a., square mile) (4,5,9,11,16,22)
The amount and size of dispersed campsites does not disrupt the recreation opportunities, or the natural resources within the zone. Any increase in use should not change the natural character of the area [number of sites within a quarter mile length of the river corridor] (6)
Number of camps by season of use (7)
Number of campsites (7)
Number of campsites in a camp (3)
Number of campsites within sight and sound of others (7,11,12,16,22j
Distance between campsites (8)

RELATED TO CAMPFIRE AREAS/RINGS

Total number of campfire areas (21)
Number of fire rings (7,17)
Active campfire area (with logs and garbage) (21)
Firering density (23)
Number of fire rings per recreation place (7)
Scorched ground (2)
Sterilized soil (2)

RELATED TO FIREWOOD

Amount of firewood gathering (7)
Available down firewood (7)
Distance of down firewood from fire ring (7)
Distance of firewood from campsites (17)

OTHER INDICATORS RELATED TO CAMPSITE

Campsite location within area of impact to sensitive areas such as lakeshores, trails, streams, other wetlands (4,5)
Distance of campsites from streams (17)
The amount and size of group campsites does not disrupt the recreation opportunities, or the natural resources of the zone. Groups should be encouraged to use campsites outside the SMA and WSR corridor [number of denied requests for group camping] (6)
Intensity of use (7)
Tent platforms (3)
Distance from other camps, main trails, water (3)
Degree of privacy for toilet (3)
Campsite size (11)

FACTOR B. TRAIL CONDITIONS

RELATED TO CONDITION

Depth of tread below surrounding ground or grade of tread (1)
Stability of tread (1)
Vegetative encroachment that hampers travel (1)
Presence of trenching (7)
Tread condition (7)
Width of trail (3,7)
Percent of sensitive areas per trail that become "problem spots" (4,5)
Trail condition [percent of trail free of erosion, blockage (including noxious weeds)] (19)
Exposed roots (3)
Safety hazards (2,3)
Grade, Traverses, Stream Crossings, Brush, Hazard trees, Erosion, Bridges (3)
Switchbacks (2,3,7)
Shortcutting (7)
Avalanche hazards, Turnpiking, Waterbars, Culverts (3)
Horse-damaged trail structures (2)
Stock waste along trails (2)

RELATED TO NUMBER OF TRAILS

Number of switchback shortcuts (7)
Number of trails (15)
Number of social trails (7,21)
Trail density per square mile (8)
Number and development of user created trails (16)
Increase in number of "ways"(user created paths) (1)
Braided trail or overwidened tread (1)
Number of multiple/undesignated trails (7)
Linear feet of multiple (braided) trails (9)
Trail condition [Percent multiple trailing] (7)
Amount of braided trails (7)

RELATED TO WATER CONTROL PROBLEMS

Linear feet of trail where drainage is not controlled and erosion ongoing (9)
Standing water; functioning water control devices (1)
Number of boggy portions of trail over 1 meter in length (that have created the need to step around) (9)
Drainage disruptions (2)

RELATED TO ACCESS/TRAILHEADS

Access sites [number of access sites / 30 acres] (11)
Number of trailheads (7)

FACTOR C. SOCIAL CONDITIONS (HUMAN CONTACTS/CONFLICT/NOISE/EXPERIENCE QUALITY)

AT TRAILHEAD/BOATRAMP

Time spent waiting [percent of parties that have to wait longer than a given number of minutes] (19)
Vehicle count at trailhead (23)
Waiting time at the launch site (20)
Public vehicle traffic counts (7)

WHILE TRAVELING

Percent time in sight of other boating parties (20)
Number of encounters on trail and road (1)
Trail encounters per day - by opportunity class (14)
Number, type and size of other parties met per day while traveling (9)
Waiting time to portage around a waterfall (20)
Recreation parties should travel unencumbered by other parties [the percent probability that you will encounter other parties] (6)
Number of other recreation parties encountered/day while traveling (8,22)
Number of human encounters while traveling(by # of groups and # of people) (7)
Visitors encounter few people while traveling [The percent probability of meeting other users during a certain use period. Example:spring] (6)
% probability of encountering X other parties while on trails (10)

