

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

15 February 2008

Executive Summary

The Clark County Multiple Species Habitat Conservation Plan's (MSHCP: RECON 2000) Adaptive Management Program tracks land use trends within the Section 10(a) Incidental Take Permit (US Fish and Wildlife Service: USFWS 2001a) area in order to balance land disturbance under the permit with mitigation actions. Both aspatial and spatial analyses were conducted in early 2008 to track the following land use trends: number of acres permitted for disturbance under the MSHCP's Section 10(a) Incidental Take Permit (February 2001 to December 2007) and location of acres actually disturbed during the term of the Section 10(a) Incidental Take Permit. As of December 31, 2007, 61,987.46 acres had been permitted for disturbance. Spatial analyses of the number of acres actually disturbed within Federal Disposal Areas and within MSHCP Management Area categories were also conducted. These spatial analyses showed that between March 2001 and March 2007, 56,512 acres had been disturbed. The result of the spatial analysis was less than 10% different than the reported number of acres permitted for disturbance between February 2001 and December 2007. Possible reasons for this discrepancy include the difference in the time periods analyzed, discrepancies in acres permitted but exempt from payment of the per-acre disturbance fee, lag time between payment of disturbance permit fee and actual on-the-ground disturbance, and scale of the spatial analysis. The majority of acres disturbed during the term of the Section 10(a) Incidental Take Permit (49,798) are within Federal Disposal Areas, and the majority (55,911) of disturbed acres are located in either MSHCP Management Area categories of Unmanaged or Multiple Use Management Areas, as anticipated by the MSHCP and USFWS analysis of the potential impacts of the MSHCP's Section 10(a) Incidental Take Permit (RECON 2000 and USFWS 2001a). An anticipated separate analysis of legislative and other changes to the boundaries of MSHCP Management Areas is currently being completed by the Bureau of Land Management, and the results were not available for this report. An anticipated additional analysis of projected future land uses and disturbance prepared by municipalities in the permit area was not available for this report. Recommendations for use and enhancement of the completed analyses include refinement of the data sets and incorporation of forthcoming datasets from the Bureau of Land Management's analysis of changes to MSHCP Management Areas and the Southern Nevada Regional Planning Coalition's and Clark County Regional Transportation Commission's future land use and disturbance projections.

Introduction

The MSHCP's Section 10(a) Incidental Take Permit (USFWS 2001b) is for incidental take of desert tortoises and seventy-seven (77) other Covered Species within Clark County in connection with development on non-Federal lands and Nevada Department of Transportation activities in Clark County and within desert tortoise habitat in adjacent Nevada Counties below the 38th parallel and 5,000 feet in elevation (RECON 2000 p. 2.4). Incidental take is permitted on a per acre habitat loss basis rather than by the number of individuals of each listed covered species. For the purposes of the analyses in this report, incidental take of habitat is described as "disturbance." For each non-Federal acre to be disturbed under the Section 10(a) Incidental

Take Permit, a fee of \$550.00 is paid into a mitigation fund. Up to a total of 15,000 acres may be exempted from the fee if the lands to be disturbed are to serve a municipal purpose. A total of 145,000 non-Federal acres may be disturbed under the term of the MSHCP's Section 10(a) Incidental Take Permit (USFWS 2001b).

The MSHCP's Adaptive Management Program (AMP) is 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 disturbance under the Section 10(a) Incidental Take Permit is balanced with implementation of mitigation actions (RECON 2000 p. 2.179 and USFWS 2001a p. 2.11). Data are available to document the number of acres permitted for disturbance to date 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.

Approximately 100,000 acres of Federal lands within Clark County are currently within designated Federal Disposal Boundaries (figure 1) and are eligible for transfer from Federal ownership to private or municipal ownership (personal communication to Sue Wainscott from Ron Gregory, Clark County Department of Air Quality and Environmental Management, January 3, 2008). These lands may be transferred via sale, exchange for other acres, or Recreational and Public Purpose lease to municipalities. Upon transfer to non-Federal ownership, these lands become eligible to be permitted for disturbance under the MSHCP's Section 10(a) Incidental Take Permit. The MSHCP, USFWS analysis of the MSHCP and the Section 10(a) Incidental Take Permit anticipated that some or all of these acres might be transferred to non-Federal ownership at some point during the term of the permit (RECON 2000, USFWS 2001a and 2001b).

