

Land Use Trends Tracking System

**Report from Clark County, Nevada, Department of Air Quality and Environmental Management,
Desert Conservation Program to Science Advisor, Desert Research Institute**

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Executive Summary

The Clark County Multiple Species Habitat Conservation Plan's (MSHCP: RECON 2001) Adaptive Management Program tracks land use trends within the Section 10(a) Incidental Take Permit (USFWS 2001b) area in order to balance land disturbance under the permit with mitigation actions. Both aspatial and spatial analyses were conducted in 2007 to track the following land use trends: number of acres permitted for disturbance under the Section 10(a) Incidental Take Permit, number of Federal Disposal Area acres disposed of since the 2006 Adaptive Management Report (Clark County, Nevada 2006) analysis was completed, and location of acres disturbed during the term of the Section 10(a) Incidental Take Permit. A spatial analysis of the number of acres of each MSHCP Management Area category was also conducted. The results of the spatial analysis were not more than 10% different than the number of permitted acres reported. A separate analysis of legislative and other changes to the boundaries of MSHCP Management Areas is currently being conducted by the Bureau of Land Management, and the results were not available for this report. Recommendations for enhancement of the present spatial analysis are presented.

Introduction

The MSHCP's Adaptive Management Program (AMP) was tasked with analyzing land use trends to "make sure that take and habitat disturbance is balanced with solid conservation" (RECON 2000, p. 2.179). The intent of this AMP task is to ensure that "take" or land disturbance under the Section 10(a) Incidental Take Permit is balanced with implementation of conservation actions (RECON 2000 p2.179 and USFWS 2001a p 2.6). Data are available to document the number of acres permitted for disturbance to date under the Section 10(a) Incidental Take Permit, the number of acres remaining in Federal Disposal Areas that might be included in future applications for disturbance under the Section 10(a) Incidental Take Permit, and the spatial extent of land disturbed to date during the term of the Section 10(a) Incidental Take Permit.

Clark County, Nevada, Department of Air Quality and Environmental Management staff track the results of Federal Disposal Area land sales. Table one compares the acres remaining in each of these Federal Disposal Areas as of January 1, 2006 (as reported in the 2006 Adaptive Management Report (Clark County, Nevada 2006) to those remaining as of July 30, 2007. A total of 58 acres were disposed of during this time period.

Clark County, Nevada, Department of Air Quality and Environmental Management, Desert Conservation Program staff track the acres permitted for disturbance (take) under the Section 10(a) Incidental Take Permit. This number is reported quarterly to the US Fish and Wildlife Service and interested parties. As of June 30, 2007, a total of 72,973 acres had been disturbed, leaving 72,027 acres available for disturbance under the Section 10(a) Incidental Take Permit. These figures include permitted acres for which the \$550.00 per acre fee has been paid, as well as an assumption that all 15,000 of the fee-exempt municipal-purposes acres had been permitted. An audit of the actual fee-exempt municipal-purposes permitted acres is underway and an exact accounting was not available for this report.

Table 1. Acres available in Federal Disposal Areas within Clark County, Nevada.

Disposal Area	Acres remaining January 1, 2006	Acres remaining July 30, 2007
Goodsprings	946	946
Indian Springs South	1,308	1,308
Indian Springs North	420	420
Jean	2,633	2,633
Las Vegas Valley (excluding BLM lands previously sold and known R&PP leases)	25,206	25, 148
Laughlin	4,077	4,077
Mesquite/Bunkerville	14,460	14, 460
Moapa/Glendale	40,950	40,950
Nelson	859	859
Primm	1,202	1,202
Sandy Valley	3,831	3,831
Searchlight	2,019	2,019
Valley West	980	980
Grand Total	98,819	98,761

Clark County, Nevada, Department of Air Quality and Environmental Management, Desert Conservation Program staff also prepared a spatial analysis of lands disturbed during the term of the Section 10(a) Incidental Take Permit. The methods and results are discussed in the following sections.