AT CAMPSITE

Number of campsites within sight (16)
Availability of campsites (1)
Number of human encounters by destination "campsite" (7)
The number of sites occupied at one time (8)
Number of campsites within sight or sound of each other (7,11,12,16,18,20)
Number of human encounters by "campsite" (7)
The number of days/summer season a site is occupied (8)
Occupancy rate of public recreation cabins (7)
Number and density of campsites (1)
Number, type and size of other parties camped within site and sound/day (22)
% probability of encountering X other parties (10)

RELATED TO GROUP SIZE

Party size (11,12)
Number of human encounters while traveling on land/day by # of groups and by size (7)
Number of people or recreation stock per group (8)

RELATED TO GROUP TYPES

Encounter between shore to shore groups (13)
Encounter between float and float groups (13)
Encounter between shore to float groups (13)
Encounter between float to shore groups (13)
Number of encounters/day between shore and other shore groups (13)
Number of encounters/day between float and other float groups (13)
Number of encounters/day between float and shore groups (13)
Number of encounters/day between shore and float groups (13)
There are few encounters between motorized and nonmotorized travelers (river area) [percent probability of meeting other users during a certain use period. Ex. spring] (6)
Number of encounters/day with nonrecreation parties (ranchers,pipeline) (22)
Types of use encountered (1)
Complaints from private land owners (20)
The number of contacts between recreation groups (e.g., anglers and boaters) should not cause undue conflict [the number of reported or otherwise documented conflicts between different types of users (e.g., anglers and rafters)] (6)
The number of competitive events, group demonstrations, ceremonies, or other similar events (8)
Number of dogs off leashes where a problem exists with uncontrolled dogs (8)
Ratio of visitors to outfitters/ guides (7)

RELATED TO HUMAN USE (WASTE DISPOSAL/LITTER)

Evidence of human waste (21)
Presence of litter (20)
Human waste [percent of beaches and river corridor free of human waste] (19)
Piece's of trash/litter (17.19.21)
Garbage (2)
Toilet paper (2)
Offensive odors (2)

RELATED TO QUALITY OF VISIT

Complaints (23)
Return visitation (23)
Quality of experience (23)
Degree of challenge (2)
Relative isolation (2)
Evidence of human activities (2)
Difficulty of travel (2)
Degree of risk (2)

RELATED TO NOISE

Permitted noise levels (4,5)
Noise (24)
Sounds associated with heavy traffic, vehicle traffic, logging equipment, and mining developments (7)
Number of visitors/year who complain about noise caused by other visitors (4,5)

OTHER SOCIAL CONDITION INDICATORS (not specific to traveling or campsite)

Number of trail and campsite encounters/trail segment/day (24)
Perceived and recorded social conflicts and incidents of resource damage [number of] (19)'
Number of groups encountered/day (11,12,16)
Maximum number of other parties encountered/day (18)
Reduction in opportunity for solitude (1)
Frequency of group encounters per day 80% of the time (4,5)
Aside from specific activities, there are few encounters with recreationists [percent probability of meeting other forest users during a certain use period] (6)
Number of trail and camp encounters per day (8)
The number of PAOT (people at one time) per acre (8)
Percentage of days in the season that the level of use exceeds capacity (8)
Average number of visitors per day (23)
Average number of encounters per day (23)
Density of people (7)
Number of visitors and stock using an area per day (3)
Number of visitor-visitor, visitor-stock and visitor-staff contacts/day (3)
Visual sightings of stock users off trail and in restricted areas (2)

FACTOR D. SOIL CONDITIONS

RELATED TO EROSION/COMPACTION

Degree of bare soil and compaction at picnic sites (20)
Naturally occurring erosion (4,5)
Human caused erosion (4,5)
Compaction (24)
Erosion (24)

RELATED TO BARE SOIL EXPOSURE

Square feet of mineral/barren soil (7)
Bare mineral soil (in camp areas) (23)
Soil exposed - bare soil - bare area (17)