The Southern Nevada Regional Planning Coalition and Clark County Regional Transportation Commission are coordinating development of a demographic spatial data set for Clark County that includes land use projections. Land use projection data is being provided by Henderson, North Las Vegas, Las Vegas, Mesquite, and Clark County. This dataset will depict both areas of likely future disturbance and requests for additional disposal of Federal lands. This dataset was not available for analysis in this report.

The MSHCP (RECON 2000) categorized the landscape of the area covered by the Section 10(a) Incidental Take Permit in four basic conservation management categories shown in figure 2: Intensively Managed Areas (IMA), Less Intensively Managed Areas (LIMA), Multiple Use Managed Areas (MUMA), and Unmanaged Areas (UMA). The MSHCP's goals for species management are described in terms of the habitat quality in each of these management categories (RECON 2000). The MSHCP, USFWS analysis of the MSHCP and the Section 10(a) Incidental Take Permit anticipated that changes in MSHCP Management Area designation might take place during the term of the permit (RECON 2000, USFWS 2001a and 2001b), and a process for evaluating such changes was described in the MSHCP (RECON 2000 p. 2.292). Such an analysis is currently being completed by the Bureau of Land Management, but the datasets were not available for analysis in this report.

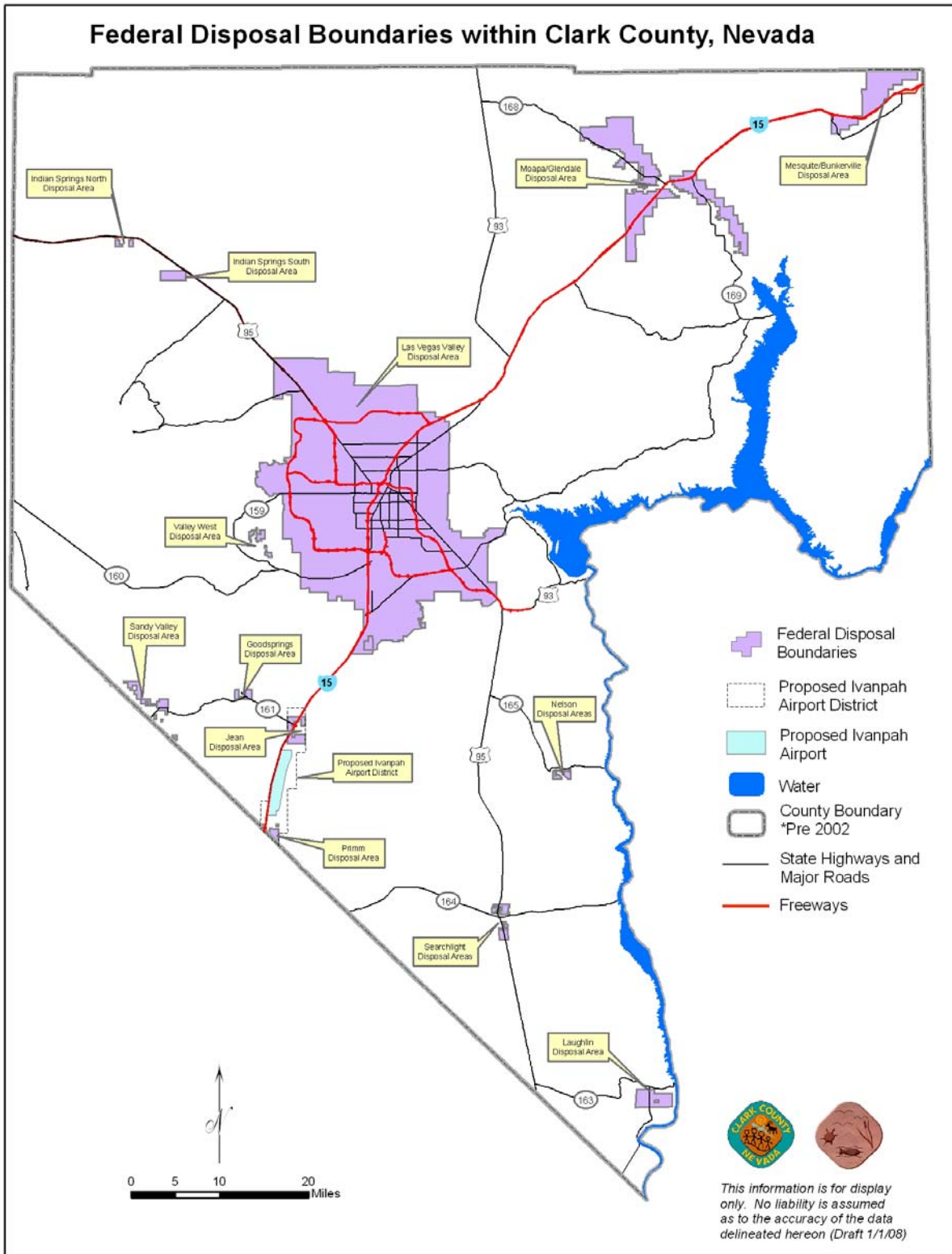


Figure 1. Federal Disposal Boundaries within Clark County, Nevada

Clark County MSHCP Section 10(a) Incidental Take Permit Area with Conservation Management Categories

