



Economic Analysis  
**MULTIPLE SPECIES HABITAT  
CONSERVATION PLAN**



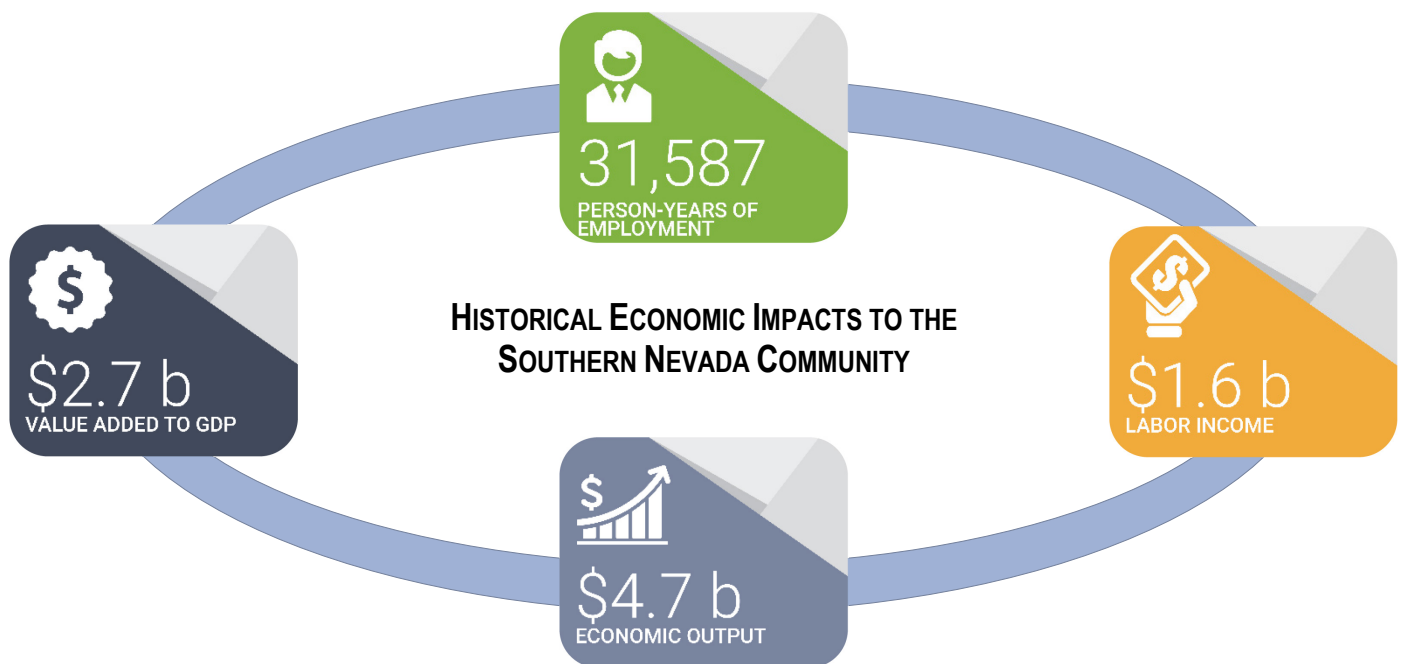
# Table of Contents

<b>Executive Summary</b> .....	<b>1</b>
<b>Introduction</b> .....	<b>3</b>
Southern Nevada: An Economy Designed for Growth.....	4
History of Habitat Conservation Plans in Southern Nevada .....	7
<b>Methods</b> .....	<b>8</b>
Quantitative Development Impacts.....	8
Analytical Approach.....	9
Measuring Economic Impacts.....	11
Qualitative and Non-Quantified Impacts .....	13
<b>Quantitative Impacts: A Historical Perspective</b> .....	<b>15</b>
Employment Impacts .....	16
Labor Income Impacts .....	17
Economic Output Impacts.....	18
Value Added Impacts.....	19
<b>Quantitative Impacts: Projected (Future) Impacts</b> .....	<b>20</b>
Projected Impacts of the Current Plan.....	20
Projected Impacts of MSHCP Amendment.....	21
<b>Comparison with Other Regional Plans</b> .....	<b>22</b>
<b>Conclusions</b> .....	<b>23</b>
<b>Supplemental Tables</b> .....	<b>24</b>
<b>Bibliography</b> .....	<b>33</b>

## Executive Summary

As Clark County looks to amend its existing Multiple Species Habitat Conservation Plan (“MSHCP” or “plan”), it is worth reflecting on the value of the current plan to the community. Clark County’s MSHCP has been a key asset in facilitating the growth of Southern Nevada. Without the MSHCP, Southern Nevada would have faced increased barriers to growth, most notably higher risk for developments and potential building delays as costly and time-intensive environmental mitigation plans were approved directly by the U.S. Fish and Wildlife Service.

Instead, the MSHCP provides developers and residents with a cooperative framework for the preservation of the natural environment. By facilitating a universal \$550 per-acre charge for land disturbance and efficiently expediting development, the MSHCP has been responsible for an estimated annual average of 1,974 jobs (31,587 cumulative person-years<sup>1</sup> of employment) as well as \$1.6 billion (in current dollars) of labor income<sup>2</sup> and \$4.7 billion of economic output<sup>3</sup> since the program’s inception in 2001. This per-acre fee has generated \$56.7 million since its inception. With \$2.7 billion added to regional gross domestic product<sup>4</sup> (“GDP”) as a result of the MSHCP, the amount of developer fees paid have translated into an over forty-fold increase in economic activity. Assuming the remainder of land available under the MSHCP is developed, the plan is anticipated to support an additional 16,041 person-years of employment, nearly \$0.8 billion of labor income, \$2.4 billion of economic output and nearly \$1.4 billion of GDP.



<sup>1</sup> A person-year is defined as one person being employed for one year.

<sup>2</sup> Labor income represents the total compensation paid to valley employees as measured in current (2017) dollars.

<sup>3</sup> Economic output is the total value of goods and services produced as a result of the economic activity generated by the MSHCP.

<sup>4</sup> Value added is the economic output less the cost of supplying goods and services.

The plan has also generated significant qualitative, or non-quantifiable, impacts. Compliance with the Endangered Species Act would involve increased risk and likely higher costs compared to the MSHCP. The plan provides certainty for developers that would otherwise be absent. Additionally, the continuous open space provided by the MSHCP improves property values, provides educational outreach to school children and allows for vital research on the natural environment. Large habitat conservation plans like the MSHCP have also proven to have very effective outcomes in preserving endangered and threatened species, such as the four listed species in Clark County and 74 others in protected status.

Perhaps most importantly, the plan makes it clear that conservation should be a collaborative effort between various stakeholders in the community. Developers are provided certainty in avoiding a lengthy process should a listed species reside on their property, while environmentalists have a framework to preserve and protect large tracts of land within Clark County. The Southern Nevada community is expected to continue to reap the benefit of the program's implementation and its planned amendment well into to the foreseeable future as the region is expected to outpace population growth and investment averages.

**SUMMARY OF HISTORICAL AND PROJECTED (FUTURE) IMPACTS OF THE PLAN<sup>5</sup>**

		<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
<b>Historical Impacts</b>	Employment (in Person-Years)	18,415	6,264	6,908	31,587
	Labor Income	\$1.0 B	\$0.3 B	\$0.3 B	\$1.6 B
	Output	\$2.9 B	\$0.8 B	\$1.0 B	\$4.7 B
	Value Added	\$1.6 B	\$0.5 B	\$0.6 B	\$2.7 B
<b>Projected (Future, Excluding Any Planned Amendments)</b>	Employment (in Person-Years)	9,338	3,177	3,503	16,016
	Labor Income	\$0.5 B	\$0.2 B	\$0.2 B	\$0.8 B
	Output	\$1.5 B	\$0.4 B	\$0.5 B	\$2.4 B
	Value Added	\$0.8 B	\$0.3 B	\$0.3 B	\$1.4 B
<b>Total Impacts</b>	<b>Employment (in Person-Years)</b>	<b>27,753</b>	<b>9,440</b>	<b>10,411</b>	<b>47,603</b>
	<b>Labor Income</b>	<b>\$1.5 B</b>	<b>\$0.5 B</b>	<b>\$0.5 B</b>	<b>\$2.4 B</b>
	<b>Output</b>	<b>\$4.4 B</b>	<b>\$1.3 B</b>	<b>\$1.5 B</b>	<b>\$7.1 B</b>
	<b>Value Added</b>	<b>\$2.4 B</b>	<b>\$0.7 B</b>	<b>\$0.9 B</b>	<b>\$4.0 B</b>

<sup>5</sup> Dollar amounts stated in current (2017) dollars (in billions).



## Introduction

Clark County's MSHCP was created to balance the needs of the rapidly growing Southern Nevada community with the protection of native wildlife, including numerous threatened and endangered species. The Clark County Desert Conservation Program ("DCP") is preparing a major amendment to the existing MSHCP to align it with future needs of the community. As part of this process, DCP commissioned this report to provide stakeholders with an independent evaluation of the economic impact of the plan, particularly that associated with overall development activity. The results of this study will be used by the DCP in discussion with local business and development communities, government decision-makers, regulatory agencies and residents in the creation of the amendments to the existing MSHCP.

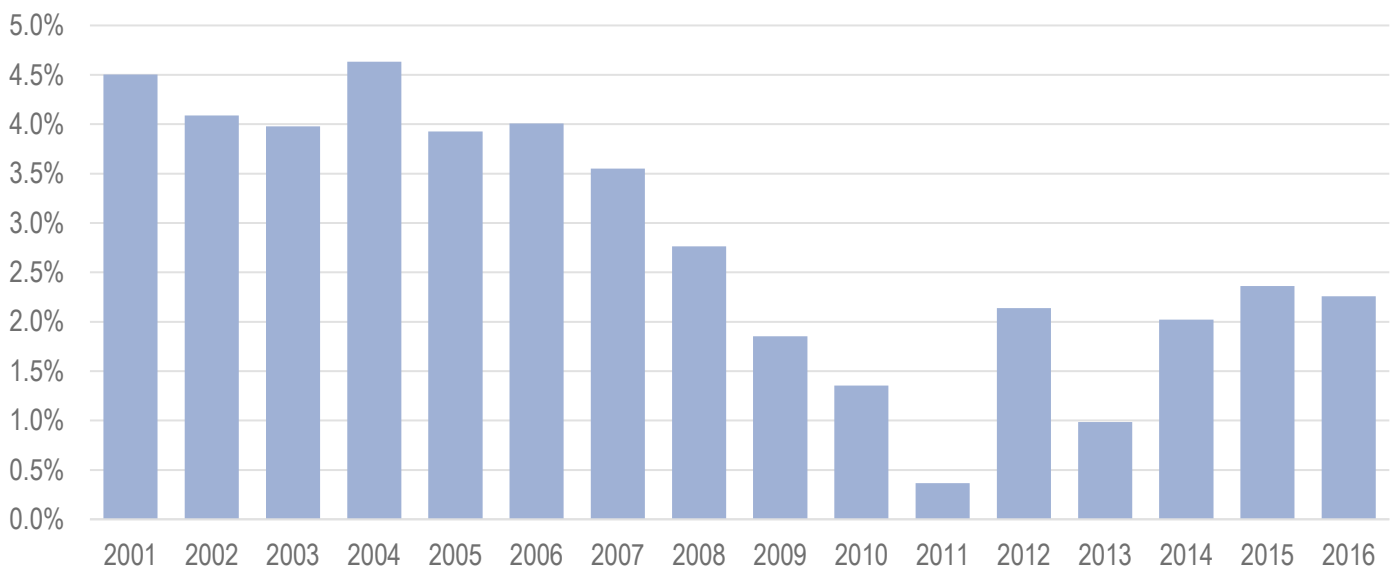


*Clockwise from the top left: desert tortoise (threatened), American peregrine falcon (delisted due to recovery), southwestern willow flycatcher (endangered), and the Mount Charleston blue butterfly (endangered). These are a small sample of the 78 species covered by the MSHCP.*

## Southern Nevada: An Economy Designed for Growth

Since the creation of the MSHCP, Las Vegas has been the 4<sup>th</sup> fastest-growing large metropolitan area in the nation, adding an additional 779,899 residents, a 56.7-percent increase.<sup>6</sup> The growth pattern for Southern Nevada during that timeframe translates into 5.6 residents per hour moving into the area since the establishment of the MSHCP. The Las Vegas area economy has, and continues to be, designed around this growth. Despite being one of the hardest-hit economies in the country in the Great Recession, population growth has resumed and is now growing at a rate more than twice the national average.