RELATED TO OTHER DISTURBANCES/CHANGES

Percent soil disturbance allowed (8)
Type and rate of change of soil ecosystem (4,5)
Amount of soil loss/changes (7)
Stability (23)

FACTOR E. VEGETATIVE CONDITIONS

RELATED TO DAMAGE

Site impact-litter, impacted area tree damage (7)
Vegetation destruction [number of trees damaged from stock] (19)
Tree damage - total number of incidents (15,17,21)
Shrub damage - total number of incidents (22)
Amount of exposed roots (7)
Number of stumps (7)

RELATED TO GROUND COVER/LITTER

Ground cover (23)
Amount of dead and down wood (7)
There is sufficient dead and down material to support recreational activities and wildlife [number of tons/acre of dead and down material available for wildlife and recreational campfire building] (6)
Vegetation cover-litter (19)
Square feet of devegetated area by activity (hiking vs. camping vs. horse tethering) per unit area (9)
% bare ground (11)

RELATED TO SPECIES COMPOSITION/DIVERSITY

Noxious weeds (19)
Loss of perennial vegetation (21)
Increase in the amount of noxious weeds (1)
Diversity as a measure of desirable condition (1)
Change in the number of species and production of natural vegetation due to trampling, grazing, camping, etc. (1)
Sensitive plants (24)
Type/rate of change due to human impact (4,5)

OTHER VEGETATIVE CONDITION INDICATORS

Overall ecological condition of potential natural plant communities (23)
Percent utilization of key forage (23)
Vegetative changes (7)
Range Utilization (14)
Base range condition (8)
Insect population(s) of threat to trees (1)

FACTOR F. STREAM/WETLAND/LAKE CONDITIONS

RELATED TO WATER QUALITY/QUANTITY

Quantity of water as it leaves the NRA (National Recreation area) (1)
Quality measured by using the parameters identified in state standards (1)
Fecal coliform counts (7,23)
Presence of giardia in water (1)
Total coliform (23)
Inorganic chemicals (23)
Temperature (24)
Turbidity (conductivity) (24)
pH (24)
Management practices maintain water quality (6)
Water quality (4,5)
Water quality (using parameters identified in state standards) (19)
Signs of pollution from humans and stock, litter, food particles, cleansing agents and other wastes (2)
Habitat and populations of aquatic organisms (2)
High levels of chemical and biological indicators of cultural eutrophication (2)

RELATED TO VEGETATIVE IMPACTS

Change in vegetation patterns (4,5)
Human impacts to bogs and wetlands (4,5)
Amount of human caused disturbed area in the riparian area (1)
Identify indicator species (plant 6 animal) that would reflect the health of the riparian area (1)

RELATED TO STRUCTURE

Change in stream structure (deposit, scour, channel, change, etc.) (1)
Sedimentation in creeks (7)

FACTOR G. FISH AND WILDLIFE CONDITIONS

RELATED TO FISH

Fish productivity rate [fish and game standards (spawning habitat)] (19)
Fish surveys indicating over use (7)
Creel census - wild steelhead stock (7)
Age and population of fish in lakes and streams (1)
Stranded fish,de-watered nests, low productivity (19)
Fish kill from gas bubble disease (19)
Die offs from introduced diseases [number of die-offs] (19)
Suitable habitat is maintained to provide viable fish populations (6)
Damage to fisheries [establish an acceptable cumulative water fluctuation allowed per day] (19)
Number of fish (7)
Means of salmon enhancement (7)
% of watershed with a fish structure (7)

RELATED TO THREATEN&D/ENDANGERED/SENSITIVE SPECIES

Baseline data for determining future population trends for Threatened, Endangered and Sensitive Species (associated with probable human causes) will be determined (9)
T&E species (23)
All National Forest System Habitats and activities for threatend and endangered species are managed to achieve recovery objectives (6)
Species extirpation likely as a result of human use (2)

RELATED TO SPECIES COMPOSITION/DIVERSITY

Changes in indicator species (7)
Number of rodents (7)
Diversity of animal and fish species (1)
Increase of non-indigenous species (1)
Animal species composition [wildlife populations will be maintained at present or better numbers (accounting for normal fluctuations) for all native species] (19)
Number of species (7)

