DRAFT v1.
Land Management Plan Monitoring Guide
Cleveland National Forest

Introduction

Effective Land Management Plan (LMP) monitoring and evaluation fosters improved management and more informed planning decisions. It helps identify the need to adjust desired conditions, goals, objectives, standards and guidelines as conditions change. Monitoring and evaluation helps forests, grasslands, the Agency and the public determine how a LMP is being implemented, whether plan implementation is achieving desired outcomes, and whether assumptions made in the planning process are valid.

Monitoring and evaluation are learning tools that form the backbone of adaptive management. With these tools, information is collected and compiled to serve as reference points for the future; new scientific understanding and technology, changes in law and policy and resource conditions, growing concerns, trends and changing societal values are incorporated into forest/grassland planning; and the scientific validity and appropriateness of assumptions used in the development of forest/grassland plans is evaluated. In short, they breathe life into a static document—the LMP—to make it dynamic, relevant and useful.

Types of Monitoring

Several kinds of activities can be referred to as "monitoring":

- ▪ Programmatic monitoring tracks and evaluates trends of ecological, social, or economic outcomes.
- ▪ Project implementation monitoring monitors compliance with LMP standards and guidelines.
- ▪ Effectiveness monitoring evaluates how effective our management actions are at achieving desired outcomes. Validation monitoring verifies assumptions and models used in LMP implementation.
- ▪ Monitoring may also address issues for large geographic areas of which a forest or grassland is a part. These types of monitoring are addressed in LMPs.

Two other types of "monitoring" are not appropriate for inclusion in the Monitoring chapter of the LMP:

- ▪ Tracking or development of administrative reports (plans for protection of historic sites, interpretive plans, plans to inventory a particular resource, or conservation strategies)
- ▪ Tracking specific program outputs (such as miles of trail maintained, recreation visitor days, cubic feet of timber harvested, or acres of prescribed burn accomplished)

Tracking of outputs can be referenced using general terms in the LMP and may be included in the annual monitoring plan or annual monitoring and evaluation report (as discussed below regarding annual indicators), as they are an important measure of how we use funds and are important to our publics.

The revised Forest Plan describes monitoring and evaluation as essential for the success of an adaptive approach to national forest management. The Forest Plan also identifies the data that will be gathered over time and

periodically evaluated to determine if changes in management are needed. Current conditions in key environmental indicators (or **reference values**) are identified in the FEIS along with projected trends. Actual trends in key reference values are used to measure changes over time as the basis for determining when a need for change is indicated. Monitoring is the vehicle to achieve desired conditions by identifying the need, adapting to change, completing amendments and eventually revising the forest plan to ensure healthy public forests for future generations. The specific reference values from the revised Forest Plan are found in the LMP Monitoring Table below. Baseline conditions for long-term reference values are discussed below for each Forest plan Goal. The process used to calculate the baseline and 5th year trends is defined in detail for each goal including the specific sources of data needed to complete the analysis.

Annual indicators originate from various accomplishment reporting systems primarily Workplan, FACTS and INFRA. Annual indicators provide information to be used in the annual LMP Monitoring and Evaluation Report.

LMP and NEPA Implementation Monitoring Protocol

Part 3 of the Land Management Plan requires annual implementation monitoring of 10 percent of projects and ongoing activity sites. This monitoring process is also tied to the Cleveland National Forest Environmental management System. To select projects for monitoring use the following protocol:

1. Make a list of all new Projects as identified in the annual program of work and reported as accomplished. Randomly select 10 percent of these projects from a stratified list of each environmental aspect (activity) implementing the forest plan.
2. Make a list of on-going activity sites identified in Biological Opinions that require annual monitoring. Review the results of this annual monitoring program.
3. Make a list of selected BMPEP monitoring sites assigned to the Forest (participation in Region-wide sampling) using the BMPEP evaluation process and forms to determine if BMPs are used and effective. Implement BMP protocol on 100 percent of these sites.
4. Make a list of selected ML1 and 2 roads from RO INFRA Roads monitoring procedure. Implement Regional protocol on 100 percent of these roads.
5. From the remaining ongoing activity sites randomly select enough sites to meet the LMP requirement of 10 percent. Use the following Guideline for the Cleveland National Forest:
    a. Recreation sites = 2, campgrounds, 2 Rec. special use areas (i.e. Rec. Residence Tract), 1 trail head and one minor rec. site (i.e. picnic area).
    b. Grazing allotments = 2, coordinate with BMP
    c. Road maintenance contracts = 1, coordinate with BMP and RO Infra roads monitoring.
    d. OHV roads trails and areas = 1 each.
    e. Non-recreation special use authorizations = 1-2.

It is anticipated that there will be between 15 and 20 projects or activity areas to review each year. This sampling protocol should be reviewed each year and modified if necessary. Use LMP M&E tracking document and project and activity monitoring table for each project or site selected in addition to monitoring forms required by the BMPEP, Biological assessments/evaluations or Heritage evaluations for those sites.

Table LMP Monitoring

Goal Code	Forest Goal	Activity, Practice Or Effect To Be Measured	Monitoring Question	Reference Values (Long-term / Annual)
1.1	Improve the ability of southern California Communities to limit loss of life and property and recover from the high intensity wildland fires that are a part of this state's ecosystem.	Vegetation Treatments in WUI	Has the forest made progress in reducing the number of acres that are adjacent to development within WUI defense zones that are classified as high risk?	Fire Hazard/Risk Annual Indicators
1.2.1	Restore forest health where alteration of natural fire regimes have put human and natural resource values at risk: Reduce the potential for widespread losses of montane conifer forests caused by severe, extensive, stand replacing fires.	Vegetation Condition	Is the forest making progress toward increasing the percentage of montane conifer forests in Condition Class 1?	Condition Class Fire Regime I Annual Indicators
1.2.2	Restore forest health where alteration of natural fire regimes have put human and natural resource values at risk: Reduce the number of acres at risk from excessively frequent fires while improving defensible space around communities.	Vegetation Condition	Is the forest making progress toward maintaining or increasing the percentage of chaparral and coastal sage scrub in Condition Class 1?	Condition Class Fire Regime IV Annual Indicators
1.2.3	Restore forest health where alteration of natural fire regimes have put human and natural resource values at risk: Maintain long fire-free intervals in habitats which are slow to recover.	Vegetation Condition	Has the forest been successful at maintaining long fire-free intervals in habitats where fire is naturally uncommon?	Veg. Type Extent Fire by Fire Interval Annual Indicators
2.1	Reverse the trend of increasing loss of natural resource values to invasive species.	Invasive species	Are the national forests' inventory of invasive plants and animals showing a stable or decreasing trend in acres of invasives?	Invasive Plants and Animals Annual Indicators
3.1	Provide for Public Use and Natural Resource Protection.	Visitor Use of the Forest	Are trends in indicators and visitor satisfaction surveys indicating that the forest has provided quality, sustainable recreation opportunities that result in increased visitor satisfaction?	Visitor Satisfaction Annual Indicators