*Las Vegas Metropolitan Statistical Area (“MSA”) Population Growth*

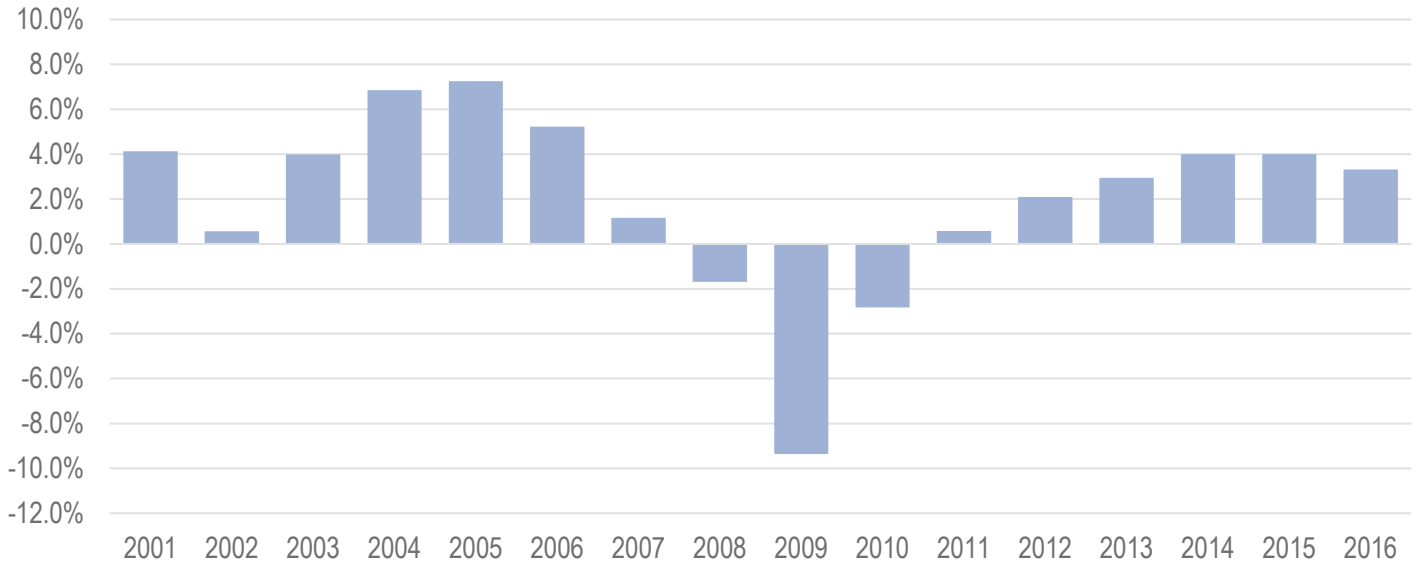


At present, the construction industry accounts for 6.3 percent of overall employment, a 33.2-percent greater share than the national level. At the peak of the prior economic expansion, the construction sector accounted for nearly 12 percent of the economy. Even at the lowest point of the Great Recession, when Las Vegas construction looked its weakest, it composed a similar percent of the Las Vegas economy as it did at the national level. Construction is a pivotal industry in Southern Nevada and could be critically threatened by the lack of an efficient approach to comply with environmental requirements. Construction employment growth has been strongly correlated (with a correlation statistic of 0.5 out of 1.0) with population growth in the Las Vegas area since the establishment of the MSHCP, though construction was notably more sensitive to the boom and bust cycle, as shown below.

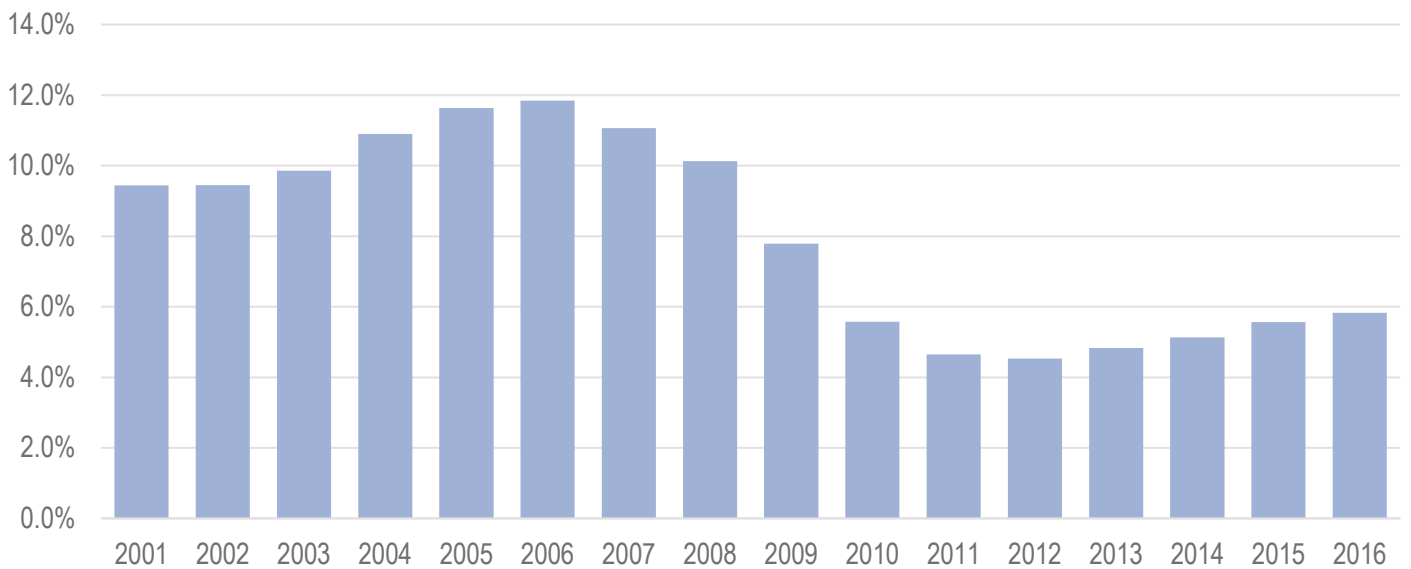
<sup>6</sup> Among metropolitan areas with one million or more in population (US Census Bureau from 2000 to present).



*Las Vegas MSA Employment Growth<sup>7</sup>*



*Las Vegas MSA Construction Employment as a Percentage of Total Employment<sup>8</sup>*

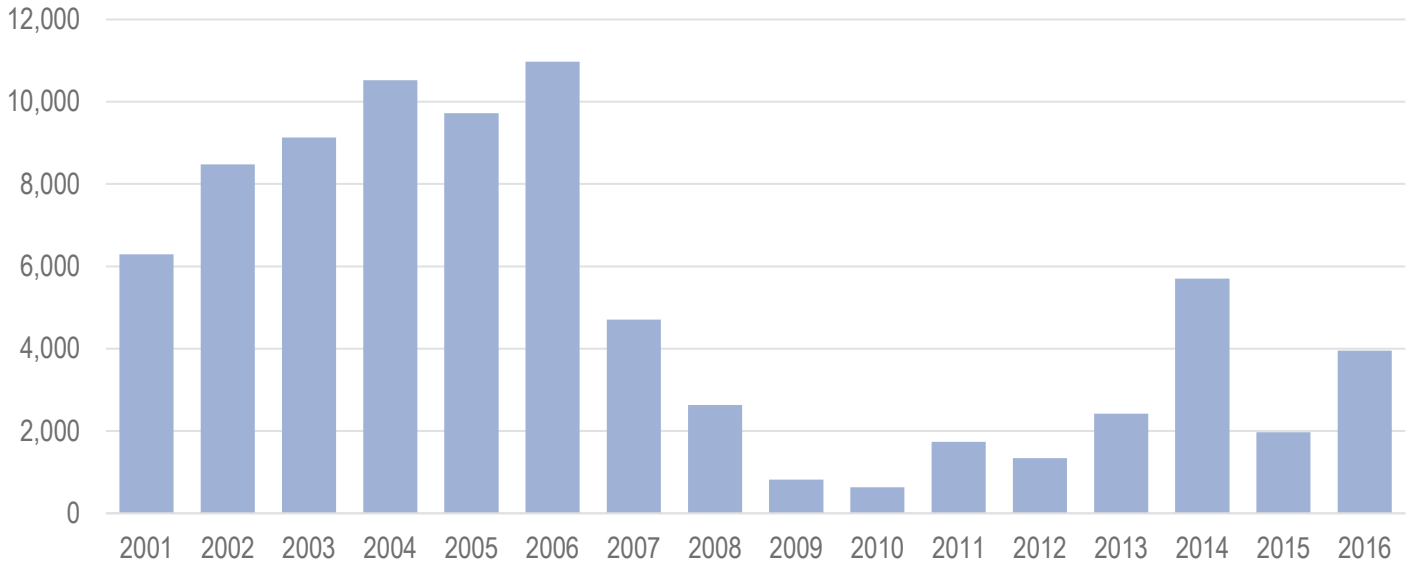


Growth is also reflected in the amount of land development and overall new home development in market area.

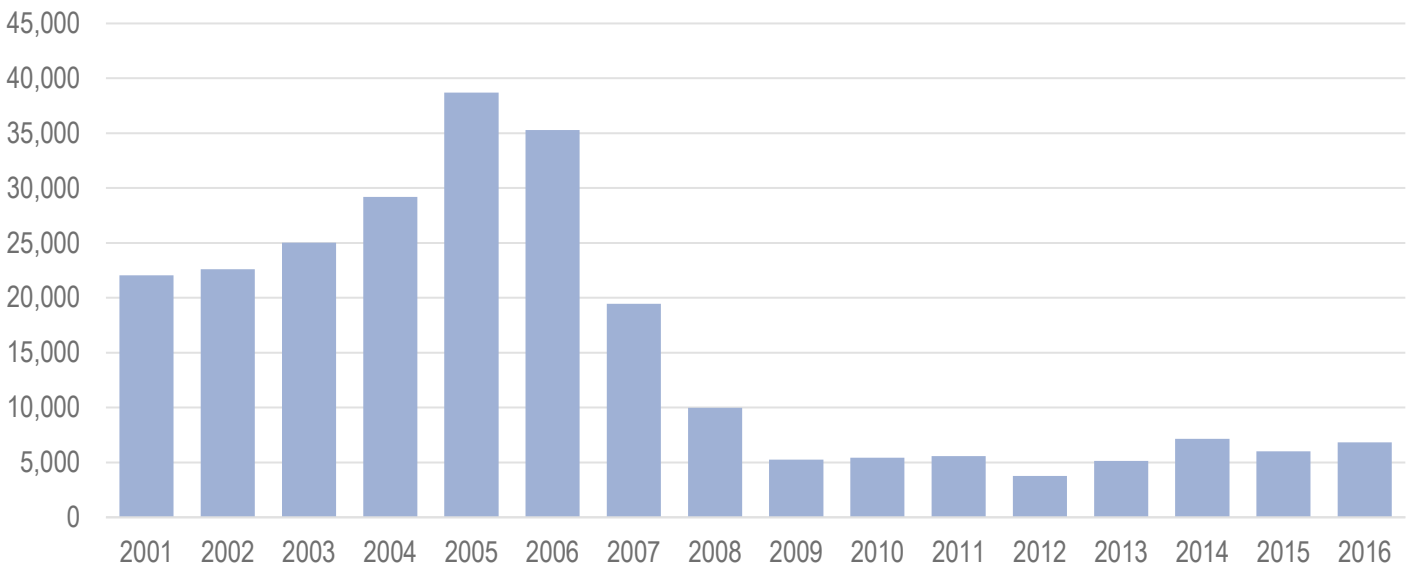
<sup>7</sup> Source: BEA.