RELATED TO POPULATION/DISTRIBUTION

Population, degree of human influence (4,5)
Type and rate of change in fish/wildlife populations (4,5)
Population trend on winter range (1)
Change in distribution of big game on winter ranges (1)
Population (number) (23)
Displacement of wildlife (7)
Wildlife displacement due to presence of humans (2)

RELATED TO HABITAT

Habitat, degree of human influence (4,5)
Occupied beaver habitat and trend (1)
Habitat condition (23)
Changes to the biophysical resource (8)

OTHER FISH AND WILDLIFE INDICATORS

Number of reported incidents of wildlife harassment by dogs (1)
Complaints of animal damage (1)
Modification of natural occurrences (7)
Bear, deer, and rodents in camps, visitors' food and equipment being eaten and/or destroyed, impacted vegetation (3)
Habituated wildlife problems (2)
Documented cases of poaching (2)

FACTOR H. DEVELOPMENTS

RELATED TO MODIFICATIONS/IMPROVEMENTS

Degree of restoration (4,5)
Past modification by people (4,5)
Presence of trail and campsite improvements such as stone fire rings, natural appearing bridges, etc. (4,5)
Presence of other site modifications due to human impacts (4,5)
Manmade changes or improvements (11)

RELATED TO NEW SITES (increase in number)

Number of new sites (percent increase of new sites or structures] (19)
Manmade landscape changes [percent increase in the number of manmade landscape changes] (19)
Non-agricultural related development [percent increase in buildings that are not agricultural related development (except for those that provide a recreational service or serve to protect the resource)] (19)
Evidence of abandoned homesteads, outfitter facilities, administrative sites and trails [percent increase in number] (19)

RELATED TO VEHICLES/ROADS

Motorized vehicles in sight of river [number of non-agricultural vehicles visible from the river] (19)
Passable roads (19)
Private road improvements (19)
Vehicles observed away from designated roads (19)
Feet of road construction in wilderness (related to minerals) (7)

RELATED TO THE NATURALNESS OF THE AREA

The number and character of developments is subordinate to the naturalness of the area. Human and technological influence will be unapparent (6)
The number and character of developments compliments the naturalness of the area [number of developments per acre] (6)
The management of specific areas does not detract from the naturalness of the zone [the extent to which the area's roadways and facilities detract from the naturalness of the area] (6)
Native materials vs. non-native (7)

OTHER INDICATORS RELATED TO DEVELOPMENT

The total allowable miles of fencing per square mile within an allotment (8)
Developments (15)
Developments / 500 acre (22)
Mining sites visible [percent increase in mining activities visible from the river corridor] (19)
Man-made structures [number of] (19)
Visibility to public (7)
Construction methods (motorized --> heavy equipment --> hand tools) (7)
Acres of private land developed (7)

FACTOR I. MANAGEMENT SETTING/PRESENCE

RELATED TO LAW ENFORCEMENT ACTIONS

Change in accident rate or enforcement action [percent increase] (19)
Number of Law Enforcement Officers(LEO's) (19)
Number of "incidents" (19)
Request for Enforcement Actions [increase in percent of request] (19)
Number of violation notices issued (19)

RELATED TO EDUCATION/INFORMATION

Map and low impact trail use information posted (19)
Number of topics and ways of presenting educational material (19)
Response to a set of basic questions addressing educational programs [percent of questions correctly answered by river users] (19)
The public should be informed of potential risks and steps should be taken to provide an appropriate level of public safety [number of accidents per year within the zone, with attention to rafting incidents] (6)
Public availability of materials [percentage of sampled outlets containing agency and tourism information] (19)

RELATED TO SIGNS/MARKERS

Signs visible from river [number of] (19)
Presence of signs (4,5)
Presence of blazes or natural markers along trails (4,5)

RELATED TO BUDGET

Diversity and level of funding (obtain funding from at least 3 different sources] (19)
Awareness by constituency groups of NRA financial status (all interested groups aware of annual budget and comparative needs] (19)
Benefit/cost ratio (of salmon enhancement program] (7)