Methods and Materials

The intent of this analysis was to establish a baseline of human disturbance and to calculate the approximate number of acres disturbed within the Section 10(a) Incidental Take Permit since implementation began in February, 2001. A number of GIS geodatabases and summary tables were produced from this analysis. Individual table data include total acres disturbed between 2001 and 2006 for Clark County, disturbance totals within the Las Vegas BLM disposal boundary, disturbance totals within all BLM disposal boundaries within Clark County, disturbance totals outside of the BLM disposal boundaries but within Clark County, and disturbance totals within the MSHCP land management categories (IMA/LIMA/MUMA/UMA).

For the purpose of this analysis two land use data sets were created from the available data with dates of 2001 and 2006. 2001 was chosen to coincide with the implementation of the Section 10(a) Incidental Take Permit and 2006 was chosen because of the availability of the latest aerial photography imagery data. The 2001 land use data set was primarily based on Clark County aerial photography imagery (Fall 2001) and enhanced with United States Geological Survey (USGS) Landsat satellite imagery from 2000 and 2001. The 2006 land use data set was built by enhancing the 2001 land use data set with the most recent available Clark County aerial photography imagery from Fall 2006. To achieve both a land use baseline and a disturbance analysis, each land use data set classification categories were classed as urban and non urban. This coding schema allowed for an elementary analysis of strictly urban growth between 2001 and 2006, although agricultural areas were also captured. For this analysis agricultural areas were included in the urban class. Agricultural areas in Clark County have experienced little significant change during the period analyzed. Results of this urban growth analysis can be found in the Results section.

The 2001 land use data set was produced by combining a series of screen digitized data sets beginning with USGS satellite imagery from 1972 with additional satellite imagery dated from 1986, 1992 and 2000. This land use data set was further enhanced with Clark County aerial photography from 2001. Once the 2001 land use data set was produced it was further enhanced by using Clark County aerial photography from 2005 and Fall, 2006. Geodatabase products that were produced and available from this effort are individual land use data sets for 1972, 1986, 1992, 2000, 2001, 2005, and 2006.

The steps used to create the land use geodatabases were:

1. In ArcMap (version 9.2), displayed the 1972 North American Landscape Characterization (NALC) Landsat Multispectral Scanner (MSS) imagery (Path39/Row34), (Path39/Row35), (Path39/Row36), (Path40/Row34), (Path40/Row35)
2. Screen digitized the urban extent and saved to a 1972 land use geodatabase
3. In ArcMap displayed the 1986 North American Landscape Characterization (NALC) Landsat Multispectral Scanner (MSS) imagery (Path39/Row34), (Path39/Row35), (Path39/Row36), (Path40/Row34), (Path40/Row35)
4. Updated the urban extent of 1972 land use geodatabase to capture new urban extent and saved to 1986 land use geodatabase
5. In ArcMap displayed the 1992 North American Landscape Characterization (NALC) Landsat Multispectral Scanner (MSS) imagery (Path39/Row34), (Path39/Row35), (Path39/Row36), (Path40/Row34), (Path40/Row35)
6. Updated the urban extent of 1986 land use geodatabase to capture new urban extent and saved to 1992 land use geodatabase
7. In ArcMap displayed the Multi-Resolution Land Characteristics (MRLC) Project (LandSat 7 ETM imagery 1999/2000/2001) used for the NLCD 2001 data sets and LandSat ETM 2000 imagery available from Keck Library (keck.library.unr.edu)
8. Updated the urban extent of the 1992 land use geodatabase to capture new urban extent and saved to 2000 land use geodatabase
9. In ArcMap displayed Clark County Fall 2001 aerial photography for primary coverage and if aerial coverage was lacking used 2001 MRLC as supplemental imagery.
10. Updated the urban extent of the 2000 land use geodatabase to capture new urban extent and saved to 2001 land use geodatabase
11. In ArcMap displayed Clark County Fall 2005 aerial photography for primary coverage and if aerial coverage was lacking and used 2006 USDA NAIP coverage for southern and northeastern portions of County
12. Updated the urban extent of the 2001 land use geodatabase to capture new urban extent and saved to 2005 land use geodatabase
13. In ArcMap displayed Clark County's Fall 2006 aerial photography
14. Updated the urban extent of the 2005 land use geodatabase to capture new urban extent and saved to 2006 land use geodatabase

The two final land use data sets used for the following analysis were the 2001 and 2006 geodatabases.

