



Transportation, Space, and Technology

A RAND INFRASTRUCTURE, SAFETY, AND ENVIRONMENT PROGRAM

THE ARTS
CHILD POLICY
CIVIL JUSTICE
EDUCATION
ENERGY AND ENVIRONMENT
HEALTH AND HEALTH CARE
INTERNATIONAL AFFAIRS
NATIONAL SECURITY
POPULATION AND AGING
PUBLIC SAFETY
SCIENCE AND TECHNOLOGY
SUBSTANCE ABUSE
TERRORISM AND
HOMELAND SECURITY
TRANSPORTATION AND
INFRASTRUCTURE
WORKFORCE AND WORKPLACE

This PDF document was made available from www.rand.org as a public service of the RAND Corporation.

[Jump down to document](#) ▼

The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world.

Support RAND

[Purchase this document](#)

[Browse Books & Publications](#)

[Make a charitable contribution](#)

For More Information

Visit RAND at www.rand.org

Explore the [RAND Transportation, Space,
and Technology Program](#)

View [document details](#)

Limited Electronic Distribution Rights

This document and trademark(s) contained herein are protected by law as indicated in a notice appearing later in this work. This electronic representation of RAND intellectual property is provided for non-commercial use only. Unauthorized posting of RAND PDFs to a non-RAND Web site is prohibited. RAND PDFs are protected under copyright law. Permission is required from RAND to reproduce, or reuse in another form, any of our research documents for commercial use. For information on reprint and linking permissions, please see [RAND Permissions](#).

This product is part of the RAND Corporation monograph series. RAND monographs present major research findings that address the challenges facing the public and private sectors. All RAND monographs undergo rigorous peer review to ensure high standards for research quality and objectivity.

Balancing Environment and Development

Costs, Revenues, and Benefits of the
Western Riverside County Multiple Species
Habitat Conservation Plan

Lloyd Dixon, Paul Sorensen, Martin Wachs, Myles Collins,
Mark Hanson, Aaron Kofner, Thomas Light,
Michael Madsen, Lindell Marsh, Adrian Overton,
Howard J. Shatz, Brian A. Weatherford

Sponsored by the Western Riverside County Regional Conservation Authority



Transportation, Space, and Technology

A RAND INFRASTRUCTURE, SAFETY, AND ENVIRONMENT PROGRAM

The research described in this monograph was supported by the Western Riverside County Regional Conservation Authority and was conducted under the auspices of the Transportation, Space, and Technology Program within RAND Infrastructure, Safety, and Environment.

Library of Congress Cataloging-in-Publication Data is available for this publication.

ISBN: 978-0-8330-4609-3

The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

RAND® is a registered trademark.

© Copyright 2008 RAND Corporation

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from RAND.

Published 2008 by the RAND Corporation
1776 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
4570 Fifth Avenue, Suite 600, Pittsburgh, PA 15213-2665

RAND URL: <http://www.rand.org>

To order RAND documents or to obtain additional information, contact
Distribution Services: Telephone: (310) 451-7002;
Fax: (310) 451-6915; Email: order@rand.org

Summary

With increasing frequency across the country, population growth and development interests are colliding with environmental goals and regulations that protect the habitat of threatened and endangered species. Perhaps nowhere is this clash more evident than in western Riverside County—one of the fastest-growing metropolitan areas in the United States and the home of a diverse array of increasingly rare species. Policy-makers in Riverside County in the 1990s found the regulatory process for reconciling environmental and development interests both ineffective and inefficient. Regulatory requirements and litigation slowed development projects and increased their costs. And required project-by-project mitigation for endangered-species impacts resulted in a patchwork assembly of uncoordinated habitats. There was legitimate concern that these problems would only grow worse over time.

Responding to this challenge, in 1999, the Riverside County Board of Supervisors and the Riverside County Transportation Commission (RCTC) initiated a comprehensive regional-planning effort called the Riverside County Integrated Project (RCIP). A key element of the RCIP is the Multiple Species Habitat Conservation Plan (MSHCP), a plan to conserve 500,000 acres of the 1.26 million acres in the western part of the county. In return for establishing the conservation reserve, the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) issued the county and 14 cities in western Riverside County a 75-year “take” permit for endangered species. Finalized in June 2004, the take permit allows the cities and county to approve development projects outside the reserve that may negatively affect sensitive plant and animal species, thus allowing for continued growth and development outside of the reserve area. The agreement vested responsibility for acquiring and managing the reserve with the Western Riverside County Regional Conservation Authority (RCA).