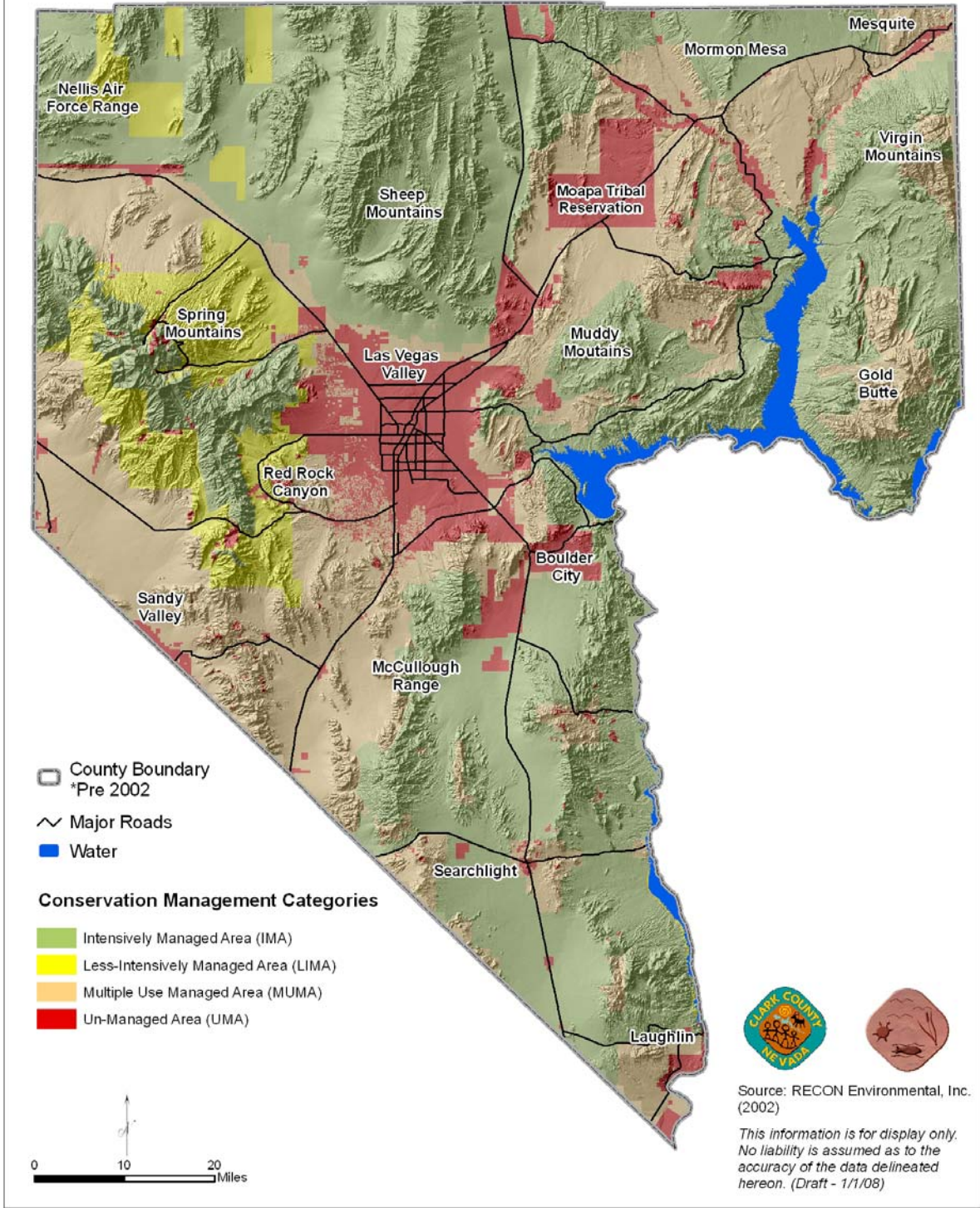


Figure 2. MSHCP Section 10(a) Incidental Take Permit Conservation Management Categories.

Clark County, Nevada, Department of Air Quality and Environmental Management, Desert Conservation Program tracks the number of acres permitted for disturbance in a non-spatial format. Clark County, Nevada, Department of Air Quality and Environmental Management, Desert Conservation Program also performed spatial analyses of lands disturbed during the term of the Section 10(a) Incidental Take Permit. The methods and results of each analysis are discussed in the following sections.

Acres permitted for disturbance under the MSHCP's Section 10(a) Incidental Take Permit

Clark County, Nevada, Department of Air Quality and Environmental Management, Desert Conservation Program tracks the acres permitted for disturbance (take) under the Section 10(a) Incidental Take Permit. This report is submitted quarterly to the US Fish and Wildlife Service and interested parties. As of December 31, 2007, a total of 61,978.46 acres had been permitted for disturbance (appendix A). Of those acres, 2,133.60 were acres claiming exemption from fee payment due to the anticipated municipal-use of the permitted acres. An audit of reported fee-exempt acres is underway, and the reported number of permitted, fee-exempt acres is subject to change. Thus, the calculation of the number of acres remaining under the Section 10(a) Incidental Take Permit includes 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 have been permitted, leaving 70,146.14 acres available for disturbance under the Section 10(a) Incidental Take Permit (appendix A). A Desert Conservation