Goal Code	Forest Goal	Activity, Practice Or Effect To Be Measured	Monitoring Question	Reference Values (Long-term / Annual)
3.2	Retain a Natural Evolving Character within Wilderness.	Wilderness Use	Are trends in indicators and visitor satisfaction surveys depicting the forest has provided solitude and challenge in an environment where human influences do not impede the free play of natural forces?	Natural Processes Wilderness Annual Indicators
4.1a	Administer minerals and Energy Resource Development while protecting ecosystem health.	Mineral and Energy Development	Has the forest been successful at protecting ecosystem health while providing mineral and energy resources for development?	Energy Success at protecting Ecosystem Health Annual Indicators
4.1b	Administer Renewable Energy Resource Developments while protecting ecosystem health.	Mineral and Energy Development	Has the forest been successful at protecting ecosystem health while providing renewable resources for development?	Renewable Resources Success at protecting Ecosystem Health Annual Indicators
5.1	Improve watershed conditions through cooperative management.	Watershed	Is the forest making progress toward sustaining Class 1 watershed conditions while reducing the number of Condition Class 2 and 3 watersheds?	Sustaining Class 1 watershed conditions while reducing the number of Condition Class 2 &3 watersheds Annual Indicators
5.2	Improve riparian conditions.	General Forest Activities	Is the forest making progress toward reducing the number of streams with poor water quality or aquatic habitat conditions?	Stream Condition–in Impaired State listed 303(d) streams Annual Indicators
6.1	Move toward improved rangeland conditions as indicated by key range sites.	Livestock Grazing	Is forest rangeland management maintaining or improving progress towards sustainable rangelands and ecosystem health by increasing the number of key areas in good and fair condition?	Rangeland Condition Annual Indicators

Goal Code	Forest Goal	Activity, Practice Or Effect To Be Measured	Monitoring Question	Reference Values (Long-term / Annual)
6.2	Provide ecological conditions to sustain viable populations of native and desired nonnative species.	General Forest Activities	Are trends in resource conditions indicating that habitat conditions for fish, wildlife, and rare plants are in a stable or upward trend?	TEPCS Baseline MIS_Hab_Trends Annual Indicators
7.1	Retain natural areas as a core for a regional network while focusing the built environment into the minimal land area needed to support growing public needs.	Built Landscape Extent Land Adjustment	Is the forest balancing the need for new infrastructure with restoration opportunities or land ownership adjustment to meet the desired conditions?	Built Area and Land Ownership Complexity Annual Indicators

Long-Term Indicator Baseline Values

Forest GOAL 1.1 Indicator Trends
Acres of High Hazard and High Risk in WUI Defense Zone

The WUI defense zone is defined in Part 3 of the Land Management Plan (LMP) in standard S7 including the referenced Appendix K. The defense zone is the portion of the Wildland / Urban Interface that is directly adjacent to structures. It has a variable width which is determined at the project level up to maximum widths defined for general vegetation types in S7. For the LMP analysis the maximum width was assumed and this was used to represent the present or "baseline" extent of the WUI defense zone.

High hazard fuels are those that have the potential to burn with high intensity. Fire intensity affects suppression effectiveness in protecting structures in interface areas. A key strategy in the LMP is to reduce fire hazard adjacent to communities and structures to improve suppression effectiveness and provide defensible space in interface areas.

Risk is related to human values or "risk of loss". The presence of structures is the indicator of risk in this analysis. (It should be noted that due to rapid development of private lands in southern California, the inventory of areas with structures is constantly changing. It is likely that the map representing the WUI defense zone is out of date and should only be considered an estimate of the actual area. The actual presence of communities and substantial structures is determined at the project level. In other word the WUI defense zone GIS coverage or map is not an LMP decision. The decision is to apply the direction in Standards S7 (including Appendix K) and S8 to areas that are actually adjacent to communities or substantial structures at the time of project planning. Areas where old structures have been removed are not part of the defense zone.)

There is no current site-specific inventory of fuel hazard within the defense zone. In addition, high hazard conditions can be dynamic returning in as little as 5 years after a fire in some vegetation types. For this reason the hazard indicator is assumed to be high in all areas until a project level assessment determines otherwise. Therefore, the monitoring task is to track the level of management effort directed at reducing fire hazard in the WUI defense zone including keeping the inventory of the actual defense zone up-to-date.

Calculate indicators of progress toward Goal 1.1 by using the WUI Defense Zone from the LMP analysis database. Include any adjustments to this coverage based on documented project analysis or other monitoring. Select accomplishment polygons for accomplishment code FP-FUELS-WUI for the year or years being analyzed from the appropriate reporting system (NFPORS, FACTS). Report the acres of overlap of accomplishment polygons with defense zone polygons as the annual indicator of progress toward the desired condition. Every five years the number of high hazard acres within the defense zone should be calculated to use for documenting the trend as a long-term indicator. It can be assumed that acres documented as being treated in the above reporting system are no longer high hazard.

Use of spatially explicit information for adjusting the baseline is important so the cause of changes in the numbers can be evaluated. It is important to know if the change is due to improved inventory information, actual treatments or both. Also, it is not appropriate to simply add up the annual indicator (acres treated) and subtract it from the baseline. This could over count maintenance treatments and would not take into account acres added due to new development. Part of our evaluation should determine if new development is adding to the defense zone increase because we have an LMP strategy to prevent that from happening through involvement in local planning.