The MSHCP is an ambitious effort, mitigating development impact on 146 plant and animal species. While it is a potential model for other areas in the county, questions remain about the cost of assembling and operating the reserve, the adequacy of revenue sources, the prospect for achieving the habitat-conservation goals specified in the MSHCP, and whether the MSHCP has, in fact, streamlined the permitting pro-

cesses for transportation and development projects. This monograph examines a series of issues that address these questions. Specifically, we examine the

- extent to which the MSHCP has shortened the permitting processes for transportation and development projects and reduced the frequency and scope of lawsuits that attempt to stop or modify projects
- effect on average travel speeds of faster completion of four major transportation corridors in western Riverside County and the monetary value of higher travel speeds
- market value as of mid-2007 of the land already acquired for the reserve and of the land needed to complete it
- advantages and disadvantages of land-acquisition strategies that vary in the period during which the reserve is assembled and whether annual acquisition goals are set in terms of acres or annual outlays
- costs to administer the plan and operate the reserve over the 75-year planning period
- adequacy of revenue for the plan and options for raising additional revenue
- prospects for achieving the plan's habitat-conservation goals, using USFWS's conceptual design for the reserve.

Our analysis examines the MSCHP's benefits for the permitting process. The MSHCP is also expected to have important ecological benefits—namely, the assembly of a well-planned reserve area rather than the patchwork of uncoordinated habitats that could result without the MSHCP. Assessing the MSHCP's ecological benefits, however, is beyond the scope of this analysis.

After providing some background on the MSHCP, we summarize our findings in each area that the study addressed and identify issues that our analysis raised and that the RCA Board of Directors, RCA staff, and stakeholders should address moving forward.

The Multiple Species Habitat Conservation Plan

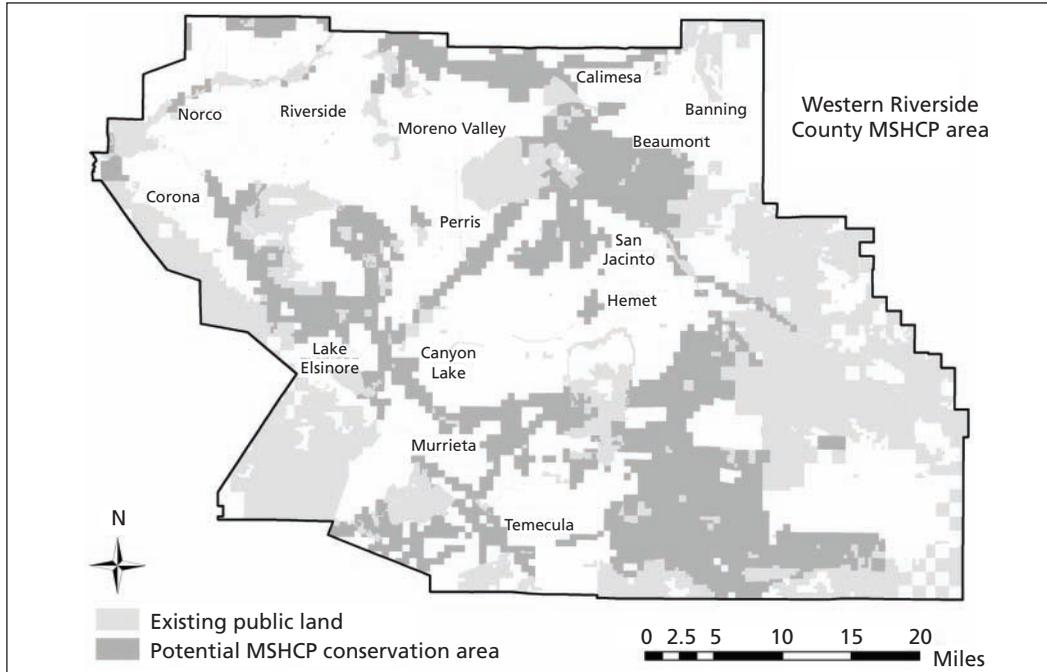
The plan area for the MSHCP encompasses the unincorporated lands within Riverside County west of the crest of the San Jacinto Mountains as well as the cities of Banning, Beaumont, Calimesa, Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Norco, Perris, Riverside, San Jacinto, and Temecula. Under the arrangement, these jurisdictions share responsibility for assembling and managing the reserve area, and each in turn gains greater local control over land-use and development decisions consistent with the plan.

