TOURISM ECONOMICS

AN OXFORD ECONOMICS COMPANY

REVITALIZED SALTON SEA

ANALYSIS OF POTENTIAL ECONOMIC BENEFITS

DECEMBER 2017

GREATER palm springs convention & visitors bureau

Tourism Economics

Tourism Economics is an Oxford Economics company with a singular objective: combine an understanding of tourism dynamics with rigorous economics in order to answer the most important questions facing destinations, developers, and strategic planners. By combining quantitative methods with industry knowledge, Tourism Economics designs custom market strategies, destination recovery plans, tourism forecasting models, tourism policy analysis, and economic impact studies.

With over four decades of experience of our principal consultants, it is our passion to work as partners with our clients to achieve a destination's full potential.

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December 2017

The modelling and results presented here are based on information provided by third parties, upon which Tourism Economics and Oxford Economics have relied in producing its report and forecasts in good faith. Any subsequent revision or update of those data will affect the assessments and projections shown.

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EXECUTIVE SUMMARY

INTRODUCTION

To contribute to Salton Sea planning, the Greater Palm Springs Convention & Visitors Bureau commissioned Tourism Economics, part of Oxford Economics, to analyze the potential economic benefits of a hypothetical future scenario with a revitalized Salton Sea. This would represent a scenario in which short term damage is not only mitigated, but also a concerted program succeeds in stabilizing and reviving the Salton Sea.

BACKGROUND

The Salton Sea is a lake located in the Coachella and Imperial valleys of California, which was formed accidentally in 1905 when the Colorado River breached its banks. As the state's largest inland lake, the Salton Sea has traditionally been an important fishery and wildlife habitat, and a major stopping point for migratory birds along the Pacific Flyway. In the 1950s and 1960s, it was also a popular tourist attraction, before fluctuating water levels undermined development.

More recently, the conditions of the Salton Sea have been degraded by a series of issues. Reduced water inflows, combined with evaporation and residual salt from previous lake formations in the valley, and runoff from local agricultural operations, has caused salinity levels to rise substantially. Additionally, the Salton Sea's eutrophic state occasionally causes unpleasant odors that permeate its proximate residential areas, and occasionally as far away as Los Angeles and the San Fernando Valley.

The Salton Sea is reaching a critical point, as mitigation water inflows are scheduled to end this year, and the lake is expected to start to recede even faster, resulting in a further collapse of the local ecosystem and exposure to desert winds of a dry lakebed with toxic dust.

REVITALIZATION CASE STUDIES

Communities across the country have successfully revitalized bodies of water, creating valuable assets out of formerly polluted lakes or waterfront areas that had fallen into neglect. For example, Baltimore Inner Harbor represents a successful public-private revitalization of a neglected port that is now an active waterfront district and tourism zone. Buffalo, NY has recently had similar success with its inner harbor, and New York City is more than $1 billion along in its ambitious 30-year goal of converting what was once the world's largest landfill into the city's largest public park and wetlands. On the upper Hudson River, NY the largest, most complex Superfund site in history has recently reached the completion of $1.7 billion of dredging and related clean-up; allowing local towns to look to old industrial waterfronts as new assets.

Such case studies help set important context for planning the future of the Salton Sea, and are summarized in the first section of this report.

REVITALIZED SALTON SEA

The second and third sections of this report quantify potential benefits and costs associated with a revitalization of the Salton Sea. For this purpose, we considered scenarios in two phases. In Phase 1, the 10-year plan prepared by the California Natural Resource Agency (10-Year Plan) is implemented. This envisions the development of approximately 30,000 acres of wet habitat, consisting of deeper water areas and shallow water areas. Both the deeper water areas (approximately 6,000 to 8,000 acres) and the shallow water habit (approximately 22,000 to 24,000 acres) would be surrounded by earth berms, paths and small roadways, making them accessible to visitors for fishing, wildlife watching, limited boating (e.g. canoes), and other outdoor recreation. Additional steps would be taken to mitigate negative impacts to air quality from the exposure of previously submerged lakebed, known as playa, as the lakebed shrinks.

Phase 1 (10-Year Plan) is a stepping stone to a more complete revitalization of the Salton Sea. Therefore, we have also considered a Phase 2 in which construction continues after the end of Phase 1. This results in the complete build out of a stable, vibrant and diverse lake and wetlands. To help provide a reference point for this build out, we characterize the future lake as offering 23,000 acres of lake surface area, such as could be provided by 36 square miles of lake area as described in the Perimeter Lake Concept presented in the May 2016 Salton Sea Funding and Feasibility Action Plan for the Salton Sea Authority. [1] This Perimeter Lake Concept envisions a lake along the edge of the existing Salton Sea boundaries, separated into water cells, with areas up to 25 feet deep suitable for boating, as well as 130 miles of shallow habitat along the existing shoreline and levees. Additionally, consistent with the Perimeter Lake Concept, we assume 18,000 square acres of habitat areas, resulting in a total lake and wetlands area of 41,000 square acres.

We have assumed a development cost of $383 million for the 10-Year Plan, which is consistent with recent estimates by the California Natural Resource Agency. (California Natural Resources Agency, 2017, March) The cost of the Perimeter Lake Concept was previously estimated at $1.8 billion. Deducting the cost of the 10-Year Plan, we have therefore assumed a development cost of $1.4 billion for the Phase 2 analysis.

[1] Within the Salton Sea Funding and Feasibility Action Plan, Benchmark 4: Conceptual Plans and Cost Estimates, Volume 2: Smaller Sea Options – Perimeter Lake Concept. (Salton Sea Authority, 2016)

ECONOMIC BENEFITS

Phase 1 (10-Year Plan)

Phase 1 (10-Year Plan) is expected to yield substantial benefits by helping stabilize a valuable ecosystem; partly mitigating air quality challenges; and demonstrating the region's commitment to address challenges over the long-term. Such progress is expected to help mitigate the risk that continued decay of the Salton Sea, and resulting "bad smell" events, dust storms, and negative perceptions, will negatively impact the Greater Palm Springs visitor economy.

In prior research, we estimated that a no-action scenario could result in the loss of 5% to 25% of annual visitor spending in Greater Palm Springs (Tourism Economics, 2014, December). For the purpose of this current analysis, we have conservatively assumed that the implementation of the 10-Year Plan would mitigate the loss of 10% of visitor spending relative to a no-action scenario. This "avoided loss" of visitor spending, and the related jobs, incomes, and taxes it supports, represents the economic benefit of the 10-Year Plan as quantified in this analysis. We expect other benefits as well, including air quality-related health benefits and ecosystem benefits, but we have not quantified these in our analysis of the 10-Year Plan.

Since annual visitor spending in Greater Palm Springs currently totals approximately $5.0 billion, supporting almost 50,000 local area jobs, by mitigating the loss of 10% of visitor spending relative to the no-action scenario, we estimate the implementation of the 10-Year Plan will preserve approximately $496 million of visitor spending annually. This would mitigate the loss of almost 5,000 local jobs with $150 million of annual labor income, and $95 million of annual tax revenue.

Using these annualized impacts as a base, we allowed for a period of construction and ramp-up of the benefits, and then discounted the estimates to a present value using a real discount rate of 5.0%. This discounting adjustment reflects the recognition that future benefits and costs are not worth as much as those received today. The result provides a set of estimates extending for an 11-year period from 2018 through 2028. All estimates are in 2016 dollars.

As shown in the Phase 1 (10-Year Plan) column of ES-1, we estimate a revitalized Salton Sea would generate the following present value benefits and costs over an 11-year period relative to a no-action scenario:

- **Benefits (2018 to 2028)**
  - Avoid a loss of $3.7 billion of visitor spending by mitigating negative perceptions of potential travelers through improved air quality and visible evidence of a plan being implemented to manage and transition the Salton Sea.
  - Gain economic impacts within Greater Palm Springs as a result of the avoided loss of visitor spending, plus impacts of revitalization spending, totaling:
    - $5.2 billion of output (business sales)

- $1.3 billion of labor income, including wages, salaries and benefits
- Almost 40,000 job years (one job for one year is equivelent to one job year)
- $752 million of tax revenues, including $415 million of state and local taxes

- **Costs (2018 to 2028)**
  - $280 million of assumed design and construction costs.
  - Economic impacts within Greater Palm Springs, including:
    - $11.1 billion of output (business sales)
    - $2.8 billion of labor income, including wages, salaries and benefits
    - Over 77,000 job years (one job for one year is equivelent to one job year)
    - $1.6 billion of tax revenues, including $832 million of state and local taxes
- **Costs (2018 to 2042)**
  - $1.1 billion of assumed design, construction costs, maintenance and monitoring costs

These results are further summarized in the following Key Results section.

Phase 2

For the Phase 2 analysis, we shifted our focus from the avoided loss of visitor spending to a full set of other economic benefits that we anticipate would result from a revitalization of the Salton Sea. In terms of annual amounts, these estimated benefits are led by an overall increase in visitor spending, which we estimate at $519 million, followed by wetlands ecosystem benefits, such as habitat for species and recreational opportunities[2] at $283 million; real estate development of $204 million; property value appreciation of $37 million, and property tax impact of $12 million. We refer to these as the "specific economic benefits" of a revitalized Salton Sea, representing an annual flow of benefits totalling $1.1 billion.

We based our estimates of future, incremental visitor spending in Greater Palm Springs on visitor spending at comparable lakes. We considered certain positive factors, including the proximity of the Salton Sea to the large Southern California population base, its warm winter climate, and the presence of extensive visitor infrastructure in Greater Palm Springs. We also adjusted for expected future growth in the Southern California economy.

We converted several of the specific economic benefits into estimated annual economic impacts, including output (business sales), jobs, labor income, and tax revenues. As an example, we anticipate visitor spending of $519 million annually would support 3,515 direct jobs, with $109 million of direct wages, salaries and other income. These direct impacts would support an additional 1,034 indirect and induced jobs. In total, visitor spending would support $100 million of annual tax revenue, including $56 million of state and local taxes.

These annualized estimates represent a stabilized level of incremental activity that we anticipate a revitalized Salton Sea would generate for Greater Palm Springs in the future relative to a no-action scenario. In preparing estimates of the benefits that would be generated over time, we allowed for a period of construction and stabilization, and a ramp-up of visitor spending, real estate development, and other benefits. We estimated that the ramp-up of benefits would begin to occur in approximately 2026, as the 10-Year Plan reaches completion, and as the region looks ahead to even greater investment in Salton Sea revitalization. The result provides estimates extending for a 25-year period from 2018 through 2042.

[2] As an ecosystem benefit, recreational opportunities represent the monetary value to consumers of visits to the area, in excess of the amount spent during the trip.