<sup>8</sup> Source: BEA and Applied Analysis calculations.

*Clark County Acreage Disturbed Under the MSHCP*



*Southern Nevada New Home Closings<sup>9</sup>*



Given the constraints the lack of an MSHCP placed on the construction sector prior to its creation, the elimination of it would result in a noticeable economic shock. The increased cost of compliance with the Endangered Species Act, delay in growth, and additional risk to developers would all but ensure that Clark County’s growth trajectory would be permanently lowered without the MSHCP.

<sup>9</sup> Source: SalesTraq.



## History of Habitat Conservation Plans in Southern Nevada

In 1989, the U.S. Fish and Wildlife Service listed the desert tortoise (*Gopherus agassizii*) as an endangered species. The listing of the tortoise resulted in an immediate halt of nearly all new construction in the rapidly growing Southern Nevada area, and subsequent legal challenges to the listing failed. During this time, development companies seeking to continue a project were required to negotiate with the U.S. Fish and Wildlife Service on a case-by-case basis, comply with a lengthy list of rules and relocate tortoises within the area. The process was onerous on development and construction firms throughout Southern Nevada.

To help reduce these impacts, Clark County and the cities of Las Vegas, North Las Vegas, Henderson, Boulder City and Mesquite obtained an incidental take permit for the desert tortoise in August 1991 after nearly two years of negotiation with the U.S. Fish and Wildlife Service. This was followed by a long-term plan in 1995 for the desert tortoise. The 1995 plan also allowed for the formation of a multiple species habitat conservation plan, providing research on other species of concern in Clark County.

The County and cities began discussions in May 1996 on implementing a multiple species habitat conservation plan. This plan, which would eventually cover 78 species, nearly guaranteed the availability of land for development as it would allow land to be disturbed (or developed upon) even if one of the covered species were to be listed as threatened or endangered. The plan also allows a holistic management of natural habitats and environments to reduce the chance of further species being listed. The key objectives of the existing MSHCP are as follows:

- Achieve a balance between long-term conservation and recovery of the diversity of natural habitats, native plants and animals that comprise an important part of the natural heritage of Clark County;
- Maintain an orderly and beneficial use of land to promote the economy, health, well-being, customs and culture of the growing population of Clark County;
- Provide substantial recovery and conservation benefits to species and ecosystems in Clark County;
- Maximize flexibility and available options in developing mitigation and conservation programs;
- Reduce the economic and logistical burden of these programs on individual landowners and state and federal land managers by distributing their impacts in a fair and effective manner;
- Reduce uncoordinated decision making, which can result in incremental habitat loss and inefficient project review;
- Provide the community with long-term planning assurances and increase the number of species for which assurances can be given; and
- Bring a broad range of activities under the permit's legal protection.

## Methods

---

To measure the impact of the MSHCP, they generally fall into two categories – quantifiable and qualitative. The principal quantifiable impact of the plan is minimizing the time involved by land developers with compliance of the Endangered Species Act, and allowing them to substantially reduce or eliminate carrying costs for land. The other impact considered involves non-quantifiable, or qualitative, effects such as the value of saving a species, preventing a species from becoming endangered and the impact of holistic management practices for environmental preservation. The following subsections discuss the methodology for evaluating these quantitative and qualitative impacts.

### Quantitative Development Impacts

Based on discussion with the development community, the primary quantifiable impact of the MSHCP is the delay developers would potentially incur if not for Clark County's agreement with the U.S. Fish and Wildlife Service. In 1990, before the temporary habitat conservation plan was established, construction projects would have likely had to hire their own biologist to survey the site. If tortoises were found, developers would have to wait up to two years for a permanent take permit to remove tortoises from the project site.<sup>10</sup>

Discussions with selected Southern Nevada area developers tend to confirm this concept. Selected developers, some with a national presence, indicated that not having the MSHCP in place would be difficult for business as projects would require a six- to 24-month delay as they work directly with the U.S. Fish and Wildlife Service to negotiate agreements. Some developers suggested delays could extend beyond this timeframe. They also indicated that any project delays would require considerable expense in both the carrying cost of the land as well as the eventual mitigation actions required. By comparison, developers in Clark County's MSHCP can pay the \$550 per-acre fee and begin land-taking activities immediately. Notably, not all developers were necessarily familiar with the MSHCP details.

For purposes of this analysis, an average delay of 21 months without the MSHCP was assumed based on conversations with developers, discussion with consultants, and a review of the historical delays in development experienced in 1989.<sup>11</sup> In 1989, rather than deal with the government to potentially expedite development, many homebuilders instead chose to wait for Clark County to finish its initial habitat conservation plan in 1991, the MSHCP's predecessor. If homebuilders had not paused development, the lone U.S. Fish and Wildlife Service office in Clark County would have likely been pushed to its limits handling the permitting under the Endangered Species Act.<sup>12</sup> Finally, consultants with experience in assembling small-scale habitat conservation plans cited a consensus period of 6 to 12 months for an applicant to prepare a Habitat Conservation Plan ("HCP") package, and an additional 6 to 18 months for the U.S. Fish and Wildlife Service to process, prepare analysis and issue a permit and biological opinion.

With these ranges in mind, a 21-month delay was assumed in the 79 percent of developed areas not within a master planned community. The other 21 percent of acres developed within master planned community would likely be covered as part of their initial development

---

<sup>10</sup> Shetterly, C. (1989, August 22). Lawyer says tortoise ruling will slow projects to crawl. Las Vegas Review-Journal.

<sup>11</sup> Shetterly, C. (1989, December 5). Tortoise delays building one year. Las Vegas Review-Journal.

<sup>12</sup> Wachs, M., & Lederman, J. (2014). Transportation and Habitat Conservation Plans: Improving Planning and Project Delivery While Preserving Endangered Species.



process of those plans and are assumed to face no additional delay due to the lack of an MSHCP. Based on these two factors, the blended average delay to complete the HCP process was estimated to be 17 months; however, a range of potential values with different lengths of delay are also provided in the *Supplemental Tables* section of this report.

In addition to the estimated cost of delay, the costs of mitigation efforts were assumed to be roughly equal to what the MSHCP has spent or is obligated to spend in the future based on the present amount of take. This amounts to \$1,546 in estimated costs in current dollars per acre of land, or \$877 after inflation-adjusted mitigation fees are netted out. This assumption likely falls on the conservative side of what actual costs may potentially be incurred. Mitigation costs, particularly for smaller developments, would likely well exceed this cost on average per-acre basis due to the lack of pooled resources and holistic management practices of the MSHCP. Without the large-scale environmental management offered by the MSHCP, outcomes would likely be worse for the environment and the Southern Nevada economy.<sup>13</sup>

If not for the implementation of the MSHCP, additional risk would be inserted into development (and growth) calculus in Southern Nevada. Investors and developers would be required to hire independent biologists to verify the lack of tortoises (or other species), and if tortoises were found, delays could last years as developers negotiated with the U.S. Fish and Wildlife Service on how to remove the tortoises and protect the environment. This risk would have likely deterred a number of developers from entering or continuing to do business in the Southern Nevada market. However, in considering a quantitative impact for the MSHCP, the analysis assumes a conservative assumption that historical development continued at the same pace and that no adverse risk effects on development activity would have occurred without the MSHCP.

## Analytical Approach

A range of delay scenarios were considered – spanning a six- to 36-month delay period. The cost of delay for developers was estimated using three factors: (1) the amount of land each quarter where the \$550 per-acre disturbance fee was paid; (2) the historical borrowing rate and (3) the historical price of land. The amount of land each quarter that was subject to the \$550 per-acre fee was provided by the Desert Conservation Program; the dataset includes breakouts by the jurisdiction source. The historical borrowing rate utilized in the analysis was the AAA Moody's bond rate, which was averaged for the quarter.<sup>14</sup> Land prices used were either the local land price (for the City of Henderson, the City of North Las Vegas and the City of Las Vegas for 2004 through 2016) or the Las Vegas valley's average land price.<sup>15</sup> Land prices are sourced to historical transactional data of vacant land derived from the Clark County Assessor's Office and Clark County Recorder's Office. Land prices used excluded resort property transactions as they can significantly impact (inflate) broader average land prices. These three factors were then used to calculate the cost of a 17-month development delay.

---

<sup>13</sup> Beatley, T. (1994). *Habitat Conservation Planning: Endangered Species and Urban Growth*. University of Texas Press.

<sup>14</sup> St. Louis Federal Reserve. Moody's Seasoned Aaa Corporate Bond Yield.

<sup>15</sup> Las Vegas valley prices reflect the urban market area, excluding outlying areas such as Moapa or Laughlin.

To provide context to the mathematical calculations, the following assumes: (1) an average inflation-adjusted land price of \$446,789 per-acre; (2) the average rate of interest of 5.4 percent and (3) a 17-month delay to estimate the direct impact of a delay in development:

$$\text{Direct Output Impact} = \$446,789 * ((1 + 5.4\%)^{17/12} - 1)$$

Note,  $((1 + 5.4\%)^{17/12} - 1)$  yields the interest multiplier for 17 months of compounded interest. This multiplier is then applied to the per-acre cost, which results in a direct output impact of \$34,731 (after rounding). IMPLAN economic modeling software was used to determine the total economic impact of that delay, or ripple effect of the delay, based on the direct output impact as calculated above. The following subsection describes that process and explains the results yielded from the software.

It is important to note that all dollar figures reported, unless otherwise noted, have been adjusted for inflation so that they can be stated in today's equivalent dollars. This adjustment is a necessary step which allows figures to be adjusted, calculated and combined across years and provide a relevant context to the current reader what the impact of the MSHCP has been. The rate of inflation was calculated using IMPLAN modeling software.

In addition to the development time of delay, the impact from the amount of spending on mitigation above the \$550 fee is taken into account. In addition to the fees, the MSHCP also collects funds from interest, grants, and other funding sources. Currently, the MSHCP has spent or is obligated to spend a total of \$110.7 million through fiscal year 2018 based on land take that has already occurred. This is inflation-adjusted to a total value of \$125.2 million today. The sum of the \$550 fees paid by developers are adjusted for inflation and then subtracted from this figure. The total impact of the MSHCP's mitigation after accounting for fees collected is \$71.1 million. Mitigation costs were then allocated on an annual basis proportionally, using the number of acres each year a mitigation fee was collected to arrive at a direct economic impact for each year. The end result is per-acre direct output impact of \$877.

Finally, the impacts of both the length of delay and the gap between spending and mitigation fees collected were combined for a total economic impact for the MSHCP, resulting in an average direct economic output impact of \$35,608 per acre.





## Measuring Economic Impacts

In economic impact modeling, the outputs of one industry become the inputs of others, and vice versa. This relationship, sometimes referred to as the multiplier effect or ripple effect, illustrates how changes in one sector of the economy can affect other sectors. The sum of these impacts is the total economic impact.

The notion of multipliers rests upon the difference between an initial effect and the total effects of that change or stimulus. Generally speaking, these effects are segmented into direct impacts, indirect impacts and induced impacts. Each is described below.



- **DIRECT IMPACTS** measure the effects of the specific impacting force being considered. In this case, for example, the potential lost value to developers (and ultimately homebuyers) sourced to the carrying cost for additional 17-month period is the direct output of the MSHCP.
- **INDIRECT IMPACTS** consider how other businesses respond to the impacting condition. The wages and salaries paid by a vendor providing supplies to developers would be considered an indirect impact.
- **INDUCED IMPACTS** measure the effects of increased (or decreased) consumer expenditures resulting from wage and salary payments sourced to an impacting condition. For example, a person employed by a developer might be expected to spend a portion of her monthly salary at a supermarket, a movie theater or a restaurant. Induced effects capture the impacts of this spending as it ripples through the economy.
- **TOTAL IMPACTS** are the sum of direct, indirect and induced effects.