Figure S.1 provides an overview of the MSHCP area within western Riverside County, including existing public land as well as the additional area from which the reserve will be drawn. The 500,000 acres to be conserved include about 350,000 acres already held in public trust, along with 153,000 additional acres that will be conserved under the MSHCP agreement. The 153,000 acres will be drawn from approximately 300,000 acres that constitute the potential MSHCP conservation area in Figure S.1.

Of the land still required when the plan was adopted, federal and state agencies are obligated to fund the acquisition of about 56,000 acres (see Table S.1). Local governments, in turn, are expected to purchase an additional 56,000 acres from willing sellers. It is anticipated that an additional 41,000 acres will be conserved through the entitlement and authorization processes for private development, relying on incentives as well as existing local, state, and federal development regulations.

According to RCA staff, 35,526 acres were acquired as of October 2007 (see rightmost column of Table S.1). To date, very little acreage has been conserved through the development-review process because developers have, by and large, avoided projects that would require contributions, as opposed to sales, of land to the reserve. As density increases and development options decrease, contributions through the

Figure S.1
Location of the MSHCP and Targeted Areas for Conservation



SOURCE: Data provided by Western Riverside County Regional Conservation Authority in 2007.

RAND MG816-S.1

Table S.1
Responsibility for Assembling the Reserve

Resource	Target Acreage	Acreage Acquired as of October 2007
Existing public or quasipublic (PQP) open space		
Federal	248,000	248,000
State	34,000	34,000
Local	65,000	65,000
Subtotal	347,000	347,000
Land for RCA to assemble		
Federal and state acquisition	56,000	14,677
Purchases by local government	56,000	20,192
Contributions by private developers through development-authorization process	41,000	657
Subtotal	153,000	35,526
Total	500,000	382,526

SOURCE: Data on target acreage from TLMA (2003, pp. 4-3-4-13). Data on acquired acreage provided by RCA in 2007.

NOTE: There are 1.26 million acres in western Riverside County.

development process may accelerate. If they do not, however, local government will likely need to fund the purchase of much of the 41,000 acres in addition to the 56,000 acres for which it is already responsible.

Benefits of the Multiple Species Habitat Conservation Plan for Constructing Infrastructure

Our analysis of the MSHCP's effects on permitting transportation and development projects is based on (1) interviews with organization representatives who have substantial experience with and insights into the MSHCP and its implementation and (2) a detailed questionnaire completed by most of those interviewed and other knowledgeable stakeholders. The number of organizations involved in the process of seeking or issuing permits is limited. The questionnaire was sent to the 38 such organizations we could identify and completed by 19, representing the perspectives of cities, transportation agencies, wildlife agencies, consultants, lawyers, environmental organizations, and developers. We also interviewed 22 individuals. While the number of completed questionnaires and interviews is not particularly large, it reflects a substantial proportion of organizations experienced with the permitting process under the MSHCP, and

we believe that it provides a reasonably accurate overall picture of the plan's perceived impact on the permitting process.

Considerable care was taken to design the questionnaire so that responses would accurately reflect reality. For example, respondents were asked to identify specific road projects that have been active in the planning process since the MSHCP was adopted and to answer detailed questions about each project. In spite of these precautions, stakeholder perceptions of the MSHCP's impact on the permitting process are subject to error and should be interpreted only as an initial indication of the MSHCP's impact. Further work is warranted exploring the feasibility and cost of using administrative data on the time needed to complete the permitting process with and without the MSHCP.

Overall, the findings on the MSHCP's impact on the permitting process for road-transportation projects are encouraging. Projects that affect federally listed species appear to benefit the most from the MSHCP. Stakeholders indicated that the MSHCP had accelerated the permitting process for all such projects with which they were familiar that had completed major steps in the permitting process since the MSHCP was adopted. Examples include Clinton Keith Road in the southern part of western Riverside County and the River Road bridge over the Santa Ana River. Savings in time ranged from one to five years, and, in some cases, the MSHCP was perceived to have allowed a project to proceed that would not have proceeded otherwise. The perceived benefits were also substantial for projects affecting federally listed species that had not yet completed a major step in the permitting process: Stakeholders believed that the MSHCP has increased the chance that the project would receive all the required authorizations and has accelerated the permitting process in a substantial majority of the projects identified. Examples cited include the Mid County Parkway and the realignment of State Route (SR) 79.