ES-1. Benefit and cost summary

In millions of 2016 dollars

	Present value (25 years, 2018 to 2042)		
	Phase 1 (10-Year Plan)	**Phase 2**	**Combined**
Specific economic benefits			
Visitor spending avoided loss (visitor spending in Greater Palm Springs that would otherwise be lost)	$3,703	$0	$3,703
Visitor spending impact (additional visitor spending in Greater Palm Springs)	0	2,634	2,634
Real estate development impact (value of new development proximate to Salton Sea)	0	1,035	1,035
Property tax impact (property taxes on new real estate development)	0	63	63
Property value impact (property value appreciation in Greater Palm Springs)	0	185	185
Wetlands ecosystem benefits (monetary value of ecosystem benefits broadly)	0	1,436	1,436
Total of specific economic benefits	**$3,703**	**$5,353**	**$9,056**
Economic impacts supported by selected benefits *Total impacts of visitor spending, real estate development, property tax impact, and revitalization spending*			
Output (business sales)	$5,177	$5,957	$11,134
Labor income	$1,253	$1,581	$2,833
Employment (job years)	39,508	37,988	77,496
Fiscal (tax revenue)	$752	$842	$1,594
Federal taxes	$336	$402	$739
State and local taxes	$415	$440	$855
Assumed cost of revitalization	**($280)**	**($853)**	**($1,134)**

Source: Tourism Economics

KEY RESULTS

PHASE 1 (10-YEAR PLAN)

SCOPE

Implementation of the 10-year plan prepared by the California Natural Resource Agency, resulting in development of the 30,000 acres of wet habitat and steps to mitigate negative impacts to air quality as the lakebed shrinks.

BENEFITS IN GREATER PALM SPRINGS

$3.7 billion Avoided loss of visitor spending by mitigating negative perceptions of potential visitors

RESULTING ECONOMIC IMPACTS IN GREATER PALM SPRINGS

$5.2 billion Output (business sales)

$1.3 billion Labor income

40,000 Job years (rounded)

$752 million Tax revenue, including $415 million of state and local taxes

ESTIMATED COST

$280 million Design and construction

Note: All amounts shown are in present value, representing an 11-year period, 2018 to 2028
Source: Tourism Economics

KEY RESULTS

COMBINED PHASE 1 AND PHASE 2

SCOPE

Construction continues after Phase 1, resulting in the complete build out of a stable, vibrant and diverse lake and wetlands. Assume 41,000 acres of lake and habitat, such as could be provided by the Perimeter Lake Concept, including 23,000 acres of lake surface area.

BENEFITS IN GREATER PALM SPRINGS

$9.0 billion

Specific economic benefits, representing the avoided loss of $3.7 billion of visitor spending associated with Phase 1, plus the following benefits associated with Phase 2: $2.6 billion of additional visitor spending; $1.0 billion of new development; $63 million of property taxes; $185 million of property value appreciation, and $1.4 billion of ecosystem benefits.

RESULTING ECONOMIC IMPACTS IN GREATER PALM SPRINGS

$11.1 billion Output (business sales)

$2.8 billion Labor income

77,000 Job years (rounded)

$1.6 billion Tax revenue, including $855 million of state and local taxes

ESTIMATED COST

$1.1 billion Design and construction

1. INTRODUCTION

1.1 HISTORICAL SUCCESS

Recent discussions have focused on Salton Sea challenges, and at times overlook its historical successes. For example, the 1950s and 1960s stand out as a period that gives a glimpse of the recreational potential of the region. Indeed, at its peak, the Salton Sea attracted 1.5 million visitors annually, more than Yosemite. (Iovenko, 2015)

In the 1950s, as Palm Springs was rising in popularity, the Salton Sea attracted the attention of land developers. One of the most ambitious developments was Salton City, which grew to include the Salton Bay Yacht Club, a golf course, airstrip, motel and restaurants, and which had a longer-term vision encompassing almost 20,000 acres. Similarly, Bombay Beach grew along the shoreline, attracting visitors interested in water sports, fishing and swimming. The Salton Sea State Park opened in 1955, and at the time was the second largest in the state.

The North Shore Beach and Yacht Club opened in 1962, and was described at the time as one of the largest marinas in Southern California, reflecting the fact that speedboat racing was a popular activity on the Salton Sea for some time. Examples include the Salton Sea Regatta, sponsored by regional organizations such as the Southern California Speedboat Club and the Los Angeles Speedboat association. (Laflin, 1995).

Ultimately, fluctuating water levels and related challenges limited the success of such developments in the area. For example, some waterfront buildings were moved inland multiple times to avoid rising waters. In the late 1970s, a series of heavy tropical storms caused the water level to rapidly rise and flood nearby areas, damaging businesses and infrastructure. Then, in the 1990s, the lake receded substantially, stranding homes and businesses. (Iovenko, 2015)

1.2 IMPLICATIONS

These historical experiences affirm both the potential for a revitalized Salton Sea as well as the importance to future development of stabilizing the lake and surroundings. We believe the Salton Sea satisfies certain destination success criteria, including its location in Greater Palm Springs, proximity to the sizable Southern California market, and the potential for a unique waterfront environment. However, at the same time, we anticipate the path to realize that potential will require a demonstrated commitment to stable, long-term management of the lake and its surroundings.

To help provide examples of what is possible with such vision and commitment, we have prepared case studies that highlight examples in which other communities have transformed polluted or otherwise neglected bodies of water into valuable assets, supportive of recreation, real estate development, and environmental uses. These case studies are presented in the following section.

2. REVITALIZATION CASE STUDIES

Today, almost every city with any form of water frontage – at least in advanced countries – is doing something about revitalizing its waterfront, if such renovation can be considered remotely affordable and if the essential political impetus is present. This process involves not only port cities, of course, but all kinds of other cities: on lakes, rivers, canals, and artificial water bodies. (Hoyle, 2000)

As a reference point, we considered a range of situations in which local communities have revitalized a body of water, other wetlands, or a waterfront district. Similar to the Salton Sea, these locations typically represent areas that had reached a point of disuse, whether as a former industrial site, ignored waterfront, or closed landfill. In many situations, to succeed, the revitalization involved innovative action by multiple public and private organizations. In several of the situations, the costs were quite substantial, and in almost all cases, the revitalization effort spanned decades.

The revitalizations typically resulted in creation or restoration of an important asset for the local community. For example, a lake that is once again swimmable, or a waterfront district that becomes a focal point for multiple forms of recreation. In these examples, area residents gain not just through “use” or “recreation” opportunities, but also through intangibles, such as a sense of local pride and a relationship to a revitalized environmental resource. Typically, and in some cases quite substantially, the revitalizations also result in new private investment, attracted by the improved area and engaged public interest.

A short write-up on each of the following case studies is provided in this section.

- Baltimore Inner Harbor, MD
- Buffalo Inner Harbor, NY
- Delavan Lake, WI
- Buffalo Bayou Park, TX
- Freshkills Park, NY
- Old Mill District, Bend, OR
- Onondaga Lake, NY
- Upper Hudson River, NY

CASE STUDY: BALTIMORE INNER HARBOR, MD

In this frequently-cited example of the significant potential for waterfront redevelopment, city leaders initiated an effort that exceeded its goals and created a widely emulated waterfront district.

Issue

In the 1950s, downtown Baltimore was experiencing declining property values and city tax revenues. The city's Inner Harbor had fallen out of use, as shipping activities had shifted to deeper water facilities in the outer harbour area. (Norris, 2003)

Approach

Initially, city officials and the local business community backed an innovative urban renewal project for the downtown core. This included the almost $1 billion Charles Center Project ($140 million in 1957 dollars). As these efforts gained traction, focus turned to the Inner Harbor. In 1964, the city announced the Inner Harbor Master Plan, and voters approved a bond issue of $2 million to start the program. Efforts included the acquisition of almost 1,000 properties – relocating more than 700 businesses – and disposing of toxic dredging materials.

In each stage of the plan, public investment led, followed by private capital. For example, the state's board of public works approved the construction of the 28-story World Trade Center. By 1973, the shoreline was rebuilt with new bulkheads, and a wide promenade was added along the water's edge. By 1975, private development interest had increased, and land prices appreciated above the city's cost of acquiring land and buildings a few years earlier. To activate the reclaimed waterfront, floating attractions were brought in, including a World War II submarine, a coastal steamer converted to a restaurant, and water shuttles. The area started to host events and festivals, attracting many local residents.

By 1975, the 100,000-square-foot Maryland Science Center was under construction on the shoreline, with plans announced for an aquarium and new convention center. Moody's, the credit agency, raised the city's bond rating, citing the Inner Harbor development as a positive factor. In 1976, Baltimore attracted a tour of visiting square-rigged Tall Ships, helping put the Inner Harbor on the map as a tourism destination. Additional attractions followed. Between 1979 and 1981, the city won approval from the state to build the Baltimore Convention Center; the National Aquarium opened; the district attracted the development of the Hyatt Regency Baltimore, made possible by a $10 million Federal grant; and the Harborplace marketplace opened. (Millspaugh, 2003)

Results

The impact to the attractiveness of the area to tourists was notable, as described in an article by Martin L. Millspaugh:

> "By 1982, attendance at the Inner Harbor was estimated at 20 million visits a year… The critical mass and the out-of-town visitation that it created put Baltimore in a new position among the world's cities… The hotel became the most successful property in the Hyatt chain. Twelve other downtown hotels were either built or rehabilitated in the next few years – without any further city participation except in the form of

clearing and selling sites for a fair market purchase price…" (Millspaugh, 2003)

Urban Land Institute summarized the redevelopment as follows:

> "The Inner Harbor Master Plan of 1964 was substantially completed in 20 years – a decade sooner than originally anticipated – and with three times as much development than initially projected. Private development funds accounted for 75 to 80 percent of the district's financing, often spurred by public investment – municipal bond funds, federal and state highway grants, and urban renewal money. The Inner Harbor has catalysed new development, expanding its impact well outside the project area: to the north, the 1.2 million-square-foot (111,484-square-meter) mixed-use Gallery; to the west, Oriole Park at Camden Yards; to the east, the 15-acre (six-ha) mixed-use Inner Harbor East project; and to the south, Harborview, a 2,600-unit residential development….
>
> The redevelopment of 192 acres (78 ha) of dilapidated and abandoned waterfront property, the Baltimore Inner Harbor catalysed the reinvestment of Baltimore – supporting over 50,000 new jobs, generating US$60 million in new tax revenue, and creating a US$4 billion tourism industry where none existed before – and now stands as the model for post-industrial waterfront development around the world." (Urban Land Institute, 2010)

CASE STUDY: BUFFALO INNER HARBOR AND WATERFRONT, NY

Issue

In the mid-1960s, the Buffalo River was "biologically dead… so polluted that no fish could survive in its waters". (McClelland, 2016) After the passage of the Clean Water Act in 1972, fish started to return. Later, federal projects supported by the 2002 Great Lakes Legacy Act and the 2020 Great Lakes Restoration Initiative provided funding for additional dredging, which removed 1.1 million cubic yards of sediment laced with pollutants.