When the additional indirect and induced output multipliers are applied to the direct impact per acre impact of \$35,608, total impacts for an average acre of land rise to \$58,251. While these estimates reflect the estimated impacts sourced to historical land values, assumed carrying costs and an average delay timing of 17 months, a range of alternative scenarios are possible. The following provides a range of economic impact per acre of land disturbed assuming lower and higher land values, as well as shorter and longer periods of estimated delay for illustration purposes.

Table 1: Estimated Historical Total Economic Output Per Acre of Land (in Current Dollars)<sup>16</sup>

	Average Price per Acre	Range of Potential Delay (in months)								
		6 Mo.	8 Mo.	12 Mo.	17 Mo.	20 Mo.	24 Mo.	28 Mo.	32 Mo.	36 Mo.
<b>TROUGH (2011)</b>	\$176,581	\$7,965	\$10,180	\$17,110	\$23,890	\$28,030	\$33,636	\$39,341	\$45,148	\$51,058
	\$200,000	\$8,831	\$11,340	\$19,189	\$26,868	\$31,557	\$37,906	\$44,369	\$50,945	\$57,639
	\$250,000	\$10,680	\$13,817	\$23,628	\$33,226	\$39,088	\$47,024	\$55,102	\$63,323	\$71,690
	\$300,000	\$12,529	\$16,293	\$28,066	\$39,584	\$46,618	\$56,142	\$65,835	\$75,701	\$85,741
	\$350,000	\$14,378	\$18,769	\$32,505	\$45,943	\$54,149	\$65,260	\$76,569	\$88,078	\$99,792
<b>AVERAGE</b>	\$400,000	\$16,227	\$21,246	\$36,943	\$52,301	\$61,679	\$74,378	\$87,302	\$100,456	\$113,843
	\$446,789	\$17,958	\$23,563	\$41,097	\$58,251	\$68,726	\$82,910	\$97,346	\$112,039	\$126,992
	\$500,000	\$19,925	\$26,198	\$45,820	\$65,017	\$76,740	\$92,614	\$108,769	\$125,211	\$141,946
	\$550,000	\$21,774	\$28,674	\$50,259	\$71,376	\$84,271	\$101,731	\$119,502	\$137,589	\$155,997
	\$600,000	\$23,623	\$31,151	\$54,697	\$77,734	\$91,801	\$110,849	\$130,236	\$149,966	\$170,048
	\$650,000	\$25,472	\$33,627	\$59,136	\$84,092	\$99,332	\$119,967	\$140,969	\$162,344	\$184,099
	\$700,000	\$27,322	\$36,103	\$63,574	\$90,450	\$106,862	\$129,085	\$151,702	\$174,722	\$198,150
	\$750,000	\$29,171	\$38,580	\$68,013	\$96,809	\$114,393	\$138,203	\$162,436	\$187,099	\$212,201
	\$800,000	\$31,020	\$41,056	\$72,451	\$103,167	\$121,923	\$147,321	\$173,169	\$199,477	\$226,252
	<b>PEAK (2007)</b>	\$850,000	\$32,869	\$43,532	\$76,890	\$109,525	\$129,454	\$156,439	\$183,903	\$211,854
\$881,764		\$34,043	\$45,106	\$79,710	\$113,564	\$134,238	\$162,231	\$190,721	\$219,718	\$249,229

The average price per acre of land range reflects the low (trough) in the last economic cycle, while the peak reflects the maximum average achieved during the height of the economic boom. The delay range is based on discussions with area developers and consultants who work with smaller HCP applications, with an assumption on the conservative end of the range.

<sup>16</sup> Note: Assumes an average cost of capital of 5.4 percent.

## Qualitative and Non-Quantified Impacts

In addition to the quantitative impact of the delay to the community, the MSHCP provides numerous qualitative or non-quantifiable impacts. These impacts, though substantial, by their nature are difficult, if not impossible, to quantify.

Most critically, conservation plans are effective in protecting their covered species. A study that controlled for funding and other variables found that habitat conservation plans were beneficial, with large habitat conservation plans such as Clark County's providing even better outcomes for endangered species. The study found that each additional 100,000 acres covered by HCPs increase the probability of a stable classification by 11 percentage points.<sup>17</sup> The continued well-being of these species will have a positive impact for many Clark County residents.



*Mojave Max,  
part of the MSHCP's educational outreach*

A large non-quantifiable impact is the potential cost of per-project compliance with the Endangered Species Act. In addition to quantifiable land carrying costs, the community would potentially face \$300 million in permitting costs for transportation projects alone but for the MSHCP according to an interview.<sup>18</sup> By comparison, the MSHCP in Clark County makes Endangered Species Act compliance seamless for most developers within Clark County.

As previously discussed in the quantitative impacts section, there are considerable risks with piecemeal mitigation actions. One of the primary strengths of a large-scale MSHCP's is its ability to bring certainty to residents and developers.<sup>19</sup> When an MSHCP does not exist and developers are responsible for mitigating actions for threatened or endangered species, it could potentially face expenses substantially greater than the \$550 per-acre fee. A developer could have particularly sensitive land, requiring extreme mitigation measures to satisfy the U.S. Fish and Wildlife Service or could face costs greater than the \$1,546 per acre that the MSHCP spends on mitigation activities. This additional risk, coupled with carrying costs for land and permitting costs, could lead to developers choosing to not enter the Southern Nevada market, harming the potential for economic development in the area. An existing habitat conservation plan, such as the one used in Clark County, protects developers specifically with the U.S. Fish and Wildlife Service's "no surprises" rule, which does not allow them to collect additional resources from private landowners beyond what is stipulated in the plan. If developers were responsible to create their own plan, this protection would not exist before the creation of a habitat conservation plan, and their projects could potentially be subject to significant cost overruns and oversight from the U.S. Fish and Wildlife Service.

Additionally, there is substantial evidence that open space preserves, including those provided by habitat conservation plans, can have a significant economic impact. A study of Southern California's portion of the Mojave Desert reported a net benefit of \$1.4 billion dollars

<sup>17</sup> Langpap, C., & Kerkvliet, J. (2012). Endangered Species Conservation on Private Land: Assessing the Effectiveness of Habitat Conservation Plans.

<sup>18</sup> Wachs, M., & Lederman, J. (2014). Transportation and Habitat Conservation Plans: Improving Planning and Project Delivery While Preserving Endangered Species.

<sup>19</sup> Baldino, C. L. (2015). Factors of Success for County and Regional Habitat Conservation Plan Creation.



in 2003.<sup>20</sup> This value was calculated based on recreation (\$438.7 million), housing price premium (\$84.0 million), military use (\$585.0 million) and various indirect (\$113.3 to \$133.8 million) and passive use (\$136.3 million) values. It is not necessarily unreasonable to assume that the portion of the Mojave preserved by the MSHCP would generate similar economic benefits for the Southern Nevada community.

Finally, education and science is also improved by the MSHCP. As part of its goal, the MSHCP in Clark County provides for outreach to local schools for educating students about the local environment and its unique species. Under the plan, Clark County supports numerous research projects involving the area environment, some of which will enable the MSHCP to better protect its covered species.



<sup>20</sup> Kroeger, T., & Manalo, P. (2007). Economic Benefits Provided by Natural Lands: Case Study of California's Mojave Desert. *Defenders of Wildlife*.



## Quantitative Impacts: A Historical Perspective

Since the inception of the modern MSHCP in 2001, the Southern Nevada community developed over 96,000 acres of land. Assuming the MSHCP helped reduce development timelines and ultimately carrying costs of these investments for an average 17-month period, the total benefits translate into approximately \$4.7 billion in current inflation-adjusted dollars. During this same time, the MSHCP collected approximately \$56.7 million (in current dollars) as a result of the \$550 per-acre fee. The economic return relative to the administrative cost translates into a benefit-cost ratio of \$83 to \$1. That is to say, that for every \$1 collected in fees, roughly \$83 dollars have been generated in local economic benefits. Table 2 below summarizes the historical quantifiable economic impacts of the MSHCP. The following sections describe the economic impacts in greater detail.<sup>21</sup>

Table 2: Economic Impact Summary<sup>22</sup>

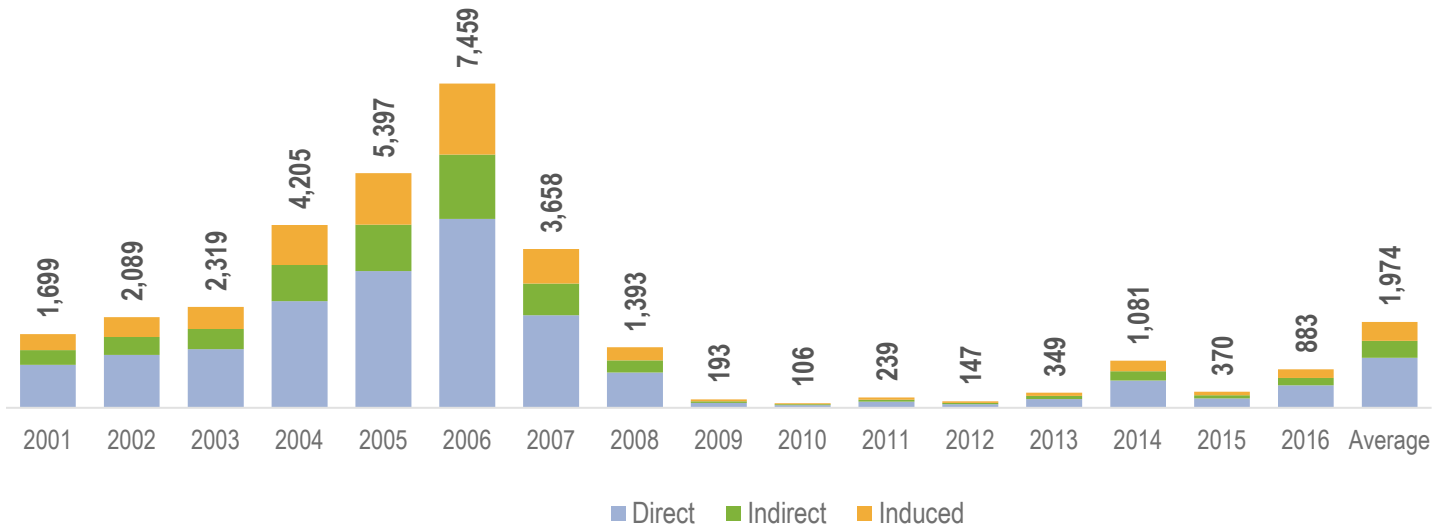
	Direct	Indirect	Induced	Total
Employment (in Person-Years)	18,415	6,264	6,908	31,587
Labor Income	\$975.9 M	\$306.4 M	\$307.3 M	\$1,589.7 M
Output	\$2,884.7 M	\$838.2 M	\$996.1 M	\$4,718.9 M
Value Added	\$1,588.4 M	\$495.7 M	\$594.7 M	\$2,678.7 M



<sup>21</sup> In addition to the average 17-month delay impacts reported in the referenced table, supplemental economic output impacts on page 30 offer a range of potential outcomes based on the average cost of capital, a range of land values, and a range of potential delays.

<sup>22</sup> Dollar amounts stated in current (2017) dollars.

## Employment Impacts



The MSHCP’s impact in the local economy is substantial. In terms of jobs, over the life of the plan it is anticipated that 18,415 direct person-years<sup>23</sup> of employment would have been lost if local developers would have had to carry the cost of land while securing their own permits from the U.S. Fish and Wildlife Service. These economic impacts fluctuate based on the price of land, amount of disturbance and interest rates at the time. These factors suggest that the economic impact of the MSHCP followed the general cycle of development in the urban Las Vegas valley, peaking in 2006 with 4,349 direct jobs supported by the MSHCP, bottoming out in 2010 with 62 direct jobs supported, averaging 1,151 direct jobs attributable to the program throughout the 16-year program. This figure is comparable to an average Clark County casino with over \$1 million of revenue, which generated approximately 887 direct jobs during 2016.

