APPENDICES

APPENDIX A: List of Acronyms and Abbreviations

APCD	Air Pollution Control District
CARB	California Air Resources Board
CCB	Center for Conservation Biology
CCD	Cooling Degree Day
C&D	Construction and Demolition
CDIP	Coastal Data Information Program
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CGCM3	Canadian General Circulation Model
CNRM	Centre National de Recherches Météorologiques (France)
CO_2	Carbon dioxide
CPP	Critical Peak Pricing
DOF	California Department of Finance
EIR	Environmental Impact Report
ENSO	El Niño/Southern Oscillation
EPA	Environmental Protection Agency
ESI	Environment and Sustainability Initiative
Focus 2050 Study	San Diego Foundation's Regional Focus 2050 Study
Foundation	The San Diego Foundation
FY	Fiscal year
GCM	Global Climate Model
GFDL	Geophysical Fluid Dynamics Laboratory
GHG	Greenhouse gas
GtC	Global carbon emissions
GWh	Gigawatt hours
IEUA	Inland Empire Utilities Agency
IPCC	Intergovernmental Panel on Climate Change
LIDAR	Light Detection and Ranging remote sensing system
MMRP	Mitigation, Monitoring and Reporting Program
MW	Megawatt
MWD	Metropolitan Water District
MWh	Megawatt hour
NAAQS	National Ambient Air Quality Standards
NCAR	National Center for Atmospheric Research (USA)
PM	Particulate matter
$PM_{2.5}$	Fine particulate matter
Ppmv	Parts per million by volume
RGF	Regional Growth Forecast
RO	Reverse osmosis
ROG	Reactive organic carbon
RTP	Regional Transportaion Plan
SANDAG	San Diego Association of Governments
SDG&E	San Diego Gas and Electric Company
SIO	Scripps Institution of Oceanography
SRES A2	A2 scenario from Special Report on Emissions Scenarios (IPCC)
SRES B1	B1 scenario from Special Report on Emissions Scenarios (IPCC)
UC	University of California
VMT	Vehicle Miles Traveled
Water Authority	San Diego County Water Authority

APPENDIX B: Future Research Needs and Unanswered Questions

PUBLIC HEALTH

Extreme Heat Events

What we want to predict (the model we propose to build)

- Number/duration/distribution? of "extreme heat events" with and without climate change
- Excess morbidity and mortality from climate change induced "extreme heat events"

Particulate Air Pollution Levels

What we know

- Current particulate air pollution levels
- Threshold particulate levels that cause effects on asthma, COPD, emphysema, bronchitis (others?)
- Current and future lung disease estimates based on non-climatic factors such as age, smoking etc.

What we need to know

- How air pollution particulate levels are expected to change as result of climate change
- What the particulate thresholds for increased lung disease are?
- Do we need specific thresholds for different segments of the population?

What we want to predict

- Future particulate air pollution levels
- Number of excess deaths/hospitalizations (other?) caused by predicted levels of particulates
- Synergistic effects with age, expected levels of smoking etc. (or are those already implicit in published particulate effect thresholds?)

Wildfires

What we need to know

- What thresholds are available for crude relationship of future temperature/precipitation patterns to wildfires?
- How will these conditions change wildfire patterns (severity, frequency, distribution?)
- How these changes will translate into fire-related injuries/deaths and short term lung disease changes

What we want to predict

- Number of wildfires with and without climate change
- Excess fire-related injuries/deaths from climate change induced wildfires
- Excess short term lung disease hospitalizations/deaths from increased smoke particulates during fires (not acute smoke inhalation injuries, which are considered fire-related injuries

Disease Vectors

What we need to know

- How vector dynamics are expected to change with changes in temperature and precipitation

- How vector monitoring/control efforts will need to change for weather changes (more frequent, more widespread, less effort if it gets drier?)
- What new vectors could survive/immigrate here with climate changes
- Duration/extent of past beach closures from colliform surges
- Do we need a more complex weather threshold for colliform surge prediction?
- What is threshold of energy blackout needed to shut down sewage treatment for long enough to cause colliform surge?
- Predicted frequency of future energy blackouts sufficiently severe to shut down sewage treatment and cause colliform surge
- Weather thresholds for "red tide" blooms?