These restoration efforts helped improve the waterway, but what was still needed was the final step that would reconnect Buffalo to the water. Indeed, as a journalist quotes a local resident as saying in 2005, "There's very few things that Buffalo has done perfectly. They have perfectly separated the citizens from the waterfront." (McClelland, 2016)

Approach

A 2006 agreement negotiated between Buffalo officials and New York Power Authority that gave the state a 50-year license to Niagara Falls energy provided $7 million annually for communities whose waterfronts had been polluted by industries drawing on the authority's power. (McClelland, 2016) (Foderaro, 2006) That provided a source of funding and a new authority. The Erie Canal Harbor Development Corporation (ECHDC) was formed in 2006 by New York State to lead Buffalo's waterfront revitalization.

Results

Within two years, this enabled the city to develop Canalside, a nautical-themed park at the mouth of the Erie Canal. The effort also removed an old sports arena to make space for new canals that become public ice skating rinks in winter. Private developers saw an opportunity, and in 2014, an office building that had been empty for 20 years reopened as the $30-million One Canalside. Also in 2014, a $200-million ice-hockey themed mixed-use development called HarborCenter opened. In 2018; a children's museum is expected to open on the last remaining piece of the old sports arena site that the city and state started redeveloping slightly more than a decade ago. Canalside now attracts nearly 1.5 million visitors annually and hosts numerous events and activities.

As documented by journalist Edward McClelland:

> "'What we're seeing with the Buffalo waterfront is that when we made the public investment in infrastructure to make the waterfront more attractive and more accessible, it's also become more attractive to private sector investment,' says Higgins. For the congressmen, the numbers prove the strategy.
>
> 'So you saw… a $35 million investment, which leveraged over $200 million in private sector investment,' he says. 'That was not coincidental. It's a cause and effect relationship.'
>
> Brendan Mehaffy, executive director of the city's Office of Strategic Planning, estimates that waterfront development projects have created 'thousands of construction jobs and easily over a thousand permanent jobs.'" (McClelland, 2016)

CASE STUDY: DELAVAN LAKE, WI

Delavan Lake is a 2,072-acre lake that supports year-round recreational activities and is an amenity to local communities. A water quality rehabilitation program conducted in the early 1990s provides an example of impacts to local residential property values and tourism activity.

Issue

During the early 1980s, Delavan Lake experienced numerous challenges related to water quality, including algal blooms.

Approach

Multiple levels of government undertook a $7 million rehabilitation program between 1989 and 1993. Once the wetlands were restored, the lake basin was allowed to refill and game fish were restocked.

Results

More than a decade later, a team of researchers at the University of Wisconsin analyzed the impact to local property values of the improvement in lake water quality, as well as estimated the amount of visitor spending being attracted by the lake. (Eiswerth, Kashian, & Skidmore, 2005) The econometric analysis of shoreline residential property values across multiple years relative to other nearby areas with similar lakes showed the rehabilitation had a significant impact on property values. The analysis showed that the 565 homes with shoreline on Delavan Lake experienced an aggregate increase in valuation of over $99 million. In addition, the analysis showed that, following the remediation, the lake attracted $9.4 million of annual visitor spending (approximately $4,500 per acre of lake surface area).

CASE STUDY: FRESHKILLS PARK, NY

New York City is transforming what was once the world's largest landfill into the city's largest public park – a 2,200-acre park almost three times bigger than Central Park.

Issue

Originally opened in 1948, Freshkills eventually became New York City's only landfill, ultimately receiving 150 million tons of garbage. In 2001, the state legislature ordered the closure of the landfill, which is located on Staten Island, about 20 miles south of Manhattan.

Approach

Starting that year, city agencies collaborated on an international design competition. The winning firm completed a master plan, which was adopted in 2006, with New York City Parks assuming responsibility for implementing the project. Work officially got underway in 2008, and the first section of the new park opened in 2012.

Completion of the park is anticipated to be a 30-year effort, and the ultimate cost of the transformation remains uncertain. To date, the New York City Sanitation Department has spent $900 million to cap four large mounds of trash, and another $300 million in closure work is anticipated. Also, $50 million has been spent for the park portion of the site, including perimeter projects and wetland restoration. (Sanders, 2014)

Results

The park is being developed from the outside in, helping create accessible areas proximate to local residential areas earlier in the timeline. When complete, the park is envisioned to have five main areas, including Creek Landing (waterfront activities, canoe and boat launch, restaurants, visitor center, event lawn); The Point (sports fields and event spaces); North Park (meadows and wetlands); South Park (natural settings, soccer fields and equestrian facility); East Park (park road, nature recreation area, space for recreational uses such as golf and field sports); and, West Park (spectacular 360-degree views of the region).

Ultimately, the park is anticipated to support a host of recreational and natural experiences that will be a valuable asset to residents of the surrounding urban area. (The Freshkills Park Alliance) As documented by journalist Elizabeth Royte:

> "Researchers do know that Freshkills' biodiversity is on the rise. In addition to the pheasants Hirsh noted in 2006, there are herds of deer (which locals hunt on the down low), red foxes, rabbits, coyotes, snakes, turtles, and more than 200 species of birds…
>
> Birders are excited about Freshkills because so much marsh and grassland on Long Island, in New Jersey, and in New England has been lost to development or to the consequences of climate change." (Royte, 2015)

CASE STUDY: OLD MILL DISTRICT, BEND, OR

A small town in Oregon transformed a waterfront brownfield site to an active, waterfront development.

Issue

The Bend, Oregon general plan prepared in 2005 encouraged downtown revitalization by rezoning an abandoned lumber mill property on the waterfront of the Deschutes River. However, the 180 acres of former lumber mill site was contaminated by decades of industrial use.

Approach

The Oregon Department of Environmental Quality began remediation, and the site developer agreed to a voluntary clean-up plan to complete it. The resulting development, known as the Old Mill District, now includes activities such as kayaking and fishing, as well as restaurants, shops, and art galleries.

Results

The redevelopment cleaned up environmental contamination, and the Old Mill District became an economic engine for the region, employing more than 2,000 people by 2013. The project has contributed to Bend's quality of life and natural resources, helping attract entrepreneurs to the city. (Environmental Projection Agency, 2015)

CASE STUDY: ONONDAGA LAKE, NY

Onondaga Lake is on the track to recovery following almost $1 billion of investment in toxic chemical clean-up and new wastewater treatment facilities. The efforts have restored swimming and fish species to this former resort lake proximate to Syracuse.

Issue

Onondaga Lake made a relatively rapid cycle from pristine condition, to a popular resort lake, to a dumping ground for industrial waste within a 100-year period. The rise of industrial activity around the lake led to a rapid decline in its natural conditions, resulting in the banning of ice harvesting in 1901, swimming in 1940, and fishing in 1972. (Idrisi, Sage, & Gao, 2014)

Approach

Clean-up actions for the 2,900-acre lake began in the 1970s, including the establishment of an annual lake monitoring program. In 1988, a local group filed a lawsuit against Onondaga County for sewage treatment violations, resulting in a settlement that mandated construction of additional facilities. In 1989, the state filed a lawsuit against a corporate entity that is now controlled by Honeywell International, Inc. seeking to compel the company to clean up the hazardous substances that it had discharged into and around the lake, and to pay damages for the destruction of natural resources.

As a result of these legal actions, Onondaga County invested $500 million in its sewage treatment plant, which lowered bacteria levels enough to make the lake safe for swimming. Additionally, Honeywell undertook a $451 million lake clean-up, which was completed in 2014, and which involved dredging 2.2 million cubic yards of toxic-laden material from the lake bottom. (Coin, 2014) The next phase of the clean-up calls for Honeywell to fund projects based on a “damages assessment” designed to compensate the public and the environment. Recommended projects under consideration in 2017 include 1,400 acres of land for public use and an extension of the Erie Canal trail. The ultimate cost to Honeywell of the damages assessment is not yet known.

Results

The water quality in Onondaga Lake has improved to its best level in 100 years. More than 60 fish species now swim in the lake, compared to about a dozen at the lake’s low point. Governor Andrew Cuomo stated:

> “The lake is back… faster than anyone predicted. It’s a story of renewal and rebirth, and an optimism about that rebirth that nobody expected.” (Honeywell International, Inc., 2017)

As documented by journalist David Chanatry:

> “Longtime resident Al Dahler says people need to know the lake is changing.
>
> ‘The jokes [in the past] were that if you caught a fish here you'd glow,’ Dahler says. ‘Onondaga Lake is an environmental comeback in progress, and gradually we're learning to reconnect to this beautiful jewel.’” (Chanatry, 2012)

CASE STUDY: UPPER HUDSON RIVER, NY

A proposed clean-up of toxic chemicals on the upper Hudson River in New York was initially opposed by local critics, who feared the major project would disrupt use of the river and tourism. Now that the clean-up has been deemed complete, the views are more favourable.

Issue

Two plants operated by General Electric poured tons of PCBs into the upper Hudson River before the chemicals were banned in the 1970s.

Approach

The location was classified as a Superfund site in 1984 by the U.S. Environmental Protection Agency (EPA). To remediate, GE dredged the river, removing 2.75 million cubic yards of contaminated sediment from a 40-mile stretch of the river as part of a $1.7 billion clean-up over a six-year period through 2015. It was described as the largest, most complex Superfund site in U.S. history. (Mann, 2015)

Results

In 2017, the EPA reported the river's rebound appeared on track. (Hill, 2017) The EPA referred to the project as:

> "The most extensive dredging project undertaken in the nation, and its success is a historic achievement for the recovery of the Hudson River. It was also a success for the local economy — providing about 500 jobs at its peak." (General Electric)

As described by Brian Mann for NPR:

> "With active dredging now its sixth year, even the project's early critics say it's been a huge success.
>
> 'We did have reservations about this project, as did many others,' says Mark Behan, a spokesman for GE. 'Because at the time that it was conceived, no project of this size or complexity had ever been attempted before.'
>
> Behan says the company is now proud of its work here, developing new techniques to remove toxic silt from a vast river that changes from season to season.
>
> "We assembled a world-class team of dredging, environmental and engineering experts, we adapted technology to the task and we've produced a project that EPA now calls a national model," Behan says.
>
> Now towns along New York's upper Hudson have begun revitalizing these old industrial waterfronts, thinking about a future where kids can swim and play along the shore without fear of contamination." (Mann, 2015)

3. PHASE 1 (10-YEAR PLAN) ANALYSIS

We conducted our analysis of Phase 1 (10-Year Plan) in the following steps.