Outcome Indicator	Desired Condition Declining Trend	Baseline	Year 5	Trend	Trigger
Acres of High Hazard and High Risk in WUI Defense Zone	**Fire Regime:**	**Assumes High Hazard in all areas**			
CNF	I	6,656			
	III,IV,V	3,574			

Template for adjustments to the baseline:

A = Baseline Acres from LMP Analysis	B = Acres removed due to new information on presence of substantial structures	C = Acres added due to new information on presence of substantial structures	D = Acres treated and reported in corporate reported systems.	Adjusted Acres (A-B+C-D)
Fire Regime I				
Fire Regimes III, IV, V				
Total				

Forest Goal 1.2.1 Indicators
Departure from desired fire regime, acres by condition class for Fire Regime I.

Fire regime was mapped using the Ecological Unit Inventory (EUI) polygons at the Land Type Association (LTA) level. Existing vegetation data polygons were unioned with the EUI data in order to calculate the percentage of each vegetation type in each LTA polygon. One of five fire regimes (as described in Part 1 of the LMP) was then assigned to each LTA polygon based on the predominant vegetation type (the type expected to most influence fire behavior within the LTA). This regime code was added to the geodatabase used for fire analysis.

Fire history data was used to calculate the number of times each area of land has burned in the last century (The Remote Sensing Lab has an AML (arc macro language script) that generates this coverage from the fire history database they maintain). This frequency of actual burning was used to compare with the expected range for the mapped fire regime and assigned to a category based on departure from expected fire regime as shown on the departure from expected fire regime analysis tables. Field mapping of condition class has not been completed at this time, therefore the simple departure from the expected fire regime is being used as an indicator of risk of potential loss of desired ecosystem elements as described in the desired condition section of the Forest Plan. The California Department of Forestry has developed a condition class rating for the State. Baseline conditions of this condition class indicator are included for montane conifer forests.

Vegetation treatments envisioned by the Forest Plan are to be designed to bring forested stands into condition class 1, therefore it is assumed that if these projects are implemented as planned that acres treated, as measured by the annual indicators for this goal, will indicate progress toward the desired condition of moving at least 80 percent of these stands to condition class 1.

Adjustments to the baseline used to develop long-term trends are anticipated at least every five years. The baseline is adjusted by updating the fire history and adjusting the number of times each area has burned, adding treatment polygons from corporate reporting systems and recalculating the departure from the fire regime. Mechanical treatment acres are added to the “None” category in the tables below (it is assumed that the management prescriptions were designed to meet the desired pre-suppression era stand structure that would occur if the fire regime had not been altered). Areas that burn in wildfire or prescribed fire are used to adjust the number of times the area has burned which may or may not move it into a new category in the fire regime analysis tables. It is important to track the reasons for adjustment of the baseline numbers in year 5 using the adjustment template to allow for evaluation of the effectiveness of the vegetation treatment program relative to changes due to wildfire.

Regime I Baseline Tables:

Cleveland National Forest

Departure Category	Desired Condition	Baseline		Year 5	Trend	Trigger
		Acres	Percent			
None	80%	22152	42%			Stable or declining trend.
Moderate	10%	18577	35%			Stable or increasing trend.
High	10%	11942	23%			Stable or increasing trend.
Total	100%	52671	100%			

Baseline adjustment template:

Departure Category	Baseline Acres of Regime I (montane conifer)	Acres of mechanical treatment.	Acres of Prescribed fire (under burning only, do not include pile burning).	Acres of wildfire.	Fifth year
None					
Moderate					
High					

Forest Goal 1.2.2 Indicators
Departure from desired fire regime, acres by condition class for Fire Regime IV.

Fire regime was mapped using the Ecological Unit Inventory (EUI) polygons at the Land Type Association (LTA) level. Existing vegetation data polygons were unioned with the EUI data in order to calculate the percentage of each vegetation type in each LTA polygon. One of five fire regimes was then assigned to each LTA polygon based on the predominant vegetation type (the type expected to most influence fire behavior LTA). This regime code was added to the geodatabase used for fire analysis.

Fire history data was used to calculate the number of times each area of land has burned in the last century (The Remote Sensing Lab has an AML (arc macro language script) that generates this coverage from the fire history database they maintain). This frequency of actual burning was used to compare with the expected range for the mapped fire regime and assigned to a category based on departure from expected fire regime as shown on the departure from expected fire regime analysis tables. Field mapping of condition class has not been completed at this time, therefore the simple departure from the expected fire regime is being used as an indicator of risk of potential loss of desired ecosystem elements as described in the desired condition section of the Forest Plan.

Acres in departure category 2 and 3 are due to excessively frequent fires. Acres of fuel treatment therefore, are not good indicators of making progress toward this goal. Improved suppression and prevention effectiveness over time may lead to improving conditions where long-term trends will indicate progress toward the desired condition. The annual indicator should be acres burned by fire regime. Evaluation should discuss the fact that large infrequent fire events are most responsible for changes in these numbers so the annual indicators have limited value in estimating long-term trends.

Fire Regime IV Baseline Tables

Cleveland National Forest

Departure Category	Desired Condition	Baseline		Year 5	Trend	Trigger
		Acres	Percent			
None	90%	247,722	76%			Stable or declining trend.
Moderate	5%	69,638	22%			Stable or increasing trend.
High	5%	5,211	2%			Stable or increasing trend.
Total	100%	322,571	100%			

Baseline adjustment template:

Departure Category	Baseline Acres of Fire Regime IV	Acres of mechanical treatment	Acres of Prescribed fire	Acres of wildfire	Fifth year
None					
Moderate					
High					

Forest Goal 1.2.2 Indicators
Extent of Vegetation type by Fire Interval in Fire Regime V

To be developed.

Forest Goal 2.1 Invasive Species
Acres or stream miles occupied by invasive species

The annual indicator is acres of inventory effort and acres of eradication effort. Long-term success is indicated by total acres on the inventory occupied by invasive species.

Desired Condition: Decreasing trend or no net increase.

Forest	Baseline	Year 5	Trend	Trigger
CNF	TBD			Increasing trend not caused by new information alone.

Forest Goal 3.1
Visitor Satisfaction from NVUM (National Visitor Use Monitoring)

Annual indicators are recreation facilities managed to standard including natural resource protection as described in Forest Goal 3.1. Meaningful Measures provides a framework for measuring this but the linkage to resource protection is not as clear. Implementation and effectiveness monitoring of resource protection actions required by Standards S34 and S50 (including Appendix D) help to measure the resource protection element of this goal.