What we want to be able to predict

- Predictive modeling not likely to be useful without a great deal of work. But we can pose the question: Is this work worth doing in the future?

Algal blooms

- Will climate change allow the local introduction of a toxic phytoplankton species from some other region?
- Will climate change allow local species to form more frequent, more intense, or more geographically widespread blooms?
- How do human pathogens – bacteria and viruses – interact with dense algal blooms?

Water Borne Disease

- Number/extent/distribution of beach closures due to colliform surges, with and without climate change (how to include energy failures in this model?)
- Extent/frequency of drinking water contamination events with and without climate change?
- Extent/frequency of severe "red tide" blooms with and without climate change?

ECOSYSTEMS AND BIODIVERSITY

Biodiversity inventories and monitoring: We cannot manage what we do not know about and reliable predictions about how coastal marine communities of San Diego will look in 2050 are impossible without proper biodiversity inventories and monitoring. It is particularly troublesome that microbial and meiofaunal communities, the key components of benthic ecosystems, remain very poorly studied along the California coast, including San Diego. For example, a recent study of intertidal ostracodes, a crustacean group common in the ocean, found that almost a quarter of the species sampled from the tidepools at Scripps Intertidal Reserve and Birdrock area in La Jolla were new to science[1]. This unlikely to be an isolated example and if anything the situation is probably worse for many of the other invertebrate groups that are common in San Diego[2]. Similarly, we know virtually nothing about the biodiversity of marine microbes in the intertidal and subtidal habitats of San Diego even though these organisms are critical components of biogeochemical cycles and essential for maintaining proper ecosystem functions.

[1] Frame, K., Hunt, G., and Roy, K. 2007.
[2] Roy, K., A.G. Collins, B.J. Becker, E. Begovic, and J.M. Engle. 2003.

Generating comprehensive biotic inventories and monitoring coastal marine ecosystems is a time and resource intensive endeavor and intensively sampling the entire San Diego coastal zone is impractical. A better alternative would be to establish a few benthic marine observatories (intertidal and subtidal) along the San Diego coast where the whole benthic ecosystem can be monitored using traditional ecological methods as well as genomic and sensor technologies. The resulting information, in conjunction with coastal oceanographic models, can be used to generate more specific predictions about the future of coastal marine ecosystems in San Diego.

Modeling of sea level rise and resulting changes in intertidal habitat: How much soft bottom intertidal habitats are we likely to lose in San Diego and how much artificial hard substrates are we likely to gain as a result of increased armoring of coastlines? As discussed above, sea level rise is likely to change the nature and extent of our intertidal habitats and potentially threaten two important intertidal marine reserves in San Diego. Models of sea level rise specific to San Diego county in conjunction with digital elevation maps of the coast can be used to predict the spatial pattern and rate of such habitat loss. These predictions are urgently needed for developing strategies to minimize the loss of intertidal biodiversity due to sea level rise.

Better information about the extent and consequences of harvesting: Recreational and artisanal harvesting of intertidal and shallow subtidal species is rampant along the coast of San Diego but data about which species are targeted and the catch sizes are virtually nonexistent. It is very likely that harvesting pressure will continue to increase as more people make San Diego their home but the problem has largely been neglected. As discussed above, harvesting has already led to demonstrable negative effects on coastal biodiversity in San Diego as well as southern California[3] and is likely to have an impact on the abilities of species and populations to adapt to future climate change.

Quantitative information about the extent and nature of nutrient input and metal pollution: Nutrient loading of coastal waters from point and non-point sources is a growing and important problem along most coastlines and San Diego is no exception. San Diego and Mission Bay are particularly impacted by a variety of land-derived pollutants, but the problem also plagues some open coast ecosystems and these impacts are likely to rise. Quantitative information about how the chemistry of our coastal waters is changing as a result of land-derived inputs and how such changes are impacting ecosystem processes is urgently needed.