Program audit of the actual fee-exempt municipal-purposes permitted acres is underway and an exact accounting was not available for this report. For comparison to the spatial analysis of actual disturbance described below, the figure of 61,978.46 acres permitted for disturbance is used.

Spatial analysis of acres actually disturbed during term of the MSHCP's Section 10(a) Incidental Take Permit

A spatial analysis of acres actually disturbed during the term (February 9, 2001 - December 31, 2007) of the Section 10(a) Incidental Take Permit was conducted. The intent of this analysis was to improve upon a baseline of disturbed acres which had been created in July 2007 (Clark County 2007) and to calculate the approximate number of acres actually disturbed within the permit area during the term of the Section 10(a) Incidental Take Permit. The time period of analysis was from March 2001 to March 2007, based upon the acquisition dates of available aerial imagery datasets.

For the purpose of this analysis, 2001 and 2007 land use data sets were produced by Clark County GIS analysts. Because this land use trends analysis is focused on the disturbance of land under the terms of the MSHCP's Section 10(a) Incidental Take Permit, a binary urban classification coding scheme was applied to each of the land use data sets (urban = disturbed, not urban = non-disturbed). Agricultural areas can be classified as either disturbed or non-disturbed depending on their current use. For this analysis all agricultural areas were included in the disturbed (urban) classification code. Agricultural areas in Clark County have experienced little change during the period analyzed.