Long-term indicators are visitor use trends by activity and overall satisfaction from the NVUM survey. Evaluation of the NVUM data is part of the Facilities Master Planning process being implemented by the Province.

Outcome Indicator	Desired Condition	Baseline	Year 5	Trend	Trigger
Visitor Satisfaction	100% satisfied, average or better	97.3%			decline

Forest Goals 5.1 and 5.2

Impaired Waters and Total Maximum Daily Loads

A stipulation of section 303(d) of the Federal Clean Water Act requires development and implementation of "Total Maximum Daily Loads" (TMDLs) for each impaired water body as a vehicle for reducing pollution, identifying the source(s) of pollution, quantifying the amount of current impairment (above allowable "loads"), and quantifying a required amount of pollution reduction (e.g., reducing sediment input from roads by 70% in X years). Impaired waters are identified by each state on a two-year cycle (although there was a 4-year hiatus from 1998 to 2002 as US EPA regulations were reviewed). Watersheds containing impaired waters designated in 1998 are shown in Figure 12. Table 2 lists the pollutants and their sources for each impaired water body. That table also notes whether each 1998 impaired water body was also designated as impaired in 2002.

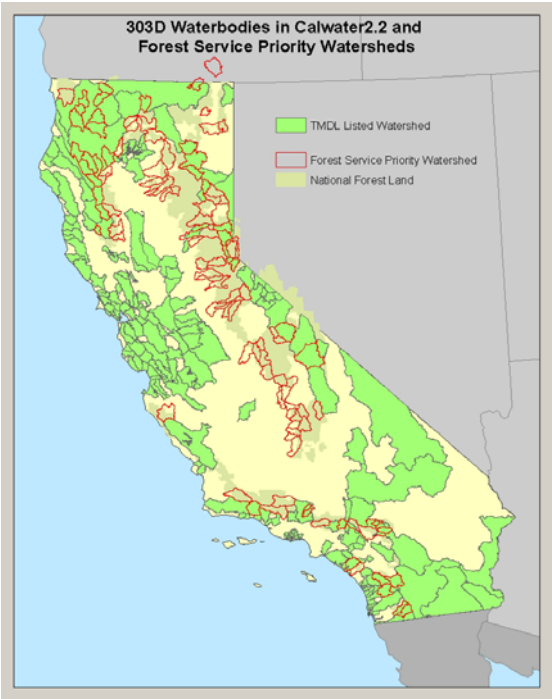

Figure 12. California watersheds with 303(d) listed (impaired) water bodies, FS priority watersheds and NFS land boundaries.

The number of impaired waters in 1998 and 2002 is listed below by Forest--

	Number of Impaired Waters	
Forest	**1998**	**2002**
Cleveland	4	4
San Bernardino	14	13
Angeles	7	6
Los Padres	9	9

The 2002 listing above is incomplete in that new waters listed in 2002 are not known; the table only deletes the few 1998 impaired waters known to have been de-listed in 2002.

A variety of pollutants and sources are listed by the State for the 1998 impaired waters on southern California Forests. Pollutants listed include pathogens (including coliform), nutrients, metals, algae,

sedimentation/siltation, fish barriers and metals. Most pollutant sources for the 1998 listed waters are either non-point or unknown (Table 2). Although some of the listed waters clearly are affected by activities downstream from the Forest boundaries, several listed waters are entirely on NFS lands.

Impairment listing, and the consequent development of a TMDL, can impact NFS management. The recently-completely East Fork San Gabriel River "trash" TMDL requires that the FS meet the numeric target of zero trash for the 5+ miles of impaired stream. To meet the target the TMDL recommends that the FS—

- Provide trash and hot coal receptacles
- Provide at least one full-time person at each of four identified sites on each weekend day and holiday to direct picnickers
- Collect litter each weekend day and holiday
- Provide litter abatement signs
- Enforce existing anti-litter laws (State of California 2000).

In addition, "The US Forest Service must conduct monitoring at locations downstream of each of the four informal recreational areas" (State of California 2000). The TMDL estimates that costs to the FS will approximate $75,000 per year.

Impaired Waters and Watershed Condition. Hypothetically, watersheds heavily altered by disturbance would contain more impaired water bodies than watersheds with moderate or minimal disturbance. The following table lists the percent of (a) Hydrologic Unit Codes (HUCs) in each condition class having impaired waters, (b) all HUCs with impaired waters by condition class, (c) all HUCs having impaired waters and (d) impaired water bodies (stream segments or lakes) by condition class:

Condition Class	% of HUCs	% of HUCs in Condition Class with Impaired Waters	% of all HUCs having Impaired Waters	% of all Impaired Water Bodies
I	**40**	**10**	**4.2**	**12**
II	**34**	**15**	**5.3**	**27**
III	**24**	**39**	**9.5**	**61**

For example, 40% of the HUCs are in Condition Class I. Ten percent of these HUCs have one or more impaired waters. The 10% rated Class I equate to 4.2% of all HUCs and the Class I HUCs have 12% of all impaired waters.

The more disturbed watersheds have more impaired waters than the less disturbed watersheds. Even though watersheds in the most disturbed class (III) are appreciably fewer in number than watersheds in the other classes, the Class III watersheds include the majority of the individual impaired waters.

Also see Watershed Condition Assessment Process specialists report.

Baseline Condition of Monitoring Indicators

Cleveland National Forest:

Outcome Indicator	Desired Condition	Baseline	Year 5	Trend	Trigger
Watersheds in Condition Class I - Good	Maintained condition ratings	4 watersheds (43 total in Province)			Decrease in number of Class I watersheds
Watersheds in Condition Class II - Moderate	Maintained or improved condition ratings	8 watersheds (34 total in Province)			Decrease in number of Class II watersheds
Watersheds in Condition Class III - Poor	Improved condition ratings	2 watersheds (12 total in Province)			Degrading conditions in Class III watersheds
Stream Condition - in Impaired State listed 303(d) streams	Stable or improving	4 streams currently listed as 303(d) Impaired (34 total in Province)			Any increase in the number of State listed 303(d) streams (that are the result of forest management)

Table 2. 1998 and 2002 Impaired Water Bodies (2002 listing is not comprehensive; the 2002 entries only update the Status of 1998 impaired waters. There are other 2002 impaired waters not listed.)