Coupled dynamics of terrestrial, coastal marine and human systems: It is becoming clear that the traditional approach of separately studying coastal marine habitats and the adjacent ones on land is insufficient for predicting how coastal zone ecosystems will look in a warmer and more urbanized San Diego. In reality these ecosystems are coupled in the sense that changes in one affects the other. For example changes in land use patterns along the coastal watersheds lead to changes in sediment input and nutrient fluxes into the coastal marine waters thereby affecting the near shore species and ecosystems. Resulting changes in the abundances of near shore fish and invertebrate species can impact some of our recreational and commercial fisheries. Thus it would be beneficial to replace the traditional model of separately studying the terrestrial and marine components with one that treats these as a coupled system.

*Strategies to Preserve Biodiversity and Ecosystems:*There are action strategies that can help to maintain our region's rich biodiversity. We need to foster growth patterns that are compatible

[3] Sagarin, R.D. et al. 2007., Fenberg, P.B. and Roy, K. 2008. , Fenberg, P.B. 2008.

with protection of biodiversity and ecosystem function, and do not subject human lives and property to unnecessary risk in this fire prone ecosystem.

- Protect landscape-scale reserve network to enhance resilience to climate change, e.g., through the completion and implementation of MSCP plans.
- Protect/restore buffers for constrained features (e.g., undeveloped coastline)
- Reduce fragmentation of intact landscapes by infrastructure (e.g., transportation corridors, housing development, energy transmission lines, border security infrastructure.)
- Maintain ecological permeability of human modified "matrix" habitat (e.g., by protecting "working landscapes")
- Engage local and regional land use and management planning efforts in jurisdictions outside of the County, as the viability of species and the functionality of ecosystems will be dependent on ecological cohesion and integrity at that scale as well.

In addition, it will be important to:

- Increase investment in efficient and informative biological monitoring, and effective conservation management
- Estimate and elucidate effects of climate driven change on priority species, communities, places, and resources of San Diego County
- Identify anticipatory restoration/habitat creation opportunities (e.g., accelerating restoration of cactus patches following fire to reduce habitat limitation for cactus wren)
- Identify and protect likely climate refugia (e.g., identify refugia from past sea level rise and protect those as possible "evolutionary hotspots")
- Create catastrophic response capacity (e.g., to engage in restoration/invasives control following fire or flooding/scouring events)
- Organize and leverage the considerable conservation assets in the County – from research institutions to business leaders to community volunteer networks – to meet the various data, planning, management and monitoring needs.

Action items:

- Enhance the commitment of the San Diego community to demonstrably reduce and effectively mitigate greenhouse gas emissions.
- Foster growth patterns that are compatible with protection of biodiversity and ecosystem function, and do not subject human lives and property to unnecessary risk in this fire-prone ecosystem. Mobilizing early to reduce non-climate stressors to our ecosystems is most likely to increase resilience of our systems, and will likely also be most cost effective over the long-term.
- Protect landscape-scale conservation reserve network to enhance resilience to climate change, e.g., through the completion and implementation of MSCP plans. The reserve must well-represent the diversity of habitats, ideally with redundancy.
- Protect/restore buffers for constrained features (e.g., undeveloped coastline and lagoons)
- Reduce fragmentation of intact landscapes by infrastructure (like transportation corridors, housing development, energy transmission lines, border security infrastructure.)
- Maintain ecological permeability of human modified "matrix" habitat (e.g., by protecting "working landscapes")