The MSHCP's effects on road-transportation projects that do not affect federally listed species were seen as positive overall, but the effects do not appear to be large; in some cases, the effects were seen as negative. For example, for projects that have not completed major steps in the permitting process, stakeholders reported roughly equal numbers of cases in which the MSHCP had (1) accelerated the permitting process, (2) slowed the process, and (3) had no effect on the process.

The MSHCP's perceived benefits also extend to road-safety and maintenance projects. While the amount of time saved was not thought to be great for such projects (typically six months to one year), the large number of such projects can cause the aggregate time savings across all safety and maintenance projects to be substantial.

A sizable majority of stakeholders believed that, since its adoption, the MSHCP has reduced the number or scope of lawsuits that have sought to stop or modify road projects. While the consequences of this reduction may be reflected, to some extent, in stakeholder estimates of the degree to which the MSHCP has accelerated the per-

mitting process, the perceived reduction in litigation may also add to the quantitative estimates of time savings.

On the downside, our findings suggest that the MSHCP has increased the cost of the permitting process, at least in some cases. Stakeholders reported that the MSHCP increased the cost of the permitting process more frequently than it decreased the cost for road projects that have not yet completed major steps in the permitting process. The MSHCP presumably reduces the cost of obtaining the required authorizations for road-safety and maintenance projects because it exempts such projects from review for consistency with the MSHCP; however, we could not investigate the magnitude of such savings or whether the MSHCP adds to or reduces project-permitting costs across all projects.

Stakeholders generally expect the MSHCP's benefits to continue for road projects over the next 10 years. The acceleration of the permitting process and the reduction in lawsuits are, by and large, expected to be somewhat greater than have been observed to date. Time savings are frequently expected to run from one to five years, and expected time savings of greater than five years were reported.

While the MSHCP appears to provide benefits for many road projects, findings on the impact for commercial, industrial, and residential development projects are mixed. Stakeholders reported that the MSHCP has increased the time needed to obtain required permits as often as it has reduced it for development projects on more than five acres and expected similar outcomes for development projects over the next 10 years. The findings suggest that the MSHCP has, on the whole, reduced the frequency and scope of lawsuits about development projects, but the magnitude of the effect is lower than for road projects.

The MSHCP is still relatively new, and our findings provide an early look at its impact on the permitting process. The extent to which the MSHCP actually facilitates placing infrastructure will be much clearer over the next three or four years as major infrastructure projects, such as the Mid County Parkway, work their way through the permitting process. The plan's benefits may also change over time, for a number of reasons. First, stakeholders will become more familiar with the permitting process, potentially accelerating it. Second, there may be fewer points of contention between the resource agencies and permittees as the habitat-conservation goals for the plan are achieved. Finally, the plan's benefits may grow as economic growth continues in western Riverside County over the long term. The permitting process without the plan in place would likely become increasingly onerous as the amount of open space declines. The findings in this monograph can serve as a baseline against which future assessments of MSHCP benefits can be compared.

So far, we have presented our findings on the MSHCP's perceived benefits for the permitting process. But this analysis can be turned around to assess what would happen if the plan were to disappear (e.g., be abandoned). If the plan were revoked, the permitting process for many roadway projects would likely lengthen—our research suggests

by up to five years. There would also be increased delays in the many road-safety and maintenance projects that are planned for the coming years. If the plan were abandoned, the habitat-conservation process in western Riverside County would also revert to the uncoordinated, project-by-project system that existed before the MSHCP.

Delaying the placement of transportation infrastructure in western Riverside County will reduce mobility in the area. To better understand how large these reductions might be, we used a detailed computer model of the transportation network to quantify the mobility impacts of delays in completing four major transportation corridors that resulted from the Community and Environmental Transportation Acceptability Process (CETAP) in western Riverside County. Our analysis suggests that delaying the four CETAP corridors will cause travel speeds in western Riverside County to decline more rapidly than they would otherwise. The effects on individual trips may not be large, but they can add up when aggregated across all trips taken in a year. Average speeds do not change by more than 1 or 2 miles per hour, but the cost in lost time to drivers can total hundreds of millions of dollars annually.