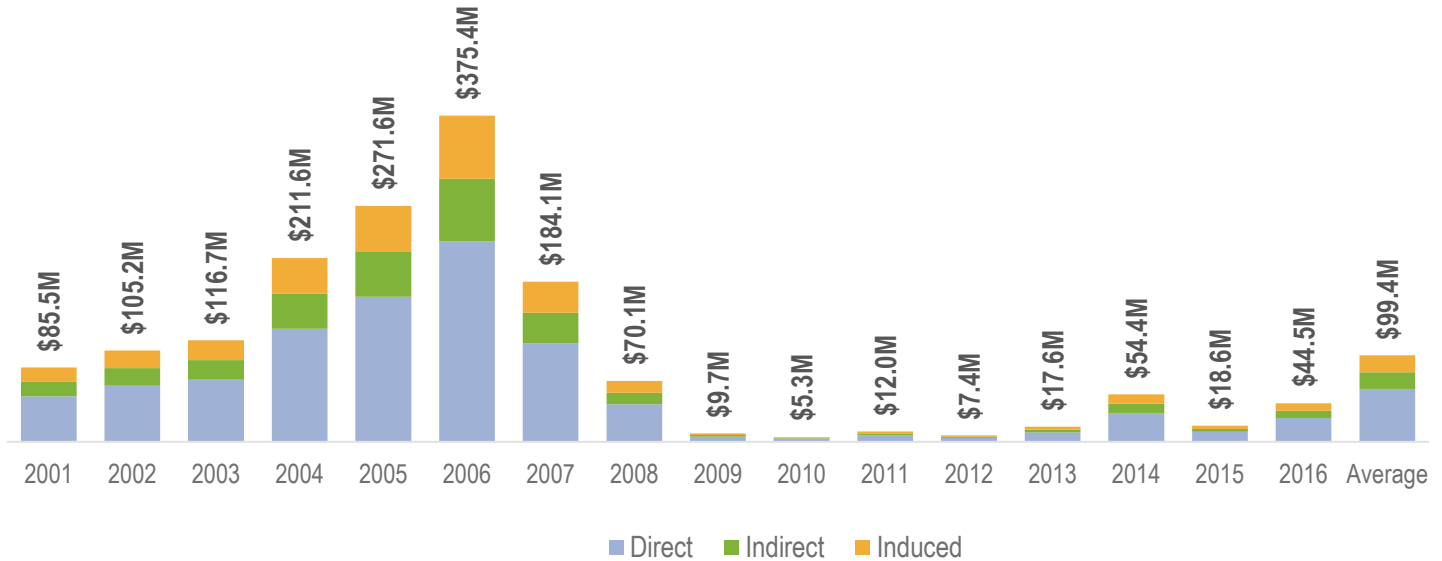
With the ripple effect, indirect (or supplier) employment added 6,264 cumulative person-years to the impact of the MSHCP. This ranged from a peak of 1,479 indirect jobs in 2006 to 21 indirect jobs in 2010, with an average of 391 indirect jobs generated by program savings each year.

Induced (or employee spending) impacts generated an additional 6,908 cumulative person-years of employment. This figure topped out at 1,631 jobs in 2006 and bottomed out at 23 jobs in 2010, with an average of 432 jobs saved per year.

In total, the delays to development and additional costs of mitigation in the area would have caused the loss of 31,587 person-years of employment since the 2001 implementation of the MSHCP, ranging from 7,459 jobs in 2006 to 106 jobs in 2010 and averaging 1,974 jobs throughout the period. For more detail on the employment impact of the MSHCP, see page 26.

<sup>23</sup> A person-year is one person employed for one year.

## Labor Income Impacts



Labor income impacts of the MSHCP were also substantial. Since its inception, the MSHCP has supported \$975.9 million in direct labor income (in current dollars) for Southern Nevada workers. This income would have been lost had developers had to delay development plans and incur additional carrying costs of land while negotiating with the U.S. Fish and Wildlife Service individually. The direct labor income impacts vary based on development factors and range from a peak of \$230.5 million in 2006 to \$3.3 million in 2010.

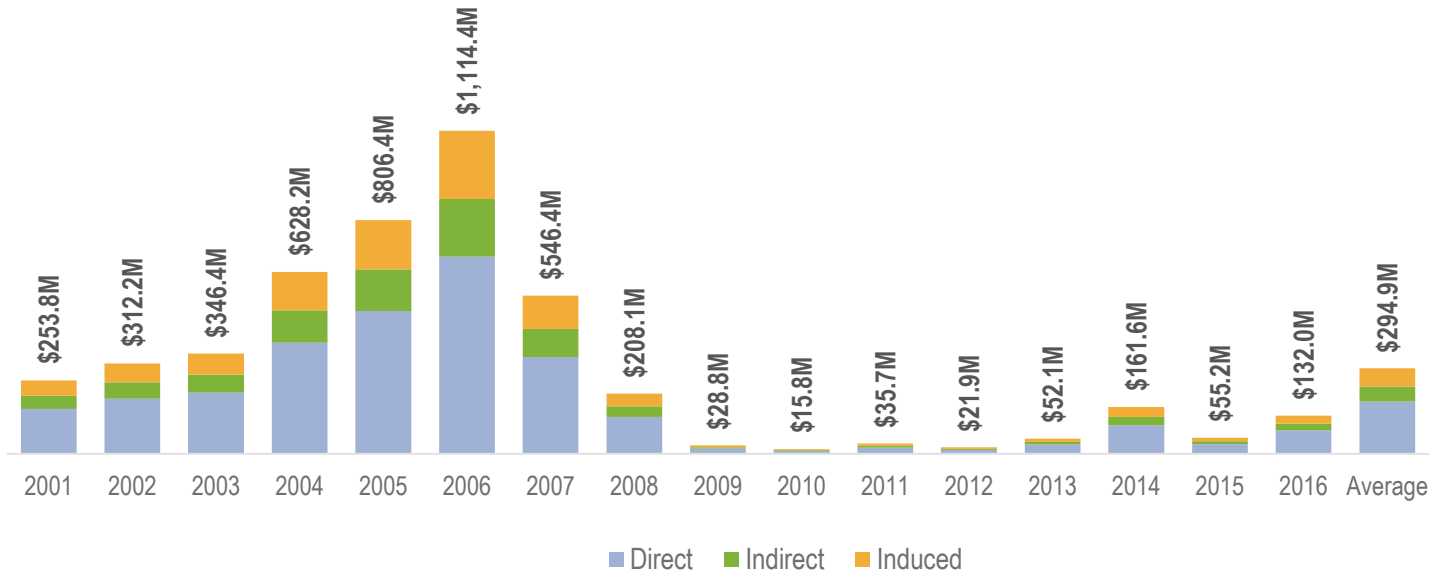
Indirect (or supplier) impacts generated an additional \$306.4 million of cumulative labor income. Workers for companies providing services and supplies to Southern Nevada’s construction industry earned an additional \$72.4 million at peak in 2006, dropping to \$1.0 million in 2010, with an average of \$19.2 million of additional labor income generated each year.

Induced (or employee spending) impacts generated \$307.3 million of labor income, reaching a peak of \$72.6 million of labor income in 2006 and low of \$1.0 million in 2010. On average, induced spending from the MSHCP generated \$19.2 million each year.

In total, the delays in development activity potentially attributable to the absence of the MSHCP and additional mitigation costs would have resulted in the loss of \$1.6 billion in labor income for Southern Nevada’s working families since 2001. At the height of development in 2006, this equated to a potential loss of labor income of \$375.4 million. On average, the MSHCP generated an additional \$99.4 million of labor income for Southern Nevada families. For more detail on the labor income impact of the MSHCP, see page 27.



## Economic Output Impacts



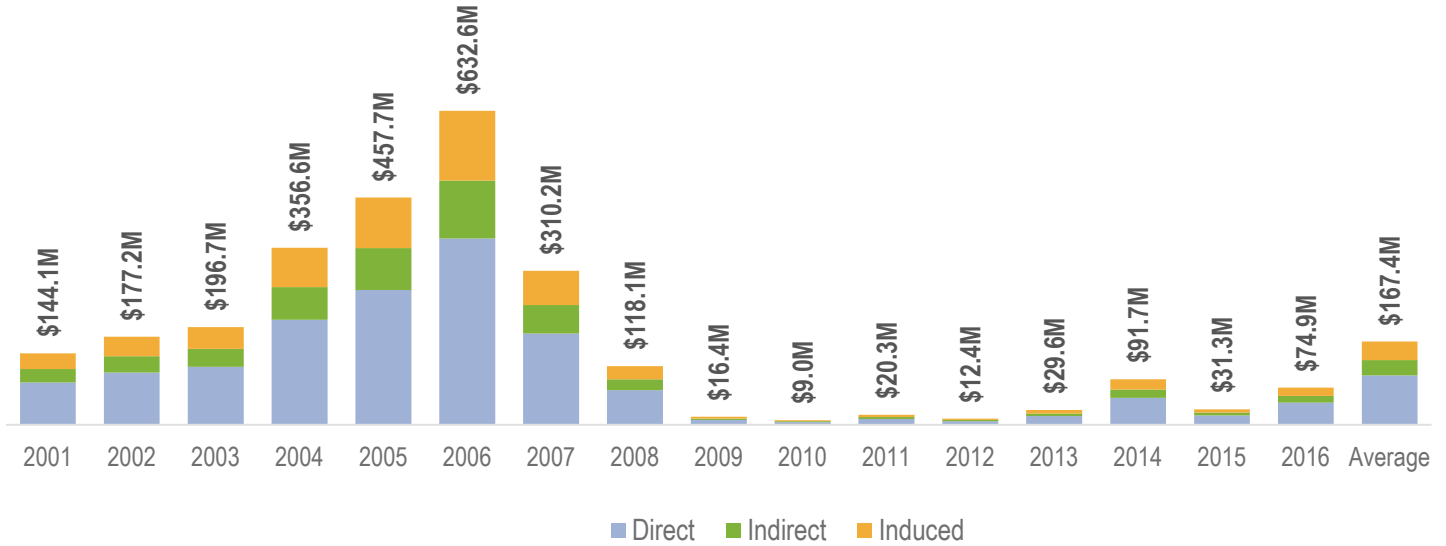
The direct economic output, or total value of goods and services transacted by the development industry, has increased \$2.9 billion (in current dollars) since the inception of the MSHCP in 2001. Again, this economic output in Southern Nevada would have likely been lost if developers experienced a delay and were required to negotiate individual agreements with the U.S. Fish and Wildlife Service to permit the taking of land. The annual direct economic output varies based on development factors and ranges from \$681.2 million in 2006 to \$9.6 million in 2010.

Indirect (or supplier) impacts generated an additional \$838.2 million of economic output. Suppliers in Southern Nevada were able to increase sales each year, ranging from \$2.8 million in 2010 to \$197.9 million in 2006. On average, suppliers within the industry increased their economic output \$52.4 million each year as a result of the MSHCP.

Induced (or employee spending) impacts generated \$996.1 million of economic output. The induced economic output topped out at \$235.2 million in 2006 and fell to \$3.3 million in 2010, averaging \$62.3 million of economic output generated annually.

In total, the delay impact of development and cost of mitigation in Southern Nevada if one was to imagine that the MSHCP did not exist would have resulted in the loss of \$4.7 billion of economic output since 2001. Total annual economic output ranged from \$15.8 million in 2010 to \$1.1 billion in 2006, with an average of \$294.9 million of output each year. For more detail on the economic output of the MSHCP, see page 28.

## Value Added Impacts



The direct value added, or the value of goods and services from developers minus costs, has increased \$1.6 billion (in current dollars) since the inception of the MSHCP in 2001. Value added is a concept comparable to GDP and represents the net addition of an action for an economy after costs are considered. The direct value added ranged from \$375.1 million in 2006 to \$5.3 million in 2010, with an average of \$99.3 million added to the economy each year.

Indirect (or supplier) impacts generated \$495.7 million of additional value. Suppliers in Southern Nevada added between \$1.7 million in 2010 and \$117.1 million in 2006 to the economy. On average, suppliers to developers increased their contribution to GDP by \$31.0 million as a result of the MSHCP.