- **Step One:** We summarized our understanding of the proposed 10-year Salton Sea Management Program (10-Year Plan).
- **Step Two:** We estimated near-term costs in terms of lost visitor spending that would be avoided through implementation of the 10-Year Plan. These avoided costs represent a benefit relative to a no-action scenario in which the Salton Sea further degrades. We calculated the corresponding economic impacts corresponding to these avoided costs, e.g. employment and taxes, as well as the economic impacts associated with annual revitalization spending, e.g. construction of berms and soil treatments.
- **Step Three:** We assumed total design and construction costs.
- **Step Four:** We estimated the ramp-up of impacts over time. In this analysis, we present an 11-year overview, as well as a calculation of the present value.
- **Step Five:** We compiled the estimates in a present value summary table.

3.1 STEP ONE: ASSUMED PHASE 1 (10-YEAR PLAN)

For the purpose of this analysis, Phase 1 (10-Year Plan) envisions the development of approximately 30,000 acres of wet habitat, consisting of deeper water areas and shallow water areas.

Of this wet habitat, about 6,000 to 8,000 acres would be deeper water areas, consisting of water management ponds that would have portions as deep as six feet deep that would be suitable for fishing. The water would be surrounded by earth berms. These berms would be large enough to support vehicles and there would be small roadways and parking areas that could be used by visitors to access the ponds, such as for birdwatching, fishing, and other outdoor recreation. Boating options in the deeper water areas would be limited (e.g. canoes and kayaks). The water level and water quality in these ponds would be managed so that the ponds are generally stable.

The remaining 22,000 to 24,000 acres of wet habitat would be shallow water habitat, ranging from 0 to 3 feet in depth. Similar to the wet habitat, these areas would be surrounded by berms, with small roads and paths providing access for visitors. The water quality and level would be managed, though seasonal flooding would be anticipated. Overall, the layout of these ponds is assumed to be better than the current lake for birdwatching, as there would be easier access across the berms, and the managed habit would be expected to attract a greater concentration of birds than the existing lake.

Besides the installation of the wet habitat, additional steps would be taken to mitigate negative impacts to air quality from the exposure of previously submerged lakebed, known as playa, as the lakebed shrinks. These steps will be important, as

it is assumed that approximately 20,000 acres of exposed lakebed would extend beyond the wet habitat by 2028.

It is assumed that air quality mitigation steps will include a mix of both water-dependent and waterless dust suppression projects. It is anticipated that dust mitigation steps, together with the wet habitat, would help mitigate dust storms and bad smell events, improving air quality relative to a no-action scenario. However, it is also assumed that some dust storms and bad smell events would continue. For example, as the center of the lake shrinks, it is possible that the area may experience more bad smell events of lesser magnitude.

Overall, for the purpose of this analysis, it is assumed Phase 1 (10-Year Plan) would:

- create approximately 30,000 acres of wet habitat, and that these areas would be stable, vibrant and diverse;
- offer a range of natural habitats, attracting and sustaining a diverse base of wildlife, including birds and fish;
- offer areas for outdoor recreation, including readily accessible areas for fishing, limited boating, wildlife observation and education, and other outdoor recreation; and,
- partly mitigate dust storms and bad smell events relative to a no-action scenario.

To the extent Phase 1 results in a situation that differs from these assumptions, we would anticipate different magnitudes of impacts than those we have estimated.

3.2 STEP TWO: EXPECTED BENEFITS

Phase 1 has the potential to yield substantial positive benefits. In broad terms, it represents an approach to: 1) help transition a valuable ecosystem from a situation of expected collapse to one that is more stable, helping support imperilled wildlife; 2) help partly mitigate air quality challenges expected as the lake recedes; and 3) help establish a foundation for investment in the region, demonstrating that successful efforts are underway to further address challenges over the long-term.

In quantifying the expected benefits over the coming decade, we have focused in particular on the potential for Phase 1 to help negative impacts to the regional tourism economy that could occur in a no-action scenario. This is because there is a significant risk that in a no-action scenario, a combination of increasing frequency and intensity of “bad smell” events, as well as dust storms and other air quality health impacts, could negatively impact traveller perceptions of Greater Palm Springs as a destination. Associations between the Greater Palm Springs region and such “bad smell” events has the potential to weigh negatively on tourism demand in the area, even if certain events are not accurately portrayed, or are not directly related to the decline of the Salton Sea. This is because perceptions can dramatically affect leisure traveller behavior, which is discretionary and which can easily be redirected to alternative destinations.

Indeed, in our previous research, we looked at how the slightest misperception of risk or the effects of a disaster can fundamentally shift travel patterns (Tourism Economics, 2014, December). We reviewed a set of case studies, including events such as harmful algal blooms, red tides, and natural and man-made disasters and found that their impact can be dramatic and endure beyond the individual event due to brand damage and traveller misperceptions. Based on these case studies, we had previously estimated potential negative impacts to the Greater Palm Springs region of continued decay of the Salton Sea could range from 5% to 25% of total visitor spending. We believe such downside risks persist in a no-action scenario.

It is difficult to determine in advance just how much impact the 10-Year Plan will have in mitigating these risks. Its effectiveness will depend not only on its success mitigating air quality issues, but also its impact on the perceptions of potential travellers. We have assumed that Phase 1 will not only have a positive impact on air quality, which itself will be a benefit to traveller perceptions, but that its implementation will be an important factor in maintaining positive perceptions of potential travellers. With its implementation, it will be evident that the region is taking steps to manage and transition the Salton Sea. In contrast, in a no-action scenario, we would anticipate traveller perceptions to more readily turn negative, seeing the Salton Sea as a region in free fall, with unknown risks.

Based on these considerations, we have assumed Phase 1 will, at a minimum, mitigate the loss of 10% of total visitor spending relative to the no-action scenario. Based on our previous research, visitor spending in Greater Palm Springs totalled approximately $5.0 billion in 2015, supporting almost 50,000 local area jobs, including more than 38,000 jobs directly supported by tourism (Tourism Economics, 2015). We have shown the implied loss of 5%, 10%, and 25% of this economic impact in Fig. 1. The 10% column is highlighted as the avoided loss we are conservatively associating with Phase 1. By mitigating the loss of 10% of visitor spending in Greater Palm Springs relative to the no-action scenario, the implementation of Phase 1 is expected to annually preserve approximately:

- $496 million of annual visitor spending (direct output);
- 4,957 total jobs, which includes 3,830 direct jobs (e.g. at the businesses where visitor spending occurs), and 1,127 indirect and induced jobs (e.g. supply chain effects, as well as businesses that benefit from spending by those with jobs directly supported by the tourism sector);
- $150 million in total labor income of Greater Palm Springs employees; and,
- $95 million of tax revenues, including $54 million of state and local taxes.

These “avoided costs” represent an additional “benefit” of a revitalized Salton Sea. Additional background on the economic impact analysis is provided in the accompanying section titled “Economic Impact Analysis”.

We anticipate the mitigating effects of Phase 1 will gradually ramp-up as the plan is implemented. This ramp-up is discussed further in Step Four.

Fig. 1. Economic impacts, annualized

Impacts, in millions of 2016 dollars

	Historical	Avoided loss (annualized level)			
	Economic impact of tourism in Greater Palm Springs (2015)	5% of annual visitor spending	**10% of annual visitor spending**	25% of annual visitor spending	**Revitalization spending (annualized)**
Visitor spending	**$4,956**	$248	**$496**	$743	
Total impacts					
Output	$6,410	$321	**$641**	$962	**$55**
Labor income	$1,501	$75	**$150**	$225	**$19**
Employment	49,572	2,479	**4,957**	7,436	**352**
Fiscal	$952	$48	**$95**	$143	**$6**
Federal taxes	$413	$21	**$41**	$62	**$4**
State and local taxes	$538	$27	**$54**	$81	**$2**
Direct impacts					
Output	$4,956	$248	**$496**	$743	**$40**
Labor income	$1,044	$52	**$104**	$157	**$14**
Employment	38,304	1,915	**3,830**	5,746	**240**
Indirect and induced impacts					
Output	$1,454	$73	**$145**	$218	**$15**
Labor income	$457	$23	**$46**	$69	**$5**
Employment	11,268	563	**1,127**	1,690	**112**

Source: Tourism Economics

ECONOMIC IMPACT ANALYSIS

Direct impacts are anticipated to generate broader economic impacts through downstream demand for goods and services and as employees spend their wages in the regional economy. The three main components of overall economic impact are described as follows:

- **Direct impacts** include direct visitor spending and construction spending.
- **Indirect impacts** include downstream supplier industry impacts. For example, businesses serving visitors typically purchase a range of third-party goods and services, including for example, food, beverages, and utilities; maintenance, repair or cleaning services; and legal, marketing and other professional and financial services.
- **Induced impacts** arise as employees spend their wages in the local economy. For example, restaurant employees spend money on rent, transportation, food and beverage, and entertainment.

To conduct the economic impact analysis, we used a customized model based on the IMPLAN modelling system, a well-respected economic impact analysis tool, to quantify key relationships in the local economy. The IMPLAN model traces the flow of direct expenditures through the local economy and the effects on employment, wages, and taxes. IMPLAN also quantifies the indirect (supplier) and induced (income) impacts.

For example, when a visitor purchases a meal at a local restaurant, a portion of the sale supports wages of restaurant employees, while a portion of the sale typically consists of locally produced food and beverages. The IMPLAN model captures these types of relationships based on a structured analysis of economic statistics. Additionally, the IMPLAN model reflects the typical levels of federal, state and local taxes generated by specific types of economic activity.

Employment impacts are measured as the number of full- and part-time jobs. Labor income includes wages, salaries and proprietors income.

3.1 STEP THREE: CONSTRUCTION COSTS

We assumed initial design and construction costs for Phase 1 (10-Year Plan) of $383.0 million (California Natural Resources Agency, 2017, March).

Fig. 2. Construction costs

In millions of 2016 dollars

Description	Total cost
Design and construction, 10-year period	$383

Source: Salton Sea Authority; Tourism Economics

We show economic impacts associated with annualized construction spending of $40 million in Fig. 1.

3.2 STEP FOUR: RAMP-UP OVER TIME

In the fourth step, we estimated how the impacts and revitalization spending may ramp-up over time. We considered an 11-year period from 2018 to 2028. These calculations are based on the following high-level, representative assumptions (Fig. 3 and Fig. 4):

- Construction begins in 2018 with approximately $10 million of expenditures, ramping up to construction expenditures of approximately $40 million a year by 2023.
- Visitor spending benefits in the form of avoided losses are assumed to begin to accrue in 2018, as the implementation of Phase 1 gains visibility, ramping up from 50% of the full annualized level in 2018 to eventually reach 100% of the full annualized level in 2021.

Next, we converted these estimates into present values by applying a real discount rate of 5.0%. This adjustment reflects the recognition that future benefits and costs are not worth as much as those received today. We selected the discount rate based on consideration of federal government guidelines, which advise for the use of a 7.0% nominal discount rate on benefit-cost analysis of public investment (Office of Management and Budget, Executive Office of the President of the United States, 1992), and the 6.0% real discount rate used by the California Department of Water Resources (California Department of Water Resources, 2008). Since our estimates were prepared in real dollars, we were comfortable with a rate two percentage points below the nominal federal assumption. Our calculation of the discounted present values is shown in Fig. 5 and Fig. 6.