As described in a previous report (Clark County 2007), the 2001 land use data set was primarily based on Clark County aerial photography imagery (March 2001). In areas where the aerial photography imagery was not collected, United States Geological Survey (USGS) Landsat satellite imagery from 2000 and 2001 was used. To create the 2001 urban land use data set, Clark County aerial photography and or LandSat imagery was displayed using a GIS (ArcGIS).

All urban areas were captured and input into a ArcGIS geodatabase. This was accomplished by screen digitizing urban areas using ArcGIS. The 2007 urban land use data set was produced using the same technique and solely based on the Clark County March 2007 aerial photography data. A minimum mapping distance of approximately 2 acres was used for capturing urban areas while screen digitizing. Total urban acreages were calculated within each data set.

This spatial analysis shows a total of 56,512 acres were disturbed in Clark County from March 2001 to March 2007. The increase of urban acreages from the 2001 to the 2007 data set was compared to the acres permitted for disturbance report for December 31, 2007. There is a difference of 5,475 acres between the two analyses, but this is a less than 10% difference. Possible reasons for this difference include the difference between the time periods analyzed, discrepancies in acres permitted but exempt from payment of the per-acre disturbance fee, lag time between payment of disturbance permit fee and actual on-the-ground disturbance, and scale of the spatial analysis, and potential errors in classification made by the GIS analysts.

The aspatial tracking of acres permitted for disturbance is through the actual term of the MSHCP's Section 10(a) Incidental Take Permit, from February 9, 2001 to December 31, 2007, while the spatial analysis of actual disturbance on-the-ground during the term of the permit was limited to the time period between available aerial imagery datasets, from March 2001 to March 2007. Some acres permitted for disturbance under the predecessor to the MSHCP may have actually been disturbed during the period analyzed by the spatial analysis, which would be an error of commission. Conversely, the spatial analysis of lands actually disturbed is limited to the date(s) the aerial imagery was acquired, which may be different across the area of analysis, and does not correspond exactly to the time that the Section 10(a) Incidental Take Permit was issued in February, 2001. Also, it is expected that applications will be submitted and fees paid for disturbance permits under the MSHCP's Section 10(a) Incidental Take Permit prior to actual disturbance on-the-ground, thus leading to expected lower numbers of acres actually disturbed to date in the spatial analysis.

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. There is also a margin of error introduced due to the interpretation of the photography by the GIS analysts.

Spatial analysis of acres disturbed within Federal Disposal Areas within the MSHCP's Section 10(a) Incidental Take Permit area

The extent of urban (disturbed) areas in each of the 2001 and 2007 GIS land use geodatabases were spatially compared with the Federal Disposal Area boundaries (figure 3). Table 1 displays the number of disturbed acres within Clark County and various Federal Disposal Areas. As shown in table 1, of the 56,512 total acres disturbed in Clark County during this time period, 47,817 were within the Las Vegas Valley Federal Disposal Area. An additional 1,981 acres were disturbed in the other Federal Disposal Areas, and 6,714 acres were disturbed in areas outside of designated Federal Disposal Areas during this time period.