15. The 2001 and 2006 geodatabases were spatially combined using ArcGIS (union) that created a Urban growth geodatabase.
16. The portion of the Urban growth database within BLM disposal boundary was spatially extracted using ArcGIS (clip) and the BLM disposal area data set.
17. The Urban growth database was spatially combined using ArcGIS (union) with the RECON IMA/LIMA/MUMA/UMA data set.
18. Exported the final geodatabase tables data into Access database software.
19. In Access, fields were summarized by year, acres, and management areas.

While an updated geodatabase of the IMA/LIMA/MUMA/UMA data set is being produced to address legislative and other changes in management area categories, this data set was not available for use in this analysis.

QA/QC

1. Visual inspection of both of the 2001 and 2006 land use geodatabases were performed by a separate GIS analyst. Any obvious errors were identified and corrected. In addition to the visual inspection, the analyst displayed and inspected various reference GIS data along with the geodatabases. Any obvious errors were identified and corrected. A few of the reference data sets used were roads, RECON veg98 (urban areas), and SWREGAP (urban areas).
2. A simple overlay analysis was performed between the 2001 and 2006 land use geodatabases which located areas of potential land use classification conflicts. An example of a conflict would be if the 2001 land use area was coded urban and the same area in 2006 was coded not urban. These conflicts were identified and corrected.
3. Total urban acreages for each of the 2001 and 2006 data sets were compared to the reported permitted acres report for July 30, 2007 maintained by the Clark County Desert Conservation Program. The difference between the land disturbance acreages between 2001-2006 in the permitted acres report and the urban expansion GIS analysis between the 2001 and 2006 land use data sets was less than 10%. This is an acceptable error because disturbance permit fees are paid prior to disturbance occurring and the latest aerial imagery (Fall 2006) did not capture all of the areas that have paid fees but have not been developed. In addition, the minimum digitized screen mapping area used in creation of the geodatabases was approximately 2 acres, which means developed areas less than 2 acres might not have been digitized and could account for some of the acreage differences between the Report and the data sets.

Results

Figures 1a and 1b depict the disturbed acres within the Las Vegas Valley in 2001 and 2006, respectively. Of the 49,662 total acres disturbed in Clark County during this time period, 43,929 were within the BLM's Las Vegas disposal area boundary. An additional 583 acres were disturbed in the other Federal Disposal Areas, and 5,150 acres were disturbed in areas outside of Federal Disposal Areas during this time period.

As shown in Chart 1, of those 49,662 disturbed acres, 516 were in Intensively Management Areas (IMA), 78 were in Less Intensively Managed Areas, 17,233 were in Multiple Use Management Areas, and the majority (31,835) were in Unmanaged Areas (UMA).

Figure 1a Acres disturbed within Las Vegas Valley area in 2001.

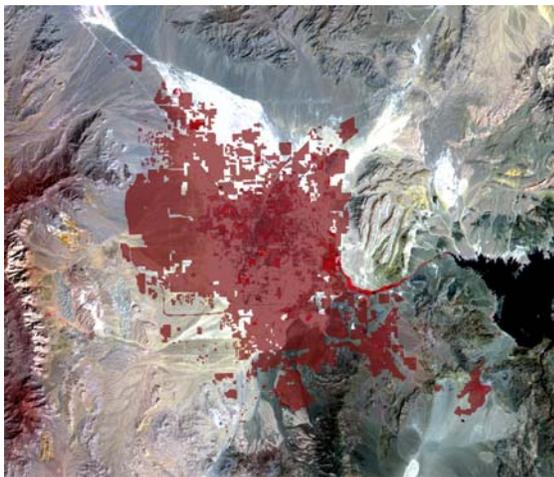


Figure 1b. Acres disturbed within Las Vegas Valley area as of 2006.

