



401 B Street, Suite 800  
 San Diego, CA 92101-4231  
 (619) 699-1900  
 Fax (619) 699-1905  
 www.sandag.org

# MEETING NOTICE AND AGENDA

## ENVIRONMENTAL MITIGATION PROGRAM WORKING GROUP

The Environmental Mitigation Program Working Group may take action on any item appearing on this agenda.

Tuesday, January 12, 2010

1:00 to 2:30 p.m.

SANDAG, 7th Floor Conference Room  
 401 B Street  
 San Diego, CA 92101-4231

Staff Contact: Keith Greer  
 (619) 699-7390  
 kgr@sandag.org

### AGENDA HIGHLIGHTS

- MID-YEAR STATUS REPORT ON EMP FUNDED ACTIVITIES
- SAN DIEGO STATE UNIVERSITY INSTITUTE FOR ECOLOGICAL MANAGEMENT AND MONITORING
- CONSIDERATIONS FOR DEVELOPING WILDLIFE MOVEMENT STUDIES

*SANDAG offices are accessible by public transit.  
 Phone 1-800-COMMUTE or see www.sdcommute.com for route information.*

*In compliance with the Americans with Disabilities Act (ADA), SANDAG will accommodate persons who require assistance in order to participate in SANDAG meetings. If such assistance is required, please contact SANDAG at (619) 699-1900 at least 72 hours in advance of the meeting.*

*To request this document or related reports in an alternative format, please call (619) 699-1900, (619) 699-1904 (TTY), or fax (619) 699-1905.*

#### MEMBER AGENCIES

Cities of  
 Carlsbad  
 Chula Vista  
 Coronado  
 Del Mar  
 El Cajon  
 Encinitas  
 Escondido  
 Imperial Beach  
 La Mesa  
 Lemon Grove  
 National City  
 Oceanside  
 Poway  
 San Diego  
 San Marcos  
 Santee  
 Solana Beach  
 Vista  
 and  
 County of San Diego

#### ADVISORY MEMBERS

Imperial County  
 California Department  
 of Transportation  
 Metropolitan  
 Transit System  
 North County  
 Transit District  
 United States  
 Department of Defense  
 San Diego  
 Unified Port District  
 San Diego County  
 Water Authority  
 Southern California  
 Tribal Chairmen's Association  
 Mexico

# ENVIRONMENTAL MITIGATION PROGRAM WORKING GROUP

Tuesday, January 12, 2010

ITEM #		RECOMMENDATION
1.	WELCOME AND INTRODUCTIONS (Chair, SANDAG Board Member, Carrie Downey, City Of Coronado Council Member)	
+2.	SUMMARY OF NOVEMBER 17, 2009, MEETING	APPROVE
	Review and approve the meeting summary of the November 17, 2009, meeting.	
3.	PUBLIC COMMENTS AND COMMUNICATIONS	COMMENT
	Members of the public will have the opportunity to address the Environmental Mitigation Program Working Group (EMPWG) on any issue within the jurisdiction of the Working Group. Speakers are limited to three minutes each.	
+4.	MID-YEAR STATUS REPORT ON EMP FUNDED ACTIVITIES (Keith Greer, SANDAG)	INFORMATION
	Mr. Greer will go over the status of the various projects funding by the SANDAG Board of Directors using <i>TransNet</i> EMP monies.	
+5.	PROCESS FOR EMP WORKING GROUP'S REVIEW OF FY 2010 EMP LAND MANAGEMENT GRANTS (Keith Greer, SANDAG)	DISCUSSION/ POSSIBLE ACTION
	On November 23, 2009, a call-for-projects was issued for grant proposals related to lands management activities. The application deadline is expected to be January 27, 2010. This is the fourth cycle of grants under the EMP program. The past three cycles have used an ad hoc subcommittee to make a recommendation to the full Working Group. The Working Group will address this year's process for its review of the grant applications at the March 2010 EMP Working Group meeting, which may again include the development of ad hoc subcommittee.	
6.	SAN DIEGO STATE UNIVERSITY INSTITUTE FOR ECOLOGICAL MANAGEMENT AND MONITORING (Rebecca Lewison, SDSU)	INFORMATION/ DISCUSSION
	San Diego State University is initiating a new institute aimed at promoting science, engineering, and technology to address the management and monitoring needs of natural resources in the region. Dr. Lewison will explain the goals of the new institute, the interdisciplinary nature of the researchers, and the possible assistance the institute could offer for determining the most cost-efficient and effective approaches for regional biological management and monitoring.	