1998 Forest and Water Body	1998 Pollutant/ Stressor	1998 Source	1998 Priority	1998 Start Date (month & year)	1998 End Date	2002 Listed (1=yes)
Cleveland NF Impaired Water Bodies **Rivers – Water Body Name**						
Santiago Creek, Reach 4 80112000	Salinity/TDS/ Chlorides	Unknown	Low	0108	0111	1
Silverado Creek 80112000	Pathogens, Salinity/ TDS/Chlorides	Unknown	Low	0108	0111	1
Aliso Creek 90113000	High Coliform Count	Nonpoint/Point source	Medium	0797	0701	1
San Juan Creek, Lower 90120000	High Coliform Count	Nonpoint/Point source	Low	0700	0710	1
Sources: 1) TMDLs Completed-1, Staff Report Vol. 1. Revision of the Clean Water Act Section 303(d) List of Water Quality Limited Segments. 2/03, State Water Resour. Control Brd. 2) 2002 information is from 2/4/03 SWRCB approved list. EPA 6/5/03 and 7/25/03 letters to Celese Cantu (SWRCB) from Alexis Strauss lists several waters EPA wants listed--that the State's 2/4/03 document had de-listed. None of these additional "re-listed" impaired waters were on the Forests.						

Forest Goal 6.1

Insert baseline data from Regional Trend Monitoring program when available.

Cleveland National Forest

Outcome Indicator	Desired Condition	Baseline	Year 5	Trend	Trigger
Livestock Grazing Areas in Good Condition	Maintain Condition Rating	__ (Number) Allotment Key Areas			Decrease in number of key areas in good condition.
Livestock Grazing Areas in Fair Condition	Maintain or Improve Condition Rating	__ (Number) Allotment Key Areas			Decrease in number of key areas in fair condition.
Livestock Grazing Areas in Poor Condition	Improve Condition Rating	__ (Number) Allotment Key Areas			Degrading conditions in key areas in poor condition

Forest Goal 6.2

Monitoring Changes in the Environmental Baseline for Threatened, Endangered, Proposed and Candidate (TEPC) species.

A biological opinion (FWS-773.9) was received on September 15, 2005 from the U.S. Fish and Wildlife service addressing anticipated effects of implementing Land Management plan decisions on TEPC species. As part of the biological assessment for the Lnad Management Plan an updated environmental baseline for each of the federally listed species on the Cleveland National Forest was prepared and became a part of this Biological Opinion. The environmental baseline identifies the extent of occupied and suitable habitat for each species and describes ongoing activities authorized by the Forest Service in relation to the occupied and suitable habitats. Implementation of the LMP strategies overtime is expected to cause changes in the baseline (both positive and negative). Annual reporting of activities that may change the baseline conditions (including recovery actions proposed, new conservation strategies and new information from surveys or inventory) for TEPC species is recommended by the U.S. fish and Wildlife Service (page 296 Conservation Recommendation 1 – FWS-773.9). Data on the extent of occupied habitat and a snapshot of ongoing activities that overlap this habitat is found in tables presented below. Updates to the baseline are anticipated once every five years although these updates are expected to be part of ongoing data collection and periodic evaluation of new information rather than a single one time analysis.

Major updates are usually accomplished through site specific biological assessments for groups of species or program activities (Ongoing Activities BA's). Monitoring of LMP Goals is long term in nature and focused on trends in the environmental baseline for TEPC species. Site-specific monitoring of ongoing activities is identified through the Ongoing Activities Biological Assessments and monitoring is accomplished as part of LMP implementation monitoring described in this guide and Part 3 of the Land Management Plans.

The process for mapping the built environment and ongoing activities is described under Goal 7.1. The GIS polygon coverage (luz_built_v1) is used to combine with current species data (occupied and suitable habitat) and designated and proposed critical habitat for applicable species. Summaries of these combined coverages are created using Microsoft Access and resulting tables are exported into Microsoft Excel for analysis. Pivot tables are used to explore relationships between activities and species habitat and are summarized below in the environmental baseline tables.

Environmental Baseline for TEPC species (As of 2005 LMP Biological Opinion)

Summary of Baseline Activities in Occupied Habitat for Cleveland National Forest

Common name / Scientific Name	Status	Occupied Habitat (OCC) Acres	Built Area	Dispersed Recreation	Fuel-break	WUI Defense	WUI Threat	Active Grazing
Plants:								
San Diego thornmint / *Acanthomintha ilicifolia*	T	212.6	1.0	0.0	5.8	2.4	210.2	0.0
Munz's onion / *Allium munzii*	E	25.2	9.6	0.0	0.3	0.0	25.2	0.0
Encinitas Baccharis / *Baccharis vanessae*	T	1.3	0.0	1.3	0.0	0.0	0.0	0.0
Nevin's barberry / *Berberis nevinii*	E	7.6	1.9	0.9	0.0	3.2	4.4	0.0
Thread-leaved brodiaea / *Brodiaea filifolia*	T	270.1	0.0	0.0	0.0	0.0	191.2	163.6
Vail Lake ceanothus / *Ceanothus ophiochilus*	T	68.2	0	0.0	0.0	0.0	68.2	0.0
Slender-horned spineflower / *Dodecahema leptoceras*	E	19.1	1.4	0.0	0.0	3.0	16.0	0.0
Santa monica Mtns. dudleya / *Dudleya cymosa ovatifolia*	T	63.7	0.2	0.0	0.0	7.2	51.5	0.0
San Bernardino bluegrass / *Poa atropurpurea*	E	71.5	1.3	5.3	0.0	0.0	71.5	71.5
Invertebrates:								
Quino checkerspot butterfly / *Euphydryas editha quino*	E	23.1	.2	0.0	0.0	0.0	23.1	0.0
Laguna Mountains skipper / *Pyrgus ruralis lagunae*	E	1821.3	137.7	424.7	0.0	288.0	1533.3	1653.7
Fish:								
Southern steelhead / *Oncorhynchus mykiss*	E	96.9	0.0	0.0	0.0	0.0	0.0	0.0
Amphibians/Reptiles:								
Arroyo toad / *Bufo californicus*	E	8,118.7	499.8	731.5	425.5	554.7	5,908.1	2523.1
California red-legged frog / *Rana aurora draytonii*	T	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Birds:								
Southwestern willow flycatcher / *Empidonax traillii extimus*	E	102.5	16.8	6.1	0.0	13.6	88.9	0.0
Bald eagle / *Haliaeetus leucocephalus*	T	102.1	9.1	0.9	0.0	8.4	62.0	33.1
California gnatcatcher / *Polioptila californica*	T	692.4	29.4	2.3	0.0	29.3	578.5	29.8