RELATED TO RESEARCH

Presence of research equipment (must conform to all resource indicators) (4,5)

MISC. MANAGEMENT INDICATORS

The levels of OHV (off hiway vehicles) use, grazing, vegetation management and mining are within the scope of PL l00-150 (6)
Management personnel encounters 80% of the time (4.5)
Forest management practices visible from the river (19)
The public will not percieve excessive contacts [percent of the public] (19)
Number of Forest Service visits per user per 2 days (11,12)
Continuation of dis-similar regulations and no move towards reciprocity (Fishing regulations between Idaho and Oregon) (19)
The management of the SMA and WSR reflects the circumstances described in the EIS and the management direction in the Implementation Plan (6)
The transportation system meets the direction in the plan (6)
Management strongly emphasizes maintaining and enhancing the natural ecosystem and its processes (6)
Management focuses on providing river-based recreation experience settings and uniquely developed opportunities [number of resource conditions,social conditions and management activities that reflect the characteristics described for a certain opportunity class and the objectives for the zone] (6)
Management focuses on providing recreation experience settings, balanced with an emphasis on maintaining and enhancing the natural environment (6)
Public parking should be provided at a level that protects the resource and provides for public safety and comfort. Visitors should find adequate parking at trailheads, and raft put-ins and take-outs [percent of parties interviewed that could not find a parking spot at their preferred trailhead, rafting put-in or take-out] (6)
Acres of clearcuts visible (7)
Management presence (construction, maintenance,monitoring) (7)
Aircraft (3)
Excessive noise from administrative use of helicopters in removing human wastes from Wilderness (2)

FACTOR J. VANDALISM

Number of incidents of vandalism (1,7)
Number of damaged trees (7)
Number of painted rocks (7)
Number of occurrences of vandalism by type, by location by month/year (7)
The amount of vandalism does not impact the visual setting of the area (number of new occurrences of graffiti vandalism or defacing of natural features located anywhere within the zone, per year] (6)

FACTOR K. AIRCRAFT/WATERCRAFT

Number of aircraft landings by type (7)
Number of flights overhead by day, by type and elevation (7)
Maximum number of landings per day (18)
Maximum number of landings per year (18)
Number of flights/ sightings (7)
Number and types of boats, watercraft/day (7)
% probability of having no more than X aircraft landings per day (10)

FACTOR L. FIRE

Amount of ladder fuels in high use areas (1)
Value of adjacent land to determine fire suppression aggressiveness (1)
Historic fire frequency pattern to determine feasibility of fire playing it's natural role (1)
-number of fires per year, past and present
-number of lightning strikes, how many started fires and where these fires occurred
Number of human-caused, versus natural fires (1)
Change in vegetation and fuels composition/density as a result of no fire (1)

FACTOR M. DOMESTIC LIVESTOCK

RELATED TO WASTE

Livestock waste [percent of beaches and campsites free of livestock waste] (19)
Nonconsolidated stock waste [accumulated stock waste] (19)
Livestock manure (21)

OTHER

Livestock carcasses [percent of beaches free of livestock carcasses] (19)
Number of animal units per month and the number of livestock within the corridor [percent increase in number of allotments stocked within the river corridor] (19)
Number of visitors per year who complain about domestic animals (4,5)
Monitor the effects of livestock and wildlife in riparian areas as called for in the Voigt/and Greer Allotment Management planning process currently underway (9)
% forage utilized (10)

FACTOR N. CULTURAL RESOURCES

RELATED TO VANDALISM

Archaeological site surface disruption and maintaining the information recovery value of archaeological sites (6)
Archaeological site disturbance (7)

OTHER

Size of area that is readily identified as a site of cultural value (acres or feet squared existing, and trend over time) (1)
Cultural value eg. eligible for or listed on the National Register (1)
Subsurface integrity (23)

FACTOR O. AIR QUALITY

Air pollutant effects on soils, vegetation, animals and aquatic systems (2)
Criteria pollutants noted in State Implementation Plan (2)