**ITEM #**

**RECOMMENDATION**

- +7. CONSIDERATIONS FOR DEVELOPING WILDLIFE MOVEMENT STUDIES (Cheryl Brehme and Amy Vandergast, U.S. Geological Survey - Biological Resources Division)

INFORMATION/  
DISCUSSION

The Board has allocated \$300,000 for wildlife linkage monitoring. Dr. Jeff Tracey, Regional Monitoring Coordinator, will be hosting a workshop in March to gather input on the best approach toward utilizing these funds. In preparation of this workshop, Ms. Brehme and Dr. Vandergast of the U.S. Geological Survey will provide some of their experiences for consideration in the development of wildlife movement studies.

- 8. NEXT MEETING DATE AND ADJOURNMENT

INFORMATION

Next Meeting of the EMP Working Group is scheduled for March 9, 2010.

Tentative topics: Review of FY 2010 land management grants, *TransNet* EMP Dashboard, and State of California's requirements for land management.

+ next to an item indicates an attachment

**San Diego Association of Governments**  
**ENVIRONMENTAL MITIGATION PROGRAM WORKING**  
**GROUP**

January 12, 2010

AGENDA ITEM NO.: **2**

**Action Requested: APPROVE**

SUMMARY OF NOVEMBER 17, 2009, MEETING

File Number 300270

**Members in Attendance:**

Hon. Carrie Downey, (Chair), City of Coronado  
Tom Oberbauer, (Vice Chair), County of San Diego  
Ann Harvey, San Diego Conservation Network  
Matt Adams, Building Industry Association  
Bruce April, Caltrans  
Michelle Mattson, Army Corps of Engineers  
Michael Beck, Endangered Habitats League  
Jim Whalen, Alliance for Habitat Conservation  
Barbara Redlitz, City of Escondido  
Carlton Rochester, U.S. Geological Survey (USGS)  
Kevin Mallory, City of Santee  
David Mayer, California Department of Fish and Game  
Kathy Viatella, The Nature Conservancy  
Marisa Lundstedt, City of Chula Vista, South County  
Clark Winchell, U.S. Fish and Wildlife Service  
Emily Young, The San Diego Foundation

**Others in Attendance:**

Jeff Tracey, San Diego Management and Monitoring Team (SDMMT)  
Lucy Galvin, Helix Water District  
Mary Lindquist, Padre Dam Municipal Water District  
Megan Hamilton, County of San Diego, Department of Parks and Recreation  
Betsy Miller, City of San Diego  
Josh Garcia, City of San Diego  
Ron Rempel, SDMMT  
Jeff Lincer, Wildlife Research Institute  
Trish Smith, The Nature Conservancy  
Jerre Stallcup, Conservation Biology Institute  
Dan Conaty, Parsons  
Markus Spiegelberg, Center for Natural Lands Management  
Kim Smith, Caltrans  
Rosanne Humphrey, TAIC  
Scott Fleury, ICF Jones & Stokes

**Others in Attendance (cont'd):**

Brad Burkhart, Habitat Restoration Consultant  
Anne Fege, San Diego Natural History Museum

**SANDAG Staff in Attendance:**

Rob Rundle  
Keith Greer  
Grace Chung  
Kim Roeland

**1. Welcome and Introductions**

Chair Hon. Carrie Downey, City of Coronado, called the meeting to order at 12:32 p.m., and welcomed the group. She invited members and guests to introduce themselves.