Induced (or employee spending) impacts generated \$594.7 million of additional value. The induced additional value peaked at \$140.4 million in 2006 and fell to \$2.0 million in 2010, with an average of \$37.2 million of economic value added each year.

In total, the delays to development in the area and additional costs of mitigation caused by a lack of the MSHCP would have resulted in the loss of \$2.7 billion of GDP since 2001, or 47 times the inflation-adjusted disturbance fees developers have paid during the life of the project. The annual value added by the MSHCP ranged from \$9.0 million in 2010 to \$632.6 million in 2006, with an average of \$167.4 million of additional value created by Southern Nevada businesses each year. For more detail on the value added by the MSHCP, see page 29.

## Quantitative Impacts: Projected (Future) Impacts

The future impacts of the MSHCP are based on two different outcomes - one where the existing agreement with the U.S. Fish and Wildlife Service maintains its status quo and another where the agreement expands to include an additional 200,000 acres to be covered by mitigation activities. The following sections describe the anticipated impacts of the development of the remaining 71,600 acres, along with the additional impact of an incremental 200,000 acres being developed within the MSHCP (under the planned amendment).

### Projected Impacts of the Current Plan

Given the 96,000 acres (including 15,000 MSHCP exempt acres) developed under the current MSHCP have translated into a substantial economic impact for Southern Nevada, the remaining capacity remaining for development under the plan (approximately 71,600 acres) are expected to contribute further to the program's regional impact. To estimate the longer-term future impacts of the MSHCP, all remaining acreage under the plan is assumed to develop at the same real (inflation-adjusted) land value, the same interest rates and the same 17-month-long delay to coordinate independently with the U.S. Fish and Wildlife Service as in 2016. The impacts are included in Table 3 below.<sup>24</sup>

Table 3: Projected Future Economic Impacts of the MSHCP<sup>25</sup>

	Direct	Indirect	Induced	Total
Employment (in Person-Years)	9,338	3,177	3,503	16,016
Labor Income	\$494.8 M	\$155.4 M	\$155.8 M	\$806.1 M
Output	\$1,462.7 M	\$425.0 M	\$505.1 M	\$2,392.8 M
Value Added	\$805.4 M	\$251.3 M	\$301.5 M	\$1,358.3 M

The current MSHCP agreement could provide 16,016 person-years of employment for the valley over the next several decades, with those workers earning an estimated \$806.1 million in wages (in current dollars). Similarly, Clark County businesses could anticipate revenues increasing \$2.4 billion as a result of the continuation of the MSHCP going forward. The overall economy's real GDP is estimated to increase by \$1.4 billion though build out under the plan; this would be approximately 34 times greater than the \$39.4 million in disturbance fees left to be collected (in nominal dollars).

<sup>24</sup> In addition to the estimated 17-month delay impacts reported in the referenced table, supplemental economic output impacts beginning on page 30 offer a range of potential outcomes based on the average cost of capital, a range of land values, and a range of potential delays.

<sup>25</sup> Dollar amounts stated in current (2017) dollars.

## Projected Impacts of MSHCP Amendment

It is also worth noting that Clark County is currently in the process of amending the MSHCP. The primary motivation would be to allow the development of Southern Nevada to continue beyond 2031 (when the current plan is set to expire). Rather than simply renew the plan, Clark County is seeking to enhance the program by opening up an additional 200,000 acres for development in Southern Nevada and extending the permit term for an additional 50 years. The permit extension would also remove currently covered species that are not as affected by development and have a better focus on mitigating actions for species most harmed. Finally, given the additional acreage and take under the new permit, the amendment also provides a plan to improve the mitigation effectiveness and accountability of the MSHCP to continue preserving Southern Nevada's environment. The process for this amendment has already begun, and it is anticipated to be completed sometime between 2020 and 2025.<sup>26</sup>

The economic impacts of this amendment would be substantial, given the nearly tripling in size of the MSHCP. It would result in an estimated 45,000 job-years of employment, \$2.3 billion of labor income (in current dollars), \$6.7 billion of additional revenue for area businesses and an additional \$3.8 billion of value added on top of the projected impacts for the remainder of the existing MSHCP. A summary of these impacts is provided in Table 4 below.<sup>27</sup> Note that impacts below consider the current fee structure of \$550 per acre, alternative fee structures are also being considered in the amendment process.

Table 4: Projected Future Economic Impacts of the MSHCP Amendment (Additional 200,000 Acres)<sup>29</sup>

	Direct	Indirect	Induced	Total
Employment (in Person-Years)	26,070	8,869	9,779	44,713
Labor Income	\$1,381.5 M	\$433.8 M	\$435.1 M	\$2,250.4 M
Output	\$4,083.6 M	\$1,186.5 M	\$1,410.2 M	\$6,680.2 M
Value Added	\$2,248.5 M	\$701.7 M	\$841.9 M	\$3,792.1 M

<sup>26</sup> More information on the MSHCP amendment can be found at: <http://www.clarkcountynv.gov/airquality/dcp/pages/permitamendment.aspx>

<sup>27</sup> In addition to the estimated 17-month delay impacts reported in the referenced table, supplemental economic output impacts on page 32 offer a range of potential outcomes based on the average cost of capital, a range of land values, and a range of potential delays.

<sup>29</sup> Dollar amounts stated in current (2017) dollars.



## Comparison with Other Regional Plans

Knowing the benefits that the Clark County MSHCP provides, a comparison with other regional plans is also warranted. Clark County is unique in offering both one of the lowest cost mitigation fees, but also a process that removes risk and differing outcomes for developers based on the land they choose to develop. Some areas, such as the San Joaquin County MSHCP, will increase development mitigation fees based on whether the land being developed is more or less environmentally sensitive. The table below compares the main funding sources of each urban development habitat conservation plan above 500,000 acres with an urban development focus.

Table 5: Comparison with Other Regional Urban Development HCPs

Plan	Acres	No. of Covered Species	State	Funding Sources <sup>30</sup>
Clark County MSHCP	5.0 Million	76	NV	Mandatory participation in a \$550 per acre development mitigation fee
Pima County HCP	6.1 Million	44	AZ	Currently \$202 million bonds funded through property taxes, depends on voter approval of additional bond measures (2015 had a failed vote)
Southern Edwards Plateau HCP	3.6 Million	9	TX	Voluntary participation; approximately \$4,000 per preservation credit/acre
San Luis Valley HCP	2.0 Million	2	CA	Property Taxes capped at a rate of 25 cents per \$100 of valuation (0.25% rate)
Southeastern Lincoln County HCP	1.7 Million	2	NV	\$550 per acre mitigation fee; \$12,000 if flycatcher habitat
Western Riverside MSHCP	1.3 Million	146	CA	Per-unit residential fee (at least \$1,036 per unit) or \$6,780 per acre
Coachella Valley MSHCP	1.2 Million	27	CA	Residential development starting at \$228 per unit, other development impact fees of \$5,529 per acre
San Joaquin County MSHCP	896,000	42	CA	Development fees starting at \$8,905 to \$109,737, depends on habitat
Williamson County HCP	726,000	28	TX	Development fees of \$7,000 to \$9,000 per acre (depending on size)
Balcones Canyonlands Conservation Plan	633,000	33	TX	\$1,000 to \$5,500 per acre mitigation fees based on area
Santa Clara Valley Habitat Plan	525,000	18	CA	Varies based on a variety of factors, including planning zones, habitat and new vehicle trips generated
San Diego South County Subarea MSCP	500,000	85	CA	Funded primarily through the county general fund

<sup>30</sup> Funding sources provided by conservation plans filed with the U.S. Fish and Wildlife Service, annual reports, and plan websites.

## Conclusions

The Clark County MSHCP has benefited Southern Nevada families, businesses and communities while protecting and preserving the area's natural resources and native species habitats. Notwithstanding the fact that the measurable impacts of the MSHCP are impressive, the risk to developers of compliance with the Endangered Species Act and direct dealings with the U.S. Fish and Wildlife Service would have likely deterred many from the Southern Nevada market. New development projects and their predictability of viability within reasonable timeframes would have come into question. The results could have been devastating.

The species covered by the MSHCP have also benefitted substantially. Though threatened or endangered species would require a mitigating action regardless of the MSHCP's existence, the plan's large scale has allowed a more holistic management of the environment in Southern Nevada. Large, continuous tracts of land preserve habitats of multiple species, and efforts can be focused on particularly sensitive areas, such as the Muddy River, where land is being purchased from the private sector for permanent protection by the MSHCP.

Finally, and perhaps most critically, the plan makes conservation a collaborative effort instead of a confrontational one. Developers no longer hope that threatened or endangered species are not on their site for fear of a lengthy process with the U.S. Fish and Wildlife Service. Residents can live near large tracts of natural, unspoiled habitat. The entire community has an interest in seeing the MSHCP preserved in the future, making compliance with the Endangered Species Act simple and relatively affordable for developers while preserving native wildlife for generations to come.



## Supplemental Tables

Table 6: Figures used in Calculating the Direct Economic Impact of MSHCP (Inflation-Adjusted)

Year	Acres	Total Fees	Average Value of Delay Per Acre	Value of 17-Month Delay in Development	Value of Mitigation Actions Above Fee
2001	6,292.46	\$5,118,288	\$23,921	\$150,521,572	\$4,608,200
2002	8,475.58	\$6,708,531	\$21,761	\$184,433,773	\$6,392,486
2003	9,132.68	\$6,848,441	\$22,392	\$204,500,466	\$7,268,280
2004	10,520.61	\$7,268,260	\$35,649	\$375,046,126	\$8,993,836
2005	9,719.45	\$6,242,906	\$49,812	\$484,144,419	\$8,780,807
2006	10,974.28	\$6,627,207	\$61,134	\$670,901,616	\$10,336,143
2007	4,707.70	\$2,813,764	\$70,005	\$329,561,741	\$4,463,102
2008	2,627.86	\$1,620,981	\$47,482	\$124,775,400	\$2,440,999
2009	819.22	\$526,772	\$20,596	\$16,872,517	\$739,526
2010	632.48	\$413,363	\$14,357	\$9,080,233	\$564,285
2011	1,733.80	\$1,121,728	\$11,685	\$20,259,904	\$1,558,271
2012	1,337.85	\$858,209	\$9,109	\$12,186,931	\$1,209,755
2013	2,417.27	\$1,469,553	\$12,237	\$29,579,782	\$2,266,911
2014	5,699.06	\$3,225,051	\$16,348	\$93,170,745	\$5,584,197
2015	1,969.72	\$1,104,115	\$16,147	\$31,805,369	\$1,940,554
2016	3,950.71	\$2,193,620	\$19,427	\$76,751,942	\$3,913,138
<b>TOTAL</b>	<b>81,010.73</b>	<b>\$54,160,790</b>	<b>\$34,731</b>	<b>\$2,813,592,536</b>	<b>\$71,060,490</b>

Table 7: Calculated Value of Delay by Jurisdiction (Inflation Adjusted)

Year	Public Works	Clark County	Boulder City	Henderson
2001	\$3,500,763	\$76,525,535	\$811,861	\$24,566,611
2002	\$5,644,854	\$72,186,062	\$408,523	\$28,303,636
2003	\$8,437,420	\$76,197,232	\$394,787	\$31,527,503
2004	\$12,867,725	\$141,376,836	\$362,846	\$69,339,753
2005	\$11,535,230	\$216,106,177	\$615,837	\$98,572,807
2006	\$6,733,409	\$209,037,492	\$29,333,788	\$228,048,929
2007	\$7,243,623	\$152,204,664	\$1,957,206	\$52,734,710
2008	\$1,289,732	\$46,114,713	\$1,620,268	\$37,880,868
2009	\$118,723	\$3,828,615	\$8,403,941	\$1,244,280
2010	\$15,896	\$5,685,303	\$0	\$1,261,367
2011	\$69,638	\$6,074,138	\$4,957,041	\$785,546
2012	\$21,002	\$6,266,808	\$0	\$4,619,689
2013	\$0	\$5,891,142	\$14,022,006	\$3,929,214
2014	\$37,272	\$66,265,745	\$6,241,625	\$10,798,694
2015	\$1,196,338	(\$19,861,404) <sup>31</sup>	\$28,857,451	\$14,344,694
2016	\$367,666	\$29,558,082	\$5,608,719	\$11,830,426