Market Value in 2007 of Land Needed for the Reserve

To estimate the 2007 market value of land needed for the reserve, we developed a statistical model of land values based on sales records from the Riverside County assessor's office for January 2000 through October 2007. The model considers such factors as parcel size, current land use, purchase date, zoning, slope, proximity to roads and freeways, job accessibility, and average household income in the surrounding area. After estimating the model based on past sales data, we used it to project the 2007 market value of the 35,526 acres that RCA had acquired through October 2007 and of the 117,474 acres remaining to be assembled. To identify the land remaining to be acquired, we developed a number of reserve-assembly scenarios based on an outline that USFWS had developed for the reserve. This so-called conceptual reserve design (CRD) was based on the textual description in the MSHCP planning document of how the final reserve might be configured.

We estimate that the 35,526 acres already acquired through October 2007 were valued at approximately \$9,000 per acre, on average, as of mid-2007. The average acquisition cost for this land was approximately \$8,200 per acre in 2007 dollars, and the difference reflects the general rise in inflation-adjusted land values through mid-2007. As of mid-2007, the market value of land still needed for the reserve was approximately \$36,000 per acre. The difference in the values of the land already acquired and yet to be acquired indicates that past acquisitions have focused on less expensive parcels.

Detailed examination of the parcels needed to complete the USFWS CRD revealed that the land needed for linkages between core habitat areas is disproportionately expensive because it runs through heavily developed areas. Modifying the link-

ages to avoid existing development could reduce the costs of assembling the reserve, and the cost reductions could be significant. If linkages are rerouted to avoid existing development, we estimate that the average value of land needed to complete the reserve could fall to as low as approximately \$26,000 per acre (up to roughly a 25-percent decline). Whether the linkages could be rerouted without degrading the reserve's ecological integrity, however, would need to be investigated.

As of mid-2007, the market value of the land needed to complete the reserve was considerable. Assuming that linkages are not rerouted, the value of the land needed to complete the reserve is an estimated \$4.2 billion, with a 95-percent statistical confidence interval running from approximately -10 percent to +20 percent of the total (\$3.8 billion to \$5.0 billion). Note that this total covers the land to be acquired by all levels of government and to be contributed through the development-authorization process, not just the land that is local government's responsibility to acquire. Our estimate of the overall value of the land in a 153,000-acre reserve is approximately double that in the initial MSHCP planning documents (which were completed in 2003), reflecting the rapid rise in land prices in western Riverside County between 2003 and 2007. Housing prices in Riverside County have fallen considerably since mid-2007. However, sales prices for open space and agricultural land in western Riverside County did not show a substantial downturn in price through October 2007, and more-recent data are not available as of this writing. Thus, it is not clear how the value of land held by RCA has changed since mid-2007.

Preferred Land-Acquisition Strategy

The substantial increase in the projected cost of assembling the reserve raises concern that current local revenue sources may be inadequate to fund local-government obligations under the plan. The overall cost of assembling the reserve, however, depends not on land prices in mid-2007 but on the trajectory of land values over time and the time frame in which RCA acquires the land needed for the reserve. The financial consequences of different price trajectories and purchase strategies can be enormous. For example, if the current downturn in housing prices causes land values to retreat substantially from the \$36,000 average in mid-2007 and if RCA buys a substantial amount of land during the downturn, then reserve-assembly costs could be considerably less than estimates based on mid-2007 values. If, on the other hand, RCA spaces purchases over a long period and land prices continue to appreciate at historic rates, then the present value of the outlays needed to assemble the reserve could be far greater than estimates based on mid-2007 prices.

The optimal period over which to assemble the reserve depends on future land prices, but it is impossible to predict with certainty how land prices will evolve over time. To address this uncertainty, we constructed a wide range of price scenarios based

on economic theory and historic trends in land prices. We then investigated the consequences of different land-acquisition strategies. While it is desirable to spread purchases over a long period in some land-price scenarios, we concluded that the preferred strategy overall is to acquire the land over approximately 10 years. Acquiring land in the next decade is desirable because the financial risks of spreading land purchases over a much longer period are substantial, while the potential excess costs of buying land too quickly are not nearly as large.

Assembling the remaining acreage needed for the reserve over 10 years would entail a considerable acceleration in land acquisition. Land acquisitions during the first three years of plan operation (2005 through 2007) averaged approximately 5,500 acres per year. Acquisitions would need to increase to nearly 12,000 acres per year to complete the reserve in 10 years.

Our findings also suggest that it would be preferable for RCA to set annual land-acquisition goals in terms of the dollar amount of land purchased rather than the number of acres purchased. In this way, more land will be purchased when land prices are low than when they are high. This strategy appears to be especially beneficial if RCA assembles the reserve over a period of several decades but has less effect if RCA can complete assembly within 10 years or less.