Barbara Redlitz, City of Escondido, introduced herself and announced that she would be replacing Patti Brindle of the City of Poway, who is retiring. Keith Greer, SANDAG, introduced Kim Roeland as the new environmental planning intern, replacing Marina Som. Bruce April, Caltrans, introduced Kim Smith and her position at Caltrans.

**2. November 17 Meeting Summary**

Ms. Downey asked the Working Group if there were any corrections to the meeting summary. David Mayer, California Department of Fish and Game, mentioned that he had two. On page 5 (paragraph 4) he suggested changing the word "the" to "some" so that it reads "...since some water districts are expected." Mr. Mayer's second correction was to change the work "nuisance" to "nuance" on page 6.

Tom Oberbauer, County of San Diego, motioned to approve the summary with Kathy Viatella, The Nature Conservancy, seconding the motion. The motion carried without opposition.

**3. Public Comments and Communications**

Members of the public had the opportunity to address the committee on matters before the Environmental Mitigation Program Working Group (EMPWG). No public comments were made.

**4. California Gnatcatcher and Coastal Cactus Wren Update**

Clark Winchell, U.S. Fish and Wildlife Service (U.S. FWS), presented an update on the 2007 *TransNet*-funded monitoring effort for the California gnatcatcher monitoring. Mr. Winchell started with a review of published reports on the California gnatcatcher starting in 1980, highlighting the estimated number of pairs reported and the methodology employed to derive the number.

Mr. Winchell then presented to the EMPWG results from the 2007 California gnatcatcher monitoring on public, quasi-public, and some military land. His presentation focused on (1) development of the monitoring program (including field sampling and modeling);

(2) occupancy relative to four strata classifying habitat quality; (3) the population estimate calculated using percent area occupied results in the highest two strata of habitat quality; and (4) effects of wildfire on the population.

Mr. Winchell finished his presentation by briefly updating the EMPWG on results from the 2009 *TransNet*-funded effort to map the extent of the cactus wren surveys. He presented maps that included historic sites, areas burned in 2007 fires, patches of habitat, and occupied sites.

Jim Whalen, Alliance for Habitat Conservation, asked how edge effects and patch size were factored into the California gnatcatcher model. Mr. Winchell answered that the model used patch size, but did not include edge effects. He further elaborated that small patches have inherently higher edge, which would result in confounding variables; patch size was selected because its geometry was better suited to fit the model.

Mr. Whalen also asked how the current California gnatcatcher estimates compare with past estimates. Mr. Winchell answered the current estimates fit with numbers from 2000, where there was consistency in sampling techniques. Keith Greer, SANDAG, commented that the methodology included sampling on public lands, and excluded private lands. Tom Oberbauer, County of San Diego, posited that the percentage of high quality habitat could be used to estimate California gnatcatcher population on private lands. Mr. Winchell disagreed, stating that that had been done in the past unsuccessfully, and what is needed is to spend time in the field to measure variables.

Michael Beck, Endangered Habitats League, asked if it would be possible to extrapolate from the information presented, which lower quality habitat areas are appropriate for restoration to move them to higher quality California gnatcatcher habitat areas. Mr. Winchell answered that it was possible. Mr. Beck also asked how and when information from this report will be available for use to guide what needs to be done for the Lakeside Archipelago. Mr. Winchell answered that he hoped to wrap up the report for the 2009 surveys by March.