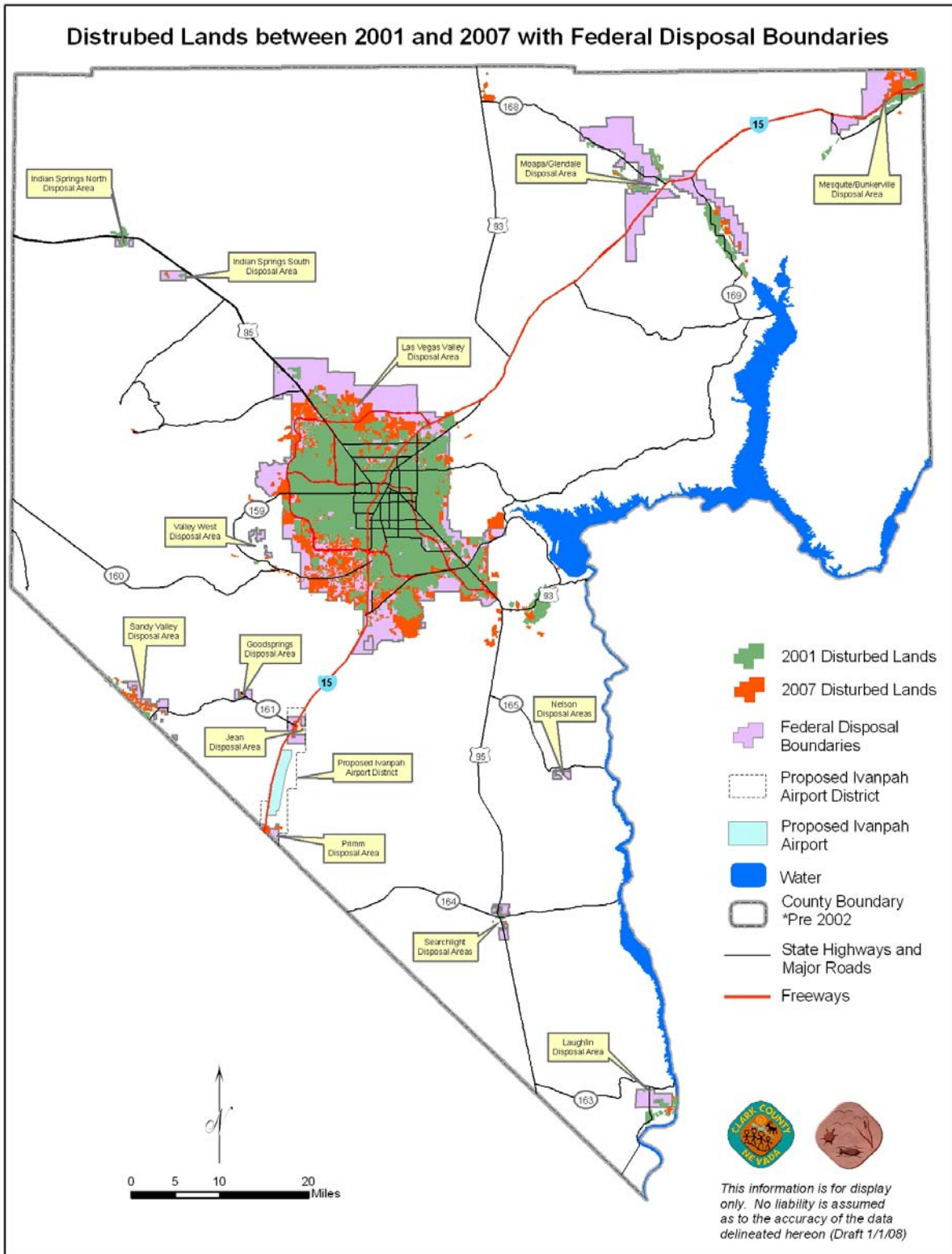


Figure 3. Disturbed Lands in 2001 and 2007 with Federal Disposal Area Boundaries.

Table 1. Disturbed acres in Clark County within Federal Disposal Areas in 2001 and 2007

Federal Disposal Areas - All	Total Acres	2001 Urban	2007 Urban	Acres Disturbed between 2001 and 2007
Clark County - All	5,056,687	204,040	260,552	56,512
Federal Disposal Areas - All	406,049	178,862	228,660	49,798
Las Vegas Valley Disposal Area only	330,644	177,901	225,719	47,817
Outside Federal Disposal Areas	4,650,638	25,177	31,891	6,714

Spatial analysis of acres disturbed in the MSHCP's Management Area categories

The extent of urban (disturbed) acres in each of the 2001 and 2007 GIS land use geodatabases were spatially compared with the MSHCP Management Area boundaries, and the number of acres disturbed in each category was calculated. Table 2 displays the results of the analysis of disturbed acres within the MSHCP Management Area categories. Of the 56,512 disturbed acres, 523 were in Intensively Management Areas (IMA), 79 were in Less Intensively Managed Areas (LIMA), 19,848 were in Multiple Use Management Areas (MUMA), and the majority (36,063) were in Unmanaged Areas (UMA). This analysis shows that 99% (55,911 acres) of the disturbance has taken place within UMAs and MUMAs.