Costs of Implementing the Plan and Operating the Reserve

The cost of the MSHCP includes not only the cost of acquiring the land needed for the reserve but also the costs of implementing the plan and operating the reserve over time. These include the costs of routine habitat management, adaptive management, biological monitoring, and plan implementation and oversight. Routine habitat management consists primarily of controlling public access to conserved lands by installing and maintaining fences and gates and by regularly patrolling areas that frequently experience illegal dumping, off-highway vehicle (OHV) use, hunting, and other illegal trespass. Adaptive management uses the results of information gathered through the biological-monitoring program and from other sources to adjust habitat-management strategies and practices. Biological monitoring involves developing an initial baseline inventory of the 146 species that the MSHCP covers and ongoing annual monitoring to follow their status. Plan implementation and oversight costs arise from the day-to-day operational expenses that RCA incurs to implement the plan. These include managing reserve assembly, complying with reporting requirements, and overseeing management and monitoring programs.

We project the costs to operate the reserve from 2008 through the plan's expiration in 2079, using historical data on program expenditures as well as qualitative information elicited from subject-matter experts. Table S.2 shows the present value of projected management, monitoring, and plan implementation and oversight costs in 2007

Table S.2
Present Value of the Costs of Implementing the Plan and Operating the Reserve Through 2079 (millions of 2007 dollars)

Cost Category	Estimate		
	Low	Baseline	High
Habitat management	51	146	309
Adaptive management	27	41	58
Biological monitoring	47	55	65
Plan implementation and oversight	189	232	258
Total	314	474	690

dollars for the MSHCP's remaining 72-year life. The baseline estimate is the value we calculate using assumptions that we consider most reasonable and is typically a continuation of historical values. The high and low estimates are calculated using a reasonable set of optimistic and conservative assumptions.

Discounted back to 2007 using a 3-percent real discount rate, the present value of reserve-operation costs over the MSHCP's remaining life is projected to total \$474 million. The range into which these costs can be reasonably expected to fall runs from \$314 million to \$690 million.

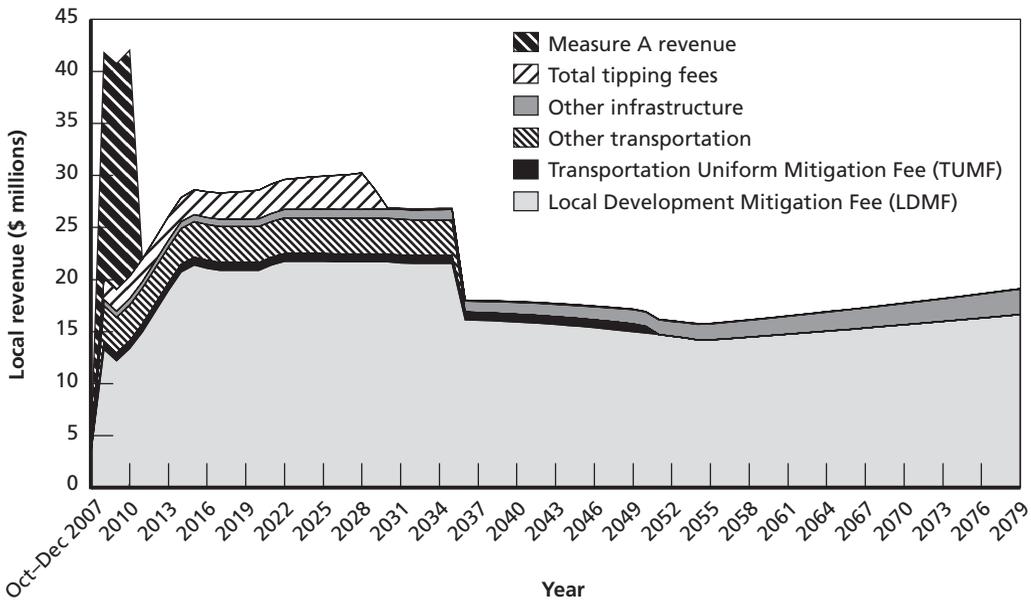
Our undiscounted operating-cost projection exceeds the original forecast in MSHCP planning documents by \$345 million (increasing from \$937 million to \$1,282 million). The increase is due primarily to plan implementation and oversight costs that were not included in the original cost analysis.