Fig. 3. Economic impacts, avoided loss: Ramp-up

In millions of 2016 dollars

			Economic impacts, total (avoided loss)					
	Ramp-up percent-age	**Avoided loss of visitor spending**	Output	Labor income	Employ-ment (job years)	Fiscal	Federal taxes	State and local taxes
Annualized level		$496	$641	$150	4,957	$95	$41	$54
Period								
2017								
2018	50%	248	321	75	2,479	48	21	27
2019	70%	347	449	105	3,470	67	29	38
2020	90%	446	577	135	4,461	86	37	48
2021	100%	496	641	150	4,957	95	41	54
2022	100%	496	641	150	4,957	95	41	54
2023	100%	496	641	150	4,957	95	41	54
2024	100%	496	641	150	4,957	95	41	54
2025	100%	496	641	150	4,957	95	41	54
2026	100%	496	641	150	4,957	95	41	54
2027	100%	496	641	150	4,957	95	41	54
2028	100%	496	641	150	4,957	95	41	54

Source: Tourism Economics

Fig. 4. Revitalization spending: Ramp-up

In millions of 2016 dollars

		Revitalization spending	**Economic impacts, total** (revitalization spending)					
	Revitalization spending pace	Amount	Output	Labor income	Employment (job years)	Fiscal	Federal taxes	State and local taxes
Annualized level		$40	$55	$19	352	$6	$4	$2
Period								
2017								
2018	25%	$10	$14	$5	88	$1	$1	$0
2019	70%	28	39	13	247	4	3	1
2020	80%	32	44	15	282	5	3	1
2021	90%	36	50	17	317	5	4	2
2022	95%	38	53	18	335	5	4	2
2023	100%	40	55	19	352	6	4	2
2024	100%	40	55	19	352	6	4	2
2025	100%	40	55	19	352	6	4	2
2026	100%	40	55	19	352	6	4	2
2027	100%	40	55	19	352	6	4	2
2028	98%	39	54	18	343	6	4	2

Source: Tourism Economics

Fig. 5. Economic impacts, avoided losses: Present value

In millions of 2016 dollars, discounted to present value

				Economic impacts, total (avoided loss)					
		Discount factor	**Avoided loss of visitor spending**	Output	Labor income	Employment (job years)	Fiscal	Federal taxes	State and local taxes
Annualized level		5.0%	$496	$641	$150	4,957	$95	$41	$54
Period									
2017	0	1.0000							
2018	1	0.9524	$236	$305	$71	2,361	$45	$20	$26
2019	2	0.9070	315	407	95	3,147	60	26	34
2020	3	0.8638	385	498	117	3,854	74	32	42
2021	4	0.8227	408	527	123	4,078	78	34	44
2022	5	0.7835	388	502	118	3,884	75	32	42
2023	6	0.7462	370	478	112	3,699	71	31	40
2024	7	0.7107	352	456	107	3,523	68	29	38
2025	8	0.6768	335	434	102	3,355	64	28	36
2026	9	0.6446	319	413	97	3,195	61	27	35
2027	10	0.6139	304	394	92	3,043	58	25	33
2028	11	0.5847	290	375	88	2,898	56	24	31
Present value sum			**$3,703**	**$4,789**	**$1,121**	**37,039**	**$711**	**$309**	**$402**

Note: Discount factor assumes 5% real discount rate.
Source: Tourism Economics

Fig. 6. Revitalization spending: Present value

In millions of 2016 dollars, discounted to present value

			Revitalization spending	**Economic impacts, total** (revitalization spending)					
	Years	Discount factor	Amount	Output	Labor income	Employment (job years)	Fiscal	Federal taxes	State and local taxes
Annualized level		5.0%	$40	$55	$19	352	$6	$4	$2
Period									
2017	0	1.0000							
2018	1	0.9524	$10	$13	$4	84	$1	$1	$0
2019	2	0.9070	25	35	12	224	4	2	1
2020	3	0.8638	28	38	13	243	4	3	1
2021	4	0.8227	30	41	14	261	4	3	1
2022	5	0.7835	30	41	14	262	4	3	1
2023	6	0.7462	30	41	14	263	4	3	1
2024	7	0.7107	28	39	13	250	4	3	1
2025	8	0.6768	27	37	13	238	4	3	1
2026	9	0.6446	26	36	12	227	4	3	1
2027	10	0.6139	25	34	12	216	4	2	1
2028	11	0.5847	23	32	11	201	3	2	1
	Present value sum		**$280**	**$388**	**$131**	**2,469**	**$40**	**$27**	**$13**

Note: Discount factor assumes 5% real discount rate.
Source: Tourism Economics

3.1 STEP FIVE: PRESENT VALUE SUMMARY TABLE

We next compiled the present value of the economic impacts (Fig. 7) for Phase 1. Based on this analysis, we estimate a revitalized Salton Sea would generate the following present value benefits and costs over an 11-year period relative to a no-action scenario:

- **Benefits**
  - Avoid a loss of $3.7 billion of visitor spending by mitigating negative perceptions of potential travelers through improved air quality and visible evidence of a plan being implemented to manage and transition the Salton Sea.
  - Gain economic impacts within Greater Palm Springs as a result of the avoided loss of visitor spending, plus impacts of revitalization spending, totaling:
    - $5.2 billion of output (business sales)
    - $1.3 billion of labor income, including wages, salaries and benefits
    - Almost 40,000 job years (one job for one year is equivelent to one job year)
    - $752 million of tax revenues, including $415 million of state and local taxes
- **Costs**
  - $280 million of assumed design and construction costs.

Fig. 7. Cost-benefit summary: Present value

Impacts representing avoided losses and revitalization spending, in millions of 2016 dollars

	Present value (11 years, 2018 to 2028)		
	Avoided loss of visitor spending	Revitalization spending	Total
Visitor spending	$3,703	NA	**$3,703**
Total economic impacts			
Output	$4,789	$388	**$5,177**
Labor income	$1,121	$131	**$1,253**
Employment (job years)	37,039	2,469	**39,508**
Fiscal	$711	$40	**$752**
Federal taxes	$309	$27	**$336**
State and local taxes	$402	$13	**$415**
Assumed cost of 10-Year Plan			**($280)**

Source: Tourism Economics

4. PHASE 2 ANALYSIS

Following the implementation of Phase 1 (10-Year Plan), the region would be in the position to continue with the revitalization of the Salton Sea by constructing additional habitat areas. To give a view of the potential long-term impacts of continuing with the construction, we have developed a Phase 2 analysis. The benefits and costs in this analysis are additive to the Phase 1 analysis in the previous section, meaning that they build on, rather than overlap with, the benefits and costs of Phase 1.

We conducted our analysis of Phase 2 potential benefits and costs in six steps.

- **Step One:** We prepared a hypothetical description of a revitalized Salton Sea.
- **Step Two:** We identified the most important specific economic benefits that we anticipated would result from a revitalization of the Salton Sea. We then estimated the ongoing annual value of these benefits in a future, stabilized year, i.e. once a revitalized Salton Sea has been in place for a sustained period of time.
- **Step Three:** We estimated economic impacts, e.g. employment and taxes, corresponding to certain economic benefits. Also in this stage, we estimated the economic impacts associated with a hypothetical level of annual revitalization spending (e.g. construction of lake levees and soil treatments).
- **Step Four:** We assumed total initial design and construction costs, and ongoing monitoring and maintenance costs.
- **Step Five:** We estimated how the benefits, impacts, and revitalization spending could potentially ramp-up over time. In this analysis, we present a 25-year overview, as well as a summary calculation of the present value.
- **Step Six:** We compiled the estimates in a present value summary table.

4.1 STEP ONE: ASSUMED CHARACTERISTICS OF A REVITALIZED SALTON SEA

For the purpose of this analysis, we assumed as a result of Phase 2, the Salton Sea would:

- be revitalized as a stable, vibrant and diverse lake and wetlands;
- offer a range of natural habitats, attracting and sustaining a diverse base of wildlife, including birds and fish;
- offer extensive areas for outdoor recreation, including substantial areas for boating, swimming, fishing, hiking, bicycling, and wildlife observation and education;
- offer proximate areas for development of visitor facilities, including marinas, boat launches, campgrounds, RV facilities, restaurants, resorts,

hotels, other accommodations, educational and interpretive facilities, and other visitor attractions; and,

- be stable, in the sense that the water level, quality and related aspects would be controlled and supportive of wildlife, but also stable from a financial and regulatory perspective, with sufficient clarity on financial resources, responsibility, and commitments to provide a predictable setting for real estate development.

Overall, for the purpose of describing the scope of the lake in Phase 2, we characterized it as offering approximately 23,000 acres of lake surface area, such as could be provided by 36 square miles of lake area as described in the Perimeter Lake Concept presented in the May 2016 Salton Sea Funding and Feasibility Action Plan.[3] This Perimeter Lake Concept envisions a perimeter lake separated into water cells, with areas up to 25 feet deep suitable for boating, as well as 130 miles of shallow habitat along the existing shoreline and levees. Additionally, we assumed 18,000 square acres of habitat areas, resulting in a total lake and wetlands area of 41,000 square acres. We understand that such total habitat areas, as well as a perimeter lake, could be achieved by continuing with construction beyond Phase 1 (10-Year Plan).

To the extent the actual revitalization of Salton Sea results in a situation that differs from these assumptions, we would anticipate different magnitudes of impacts than those we have estimated.

4.2 STEP TWO: EXPECTED SPECIFIC ECONOMIC BENEFITS

We anticipate five specific economic benefits as a result of the revitalized Salton Sea:

- **Visitor spending impact:** Additional visitor spending in Greater Palm Springs as a result of visitors attracted by the Salton Sea, as well as visitors to the area that spend more time and/or money because the Salton Sea area that would not be available otherwise.
- **Real estate development impact:** Additional residential and commercial development in the proximate area.
- **Property tax impact:** Local property tax revenues generated by the real estate development impact.
- **Property value impact:** Property value appreciation in Greater Palm Springs.
- **Wetlands ecosystem benefits:** The monetary value of ecosystem benefits, including recreation experiences; habitat services, such as genetic diversity; and regulating services, such as climate regulation.

These are benefits that would not occur in a no-action scenario in which the Salton Sea is not revitalized. Unlike our analysis of Phase 1, which focused on avoided

[3] Within the Salton Sea Funding and Feasibility Action Plan, Benchmark 4: Conceptual Plans and Cost Estimates, Volume 2: Smaller Sea Options – Perimeter Lake Concept. (Salton Sea Authority, 2016)

losses that could occur in the no-action scenario, this Phase 2 analysis is focused on incremental benefits.

We estimated the stabilized, annual value of the five specific economic benefits to be $1.1 million (Fig. 8). Further discussion on each estimate is provided in the following subsections.