Year	Las Vegas	Mesquite	NDOT	North Las Vegas
2001	\$25,723,137	\$2,145,042	\$152,208	\$17,096,413
2002	\$39,631,427	\$3,096,644	\$209,560	\$34,953,064
2003	\$33,750,908	\$8,256,212	\$86,985	\$45,849,419
2004	\$55,470,862	\$21,654,563	\$0	\$73,973,541
2005	\$52,826,975	\$27,392,180	\$2,249,734	\$74,845,480
2006	\$69,530,608	\$81,327,476	\$0	\$46,889,915
2007	\$59,512,094	\$27,195,157	\$0	\$28,714,287
2008	\$9,948,820	\$8,946,130	\$0	\$18,974,866
2009	\$1,477,818	\$461,219	\$925,781	\$412,140
2010	\$655,369	\$16,972	\$0	\$1,445,326
2011	\$2,267,832	\$385,682	\$342,354	\$5,377,673
2012	\$408,525	\$0	\$0	\$870,907
2013	\$1,785,222	\$69,779	\$0	\$3,882,418
2014	\$5,835,084	\$31,179	\$607,424	\$3,353,721
2015	\$5,477,294	\$1,420,404	\$0	\$370,591
2016	\$9,227,632	\$618,210	\$3,104	\$19,538,103

<sup>31</sup> Due to an accounting adjustment; figures are based on fees as paid by agencies to the MSHCP, so due to a refund being issued in 2015 to Clark County fees collected are shown as a negative figure.



Table 8: Employment Economic Impacts of MSHCP

Year	Direct	Indirect	Induced	Total
2001	990	337	372	1,699
2002	1,218	414	457	2,089
2003	1,352	460	507	2,319
2004	2,452	834	920	4,205
2005	3,147	1,070	1,180	5,397
2006	4,349	1,479	1,631	7,459
2007	2,132	725	800	3,658
2008	812	276	305	1,393
2009	112	38	42	193
2010	62	21	23	106
2011	139	47	52	239
2012	86	29	32	147
2013	203	69	76	349
2014	630	214	236	1,081
2015	215	73	81	370
2016	515	175	193	883
<b>TOTAL</b>	<b>18,415</b>	<b>6,264</b>	<b>6,908</b>	<b>31,587</b>
<i>Average</i>	<i>1,151</i>	<i>391</i>	<i>432</i>	<i>1,974</i>

Table 9: Labor Income Economic Impacts of MSHCP (in Current Dollars)

Year	Direct	Indirect	Induced	Total
2001	\$52,481,415	\$16,480,146	\$16,527,768	\$85,489,328
2002	\$64,557,770	\$20,272,347	\$20,330,927	\$105,161,044
2003	\$71,642,750	\$22,497,164	\$22,562,173	\$116,702,086
2004	\$129,923,227	\$40,798,323	\$40,916,216	\$211,637,767
2005	\$166,759,823	\$52,365,703	\$52,517,022	\$271,642,550
2006	\$230,467,184	\$72,371,006	\$72,580,134	\$375,418,322
2007	\$113,002,786	\$35,484,988	\$35,587,528	\$184,075,302
2008	\$43,038,139	\$13,514,781	\$13,553,834	\$70,106,752
2009	\$5,958,270	\$1,871,008	\$1,876,414	\$9,705,692
2010	\$3,262,803	\$1,024,582	\$1,027,542	\$5,314,926
2011	\$7,381,231	\$2,317,844	\$2,324,543	\$12,023,618
2012	\$4,532,186	\$1,423,191	\$1,427,304	\$7,382,681
2013	\$10,773,945	\$3,383,220	\$3,392,996	\$17,550,160
2014	\$33,409,442	\$10,491,190	\$10,521,505	\$54,422,137
2015	\$11,416,466	\$3,584,984	\$3,595,344	\$18,596,794
2016	\$27,289,523	\$8,569,421	\$8,594,184	\$44,453,128
<b>TOTAL</b>	<b>\$975,896,961</b>	<b>\$306,449,897</b>	<b>\$307,335,433</b>	<b>\$1,589,682,288</b>
<i>Average</i>	<i>\$60,993,560</i>	<i>\$19,153,119</i>	<i>\$19,208,465</i>	<i>\$99,355,143</i>

Table 10: Economic Output Impacts of MSHCP (in Current Dollars)

Year	Direct	Indirect	Induced	Total
2001	\$155,129,772	\$45,074,018	\$53,569,804	\$253,773,595
2002	\$190,826,259	\$55,445,878	\$65,896,606	\$312,168,743
2003	\$211,768,746	\$61,530,861	\$73,128,518	\$346,428,124
2004	\$384,039,962	\$111,585,444	\$132,617,648	\$628,243,053
2005	\$492,925,226	\$143,222,804	\$170,218,183	\$806,366,212
2006	\$681,237,759	\$197,938,300	\$235,246,741	\$1,114,422,801
2007	\$334,024,843	\$97,053,208	\$115,346,301	\$546,424,351
2008	\$127,216,399	\$36,963,597	\$43,930,688	\$208,110,684
2009	\$17,612,043	\$5,117,300	\$6,081,835	\$28,811,179
2010	\$9,644,518	\$2,802,281	\$3,330,469	\$15,777,267
2011	\$21,818,175	\$6,339,420	\$7,534,307	\$35,691,902
2012	\$13,396,686	\$3,892,499	\$4,626,178	\$21,915,362
2013	\$31,846,693	\$9,253,274	\$10,997,380	\$52,097,347
2014	\$98,754,942	\$28,693,926	\$34,102,305	\$161,551,172
2015	\$33,745,923	\$9,805,109	\$11,653,227	\$55,204,260
2016	\$80,665,080	\$23,437,792	\$27,855,469	\$131,958,340
<b>TOTAL</b>	<b>\$2,884,653,026</b>	<b>\$838,155,710</b>	<b>\$996,135,658</b>	<b>\$4,718,944,391</b>
<i>Average</i>	<i>\$180,290,814</i>	<i>\$52,384,732</i>	<i>\$62,258,479</i>	<i>\$294,934,024</i>

Table 11: Value Added Economic Impacts of MSHCP (in Current Dollars)

Year	Direct	Indirect	Induced	Total
2001	\$85,419,474	\$26,655,504	\$31,980,934	\$144,055,912
2002	\$105,075,116	\$32,789,129	\$39,339,979	\$177,204,224
2003	\$116,606,727	\$36,387,616	\$43,657,399	\$196,651,741
2004	\$211,464,835	\$65,988,485	\$79,172,144	\$356,625,465
2005	\$271,420,587	\$84,697,928	\$101,619,495	\$457,738,010
2006	\$375,111,564	\$117,055,130	\$140,441,255	\$632,607,949
2007	\$183,924,891	\$57,394,530	\$68,861,227	\$310,180,648
2008	\$70,049,467	\$21,859,229	\$26,226,425	\$118,135,121
2009	\$9,697,761	\$3,026,227	\$3,630,829	\$16,354,816
2010	\$5,310,583	\$1,657,189	\$1,988,275	\$8,956,048
2011	\$12,013,793	\$3,748,954	\$4,497,948	\$20,260,695
2012	\$7,376,649	\$2,301,914	\$2,761,807	\$12,440,370
2013	\$17,535,820	\$5,472,126	\$6,565,387	\$29,573,332
2014	\$54,377,667	\$16,968,778	\$20,358,924	\$91,705,370
2015	\$18,581,598	\$5,798,465	\$6,956,925	\$31,336,988
2016	\$44,416,805	\$13,860,449	\$16,629,591	\$74,906,844
<b>TOTAL</b>	<b>\$1,588,383,339</b>	<b>\$495,661,652</b>	<b>\$594,688,544</b>	<b>\$2,678,733,534</b>
<i>Average</i>	<i>\$99,273,959</i>	<i>\$30,978,853</i>	<i>\$37,168,034</i>	<i>\$167,420,846</i>



Table 12: Estimated Historical Total Economic Output (in Current Dollars)

	Average Price per Acre	Range of Potential Delay (in months)									
		6 Mo.	8 Mo.	12 Mo.	17 Mo.	20 Mo.	24 Mo.	28 Mo.	32 Mo.	36 Mo.	
<b>TROUGH (2011)</b>	\$176,581	\$0.7 B	\$1.0 B	\$1.4 B	\$1.9 B	\$2.3 B	\$2.7 B	\$3.2 B	\$3.7 B	\$4.1 B	
	\$200,000	\$0.8 B	\$1.1 B	\$1.6 B	\$2.2 B	\$2.6 B	\$3.1 B	\$3.6 B	\$4.1 B	\$4.7 B	
	\$250,000	\$1.0 B	\$1.3 B	\$1.9 B	\$2.7 B	\$3.2 B	\$3.8 B	\$4.5 B	\$5.1 B	\$5.8 B	
	\$300,000	\$1.2 B	\$1.5 B	\$2.3 B	\$3.2 B	\$3.8 B	\$4.5 B	\$5.3 B	\$6.1 B	\$6.9 B	
	\$350,000	\$1.4 B	\$1.8 B	\$2.6 B	\$3.7 B	\$4.4 B	\$5.3 B	\$6.2 B	\$7.1 B	\$8.1 B	
<b>AVERAGE</b>	\$400,000	\$1.5 B	\$2.0 B	\$3.0 B	\$4.2 B	\$5.0 B	\$6.0 B	\$7.1 B	\$8.1 B	\$9.2 B	
	\$446,789	\$1.7 B	\$2.2 B	\$3.3 B	\$4.7 B	\$5.6 B	\$6.7 B	\$7.9 B	\$9.1 B	\$10.3 B	
	\$500,000	\$1.9 B	\$2.5 B	\$3.7 B	\$5.3 B	\$6.2 B	\$7.5 B	\$8.8 B	\$10.1 B	\$11.5 B	
	\$550,000	\$2.1 B	\$2.7 B	\$4.1 B	\$5.8 B	\$6.8 B	\$8.2 B	\$9.7 B	\$11.1 B	\$12.6 B	
	\$600,000	\$2.2 B	\$3.0 B	\$4.4 B	\$6.3 B	\$7.4 B	\$9.0 B	\$10.6 B	\$12.1 B	\$13.8 B	
	\$650,000	\$2.4 B	\$3.2 B	\$4.8 B	\$6.8 B	\$8.0 B	\$9.7 B	\$11.4 B	\$13.2 B	\$14.9 B	
	\$700,000	\$2.6 B	\$3.4 B	\$5.2 B	\$7.3 B	\$8.7 B	\$10.5 B	\$12.3 B	\$14.2 B	\$16.1 B	
	\$750,000	\$2.8 B	\$3.7 B	\$5.5 B	\$7.8 B	\$9.3 B	\$11.2 B	\$13.2 B	\$15.2 B	\$17.2 B	
	\$800,000	\$3.0 B	\$3.9 B	\$5.9 B	\$8.4 B	\$9.9 B	\$11.9 B	\$14.0 B	\$16.2 B	\$18.3 B	
	<b>PEAK (2007)</b>	\$850,000	\$3.1 B	\$4.2 B	\$6.2 B	\$8.9 B	\$10.5 B	\$12.7 B	\$14.9 B	\$17.2 B	\$19.5 B
		\$881,764	\$3.2 B	\$4.3 B	\$6.5 B	\$9.2 B	\$10.9 B	\$13.1 B	\$15.5 B	\$17.8 B	\$20.2 B

Note: Assumes an average cost of capital of 5.4 percent

Table 13: Projected Future Total Economic Output (in Current Dollars)