- Engage local and regional land use and management planning efforts in jurisdictions outside of the County, as the viability of species and the functionality of ecosystems will be dependent on ecological cohesion and integrity at that scale as well.
- Increase investment in efficient and informative biological monitoring, climate and ecosystem impact projection (e.g., direction of habitat shifts), and effective conservation management.
- Estimate and elucidate effects of climate driven change on priority species, communities, places, and resources of San Diego County
- Evaluate future development, community and management projects in the context of climate change.
- Identify anticipatory restoration/habitat creation opportunities (e.g., accelerating restoration of cactus patches following fire to reduce habitat limitation for cactus wren)
- Identify and protect likely climate refugia (e.g., identify refugia from past sea level rise and protect those as possible “evolutionary hotspots”)
- Create catastrophic response capacity (e.g., to engage in restoration/invasives control following fire or flooding/scouring events)
- Organize and leverage the considerable conservation assets in the County – from research institutions to business leaders to community volunteer networks – to meet the various data, planning, management and monitoring needs. The effectiveness of partnerships across jurisdictions (within and beyond San Diego County) and across disciplines will determine the success of the inter-generational adaptive management experiment ahead.

References

Fenberg, P.B. and K. Roy. 2008. Ecological and evolutionary consequences of size-selective harvesting: how much do we know? *Molecular Ecology* 17: 209-220.

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Frame, K., Hunt, G., and Roy, K. 2007. Intertidal meiofaunal biodiversity with respect to different algal habitats: A test using phytal ostracodes from southern California. *Hydrobiologia* 586:331-342.

Roy, K., A.G. Collins, B.J. Becker, E. Begovic, and J.M. Engle. 2003. Anthropogenic impacts and historical decline in body size of rocky intertidal gastropods in Southern California. *Ecology Letters* 6: 205-211.

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APPENDIX C: SANDAG Settlement Agreement

SANDAG Contract No. 5001000

SETTLEMENT AGREEMENT WITH RELEASE OF ALL CLAIMS

This Settlement With Release Of All Claims (hereinafter "Agreement") is entered into by and between Save Our Forest and Ranchlands and Duncan McFetridge (hereinafter "SOFAR"), Affordable Housing Coalition of San Diego County, Citizens for Responsible Equitable Environmental Development, and San Diego Public-Transit Riders' Alliance (hereinafter collectively referred to as "Alliance") and the SAN DIEGO ASSOCIATION OF GOVERNMENTS and its Board of Directors, employees, officers, representatives, insurers, attorneys, agents, successors, and assigns (hereinafter "SANDAG").

WHEREAS, on November 30, 2007, SANDAG and the SANDAG Board of Directors approved the 2030 Regional Transportation Plan, Pathways for the Future ("2007 RTP" or "Project"), certified the Final Environmental Impact Report ("FEIR") for the Project, and posted a Notice of Determination for the Project pursuant to the California Environmental Quality Act (Public Resources Code, § 21000 et seq.) ("Project Approval"); and

WHEREAS, Alliance and SOFAR (hereinafter collectively "Petitioners") gave notice of a claim against SANDAG under CEQA alleging insufficiencies in EIR for the Project (the "CEQA Claims") and challenging the Project Approval; and

WHEREAS, SANDAG denies Petitioners' allegations; and

WHEREAS, Petitioners and SANDAG, without admitting or acknowledging any liability and solely to avoid the expense of litigation and buy their peace, desire to settle fully and finally any and all current or future differences between them concerning the Project Approval, including, but in no way limited to the CEQA Claims, under the terms and conditions set forth below; and

WHEREAS, SANDAG is committed to addressing climate change impacts pursuant to the California Global Warming Solutions Act of 2006;

NOW THEREFORE, in consideration of the mutual covenants and promises herein contained and other good and valuable consideration, receipt of which is hereby acknowledged, Petitioners and SANDAG hereby agree to all of the following conditions and terms in this Agreement:

1. Petitioners hereby release and unconditionally absolve SANDAG from any and all liabilities, debts, or obligations of any kind or character that it has had, now has, or may have in the future, which arise from or are in any way related to, the CEQA Claims or the Project Approval, relating to events that have occurred as of the date of this Agreement. Petitioners will not file any complaints, claims, grievances, or other actions against SANDAG with any state, federal, or local agency or court with regard to or related to the CEQA Claims or the Project Approval relating to events that have occurred as of the date of this Agreement. This Agreement releases and forever discharges SANDAG from any and all past, present, or future charges, complaints, claims, lawsuits, and liabilities of any kind or nature whatsoever, known or unknown, suspected or unsuspected regarding events that have occurred as of the date of this Agreement and arising from or relating to the CEQA Claims or the Project Approval, to the maximum extent permitted by law. All such claims are forever barred by this

Agreement without regard to whether those claims are based upon any alleged breach of duty arising in a statute, contract, or tort; any alleged unlawful act; any other claim; and regardless of the forum which it might be brought.