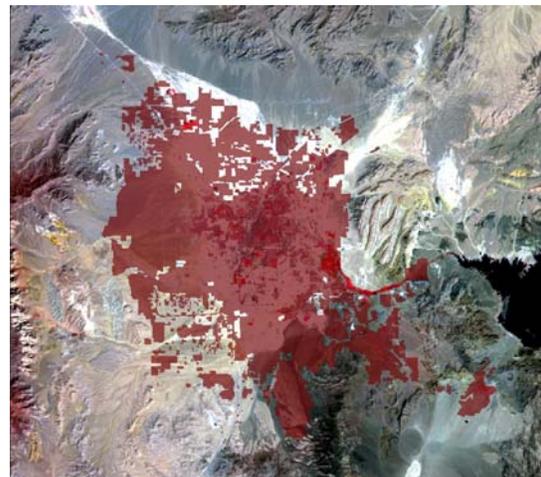


Chart 1. Disturbed acres in Clark County 2001 compared to 2006 among MSHCP land management categories.

	Total Acres	2001 Urban	2006 Urban	Acres Lost
Clark County	5,056,670	201,091	250,753	49,662
BLM Disposal Boundary - All	406,032	176,987	221,498	44,512
BLM Disposal Boundary - Las Vegas	390,332	176,026	219,955	43,929
Outside BLM Disposal Boundary	4,650,638	24,104	29,255	5,151
IMA	2,650,007	506	1,022	516
LIMA	380,914	75	153	78
MUMA	1,505,863	19,456	36,689	17,233
UMA	519,882	181,054	212,889	31,835

Recommendations

Recommendations for future land use trends analysis could include refining the land use classification schema to include a more robust and finer classification system. A combination of land use/land cover classification system could be used. A common land use/land cover classification system that could be used is the Anderson Level I land use/land cover. In time this could be developed into a more complex classification system like the one used in Anderson Level II or in the NLCD products. To achieve this level of classification the land use data sets would have to be enhanced by use of GIS reference data such as parcel data from Clark County and other MSHCP permit holders, USDA NAIP imagery, DOQQs, other imagery data such as Quickbird, roads, government lands data sets, and color IR aerial photography.

Once available, the updated IMA/LIMA/MUMA/UMA data set currently being developed by BLM should be used in future analyses involving the MSHCP Management Area categories.

Desert Research Institute has indicated that they have additional urban data sets of the Las Vegas Valley. These new products could be helpful in refining the existing land use data sets used for this analysis.

A demographic GIS data set for the Las Vegas Valley that includes land use projections is being developed and coordinated by Southern Nevada Regional Planning Coalition and Clark County Regional Transportation Commission. Land use projection data is being provided by Henderson, North Las Vegas, Las Vegas, and Clark County. This data set will be useful for future land use trends and habitat loss analysis.

The Clark County aerial photography acquisition period occurs twice yearly, in March and September. Beginning with the March, 2007 aerial photography acquisitions, the County aerial contractor will begin providing 4 band (1 color IR) 6 inch resolution imagery instead of the previous 1foot 3 band imagery. Higher resolution imagery with the additional IR band will provide the analyst a means to extract more visual information from the imagery. With the addition of the IR band, vegetation data may be extractable.

Reference Imagery/Data

Main image: Used Landsat-7 Path Row 39/35 04/01/2000 KECK Library

USDA NAIP 2006

NLCD2001 MRLC Imagery, NLCD01 imagery, and impervious imagery downloaded from EDC

Used SWReGAP developed classes – 2001

Lasvegas_roi_classified-2000.tif? Free from EDC? Clipped to LV valley source unknown

Lasvegas_may2000_str_geo_rgb.tif? Free from EDC? Clipped to LV valley source unknown

Roads

RECON VEG data (1998)

RECON exmgt data (IMA/LIMA/MUMA/UMA 1998)

BLM Disposal Boundary areas

Literature Cited

Clark County, Nevada. 2006. Adaptive Management Report for the Clark County, Nevada Multiple Species Habitat Conservation Plan. Unpublished report from Clark County, Nevada as Plan Administrator to US Fish and Wildlife Service. 116 pp.

[RECON] Regional Environmental Consultants, Inc. 2000. Final Clark County Nevada Multiple Species Habitat Conservation Plan and Environmental Impact Statement. Prepared for Clark County Administrative Services.

[USFWS] US Fish and Wildlife Services. 2001a. Biological Opinion for a Section 10 Take Permit for the Clark County Multiple Species Habitat Conservation Plan. Carson City, Nevada.

USFWS. 2001b. Section 10 Take Permit for the Clark County Multiple Species Habitat Conservation Plan. Carson City, Nevada.