David Mayer, California Department of Fish and Game, inquired if conducting site visits before the California gnatcatcher starts building nests or sitting on nests would increase detectability. Mr. Winchell answered that data from 2002, 2004, 2007, and 2009 show there is always a week where detectability drops, but it is not always the same week: surveys are conducted over a six-week period and an average is taken, which is assumed to be constant. He added that there is an issue in timing the field crew while maintaining efficiency in the budget. Mr. Mayer suggested collecting the data from mid to late February to the first half of March without extending the field season. Mr. Winchell responded that their six-week survey period starts in the second week of April and ends in May, which, he noted, was for some years the best period to survey, but that weather is the determining factor. Mr. Mayer further added that from his experience, the best time to survey was in March because the birds are extremely responsive. Mr. Winchell stated that U.S. FWS data from March did not follow that trend.

Mr. Oberbauer's question referred back to the discussion on restoration. He noted that restoration should be for habitat that was disturbed in the past, rather than conversion of some aspect of a slope, for example, to create California gnatcatcher habitat. Mr. Winchell agreed.

Mr. Greer suggested that Mr. Winchell remain after the meeting to answer any further questions.

Ms. Downey announced a change in the order of speakers from the agenda, indicating that Item 6 would precede Item 5.

## **6. Quality of Life Funding Strategy Update**

Rob Rundle, SANDAG, updated the EMPWG on the progress the Board of Directors has made in amending the *TransNet* Extension Ordinance to extend the deadline for acting on potential future funding measure to 2012. He indicated that the Board has authorized the initiation of a public education outreach effort. SANDAG is looking for representatives from several working groups, including EMP, transit, water quality, shoreline preservation, as well as other stakeholders. Mr. Rundle asked for two volunteers to represent the EMPWG on a Quality of Life Ad Hoc Working Group that will report to the Ad Hoc Steering Committee.

Ms. Downey indicated that the two people will not be chosen by the EMPWG, but that names will be provided to the steering committee for nomination to the Quality of Life Ad Hoc Steering Committee.

Mr. Whalen mentioned that he and Matt Adams, Building Industry Association, were already participating in the Quality of Life effort. The discussion that followed regarded clarification of who was on the Quality of Life Ad Hoc Steering Committee (comprised of elected officials) and various groups relating to effort. Mr. Beck requested clarification that the volunteers are being solicited for a group that has not yet met. Mr. Rundle confirmed that to be true.

Ms. Downey then asked for volunteers, and received the following names: Mr. Whalen, Mr. Oberbauer, Kathy Viatella (The Nature Conservancy), Marisa Lundstedt (Chula Vista), and Mr. Beck.

Mr. Beck requested a flow chart to assist in the clarification of the various groups and meetings and to depict the relationships between them. Ms. Downey asked when the names were needed, and Mr. Rundle replied that the names are needed within the next couple of weeks. Ms. Downey then stated that she would submit three names to represent the EMPWP – Ms. Viatella, Mr. Whalen, and Mr. Beck. Ms. Downey added that some of our EMPWG members are also elected officials from the cities and the County of San Diego, and recommend Mr. Oberbauer and Ms. Lundstedt be considered as representatives from that group of stakeholders.

As an item listed on the agenda as “recommend,” Ms. Downey motioned to approve the three names. Mr. Adams seconded the motion, which carried without opposition.

## **5. Triennial Species Monitoring Report Outline**

Ron Rempel, SDMMT, presented the outline for the triennial species monitoring report. He discussed the various sections of the report, starting with a summary and organization of data from the first 12 years of monitoring in a spreadsheet. He spoke of incorporating lessons learned from the first 12 years of monitoring and analyzing the current monitoring efforts to prepare a draft five-year (2011 – 2016) program for monitoring. While not specifically called for in the Triennial Report, Mr. Rempel noted that adaptive management monitoring would be included in the report. In discussing the results section, Mr. Rempel described how the data will be related to the goals of the various plans, which are not consistent and will require evaluation on a plan-by-plan basis. Mr. Rempel finished by looking at future opportunities in regards to monitoring

efforts. Some of the components of this final section that he highlighted were protocol testing, monitoring based on risk groups, preserve-level monitoring programs, risk threat monitoring, improvement of data storage and access, standardization of the databases for monitoring data, and utilization of adaptive management monitoring.