Revenues for the Plan

RCA receives revenues from local, state, and federal sources. Forecasting RCA revenue is a difficult task, as the funding program is still relatively new and reaches far into the future. Therefore, projections are made for a range of assumptions about underlying economic and demographic conditions. Figure S.2 shows our baseline forecast for revenue from local sources through 2079, in 2007 dollars. Local revenues are projected to peak at approximately \$40 million per year over the next few years before falling to between \$25 million and \$30 million through 2035 and then to between \$15 million and \$20 million for the remainder of the plan.

The baseline projections translate into \$770 million in present value. In recognition of the uncertainty in underlying parameters, we constructed low-revenue and high-revenue scenarios. The present value of the revenue streams is \$635 million in the low-revenue scenario and \$962 million in the high-revenue scenario. Revenues from state and federal sources are projected to add \$180 million in present value over

Figure S.2
Baseline Forecast for Local Revenue Program in 2007 Dollars



RAND MG816-S.2

the plan's life, with estimates for the low- and high-revenue scenarios ranging from \$121 million to \$237 million.

Gap Between Local Costs and Revenue

Comparing the plan's projected costs and revenues raises two main issues: the timing of revenues relative to expenditures and the overall adequacy of revenues. Regarding the first issue, the expected receipts from revenue sources that are already in place do not line up well with a strategy of acquiring land in a relatively compressed time frame. To finance acquisition of the reserve in a relatively short period, RCA will need to pursue financial strategies that allow it to decouple annual expenditures from annual revenues. Strategies that would enable this include bonding against a future revenue stream or borrowing funds with repayments made over time from ongoing revenues.

Regarding the overall adequacy of revenue, our analysis does not allow us to conclude with certainty whether existing local revenue streams will be sufficient to finance the local share of reserve assembly and operation costs. The gap between costs borne by local permittees and local revenue sources depends on a number of factors, including the trajectory of future land prices, RCA's adopted acquisition strategy, the amount of acreage obtained through the entitlement and authorization processes for private development projects, and the economic and demographic trends that influence revenue.

Given the wide range of potential outcomes, we provide estimates of the local funding gap under favorable and unfavorable realizations (from RCA's point of view) of the underlying uncertainties. In some scenarios that combine very optimistic assumptions about land prices (from RCA's point of view) and local developer contributions through the development-authorization process with optimistic assumptions about revenue, the present value of existing revenue streams will be adequate to cover the present value of expenditures. In less favorable scenarios in which land prices remain relatively high, land contributions through the development process remain low, and revenue ends up at the low end of the projected range, the present value of revenue could fall several billion dollars short of expenditures. We cannot assign probabilities to the various outcomes but note that the factors that could lead to low land values (e.g., a drop in the housing market) could also lead to low revenues (e.g., a decline in revenue from the LDMF), decreasing the likelihood of scenarios in which current revenue sources are adequate.

To determine whether additional local revenue instruments will be acquired, RCA should pay close attention to the changes in land prices over the next few years. If land prices fall substantially from the levels paid for comparable parcels in mid-2007 and RCA can purchase a substantial amount of acreage at the reduced prices, then it is conceivable that additional revenue from local sources will not be needed. If, on the other hand, land prices do not decline much over the next few years, it will become increasingly likely that revenue from existing instruments will be inadequate and that additional local revenue sources will be required.

Additional Revenue Options

A wide range of options exists for raising additional revenue from local sources. We examined 10 sources of additional revenue, including property-based revenue sources, development-based revenue sources, transportation-based revenue sources, and sales tax-based revenue sources. Table S.3 provides estimates of the amount by which each tax or fee would need to increase in order to raise \$1 billion on a present-value basis. The projections assume that the tax is levied on all Riverside County property, development, transportation, or sales, respectively. If any of the revenue mechanisms is implemented only in western Riverside County or if revenue from a countywide tax is shared with eastern Riverside County, then the increases in Table S.3 would need to be somewhat larger to generate \$1 billion in revenues for the MSHCP.

Each option considered has advantages and disadvantages in terms of equity, efficiency, and political feasibility. If additional revenue is necessary, policymakers will need to weigh the trade-offs in deciding what options to pursue.