Common name / Scientific Name	Status	Occupied Habitat (OCC) Acres	Built Area	Dispersed Recreation	Fuel-break	WUI Defense	WUI Threat	Active Grazing
californica								
Least Bell's vireo / *Vireo bellii pusillus*	E	436.6	2.3	2.2	16.8	4.3	240.2	77.5
Mammals:								
Stephen's kangaroo rat / *Dipodomys stephensi*	E	.5	0	.1	0.0	0.0	0.5	0.5

Summary of Baseline Activities in Critical Habitat

Common name / Scientific Name	Critical Habitat Status	Total Acres	Built Area	Dispersed Recreation	Fuel-break	WUI Defense	WUI Threat	Active Grazing
Plants:								
San Diego thornmint / *Acanthomintha ilicifolia*	N	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Munz's onion / *Allium munzii*	D	226.6	24.9	1.5	23.6	0.0	226.6	0.0
Encinitas Baccharis / *Baccharis vanessae*	N	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nevin's barberry / *Berberis nevinii*	N	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Thread-leaved brodiaea / *Brodiaea filifolia*	P	249.1	0.0	2.2	0.0	0.0	160.0	0.0
Vail Lake ceanothus / *Ceanothus ophiochilus*	N	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slender-horned spineflower / *Dodecahema leptoceras*	N	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Santa Monica Mtns. dudleya / *Dudleya cymosa ovatifolia*	N	0.0	0.0	0.0	0.0	0.0	0.0	0.0
San Bernardino bluegrass / *Poa atropurpurea*	N	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Invertebrates:								
Quino checkerspot butterfly / *Euphydryas editha quino*	D	23.1	.2	0.0	0.0	0.0	23.1	0.0
Laguna Mountains skipper / *Pyrgus ruralis lagunae*	N	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fish:								
Southern steelhead / *Oncorhynchus mykiss*	P	96.9	0.0	?	0.0	0.0	0.0	0.0
Amphibians/Reptiles:								
Arroyo toad / *Bufo californicus*	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0
California red-legged frog / *Rana aurora draytonii*	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Birds:								
Southwestern willow flycatcher / *Empidonax traillii extimus*	D	73.6	1.7	6.4	0.0	2.6	71.0	48.1
Bald eagle / *Haliaeetus leucocephalus*	N	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Common name / Scientific Name	Critical Habitat Status	Total Acres	Built Area	Dispersed Recreation	Fuel-break	WUI Defense	WUI Threat	Active Grazing
California gnatcatcher / *Polioptila californica*	D/P	17,960.8 /12,963.5	77.5 /50.7	10.1 /67.5	137.1 /73.4	124.0 /38.9	14,748.9 /10,879.0	333.3 /291.5
Least Bell's vireo / *Vireo bellii pusillus*	D LPNF Only	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mammals:								
Stephen's kangaroo rat / *Dipodomys stephensi*	N	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Management Indicator Species:

See management indicator species (MIS) trend reports:

Forest Goal 7.1
Built Area

As part of the analysis for the Land Management Plan, a series of coverages were developed representing the extent of development (or built area) and ongoing activities on the Forests. These coverages have been combined into a single coverage called luz_built_v1. Roads and trails are not a part of this coverage and are analyzed as linear features represented as miles rather than acres. This data is used to track progress toward the goal of minimizing built area over time as described in LMP Goal 7.1.

Existing data from INFRA databases or other GIS coverages were used to form the baseline, representing information from approximately FY 2000. Selected coverages were combined including the following:

- Developed Areas (existing residential or other buildings)
- Developed Recreation Sites
- Ski Areas (if applicable)
- Special Use Recreation Sites
- Administrative Facilities
- Non-Recreation Special uses
- Major Diversions (i.e. dams)
- Sediment Disposal Sites (ANF only)
- Active Mines
- Oil and Gas Leases (LPNF only)

In addition to the built area coverages, several activity coverages were included for use in other analysis such as the environmental baseline for Goal 6.2 (TEPC species). These include:

- Fuelbreaks
- WUI (Wildland / Urban Interface) Defense Zone
- WUI Threat Zone
- Grazing Allotments (including Status)
- Modeled Dispersed Recreation Opportunities

Mineral Withdrawal Status and Known Mineral Areas were also included.

Each of these data layers were combined into a single coverage and each activity is represented by an attribute of the various polygons. By default, the presence of an activity was represented with a “1” while its absence was coded as “0”. Some activities such as range allotments are coded with their INFRA code to allow status updates (for example, INFRA documents active vs. vacant grazing allotments).

A new coverage was created by combining the Land Management Plan land use zones. This combined coverage was exported into a personal geodatabase using arc catalog. Microsoft Access was used to query the database to summarize information about the polygon attributes. Various summaries are then exported into Microsoft Excel and converted into a pivot table, to allow users to look at relationships between activity patterns and land use zones or any other feature they want to explore such as TEPC species occupied habitat (see Goal 6.2). A pivot table developed from the luz_built_v1 coverage provides the summary by land use zone of total built area. The contribution of each type of activity may be calculated using the pivot table and presented in a set of Outcome Indicators. The first set below uses the “built area = 1” for Built Area by land use zone. It should be noted by users of the pivot tables that the Forest (or ADMINFOR) needs to be set to a specific Forest and the “owner” code needs to be set to “1” for NFS lands only.

Outcome Indicator: Built Area by Land use Zone

Cleveland National Forest

Land use Zone	Desired Condition	Baseline Acres	Baseline Percent	Year 5	Trend	Trigger
Back Country	Minimize	969	1.26%			
Back Country (Motorized Use Restricted)	Minimize	339	0.67%			
Back Country Non-Motorized	Minimize	249	0.15%			
Critical Biological	None	10	0.48%			
Developed Area Interface	Minimize	2,707	6.28%			
Existing Wilderness	None	26	0.03%			
Recommended Wilderness	None	4	0.04%			
Total	Minimize	4,304	1.02%			

Outcome Indicator: Miles per sq.mi. of boundary

This indicator is a measure of the complexity of the land ownership pattern. A higher value indicates highly intermixed ownerships. The land ownership coverage is used calculate the length of polygon boundaries in total and with private lands. The land adjustment program can reduce ownership complexity through consolidation of ownerships. This index is a measure of progress toward that goal.