Mr. Beck inquired if the report was going to provide an estimate of the cost and staff time necessary to implement the priorities that will result from the analysis. Mr. Rempel responded that they have started to research cost estimates. Mr. Beck added that it would be helpful to have a matrix to aide in understanding how much it will cost for monitoring the regional preserve system. Mr. Rempel responded that they are five to six months away from understanding how many hours are needed for various monitoring tasks and what is the hourly rate for the people that will be involved.

Barbara Redlitz, City of Escondido, wondered about how far the report will go in making recommendations or prioritizing options, in reference to Section 8 (Future Monitoring Options/Alternatives). Mr. Rempel responded that the primary component of the report will be Sections 1-5. He added that Section 6 (Adaptive Management Monitoring) was included to help people design monitoring efforts associated with adaptive management actions.

Jerre Stallcup, Conservation Biology Institute, asked if the centralized database would also include a centralized library of reports and other resources that have been collected. Mr. Rempel responded that it would. Ms. Stallcup asked if the report would summarize any Best Management Practices (BMPs) that might come out of the analyses. Mr. Rempel said they would put that in the report simply by discussing what has been done and what seems to be working, but that he did not anticipate saying definitively which BMPs should or should not be used.

Ms. Viatella asked if the purposes and goals of the report described in the summary include centralized databases, streamlining for recommendations, and cost efficiency. Mr. Rempel said they are an "implied requirement" for the Triennial Report, but not an explicit requirement, and that they will be included in the report, but not necessarily in the summary.

Mr. Beck asked if the report will make recommendations without having completed an analysis of functionality of linkage. Mr. Rempel responded that it would provide information on what has been done, adding that there are a number of questions that need to be answered before making recommendations on monitoring linkages. When Mr. Beck asked who would be answering those questions, Mr. Rempel stated that there was a subgroup of the monitoring group that would be meeting to try to identify the questions that need to be asked. He also mentioned bringing in independent scientists.

Ms. Stallcup asked if it would be possible to tabulate cumulative costs of monitoring over the past ten years. Mr. Rempel answered that calculating a total cost is not feasible with the high degree of variability between the different entities performing the monitoring. Ms. Stallcup inquired if SDMMMP will be working with science advisors; Mr. Rempel responded that they would.

## **7. Next Meeting Date and Adjourn**

Vice Chair Oberbauer adjourned the meeting at 2:15 p.m. The next meeting is scheduled for January 12, 2010.