Funding mechanisms that consider the construction of transportation facilities and habitat conservation as one integrated project offer the prospect of more flexible

Table S.3
Increases in Revenue Sources Needed to Raise \$1 Billion in Present Value

Basis of Revenue Source	Tax or Fee Duration			
	10 Years	20 Years	30 Years	Life of MSHCP
Property				
Ad valorem property tax (percentage-point increase)	0.04	0.02	0.01	—
Parcel tax (\$ increase per parcel)	133	69	49	27
Special property assessment (\$ increase per dwelling unit)	140	73	51	28
Mello-Roos tax (\$ increase per parcel) ^a		Similar to parcel tax		
Documentary transfer tax (% increase)	342	178	127	70
Development				
LDMF (% increase)	636	336	253	183
Transportation				
Highway tolls (\$ per mile)	—	—	0.07–1.03 ^b	—
Vehicle-license fee (VLF) (percentage-point increase) ^c	0.62	0.32	0.23	0.13
Vehicle-registration fee (\$ increase)	63	33	23	13
Sales taxes				
Sales tax (percentage-point increase)	0.26	0.12	0.08	—

^a The Mello-Roos Community Facilities Act of 1982 provides an alternative method of financing improvements and services. See California Government Code §§53311–53368.3.

^b Depending on traffic volume and number of miles tolled.

^c Current level is 0.65 percent.

funding that may reduce the overall project cost. For example, sources of funds that could be used both for infrastructure construction and habitat acquisition could allow RCA to accelerate reserve assembly and reduce overall land-acquisition costs. Currently, major funding sources on which RCA relies do not allow constructing transportation infrastructure and conserving habitat on a fully integrated basis. Federal or state legislation would be required to enable such mechanisms. Infrastructure banks could likewise offer loans that allow flexibility in allocating funds between construction and habitat conservation. Infrastructure banks do exist in California, but the two we were able to identify do not provide loans large enough to make much of a difference in western Riverside County. Developing programs that integrate transportation funding and habitat conservation warrants further attention.

Prospects for Achieving the Habitat-Conservation Goals of the Reserve

To ensure the viability of species that the MSHCP covers, the plan requires that RCA conserve a minimum number of acres of various habitat types spread across different regions of western Riverside County. This has been operationalized as a set of specific acreage requirements for seven distinct vegetation communities within nine subregions of the plan area, referred to as *rough-step accounting areas*.

We found that individual acreage goals cannot all be met using the USFWS CRD. That said, we found that, for all but one of the vegetation communities, the number of acres in the USFWS CRD across all rough-step areas exceeds the sum of acreage targets across all rough-step areas. In other words, while there are numerous shortfalls in specific rough-step areas, there appears to be sufficient acreage in total for most of the vegetation communities. The RCA-assembled reserve will not necessarily precisely follow the USFWS CRD. We have not examined the extent to which different reserve configurations that are consistent with the MSHCP's land-acquisition criteria would satisfy the rough-step requirements. However, our analysis shows that one configuration, the USFWS CRD, will not meet the rough-step requirements as currently written, and it is plausible that other configurations will face similar problems. It also shows that it may be worth revisiting rough-step requirements to determine whether it is appropriate to allow some fungibility of acreage requirements across rough-step areas.

Moving Forward

Our analysis has identified a number of MSHCP benefits and some areas in which improvements could be made to further the plan's goals. Based on our findings, we recommend that the RCA Board of Directors, staff, and stakeholders

- explore ways to increase the acreage obtained through the entitlement and authorization processes for private development projects
- examine how to route the linkages between the core habitat areas so as to minimize acquisition costs but meet the ecological goals for the reserve
- reexamine the rough-step requirements to determine whether they are overly prescriptive with regard to the spatial distribution of vegetative-community acreage, and explore how the rough-step accounting system could be modified to better reflect progress in achieving the plan's conservation goals
- determine the time frame in which the reserve should be completed, taking into consideration the potential financial savings of completing it within the next decade

- develop bonding or other financial strategies that allow decoupling of annual revenue and annual expenditures and enable reserve completion in the next decade
- regularly update land-acquisition cost and revenue projections to determine whether additional revenue will be necessary
- prepare a strategy for raising additional revenue that could be implemented should additional revenue become necessary
- work with federal and state authorities to determine whether transportation and habitat-conservation funding programs could be integrated to permit more-comprehensive resource planning and investment
- investigate how to increase the plan's benefits for commercial, industrial, and residential development projects
- explore how to limit the apparent plan-induced increase in permitting costs for transportation projects.

Being proactive with respect to these issues can help ensure the plan's success and the ongoing economic and ecological health of western Riverside County.