Annual indicator is acres of land acquired. Use the most current land ownership layer for updates. Maintain a separate layer that tracks land adjustments to use for other analysis such as adjustments to the environmental baseline for the biological opinion under goal 6.2.

Forest	Desired Condition	Baseline	Year 5	Trend	Trigger
CNF	Declining Trend	1.44			Increasing Miles of boundary.

Outcome Indicator: Miles of Road and Trail by Class and Land use Zone

To be developed as INFRA is updated through the Access Travel Management Process including OHV route designation.

Table of annual indicators by Forest Plan Goal

Annual Indicator	Reporting System	Goal All	Goal 1.1	Goal 1.2.1	Goal 1.2.2	Goal 1.2.3	Goal 2.1	Goal 3.1	Goal 5.1	Goal 5.2	Goal 6.1	Goal 6.2	Goal 7.1
ABV_PROJ-INTGRT-INV (TEPCS-NEW-OCC)	Workplan							X				X	
Acres in Grazing Allotments	INFRA										X	X	X
Acres of Admin Facilities	INFRA											X	X
Acres of Concentrated Rec use	Model (should map actual use areas)							X				X	X
Acres of Developed Rec. Sites	INFRA								X			X	X
Acres of Mining Operations	INFRA								X			X	X
Acres of non-Rec SUAs	SUDS								X			X	X
Acres of Rec SUAs	INFRA								X			X	X
BLDG-WWS-DAM-CMPLT	INFRA											X	X
FOR-REHB-RSTR	FACTS/NFPORS			X									
FP-FFPC	WORKPLAN					X							
FP-FUELS-CC23-STWD	FACTS/NFPORS			X									
FP-FUELS-NONWUI	FACTS/NFPORS			X	X								
FP-FUELS-WUI	FACTS/NFPORS		X	X	X								
IMP-FOR-VEG	FACTS/NFPORS			X									
IMP-S&W-RSRC	FACTS								X				
INV-DAT-ACQ	Workplan						X					X	
LND-ADJ (in TEPC)	Workplan (ALP)											X	X
LND-USE-PROP-APL-PROC	SUDS											X	X

Annual Indicator	Reporting System	Goal All	Goal 1.1	Goal 1.2.1	Goal 1.2.2	Goal 1.2.3	Goal 2.1	Goal 3.1	Goal 5.1	Goal 5.2	Goal 6.1	Goal 6.2	Goal 7.1
MGMT-NXWD-INVSPE	Workplan, NRIS, FACTS						X						
Miles of Roads	INFRA								X			X	X
Miles of Trails	INFRA								X			X	X
MON-REQ-ANN	Workplan	X											
MON-RPT-CMPLT	Infra	X											
RD-CNSTR-RECNSTR	Workplan												
RD-CNSTR-RECNSTR	Workplan											X	X
RD-DECOM	Workplan											X	X
RD-HC-STO-BMP	Workplan Mar Tool								X				
RG-GZ-ADM-STD	Infra										X		
RG-GZ-HOR-CTL	Infra										X		
RG-GZ-NEPA	Infra										X		
RG-M&E	Workplan										X		
TL_RSTR-RPLCD	Workplan											X	X
TL-CNSTR	Workplan											X	X
VRFY-ENV-MGMT-SYS	Workplan MAR tool		X										
VSTR-USE-MON-SIT-CMPLT	Workplan MAR Tool							X					
Wildfire Acres	Fire History RSL		X	X	X				X				
STRM-HAB-ENH	Workplan									X			
TERR-HAB-ENH	Workplan									X			
MGMT-NXWD-INVSPE	Workplan						X			X			
T&E-HBT-ENH	Workplan							X					
HRTG-MGD-STD	Workplan							X					
REC-SIT-FCI-FR-GD	Workplan							X					
REC-SIT-OP-STD	Workplan							X					

Reference Values:

"To evaluate and use indicators, it is often highly informative to compare status and trends measured by the indicator against some 'reference state'. Without such a baseline, it is hard to assess the magnitude of change objectively, whether the magnitude of change is important, or if any efforts at amelioration are succeeding." (National Research Council 2000)

What is a Reference Value?

"Indicators will only work when they can be referenced against a target.

(Woodley et al. 2000)

Reference values come in a wide variety of names (benchmark, standard, trend, threshold, desired future condition, norm); but all refer to a comparison to which an indicator can be examined or gauged. The reference value gives a point of reference to help interpret what we know about an indicator; to force discussion about what the measurement of an indicator is telling us; to help us assess whether we are moving in the desired direction and at the right pace; and to help identify what other things interact with or are affected by that indicator.

The result of comparison against a reference value may, at the scale of an individual indicator or measure, trigger a range of responses including management action to correct an undesired situation, special cause-and -effect monitoring, intensified sampling, a change in a management standard/threshold or in the choice of the measurement protocol. Beyond the evaluation of the status of individual indicators, reference values allow the user to synthesize across a suite of indicators and assess the overall state of the systems compared to a desired target.

Reference values, although commonly used in other forms of scientific monitoring and in our everyday life from assessments of the economy to our health, are only beginning to be used in sustainability monitoring. In their assessment of a broad range of C&I initiatives, the Northeastern Area Sourcebook (NE For. Res. Plan. Assoc. 2001) noted that six of the 39 initiatives included some form of reference values from broad benchmark-type statements consisting either of broad qualitative and directional statements (e.g., reduced rate of forest land conversion) to more specific time-oriented, quantitative reference values (e.g., conserve x percent land by x date). The Oregon Benchmarks program is one of the best examples of a benchmarking approach to reference values (Figure 1). When the terms and words used in indicators are examined a bit more closely, however, the numbers of initiatives implying the use of reference values is much greater as many C&I initiatives define indicators with an implied direction.