Fig. 8. Specific economic benefits, annualized

In millions of 2016 dollars

Economic benefit	Description	Estimate (annualized)
Visitor spending impact	Additional visitor spending in Greater Palm Springs	$519
Real estate development impact	Value of new development proximate to Salton Sea	204
Property tax impact	Property taxes on new real estate development	12
Property value impact	Property value appreciation in Greater Palm Springs	37
Wetlands ecosystem benefits	Monetary value of ecosystem benefits broadly	283
	Total value of specific economic benefits	**$1,056**

Source: Tourism Economics

4.2.1 Visitor spending impact

We anticipate a revitalized Salton Sea would generate additional visitor spending in Greater Palm Springs as a result of visitors attracted by the Salton Sea, as well as visitors to the area that would spend more time and/or money because the Salton Sea area offers additional activities that would not be available otherwise.

To estimate the potential level of such visitor spending, we considered what such a lake and wetlands area could have generated in 2016, if it had existed as a well developed, stable destination. As benchmarks, we researched visitor spending estimates for a range of comparable US lakes (Fig. 9). The visitor spending estimates for the various lakes are based on a range of sources, including visitor spending in contigous counties, as well as estimates prepared by the Army Corps of Engineers, and state and national park authorities. Further detail on the spending sources is provided in the Appendix. In the case of Lake Tahoe, which is a relevant comparision in several regards, the spending estimate is based on visitor spending in contiguous counties, adjusted downward by 50% to conservatively remove ski activity.

Overall, the average shows annual visitor spending per lake of $283 million, equivalent to $7,600 per acre of surface area. Several large western lakes generate annual visitor spending of $400 million or more, such as Lake Tahoe, Lake Havasu, Lake Chelan and Shasta Lake.

Fig. 9. Visitor spending at comparable lakes

Lake	State	Surface area (in acres)	Shoreline (in miles)	Population (within 150 miles, in millions)	Ratio of population to average	Visitor spending (in millions)	Visitor spending per acre of surface area (in thousands)	Visitor spending per mile of shoreline (in thousands)
Lake Tahoe	CA-NV	122,240	71	8.8	113%	$1,119	$9.2	$15,754
Lake George	NY	28,800	176	14.8	189%	585	20.3	3,326
Lake Havasu	AZ-CA	19,300	450	4.7	60%	484	25.1	1,076
Lake Chelan	WA	33,344	109	7.8	100%	478	14.3	4,373
Shasta Lake	CA	30,000	365	2.1	27%	394	13.1	1,079
Lake Mead and Lake Mohave	AZ-NV	184,580	996	1.9	25%	313	1.7	314
Lake Champlain	NY-VT	328,960	587	10.2	131%	300	0.9	511
Lake of the Ozarks	MO	54,000	1,150	6.8	87%	234	4.3	204
Lake Texoma	OK-TX	88,000	580	9.1	116%	169	1.9	292
Lake Strom Thurmond	GA-SC	72,739	1,060	12.5	160%	166	2.3	157
Clear Lake	CA	43,520	100	11.7	150%	156	3.6	1,560
Crater Lake	OR	13,184	22	1.7	22%	65	5.0	2,995
Pine Flat Lake	CA	5,970	67	6.0	77%	19	3.2	281
Lake Sonoma	CA	2,700	53	11.4	146%	16	5.8	297
Lake Kaweah	CA	1,945	22	5.4	69%	12	6.1	536
Lake Mendocino	CA	1,922	15	10.1	130%	11	5.7	726
Average		**64,450**	**364**	**7.8**	**100%**	**$283**	**$7.6**	**$2,092**
Revitalized Salton Sea	CA	23,000	NA	20.6	263%			

Note: NA indicates not available

Source: Various sources (see Appendix); Tourism Economics

In developing an estimate for Salton Sea, we considered the comparable lakes as well as factors specific to the Salton Sea:

- Positives:
  - proximity of the Salton Sea to Southern California's large population base (e.g. approximately 20.6 million people within 150 miles, which is 263% of the average population of 7.8 million proximate to the comparable lakes)
  - warm winter climate
  - presence of extensive visitor infrastructure in Greater Palm Springs, as well as awareness and familiarity with the area as a leisure destination
- Negatives:
  - potentially less desirable swimming and water activities due to high salinity
  - potentially "non-natural" appearance of various levees and water management infrastructure

Based on this analysis, we estimated potential revitalized Salton Sea visitor spending in a hypothetical 2016 market of approximately $400 million (Fig. 10). This is equivalent to approximately $17,400 per surface area acre, which is above the average of the comparable lakes overall, but is within the range reached by several of the large western lakes.

We then analyzed Oxford Economics' projections of GDP growth in the major Southern California metro areas. We estimated that average real GDP in these metro areas over the 2021 to 2040 period will be130% greater than in 2016. With greater GDP and income in Southern California during such a future period, we would anticipate increased spending potential. We therefore adjusted our visitor spending estimate by multiplying by 130%, resulting in an estimate of $519 million of annual visitor spending at the revitalized Salton Sea, in 2016 dollars.

Fig. 10. Visitor spending estimates

In 2016 dollars

Description	Estimate
Estimated annual visitor spending impact, assuming 2016 market (in millions)	$400
Surface area acres	23,000
Implied average per acre (in thousands)	$17.4
Ratio of S. California MSA GDP during future period (2021 to 2040) relative to 2016	130%
Estimated annual visitor spending impact, assuming future market	**$519**

Source: Tourism Economics

As a reasonability check, we performed a penetration and growth analysis. In this analysis, we researched several aggregate measures of visitor spending (Fig. 11). We then estimated the potential shares of such spending we anticipate a revitalized Salton Sea could have attracted, if it existed as a stable, developed attraction in 2016. As part of this analysis, we estimated the spending that it would

have generated if it attracted 5% of the outdoor recreation spending in Southern California that occurred on public lands; 15% of the fishing and wildlife expenditures in Southern California; or 1% of total visitor spending in Southern California. Additionally, we estimated the spending level that a revitalized Salton Sea could have generated if it increased visitor spending in Greater Palm Springs by 15%. We then averaged each of these estimates, resulting in an overall average of $379 million. This was reasonably close to our estimate of $400 million based on the analysis of comparable lakes (reflecting 2016 market conditions), and we continued with the estimate for $519 million (reflecting future market expectations) for the remainder of this analysis.

Fig. 11. Penetration and growth analysis

In millions of dollars

Spending category	Estimate (nominal dollars)	Year of estimate	Inflation adjust-ment	Estimate (2016 dollars)	Penetration (growth) estimate	Implied spending level
Outdoor recreation spending in Southern California, on public lands	$5,065	2008	1.11	$5,604	5%	$280
Fishing and wildlife watching expenditures in Southern California	756	2011	1.06	803	15%	120
Visitor (destination) spending, Southern California	36,542	2016	1.00	36,542	1%	365
Visitor spending, Greater Palm Springs	4,956	2015	1.01	5,010	15%	751
					Average	**$379**

Source: Dean Runyan Associates; BBC Research and Consulting, U.S. Department of the Interior; Tourism Economics

4.2.1 Real estate development impact

We anticipate a revitalized Salton Sea would support increased residential and commercial real estate development in the proximate areas. Some of this development would be supported by the growth of travel and tourism infrastructure and businesses as the lake and wetlands attract additional visitors. Other development would be supported by the increased desirability of the area as a place to live and work.

To quantify potential real estate development, we considered the analysis presented in the Salton Sea Funding and Feasibility Action Plan, Benchmark 5: Infrastructure Financing Feasibility Analysis. (Salton Sea Authority, 2016) These estimates provided a reasonable starting point, and key aspects are summarized in Fig. 12. The result is annual residential and commercial development totalling $425 million. We adjusted this amount by multiplying by 80% to exclude land value, as we wanted to focus on construction and related spending for the purpose of the economic impact analysis. Because the initial assumptions represented an annual pace of development over the period from 2025 to 2075, and because we are focused on a shorter term time horizon, we then further adjusted by multiplying by 60%. This reflects our expectation that even with a revitalized Salton Sea, it may take several decades for development to fully ramp-up. As a result of these adjustments, we estimated $204 million of annual real estate development.

Fig. 12. Real estate development and property tax impact

In millions of constant dollars

	Riverside County	Imperial County	**Total**
Real estate development value			
Residential home units per year (2025 to 2075)	1,035	440	1,475
Residential home price assumption (per unit)	$270,000	$224,163	$256,327
Value of residential development (in millions)	$279.5	$98.6	$378.1
Nonresidential development sq. ft. per year (2025 to 2075)	227,000	53,200	280,200
Nonresidential price assumption (per sq. ft.)	$168	$170	$168
Value of nonresidential development (in millions)	$38.1	$9.0	$47.2
Combined development value (in millions)	$317.6	$107.7	$425.3
Adjustment factor to exclude land value (multiplicative)			80%
Adjustment factor to reflect pace of development in initial years (multiplicative)			60%
Estimated annual real estate development value (in millions)			**$204**
Property tax impact			
Cumulative tax collections (2025 to 2045, in millions)	$205	$122	$327.6
Annualized (divided by 20 years)	$9.77	$5.83	$15.6
Adjustment factor to reflect pace of development in initial years (multiplicative)			80%
Estimated annual property tax impact due to new real estate development			**$12**

Source: Salton Sea Authority; Tourism Economics

4.2.1 Property tax impact

We anticipate that additional real estate development as a result of a revitalized Salton Sea will support increased local property taxes. To include an estimate of property tax impacts, we followed a similar approach as the real estate development impact. We started with the cumulative property taxes estimated in the Salton Sea Funding and Feasibility Action Plan, Benchmark 5: Infrastructure Financing Feasibility Analysis. (Salton Sea Authority, 2016) We converted this cumulative total to an annual amount by dividing by 21 years. We then multiplied by 80% to adjust to the early period that is the focus of our analysis. This assumption is higher than the assumption for the actual construction activity because it is assumed broader property values and tax revenues will improve somewhat before construction activity is fully ramped up. Our resulting estimate was $12 million of additional property tax revenue.

4.2.2 Property value impact

We anticipate a revitalized Salton Sea will support an increase in property values in Greater Palm Springs. By having a substantial lake and wetlands in close proximity, the entire region will be a slightly more attractive place to live (e.g. greater opportunities for local residents to participate in nearby outdoor recreation).

To gain a sense of the possible range of impacts, we considered research summarized in an analysis of the potential benefits of protecting and restoring the Great Lakes. (Austin, Anderson, Courant, & Litan, 2007) This research referenced studies that showed the positive impacts of clean-up activities on residential real estate values, and arrived at a conservative, order-of-magnitude estimate of positive property value impacts of protecting and restoring the Great Lakes of 10% for residential properties in census tracts adjacent to the Great Lakes, and 1% to 2% for other residential properties in metro areas contiguous to the Great Lakes.