2. SANDAG hereby releases and unconditionally absolves Petitioners from any and all liabilities, debts, or obligations of any kind or character that it has had, now has, or may have in the future, which arise from or are in any way related to, the CEQA Claims or the Project Approval. This Agreement releases and forever discharges Petitioners from any and all past, present, or future charges, complaints, claims, lawsuits, and liabilities of any kind or nature whatsoever, known or unknown, suspected or unsuspected regarding events that have occurred as of the date of this Agreement and arising from or relating to the CEQA Claims or the Project Approval, to the maximum extent permitted by law. All such claims are forever barred by this Agreement without regard to whether those claims are based upon any alleged breach of duty arising in a statute, contract, or tort; any alleged unlawful act; any other claim; and regardless of the forum which it might be brought.

3. In consideration of the foregoing and without admitting to the viability of any of Petitioners' claims, SANDAG shall pay SOFAR $58,000 and Alliance $16,250 for alleged attorneys' fees, without any deductions or withholdings. These amounts shall be payable by check within 30 days following execution of this Agreement by SANDAG's Executive Director. Payment to SOFAR shall be via check made out to "Shute, Mihaly & Weinberger LLP" and mailed to SOFAR's legal counsel, Rachel Hooper, of Shute, Mihaly & Weinberger at 396 Hayes Street, San Francisco, California 94102. Payment to Alliance shall be made payable to "Briggs Law Corporation, in trust for Affordable Housing Coalition of San Diego County, Citizens for Responsible Equitable Environmental Development, and San Diego Public-Transit Riders' Alliance" and mailed to: Briggs Law Corporation, 99 East "C" Street, Suite 111, Upland, CA 91786. These amounts shall be the full and final amount of compensation paid by SANDAG to Petitioners for all Petitioners' claims relating to the CEQA Claims or Project Approval.

4. For projects requiring environmental review under CEQA (requiring, for example, an EIR or a negative declaration), SANDAG will not tier off of or otherwise rely upon the FEIR for the 2007 RTP. Furthermore, without limiting the foregoing, SANDAG agrees to conduct project level environmental documents for specific projects in the 2007 RTP instead of tiering off of the FEIR for the 2007 RTP.

5. Additionally, SANDAG agrees to do the following:

Downtown Transportation Plan

A. Continue to participate in the development of the Downtown Transit Plan ("Study") being prepared by Center City Development Corporation ("CCDC"), the results of which Study SANDAG understands will be analyzed in an EIR and presented to the San Diego City Council to approve, reject or modify.

B. Should the City of San Diego adopt the "Transit Oriented Alternative" (Alternative), SANDAG shall analyze the transit projects included in the Alternative as components of the preferred alternative analyzed in the environmental impact report for the 2011 Regional Transportation Plan (2011 RTP EIR). Notwithstanding the foregoing, the parties expressly recognize that SANDAG is obligated to include

in the EIR only those projects of regional importance that are typically and appropriately contained in a Regional Transportation Plan (RTP).

C. Prior to the adoption of the 2011 RTP, seriously consider implementing transit projects included in the Alternative that do not require an RTP amendment and that are adopted by the City of San Diego.

D. Include transit mode share goals for various regional communities and corridors, including downtown San Diego, as part of the 2011 RTP, and factoring the goals into the regional long range transit plan referenced below in this Agreement.

E. If SANDAG places a "Quality of Life" sales tax measure on the ballot that includes a transit component, a portion of the sales tax will be allocated to fund capital and/or operating costs for transit projects to the extent they may be included in the Alternative adopted by the City of San Diego.