**MID-YEAR STATUS REPORT ON ENVIRONMENTAL MITIGATION PROGRAM FUNDED ACTIVITIES**

		Total Allocation		Status of Activity
		FY06-10	FY 10	
<b>REGIONAL COORDINATION</b>				
1	Program Developer	\$450,000	\$150,000	Under contract to Ron Rempel
2	Program Administrator	\$0	\$0	
3	Management Coordinator	\$450,000	\$150,000	Contract being finalized
4	Monitoring Coordinator	\$450,000	\$150,000	Under contract to Jeff Tracey
5	Administrative Support	\$90,000	\$90,000	Discussing best way to use these funds
6	Biologist	\$0	\$0	
7	GIS Specialist	\$150,000	\$0	GIS intern hired. Additional funds for database coordinator
8	Database Specialist	\$0	\$0	
9	GIS/Database Technican	\$0	\$0	
<b>Subtotal Regional Coordination</b>		<b>\$1,590,000</b>	<b>\$540,000</b>	
<b>REGIONAL MANAGEMENT</b>				
10	Conserved Lands Database Development	\$125,000	\$0	Funds available to continue to complete project
11	Land Management Implementation	\$7,365,000	\$2,085,000	RFP out for FY 2010 land management projects
12	Invasive Species Mapping	\$250,000	\$0	Funds available to start work using on-call consultant
13	Updated Vegetation Mapping	\$600,000	\$300,000	Under contract to EDAW with CDFG as subconsultant
14	Enforcement	\$370,000	\$150,000	Under contract with CDFG and San Diego Shieriffs
15	Preseve level management plan standardization	\$225,000	\$225,000	Discussing best way to use these funds
<b>Subtotal Regional Management</b>		<b>\$8,935,000</b>	<b>\$2,760,000</b>	
<b>REGIONAL MONITORING</b>		<b>\$0</b>		
16	Post Fire Monitoring	\$1,725,000	\$0	Under contract to USGS - Fisher
17	Vegetation Monitoring	\$295,000	\$0	Under contract to SDSU - Deutschman
18	Rare and Endemic Plant Monitoring	\$300,000	\$0	Under contract to USGS- McEachern
19	California Gnatcatcher Monitoring	\$740,000	\$0	Under contract to USFWS - Winchell
20	California Coastal Cactus Wren Monitoring & Recovery	\$450,000	\$150,000	Amendment to USFWS contract being processed
21	Burrowing Owl Monitoring	\$295,000	\$150,000	Under contract to BioResource Inc.
22	Rare Butterfly Monitoring	\$230,000	\$60,000	Under contract to UNR (Thorne's) and pending contract SDSU (Hermes)
23	Wildlife Corridor and Linkages Monitoring (including genetic studies)	\$300,000	\$200,000	Working being scoped by Jeff Tracey
24	Other Species Monitoring (e.g. priority 2 species)	\$140,000	\$140,000	Discussing best way to use these funds
<b>Subtotal Regional Monitoring</b>		<b>\$4,475,000</b>	<b>\$700,000</b>	
<b>TOTAL FUNDING STRATEGY</b>		<b>\$15,000,000</b>	<b>\$4,000,000</b>	

**LAND MANAGEMENT GRANT FY 2009 STATUS**

<b>FY</b>	<b>Contract #</b>	<b>Contractor</b>	<b>Project</b>	<b>Funding Encumbered</b>
2009	50001324	City of Carlsbad, Parks and Recreation Departmen	Calavera Preserve Planning Area	\$286,667
2009	Pending	Zoological Society of San Diego & City of San Diego Water Department	Wild Animal Park	\$325,290
2009	5001327	California Wildlife Foundation	Rancho Jamul Fencing	\$393,043
2009	5001326	San Dieguito River Valley Conservancy	Hodges East & San Pasqual Valley	\$267,350
2009	5001323	Center for Natural Lands Management	Rancho La Costa, TET, Meadowlark	\$55,010
2009	5001325	Batiquitos Lagoon Foundation	Mitsuuchi Property	\$67,138
2009	50001321	Back Country Land Trust of San Diego County	Wright's Field MSCP Preserve	\$24,504
2009	5001322	Conservation Biology Institute/ California Invasive Plant Council	Invasive Species Manaement Plan	\$150,000
2009	Pending	City of Oceanside, Department of Public Works	Myers Property	\$60,998

**PROCESS FOR EMP WORKING GROUP'S REVIEW OF FY 2010 EMP LAND  
MANAGEMENT GRANTS**

Previous EMP Working Group members on ad hoc grant evaluation committee.