We estimated the recent value of owner occupied residential units in 10 selected Census county subdivisions in the Greater Palm Springs area at $36.5 billion. We assumed a 2% property value appreciation as a result of a revitalized Salton Sea, resulting in $730 million of property value appreciation. Because we expect this impact would accrue gradually over 20 years, we converted it to an annualized estimate of approximately $37 million.

Fig. 13. Property value impact

In millions of 2016 dollars

Description	Estimate
Estimated residential property value in selected area	$36,516
Potential impact to existing residential property values	2%
Implied impact to existing residential property values	$730
Annualized property value impact (impact spread evenly over 20 years)	**$37**

Source: Census Bureau; Tourism Economics

4.2.3 Wetlands ecosystem benefits

It is widely recognized that wetlands provide valuable ecological services, such as habitat for species, protection against floods, water purification, amenities and recreational opportunities. These ecosystem services typically have no market value, so economists and scientists have developed a variety of approaches to assign monetary values. These values, which depend on the characteristics of the wetlands and the surrounding area, are useful in several ways, such as considering how to allocate resources between competing uses, determine compensation to be paid for the loss of ecosystem services, and raise awareness and convey the importance of ecosystems to policy makers.

For the purpose of this analysis, we have developed a high-level approximation of the value of ecosystem benefits that could be generated by a revitalized Salton Sea. To do this, we relied on an academic metastudy of wetlands valuations that summarized the typical value estimates per hectare for a variety of wetland types. (De Groot, R., et al., 2012) This study showed an average annual value per hectare of inland wetlands of $29,285, based on our conversion to 2016 dollars, and value per hectare of lakes at $4,866 (Fig. 14). Given the uncertain characteristics of the revitalized Salton Sea, which is expected to include extensive

shallow habitat areas as well as deeper water lake areas, we averaged the two estimates.

Fig. 14. Benchmark value of ecosystem services

Annual value, in 2016 dollars, per hectare

Service	Examples	Inland wetlands	Lake
Provisioning services	Food, water, raw materials, ornamental resources	$1,892	$2,182
Regulating services	Climate regulation, disturbance moderation, waste treatment, nutrient cycling	19,800	213
Habitat services	Nursery service, genetic diversity	2,799	NA
Cultural services	Recreation, inspiration	4,793	2,470
Total		**$29,285**	**$4,866**
	Combined average per hectare	**$17,075**	

Note: NA indicates estimate not available.

Source: De Groot, Rudolf, et al. (2012); Tourism Economics

We calculated a 41,000 square acre lake and wetlands area[4], converted it to hectares, and multiplied by $17,075, to estimate the annual value of ecosystem services at $283 million (Fig. 15).[5]

Fig. 15. Value of ecosystem services

In 2016 dollars

Description	Estimate
Perimeter lake, SSREI habitat area, SCH full build out	41,000
Acres per hectare	2.471
Assumed lake surface area in hectares	16,592
Estimated annual value of ecosystem services per hectare	$17,075
Estimated annual value of ecosystem services (in millions)	**$283**

Source: De Groot, Rudolf, et al. (2012); Tourism Economics

After completing this estimate, we obtained a copy of an earlier analysis of the potential non-market benefits provided by the Salton Sea (K2 Economics, 2007). Following a broadly similar, though more in-depth approach, of referencing estimated values from a variety of ecosystem and species valuation studies, this analysis estimated the non-market benefits provided to the residents of California by a restored and preserved Salton Sea would be in the range of $1-$5 billion

[4] The 41,000 acres is calculated as: perimeter lake 23,000, plus Salton Sea Restoration and Renewable Energy (SSRREI) habitat area 15,000, plus Species Conservation Habitat (SCH) area 3,000.

[5] Within table on p. 39 of the Salton Sea Funding and Feasibility Action Plan, Benchmark 4: Conceptual Plans and Cost Estimates, Volume 2: Smaller Sea Options – Perimeter Lake Concept. (Salton Sea Authority, 2016)

annually (in 2006 dollars).[6] This indicates that our estimated value of ecosystem services is quite conservative.

4.3 STEP THREE: ECONOMIC IMPACTS

In the previous section, we estimated the value of specific economic benefits expected to result from a revitalized Salton Sea. We expressed each of these benefits as a monetary value, such as the amount of visitor spending. In this section, we present the estimated annualized "economic impacts" – in terms of business sales jobs, wages and salaries, and tax impacts – corresponding to three of the specific economic benefits: visitor spending, real estate development, and the property tax impact. We did not include the property value impact as it represents an appreciation of property value that does not directly result in a change in employment or wages and salaries. Similarly, we did not include the value of ecosystem benefits, as it also does not directly reflect a change in employment or wages and salaries. Additionally, we calculated the annualized economic impacts supported by $350 million of revitalization spending, such as costs of design, planning, and construction.

These are annualized estimates. In a subsequent step of the analysis, focused on the ramp-up of impacts, we address the topic of timing.

Our estimates of the economic impacts associated with visitor spending, real estate development, property tax impact, and revitalization spending are shown in Fig. 16. In the case of visitor spending, real estate development, and revitalization spending, the values shown are the direct output, or business sales, impact, and are the same as the specific economic benefit estimated above (i.e. $519 million, $204 million, and $350 million, respectively). In the case of the property tax impact, the value shown is the total impact to state and local tax revenue.

[6] This analysis did not make a specific assumption on the size of the restored Salton Sea, but instead assumed "the provision of a substitute habitat that at a minimum maintains the services and diversity that have been provided historically", and compared this case to a no-action alternative.

Fig. 16. Economic impacts, annualized

Impacts supported by selected benefits, in millions of 2016 dollars

	Ongoing benefits (annualized level)				
	Visitor spending	Real estate develop-ment	Property tax impact	**Total**	**Revitalization spending** (annualized)
Total impacts					
Output	$672	$271		$942	$484
Labor income	$157	$76		$233	$164
Employment	4,549	1,463		6,012	3,081
Fiscal	$100	$30	$12	$142	$51
Federal taxes	$43	$20		$63	$34
State and local taxes	$56	$10	$12	$79	$16
Direct impacts					
Output	$519	$204		$724	$350
Labor income	$109	$54		$163	$121
Employment	3,515	972		4,488	2,101
Indirect and induced impacts					
Output	$152	$66		$219	$134
Labor income	$48	$22		$70	$43
Employment	1,034	491		1,525	980

Source: Tourism Economics

For the purpose of this analysis, we analyzed impacts to the Greater Palm Springs region defined as the set of relevant zip codes. Additional positive impacts would be expected to accrue to California more broadly.

As an example, visitor spending of $519 million annually is anticipated to support 3,515 direct jobs, with $109 million of direct wages, salaries and other income. These direct impacts would support an additional 1,034 indirect and induced jobs. In total, visitor spending would support $100 million of annual tax revenue, including $56 million of state and local taxes. In total, ongoing benefits would support 6,012 jobs in the Greater Palm Springs region, and $74 million of state and local taxes.

4.4 STEP FOUR: CONSTRUCTION COSTS

We assumed initial design and construction costs for the revitalized Salton Sea in Phase 2 of $1.4 billion. This is based on the Perimeter Lake concept presented in the May 2016 Salton Sea Funding and Feasibility Action Plan, minus the assumed cost of the 10-Year Plan of $383 million.[7] Additionally, as a high level estimate, we

[7] Within the Salton Sea Funding and Feasibility Action Plan, Benchmark 4: Conceptual Plans and Cost Estimates, Volume 2: Smaller Sea Options – Perimeter Lake Concept. (Salton Sea Authority, 2016)

assumed $50 million of ongoing monitoring and maintenance costs, representing slightly less than 3% of the initial development cost.

Fig. 17. Construction and maintenance costs

In millions of 2016 dollars

Description	Total cost	Annual cost
Design and construction, five year period	$1,430	
Ongoing monitoring and maintenance		$50

Source: Salton Sea Authority; Tourism Economics

We show economic impacts associated with $350 million of annualized construction spending in Fig. 16.

4.5 STEP FIVE: RAMP-UP OVER TIME

In the fifth step, we estimated how the benefits, impacts, and revitalization spending could potentially ramp-up over time. We considered a 25-year period from 2018 to 2042. These calculations are based on the following high level, representative assumptions (Fig. 18 and Fig. 19):

- Phase 1 (10-Year Plan) is implemented from 2018 to 2028.
- Construction expenditures then ramp up to a range of $140 million to $350 million a year during a five-year period from 2029 to 2033.
- Maintenance, capital expenditures and monitoring costs continue at $50 million a year from 2035 to 2042.
- Specific economic benefits are assumed to begin to accrue in 2026, ramping up from 10% of the full annualized level in 2026 to eventually reach 100% of the full annualized level in 2035. This ramp-up is expected to occur as the 10-Year Plan is completed, and as there is visible momentum and public commitment to continue with the project, even in advance of additional construction spending in 2029.

Next, we converted these estimates into present values by applying a real discount rate of 5.0%, the same rate as applied in the analysis of Phase 1. Our calculation of the discounted present values is shown in Fig. 20 and Fig. 21.

Fig. 18. Specific benefits and economic impacts: Ramp-up

In millions of 2016 dollars

		Specific benefits						**Economic impacts, total** (visitor spending, development, property tax impact)					
	Ramp-up percent-age	Visitor spending impact	Real estate develop-ment impact	Property tax impact	Property value impact	Wetlands eco-system benefits	Total of specific benefits	Output	Labor income	Employ-ment (job years)	Fiscal	Federal taxes	State and local taxes
Annualized level		$519	$204	$12	$37	$283	$1,051	$942	$233	6,012	$137	$63	$74
Period													
2017													
2018													
2019													
2020													
2021													
2022													
2023													
2024													
2025													
2026	10%	52	20	1	4	28	105	94	23	601	14	6	7
2027	20%	104	41	2	7	57	210	188	47	1,202	27	13	15
2028	30%	156	61	4	11	85	315	283	70	1,804	41	19	22
2029	40%	208	82	5	15	113	421	377	93	2,405	55	25	30
2030	50%	260	102	6	18	142	526	471	116	3,006	69	31	37
2031	60%	312	122	7	22	170	631	565	140	3,607	82	38	45
2032	70%	364	143	9	26	198	736	660	163	4,208	96	44	52
2033	80%	416	163	10	29	227	841	754	186	4,810	110	50	59
2034	90%	468	184	11	33	255	946	848	210	5,411	124	57	67
2035	100%	519	204	12	37	283	1,051	942	233	6,012	137	63	74
2036	100%	519	204	12	37	283	1,051	942	233	6,012	137	63	74
2037	100%	519	204	12	37	283	1,051	942	233	6,012	137	63	74
2038	100%	519	204	12	37	283	1,051	942	233	6,012	137	63	74
2039	100%	519	204	12	37	283	1,051	942	233	6,012	137	63	74
2040	100%	519	204	12	37	283	1,051	942	233	6,012	137	63	74
2041	100%	519	204	12	37	283	1,051	942	233	6,012	137	63	74
2042	100%	519	204	12	37	283	1,051	942	233	6,012	137	63	74