Table 2. Disturbed acres in Clark County 2001 compared to 2007 within MSHCP Management Area categories.

	Total Acres	2001 Urban	2007 Urban	Acres Disturbed between 2001 and 2007
Clark County total	5,056,687	204,040	260,552	56,512
IMA	2,650,010	544	1,067	523
LIMA	380,914	76	155	79
MUMA	1,505,875	20,314	40,161	19,848
UMA	519,888	183,107	219,170	36,063

Conclusions

Both the aspatial tracking of the acres permitted for disturbance during the term of the MSHCP Section 10(a) Incidental Take Permit (February 2007 - December 31, 2007 (61,978.46)) and the spatial analysis of acres disturbed (56,512) during the term of available imagery (March 2001 - March 2007) show similar results within a reasonable margin of difference. The MSHCP anticipated disturbance of 63,475 acres within the first 6 years of the permit term (RECON 2000,

p. 2.284) and our analyses shows that both the lands actually disturbed and permitted for disturbance are within a reasonable margin of difference from this value.

The spatial analysis of acres disturbed within MSHCP Management Area categories shows that the majority of acres disturbed (55,911 or 99%) were within UMAs and MUMAs. The USFWS analysis of the potential impacts of the MSHCP's Section 10(a) Incidental Take Permit (USFWS 2001a) anticipated that the majority of disturbance would take place within UMAs or MUMA areas that had become UMAs through disposal of portions of Federal MUMA areas. It is likely that those MUMA areas disturbed to date were disposed of and actually UMA at the time of disturbance, but this cannot be confirmed until the BLM's MSHCP Management Area designation change analysis is completed.

Recommendations

Recommendations for future land use trends analysis include improving the resolution and reducing the potential for errors in land use classification as well as incorporation of anticipated future datasets. It has been recommended by the MSHCP's Science Advisor (DRI 2007) that future analyses of land use trends 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 USFS National Land Cover Dataset (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, US Department of Agriculture National Agriculture Imagery Program (NAIP) imagery, Digital Ortho Quarter Quads (DOQQs), other imagery data such as Quickbird, roads, government lands data sets, and color infrared aerial photography. However, because this report is concerned primarily with the extent of land disturbance under the Section 10(a) Incidental Take Permit, it is not clear whether the benefits of a more refined land use classification would result in more accurate or finer resolution of a binary dataset consisting of disturbed and non-disturbed classes.

The Clark County boundary was realigned in the early 2000s. The BLM's current analysis of changes in MSHCP Management Area categories includes incorporation of this post 2002 County boundary. In future analyses the post 2002 Clark County boundary should be used.

Upon completion of the audit of fee-exempt disturbance permitting, the results of the aspatial tracking system should be more accurate and should be used in future land use tracking analyses. Once available, the updated MSHCP Management Area categories dataset currently being developed by the Bureau of Land Management should be used in future analyses involving the MSHCP Management Area categories. Also, the Southern Nevada Regional Planning Coalition's and Clark County Regional Transportation Commission's demographic GIS land use projection data set should be incorporated in future MSHCP land use trends analyses. This dataset will depict areas of likely future disturbance and requests for additional disposal of Federal lands. This dataset will be useful for future land use trends analysis and with the MSHCP Management Area categories data to project future disturbance.

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. plus appendices

Clark County, Nevada. 2007. Land Use Trends Tracking System. Unpublished report from Clark County, Nevada, Department of Air Quality and Environmental Management, Desert Conservation Program to Science Advisor, Desert Research Institute. August 03, 2007. 7 pp.

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[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. 550 pp. plus appendices

[USFWS] US Fish and Wildlife Service. 2001a. Biological Opinion for a Section 10 Take Permit for the Clark County Multiple Species Habitat Conservation Plan. Carson City, Nevada. 237 pp.

USFWS. 2001b. Section 10 Take Permit for the Clark County Multiple Species Habitat Conservation Plan. Carson City, Nevada. 8 pp.

Appendix A. Acres permitted for disturbance from February 2001 - December 2007 under the MSHCP's Section 10(a) Incidental Take Permit