	2006	2008	2009
<b>Chair: Carrie Downey</b> SANDAG Board member, City of Coronado Councilmember	X		
<b>Vice Chair: Tom Oberbauer</b> County of San Diego		X	X
<b>Anne Harvey</b> San Diego Conservation Network			X
<b>Matt Adams</b> Building Industry Association			
<b>Bruce April</b> Caltrans	X	X	X
<b>Michelle Mattson</b> Army Corps of Engineers			
<b>Michael Beck</b> Endangered Habitats League			
<b>Jim Whalen</b> Alliance for Habitat Conservation			X
<b>Barabra Redlitz</b> City of Escondido, North County Inland			
<b>Deborah Townsend</b> Wildlife Conservation Board			
<b>Robert Fisher</b> USGS			
<b>Jeanne Krosch</b> City of San Diego		X	
<b>Mike Grim</b> City of Carlsbad, North County Coastal			X
<b>Kevin Mallory</b> City of Santee, East Suburban Communities		X	
<b>David Mayer</b> Department of Fish and Game	X	X	X
<b>Deborah Ruddock</b> California Coastal Conservancy			
<b>Kathy Viatella</b> The Nature Conservancy			
<b>Marisa Lundstedt</b> Chula Vista, South County			
<b>Susan Wynn</b> U.S. Fish and Wildlife Services	X	X	X
<b>Emily Young</b> The San Diego Foundation			
<b>Mary Jo Wilson (no longer on EMPWG)</b> National City, South County	X		

## CONSIDERATIONS FOR DEVELOPING WILDLIFE MOVEMENT STUDIES

### RESPONSES OF SMALL TERRESTRIAL VERTEBRATES TO ROADS IN A COASTAL SAGE SCRUB ECOSYSTEM

Cheryl Shaffer Brehme

#### ABSTRACT

I assessed the activity pattern of small mammals and lizards in relation to three types of roads transecting coastal sage scrub habitats. The bulk of data was generated for three small mammal species (*Chaetodipus fallax*, *Peromyscus eremicus*, and *Peromyscus maniculatus*) and two lizard species (*Sceloporus occidentalis* and *Cnemidophorus hyperythrus*). I characterized both relative abundance at two distances from each road and individual movement patterns in relation to each road in order to explore the effects of roads on species spatial and movement dynamics. The two habitat specialists exhibited decreased abundance next to different road types. The three habitat generalists either showed no difference or increased abundance by a road. This data generally supports previous studies that suggest habitat specialists are more sensitive to edges. All species exhibited decreased permeability to improved roads. The unimproved dirt road did not impede movement, while the primary highway was a barrier for all species. Responses to the secondary paved road differed among species. I suggest that species with open microhabitat preferences are more likely to venture out onto unimproved dirt and secondary paved roads. Those that did venture out onto improved roads suffered increased mortality due to vehicular traffic.

## **ARE HOTSPOTS OF EVOLUTIONARY POTENTIAL ADEQUATELY PROTECTED IN SOUTHERN CALIFORNIA?**

Amy G. Vandergast, Andrew J. Bohonak, Stacie A. Hathaway, Joshua Boy, Robert N. Fisher  
Biological Conservation 14(1) (2008) 1648–1664

### **ABSTRACT**

Reserves are often designed to protect rare habitats, or “typical” exemplars of ecoregions and geomorphic provinces. This approach focuses on current patterns of organismal and ecosystem-level biodiversity, but typically ignores the evolutionary processes that control the gain and loss of biodiversity at these and other levels (e.g., genetic, ecological). In order to include evolutionary processes in conservation planning efforts, their spatial components must first be identified and mapped. We describe a GIS-based approach for explicitly mapping patterns of genetic divergence and diversity for multiple species (a “multi-species genetic landscape”). Using this approach, we analyzed mitochondrial DNA datasets from 21 vertebrate and invertebrate species in southern California to identify areas with common phylogeographic breaks and high intrapopulation diversity. The result is an evolutionary framework for southern California within which patterns of genetic diversity can be analyzed in the context of historical processes, future evolutionary potential and current reserve design. Our multi-species genetic landscapes pinpoint six hotspots where interpopulation genetic divergence is consistently high, five evolutionary hotspots within which genetic connectivity is high, and three hotspots where intrapopulation genetic diversity is high. These 14 hotspots can be grouped into eight geographic areas, of which five largely are unprotected at this time. The multi-species genetic landscape approach may provide an avenue to readily incorporate measures of evolutionary process into GIS-based systematic conservation assessment and land-use planning.