	1998	2000	Page
KEY ENVIRONMENT BENCHMARKS			
Air Quality	**A**	**A**	**63**
Land Preservation Wetlands, Agricultural and Forest Lands	**A**	**B-**	**64**
Salmon & Steelhead	**F**	**F**	**67**
***OTHER* ENVIRONMENT BENCHMARKS**			
Carbon Dioxide Emissions	F	F	68
Stream Water Quality	A	B+	68
Instream Water Rights	A	A	68
Timber Harvest		*new*	*69*
Municipal Waste Disposal per Capita	F	F	69
Hazardous Waste Site Clean-up	A	A	69
Healthy Wildlife Species	F	D-	70
Marine Species at Risk		*new*	*70*
Healthy Native Plant Species	C-	D-	70
Nuisance Species		*new*	*71*
State Park Acreage	F	F	71
AVERAGE *OTHER* GRADE	**C+**	**C-**	
OVERALL ENVIRONMENT GRADE*	**C+**	**C+**	

Figure 1. Summary scores for the Environment Benchmarks for the Oregon 2001 Benchmarks Performance Report (Oregon Progress Board 2001)

Types of Reference Values

Reference values help us evaluate how we are doing; consequently, their utility critically hinges on the rationale for what we choose as the bases of these values. Reference values can be formed on a variety of different kinds of bases from current conditions to legal standards to historic range of variation (HRV). All present potentially logical foundations for forming reference values.

A variety of different terms are used to describe reference values. There is little consistency in the use of the terms, and they are not necessarily mutually exclusive. In any given suite of C&I the reference values may be or a combination of different forms or terms as explained below.

Reference values are the benchmark, standard, trend, threshold, or desired future condition against which measures are assessed. Reference values provide the means to determine movement towards or away from a desired target for any given indicator.

Thresholds. The maximum or minimum values of an indicator are its thresholds. They indicate the region of change in the value of an indicator beyond which precipitous declines will occur (e.g., an amount of habitat loss from fragmentation beyond which interior-dwelling species will not be able to survive). Identification of thresholds is very important because indicators do not necessarily progress in a linear fashion, but in reality few actual thresholds are known.

Benchmarks. Points of reference against which a measurement can be made and against which others may judge progress. Benchmarks can be quantitative or qualitative, input or outcome, short-term or long-term. The use of the term *benchmark* is fairly broad and may encompass a range of other kinds of reference values. Some view *benchmark* conditions as a set of intermediate conditions or points along the way to the desired future condition. Harwell (1999) notes that intermediary benchmarks may be particularly useful if, for example, the ecological condition is far removed from the desired condition and progress is focused more on restorative actions.

Reference Condition. Values that may be established based on reference to documented historical values (e.g., HRV) or on monitoring and comparison to nonaffected systems are reference conditions. Some people describe reference conditions as "bounding conditions," for example, a descriptor of a measure at each end of a spectrum from a high degree of disturbance to a high degree of pristine ecological condition (Harwell 1999).

Targets/Desired Future Conditions. According to Lammerts van Bueren and Blom (1997), a target is a "reference value to strive for." A target may also be a desired level to be achieved by an indicator. Further, a target by identifying the character of a desired future condition may represent that condition.

Norms. "A norm is the reference value of the indicator and is established for use as a rule or a basis for comparison. By comparing the norm with the actual measured value, the result demonstrates the degree of fulfillment of a criterion and of compliance with a principle" (Lammerts van Bueren and Blom 1997).

Standards. Any agreed upon value or measure can be regarded as a standard. They are frequently associated with Forest Plan standards. Standards may be legal or regulatory targets that must not be violated (e.g., human health water quality standards).

Trends. Reference values based on an assessment of trends look at change in data values over time and potentially at the rate of change. Maclaren (1996) notes that trend indicators "provide only indirect information about the future, they are more useful for reactive rather than proactive policy-making. This is because a review of trend indicators can signal when corrective action may be needed, but they are poor at anticipating future problems, and cannot help us to design policies that will prevent these problems from happening in the first place."

Analysis Results for Departure from Expected Fire Regime

Departure from Expected Fire Regime: legend

None
Moderate
High

Departure from Expected Fire Regime Cleveland National Forest 2003

	REGIME				
Number of Fires	I	III	IV	V	Grand Total
0	11,942	1,363	23,698	4,494	41,498
1	18,577	4,872	125,002	16,072	164,523
2	13,791	4,402	99,022	5,266	122,481
3	5,545	2,946	50,473	1,101	60,064
4	2,297	1,598	19,165	106	23,166
5	519	407	4,993		5,920
6		119	1,924		2,043
7		4	740		744
8			291		291
9			48		48
10			9		9
Grand Total	52,670	15,712	325,364	27,040	420,785

Departure from Expected Fire Regime San Bernardino National Forest 2003

	REGIME			
Number of Fires	I	IV	V	Grand Total
0	115,645	48,052	103,211	266,907
1	36,118	109,215	59,342	204,675
2	9,677	57,188	32,737	99,602
3	1,793	31,782	17,596	51,170
4	120	13,614	6,073	19,806
5	12	9,450	2,978	12,440
6		4,625	771	5,396
7		2,694	208	2,902
8		1,210	91	1,302
9		721	7	728
10		297		297
11		73		73
12		57		57
13		3		3
Grand Total	163,365	278,979	223,015	665,359

Departure from Expected Fire Regime Angeles National Forest 2003

	REGIME				
Number of Fires	I	III	IV	V	Grand Total
0	28,689	588	46,200	83,191	158,668
1	24,834	777	114,075	63,591	203,276
2	3,641	857	139,173	30,449	174,121
3	581	64	71,963	13,363	85,972
4		0	29,839	2,338	32,177
5		0	5,011	241	5,252
6			671		671
7			28		28
Grand Total	57,745	2,287	406,960	193,174	660,165

Departure from Expected Fire Regime Los Padres National Forest 2003

	REGIME				
Number of Fires	I	III	IV	V	Grand Total
0	99,189	4,200	174,399	238,035	515,822
1	29,332	14,506	511,926	40,691	596,455
2	10,163	18,633	427,902	6,876	463,573
3	4,545	7,524	137,265	2,089	151,422
4	2,270	451	28,175	79	30,974
5	549	8	11,998	2	12,557
6	68	5	5,262		5,335
7			173		173
8			188		188
Grand Total	146,115	45,327	1,297,287	287,771	1,776,500