	Average Price per Acre	Range of Potential Delay (in months)									
		6 Mo.	8 Mo.	12 Mo.	17 Mo.	20 Mo.	24 Mo.	28 Mo.	32 Mo.	36 Mo.	
<b>TROUGH</b> <b>(2011)</b>	\$176,581	\$0.5 B	\$0.6 B	\$0.9 B	\$1.2 B	\$1.4 B	\$1.7 B	\$2.0 B	\$2.3 B	\$2.5 B	
	\$200,000	\$0.5 B	\$0.7 B	\$1.0 B	\$1.4 B	\$1.6 B	\$1.9 B	\$2.2 B	\$2.5 B	\$2.9 B	
<b>2016 Value</b>	\$250,000	\$0.7 B	\$0.8 B	\$1.2 B	\$1.7 B	\$2.0 B	\$2.3 B	\$2.7 B	\$3.1 B	\$3.6 B	
	\$300,000	\$0.8 B	\$1.0 B	\$1.4 B	\$2.0 B	\$2.3 B	\$2.8 B	\$3.3 B	\$3.7 B	\$4.2 B	
	\$366,061	\$0.9 B	\$1.2 B	\$1.7 B	\$2.4 B	\$2.8 B	\$3.4 B	\$4.0 B	\$4.5 B	\$5.1 B	
	\$400,000	\$1.0 B	\$1.3 B	\$1.9 B	\$2.6 B	\$3.1 B	\$3.7 B	\$4.3 B	\$5.0 B	\$5.6 B	
	\$450,000	\$1.1 B	\$1.4 B	\$2.1 B	\$2.9 B	\$3.4 B	\$4.1 B	\$4.8 B	\$5.6 B	\$6.3 B	
	\$500,000	\$1.2 B	\$1.6 B	\$2.3 B	\$3.2 B	\$3.8 B	\$4.6 B	\$5.4 B	\$6.2 B	\$7.0 B	
	\$550,000	\$1.3 B	\$1.7 B	\$2.5 B	\$3.5 B	\$4.2 B	\$5.0 B	\$5.9 B	\$6.8 B	\$7.7 B	
	\$600,000	\$1.4 B	\$1.8 B	\$2.7 B	\$3.8 B	\$4.5 B	\$5.5 B	\$6.4 B	\$7.4 B	\$8.4 B	
	\$650,000	\$1.5 B	\$2.0 B	\$2.9 B	\$4.2 B	\$4.9 B	\$5.9 B	\$6.9 B	\$8.0 B	\$9.1 B	
	\$700,000	\$1.6 B	\$2.1 B	\$3.2 B	\$4.5 B	\$5.3 B	\$6.4 B	\$7.5 B	\$8.6 B	\$9.7 B	
	\$750,000	\$1.7 B	\$2.3 B	\$3.4 B	\$4.8 B	\$5.6 B	\$6.8 B	\$8.0 B	\$9.2 B	\$10.4 B	
	\$800,000	\$1.8 B	\$2.4 B	\$3.6 B	\$5.1 B	\$6.0 B	\$7.3 B	\$8.5 B	\$9.8 B	\$11.1 B	
	<b>PEAK</b> <b>(2007)</b>	\$850,000	\$1.9 B	\$2.6 B	\$3.8 B	\$5.4 B	\$6.4 B	\$7.7 B	\$9.0 B	\$10.4 B	\$11.8 B
		\$881,764	\$2.0 B	\$2.6 B	\$3.9 B	\$5.6 B	\$6.6 B	\$8.0 B	\$9.4 B	\$10.8 B	\$12.2 B

Note: Assumes an average cost of capital of 5.4 percent

Table 14: Projected Future Total Economic Output of Amendment (in Current Dollars)

	Average Price per Acre	Range of Potential Delay (in months)									
		6 Mo.	8 Mo.	12 Mo.	17 Mo.	20 Mo.	24 Mo.	28 Mo.	32 Mo.	36 Mo.	
<b>TROUGH (2011)</b>	\$176,581	\$1.4 B	\$1.7 B	\$2.5 B	\$3.4 B	\$4.0 B	\$4.7 B	\$5.5 B	\$6.3 B	\$7.1 B	
	\$200,000	\$1.5 B	\$1.9 B	\$2.7 B	\$3.8 B	\$4.4 B	\$5.3 B	\$6.2 B	\$7.1 B	\$8.0 B	
<b>2016 Value</b>	\$250,000	\$1.8 B	\$2.3 B	\$3.4 B	\$4.7 B	\$5.5 B	\$6.5 B	\$7.7 B	\$8.8 B	\$9.9 B	
	\$300,000	\$2.1 B	\$2.7 B	\$4.0 B	\$5.5 B	\$6.5 B	\$7.8 B	\$9.1 B	\$10.5 B	\$11.8 B	
	\$366,061	\$2.5 B	\$3.3 B	\$4.8 B	\$6.7 B	\$7.9 B	\$9.4 B	\$11.1 B	\$12.7 B	\$14.4 B	
	\$400,000	\$2.7 B	\$3.5 B	\$5.2 B	\$7.3 B	\$8.6 B	\$10.3 B	\$12.0 B	\$13.8 B	\$15.7 B	
	\$450,000	\$3.0 B	\$3.9 B	\$5.8 B	\$8.1 B	\$9.6 B	\$11.5 B	\$13.5 B	\$15.5 B	\$17.6 B	
	\$500,000	\$3.3 B	\$4.3 B	\$6.4 B	\$9.0 B	\$10.6 B	\$12.8 B	\$15.0 B	\$17.2 B	\$19.5 B	
	\$550,000	\$3.6 B	\$4.7 B	\$7.0 B	\$9.9 B	\$11.6 B	\$14.0 B	\$16.4 B	\$18.9 B	\$21.4 B	
	\$600,000	\$3.9 B	\$5.1 B	\$7.6 B	\$10.7 B	\$12.7 B	\$15.3 B	\$17.9 B	\$20.6 B	\$23.3 B	
	\$650,000	\$4.2 B	\$5.5 B	\$8.2 B	\$11.6 B	\$13.7 B	\$16.5 B	\$19.4 B	\$22.3 B	\$25.3 B	
	\$700,000	\$4.5 B	\$5.9 B	\$8.8 B	\$12.5 B	\$14.7 B	\$17.8 B	\$20.8 B	\$24.0 B	\$27.2 B	
	\$750,000	\$4.8 B	\$6.3 B	\$9.4 B	\$13.3 B	\$15.7 B	\$19.0 B	\$22.3 B	\$25.7 B	\$29.1 B	
	\$800,000	\$5.1 B	\$6.7 B	\$10.0 B	\$14.2 B	\$16.8 B	\$20.2 B	\$23.8 B	\$27.4 B	\$31.0 B	
	<b>PEAK (2007)</b>	\$850,000	\$5.4 B	\$7.1 B	\$10.6 B	\$15.1 B	\$17.8 B	\$21.5 B	\$25.2 B	\$29.1 B	\$32.9 B
		\$881,764	\$5.6 B	\$7.4 B	\$11.0 B	\$15.6 B	\$18.5 B	\$22.3 B	\$26.2 B	\$30.1 B	\$34.2 B

Note: Assumes an average cost of capital of 5.4 percent

## Bibliography

---

- Baldino, C. L. (2015). Factors of Success for County and Regional Habitat Conservation Plan Creation. Retrieved from <https://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/9683/BaldinoMP.pdf?sequence=1>
- Beatley, T. (1994). *Habitat Conservation Planning: Endangered Species and Urban Growth*. University of Texas Press.
- Columbia University Integrative Capstone Workshop in Sustainability Management. (n.d.). Understanding the Species Mitigation Market in the United States. Retrieved from <http://sustainability.ei.columbia.edu/files/2017/01/Understanding-the-Species-Mitigation-Market-in-the-US-The-Nature-Conservancy-PDF.pdf>
- Cutter, B., Fernandez, L., & Scott, T. (2013). Dynamic Analysis of Open Space Value with a Preservation Policy. Retrieved from [https://www.researchgate.net/profile/Bowman\\_Cutter/publication/228984881\\_Dynamic\\_Analysis\\_Of\\_Open\\_Space\\_Value\\_With\\_A\\_Preservation\\_Policy/links/0deec52bca98a5c8c9000000.pdf](https://www.researchgate.net/profile/Bowman_Cutter/publication/228984881_Dynamic_Analysis_Of_Open_Space_Value_With_A_Preservation_Policy/links/0deec52bca98a5c8c9000000.pdf)
- Gallant, J. (1989, October 4). Desert tortoise slowing pace of interchange, overpass building. *Las Vegas Review-Journal*. Retrieved from <http://www.clarkcountynv.gov/airquality/dcp/Documents/About%20Us/Desert%20Tortoise%20Slowing%20Pace%20of%20Interchange%20Overpass%20Building%20-%20LVRJ%20Oct%204%201989.pdf>
- Gaue, G. W., & Jarrett, J. E. (1992). Economic Impact Study: Balcones Canyonlands Conservation Plan. Retrieved from <https://utexas-ir.tdl.org/handle/2152/29120>
- Keough, H. L., & Blahna, D. J. (2002). Achieving Integrative, Collaborative Ecosystem Management. *Conservation Biology*. Retrieved from [https://www.researchgate.net/profile/Dale\\_Blahna/publication/6791337\\_Achieving\\_Integrative\\_Collaborative\\_Ecosystem\\_Management/links/56e6f8c908ae4cbe4d42981c.pdf](https://www.researchgate.net/profile/Dale_Blahna/publication/6791337_Achieving_Integrative_Collaborative_Ecosystem_Management/links/56e6f8c908ae4cbe4d42981c.pdf)
- Kroeger, T., & Manalo, P. (2007). Economic Benefits Provided by Natural Lands: Case Study of California's Mojave Desert. *Defenders of Wildlife*.
- Langpap, C., & Kerkvliet, J. (2012). Endangered Species Conservation on Private Land: Assessing the Effectiveness of Habitat Conservation Plans. Retrieved from <http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/37463/LangpapChristianAgriculturalResourceEconomicsEndangeredSpeciesConservation.pdf?sequence=1>



- Loew, B. (2000). Multiple Species Habitat Conservation Planning: Goals and Strategies of Local Governments. *Environmental Management*. Retrieved from <https://link.springer.com/article/10.1007%2Fs002670010059?LI=true>
- Manning, M. (1989, December 14). Developers lose verdict to tortoises. *Las Vegas Sun*. Retrieved from <http://www.clarkcountynv.gov/airquality/dcp/Documents/About%20Us/Developers%20Lose%20Verdict%20to%20Tortoises%20-%20LVSun%20Dec%2014%201989.pdf>
- Ouellette, M., & Cheong, H. E. (2014). The Western Riverside County Multiple Species Habitat Conservation Plan: 10 Years Later. *Planning & Environmental Law*, 8-11.
- Shetterly, C. (1989, August 22). Lawyer says tortoise ruling will slow projects to crawl. *Las Vegas Review-Journal*. Retrieved from <http://www.clarkcountynv.gov/airquality/dcp/Documents/About%20Us/Lawer%20Says%20Tortoise%20Ruling%20Will%20Slow%20Projects%20to%20Crawl%20-%20LVRJ%20Aug%2022%201989.pdf>
- Shetterly, C. (1989, December 5). Tortoise delays building one year. *Las Vegas Review-Journal*. Retrieved from <http://www.clarkcountynv.gov/airquality/dcp/Documents/About%20Us/Tortoise%20Delays%20Building%20One%20Year%20-%20LVRJ%20Dec%2005%201989.pdf>
- St. Louis Federal Reserve. (n.d.). *Moody's Seasoned Aaa Corporate Bond Yield*. Retrieved from <https://fred.stlouisfed.org/series/AAA>
- Wachs, M., & Lederman, J. (2014). Transportation and Habitat Conservation Plans: Improving Planning and Project Delivery While Preserving Endangered Species. Retrieved from <http://www.buttehcp.com/documents/Documents/Other%20Documents/Transportation%20and%20HCPs.pdf>
- Wheeler, D. P., & Rowberry, R. (2010). Habitat Conservation Plans and the Endangered Species Act. Retrieved from [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1927477](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1927477)