Source: Tourism Economics

Fig. 19. Revitalization spending: Ramp-up

In millions of 2016 dollars

		Revitalization spending	**Economic impacts, total** (revitalization spending)					
	Revitalization spending pace	Amount	Output	Labor income	Employment (job years)	Fiscal	Federal taxes	State and local taxes
Annualized level		$350	$484	$164	3,081	$51	$34	$16
Period								
2017								
2018								
2019								
2020								
2021								
2022								
2023								
2024								
2025								
2026								
2027								
2028								
2029	40%	140	193	66	1,233	20	14	7
2030	80%	280	387	131	2,465	40	27	13
2031	100%	350	484	164	3,081	51	34	16
2032	100%	350	484	164	3,081	51	34	16
2033	70%	245	339	115	2,157	35	24	11
2034	19%	65	90	30	572	9	6	3
2035	14%	50	69	23	440	7	5	2
2036	14%	50	69	23	440	7	5	2
2037	14%	50	69	23	440	7	5	2
2038	14%	50	69	23	440	7	5	2
2039	14%	50	69	23	440	7	5	2
2040	14%	50	69	23	440	7	5	2
2041	14%	50	69	23	440	7	5	2
2042	14%	50	69	23	440	7	5	2

Source: Tourism Economics

Fig. 20. Specific benefits and economic impacts: Present value

In millions of 2016 dollars, discounted to present value

			Specific benefits						**Economic impacts, total** (visitor spending, development, property tax impact)					
		Discount factor	Visitor spending impact	Real estate develop-ment impact	Property tax impact	Property value impact	Wetlands eco-system benefits	Total of specific benefits	Output	Labor income	Employ-ment (job years)	Fiscal	Federal taxes	State and local taxes
Annualized level		5.0%	$519	$204	$12	$37	$283	$1,051	$942	$233	6,012	$142	$63	$79
Period														
2017	0	1.0000												
2018	1	0.9524												
2019	2	0.9070												
2020	3	0.8638												
2021	4	0.8227												
2022	5	0.7835												
2023	6	0.7462												
2024	7	0.7107												
2025	8	0.6768												
2026	9	0.6446	$33	$13	$1	$2	$18	$68	$61	$15	388	$9	$4	$5
2027	10	0.6139	64	25	2	4	35	129	116	29	738	17	8	10
2028	11	0.5847	91	36	2	6	50	184	165	41	1,055	25	11	14
2029	12	0.5568	116	45	3	8	63	234	210	52	1,339	32	14	18
2030	13	0.5303	138	54	3	10	75	279	250	62	1,594	38	17	21
2031	14	0.5051	157	62	4	11	86	319	286	71	1,822	43	19	24
2032	15	0.4810	175	69	4	12	95	354	317	78	2,024	48	21	27
2033	16	0.4581	190	75	5	13	104	385	345	85	2,203	52	23	29
2034	17	0.4363	204	80	5	14	111	413	370	91	2,361	56	25	31
2035	18	0.4155	216	85	5	15	118	437	392	97	2,498	59	26	33
2036	19	0.3957	206	81	5	14	112	416	373	92	2,379	56	25	31
2037	20	0.3769	196	77	5	14	107	396	355	88	2,266	53	24	30
2038	21	0.3589	186	73	4	13	102	377	338	84	2,158	51	23	28
2039	22	0.3418	178	70	4	12	97	359	322	80	2,055	48	22	27
2040	23	0.3256	169	66	4	12	92	342	307	76	1,957	46	20	26
2041	24	0.3101	161	63	4	11	88	326	292	72	1,864	44	20	24
2042	25	0.2953	153	60	4	11	84	310	278	69	1,775	42	19	23
Present value sum			**$2,634**	**$1,035**	**$63**	**$185**	**$1,436**	**$5,329**	**$4,778**	**$1,181**	**30,477**	**$719**	**$31**	**$400**

Note: Discount factor assumes 5% real discount rate.
Source: Tourism Economics

Fig. 21. Revitalization spending: Present value

In millions of 2016 dollars, discounted to present value

			Revitalization spending	Economic impacts, total (revitalization spending)					
	Years	Discount factor	Amount	Output	Labor income	Employment (job years)	Fiscal	Federal taxes	State and local taxes
Annualized level		5.0%	$350	$484	$164	3,081	$51	$34	$16
Period									
2017	0	1.0000							
2018	1	0.9524							
2019	2	0.9070							
2020	3	0.8638							
2021	4	0.8227							
2022	5	0.7835							
2023	6	0.7462							
2024	7	0.7107							
2025	8	0.6768							
2026	9	0.6446							
2027	10	0.6139							
2028	11	0.5847							
2029	12	0.5568	$78	$108	$37	686	$11	$8	$4
2030	13	0.5303	148	205	70	1,307	21	15	7
2031	14	0.5051	177	244	83	1,556	26	17	8
2032	15	0.4810	168	233	79	1,482	24	16	8
2033	16	0.4581	112	155	53	988	16	11	5
2034	17	0.4363	28	39	13	250	4	3	1
2035	18	0.4155	21	29	10	183	3	2	1
2036	19	0.3957	20	27	9	174	3	2	1
2037	20	0.3769	19	26	9	166	3	2	1
2038	21	0.3589	18	25	8	158	3	2	1
2039	22	0.3418	17	24	8	150	2	2	1
2040	23	0.3256	16	22	8	143	2	2	1
2041	24	0.3101	16	21	7	136	2	2	1
2042	25	0.2953	15	20	7	130	2	1	1
	Present value sum		**$853**	**$1,179**	**$400**	**7,511**	**$123**	**$83**	**$40**

Note: Discount factor assumes 5% real discount rate.
Source: Tourism Economics

4.6 STEP SIX: PRESENT VALUE SUMMARY TABLE

We next compiled the present value of the various economic impacts (Fig. 22).

Fig. 22. Economic impacts summary: Present value

Impacts supported by selected benefits, in millions of 2016 dollars

	Present value (25 years, 2018 to 2042)		
	Visitor spending, real estate development, property tax impact	Revitalization spending	Total
Total impacts			
Output	$4,778	$1,179	**$5,957**
Labor income	$1,181	$400	**$1,581**
Employment (job years)	30,477	7,511	**37,988**
Fiscal	$719	$123	**$842**
Federal taxes	$319	$83	**$402**
State and local taxes	$400	$40	**$440**

Source: Tourism Economics

We then combined these estimates with the present value of the specific economic benefits, and the present value of the construction costs, to prepare a present value summary table (Fig. 23). In this table, the present value benefits and costs in the Phase 2 analysis are in addition to those associated with Phase 1.

On a combined basis, considering the impacts of Phase 1, as well as the additional construction in Phase 2, we estimate a revitalized Salton Sea would generate the following present value benefits and costs over a 25-year period:

- **Benefits**
  - $9.0 billion of specific economic benefits, including visitor spending, real estate development, property tax impact, property value impact, and wetlands ecosystem benefits
  - Economic impacts within Greater Palm Springs, including:
    - $11.1 billion of output (business sales)
    - $2.8 billion of labor income, including wages, salaries and benefits
    - More than 77,000 job years (one job for one year is equivelent to one job year)
    - $1.6 billion of tax revenues, including $855 million of state and local taxes
- **Costs**
  - $1.1 billion of assumed design, construction costs and maintenance.

Fig. 23. Present value summary table

In millions of 2016 dollars

	Present value (25 years, 2018 to 2042)		
	Phase 1 (10-Year Plan)	**Phase 2**	**Combined**
Specific economic benefits			
Visitor spending avoided loss (visitor spending in Greater Palm Springs that would otherwise be lost)	$3,703	$0	$3,703
Visitor spending impact (additional visitor spending in Greater Palm Springs)	0	2,634	2,634
Real estate development impact (value of new development proximate to Salton Sea)	0	1,035	1,035
Property tax impact (property taxes on new real estate development)	0	63	63
Property value impact (property value appreciation in Greater Palm Springs)	0	185	185
Wetlands ecosystem benefits (monetary value of ecosystem benefits broadly)	0	1,436	1,436
Total of specific economic benefits	**$3,703**	**$5,353**	**$9,056**
Economic impacts supported by selected benefits *Total impacts of visitor spending, real estate development, property tax impact, and revitalization spending*			
Output (business sales)	$5,177	$5,957	$11,134
Labor income	$1,253	$1,581	$2,833
Employment (job years)	39,508	37,988	77,496
Fiscal (tax revenue)	$752	$819	$1,594
Federal taxes	$336	$402	$739
State and local taxes	$415	$416	$855
Assumed cost of revitalization	**($280)**	**($853)**	**($1,134)**

Source: Tourism Economics

5. REFERENCES

5.1 REFERENCES CITED

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6. APPENDIX

Fig. 24. Visitor spending at comparable lakes, source notes

Lake	Source of visitor spending estimate
Lake Tahoe	Visitor spending in El Dorado County, CA (2016); Placer County, CA (2016); Douglas County, NV (2015); and Carson City, NV (2015); adjusted by 50% to remove non-lake ski impacts (Dean Runyan Associates, Visit California, Nevada Division of Tourism)
Lake George	Visitor spending in Warren and Washington counties, 2014 (Tourism Economics)
Lake Havasu	Visitor spending in Mohave County, 2015 (Dean Runyan Associates, Arizona Office of Tourism)
Lake Chelan	Visitor spending in Chelan County, 2014 (Dean Runyan Associates, Washington Tourism Alliance)
Shasta Lake	Visitor spending in Shasta County, 2016 (Dean Runyan Associates, Visit California)
Lake Mead and Lake Mohave	Visitor spending in Lake Mead National Recreation Area, 2016 (National Park Service)
Lake Champlain	Visitor spending in four lakeside counties (Lake Champlain Basin Program)
Lake of the Ozarks	Spending in 17 tourism-related industry sectors, FY16 (Missouri Division of Tourism)
Lake Texoma	Visitor spending within 30 miles of lake, 2012 (Army Corps of Engineers)
Lake Strom Thurmond	Visitor spending within 30 miles of lake, 2012 (Army Corps of Engineers)
Clear Lake	Visitor spending in Lake County, 2016 (Dean Runyan Associates, Visit California)
Crater Lake	Visitor spending in communities near park, 2016 (National Park Service)
Pine Flat Lake	Visitor spending within 30 miles of lake, 2012 (Army Corps of Engineers)
Lake Sonoma	Visitor spending within 30 miles of lake, 2012 (Army Corps of Engineers)
Lake Kaweah	Visitor spending within 30 miles of lake, 2012 (Army Corps of Engineers)
Lake Mendocino	Visitor spending within 30 miles of lake, 2012 (Army Corps of Engineers)

Source: Tourism Economics

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