Transit Plan with Urban Core Emphasis

F. Develop a regional long-range transit plan, and five-year and ten-year transit action plans ("Plans"), with emphasis given to the urban core, which for purposes of this Agreement the parties understand to mean that geographic sub-area that includes the downtown San Diego Trolley Ring and National City. The Plans would not, however, constitute an approval to implement the specific transit projects included in the Plans unless such projects are selected following all environmental reviews required by CEQA.

G. Incorporate the work from the Downtown Transit Plan, the 2007 RTP, the Regional Comprehensive Plan, the Air/Rail Network Planning Study, Climate Change Action Plan, and other recent, relevant studies when preparing the urban core portion of the long range transit plan.

H. Include the following components in the long range transit plan:

   i. An investigation of regional, corridor, local, and neighborhood transit services (e.g., transit capital improvements; operational changes; fare restructuring; design of intermodal transfer facilities) that would make transit time competitive with the private car;
   ii. An investigation of transit capital and operational funding strategies;
   iii. A public education program regarding transit services;
   iv. Strategies for increasing pedestrian and bicycling use;
   v. A parking management program; and
   vi. Identification of transit mode share targets or goals.

I. Use SANDAG's standard process for selecting a consultant to develop the long range transit plan, which includes developing a potential list of consultants, public advertisement, consultant interviews and selection, and then working with the top ranked consultant to finalize the scope of work. As part of this consultant selection process for the long range transit plan, Petitioners will be given the opportunity to do the following, provided, however, SANDAG shall have final authority for consultant selection:

i. Consult with SANDAG on the RFP Scope of Work;
ii. Supplement the list of consultants that will be sent a notice of the RFP;
iii. Provide input regarding the evaluation criteria that will be used to select a consultant;
iv. Review the proposals of the consultants short-listed for interviews by the SANDAG evaluation committee; and
v. Conduct separate interviews of the short-listed consultants and provide feedback to the evaluation committee.

J. Provide petitioners with the opportunity to participate in the long range transit plan work, including meetings and review of draft plans after such plans have been reviewed internally by SANDAG staff and approved for release to the Petitioners by SANDAG's attorneys.

K. Analyze the transit projects included in the Plans in the environmental impact report for the 2011 Regional Transportation Plan ("2011 RTP EIR") at a level at least equal to the EIR's analysis of projects located in the urban core that are included in the 2011 RTP EIR's preferred alternative. Notwithstanding the foregoing, the parties expressly recognize that SANDAG is obligated to include in the EIR only those projects of regional importance that are typically and appropriately contained in a Regional Transportation Plan.

Study Regarding Impediments to Public Transit

L. SANDAG shall undertake a comprehensive study, and thereafter issue a final report that identifies and analyzes (i) all known and reasonably foreseeable financial impediments to maintaining long-term public-transit service levels throughout San Diego County; (ii) all known and reasonably foreseeable impediments to maintaining long-term public-transit ridership throughout San Diego County; and (iii) all known and reasonably foreseeable recurring sources (i.e., not one-time sources) that provide or can provide funding to cover operational expenses for public transit throughout San Diego County. The study and report may be completed independently or in conjunction with any other project or activity undertaken by SANDAG. The identification and analysis of financial impediments shall include, but not be limited to, information on the third-party requirements for SANDAG to obtain and use such funding. The identification and analysis of ridership impediments shall include, but not be limited to, surveys of actual and potential riders for the purpose of determining how best to structure public transit so as to increase and maintain long-term ridership. The final report shall include alternatives SANDAG could implement in order to overcome impediments identified in the report, increase and maintain service levels, and increase and maintain funding for operational expenses to the fullest extent possible. SANDAG's Board of Directors shall consider implementation of the alternatives at a public meeting to be held not more than 60 days after issuance of the final report. The final report, along with all supporting and other back-up materials, shall be available to the public. The report shall be completed and posted on SANDAG's Web not more than 12 months after the execution of the Agreement.

Double Track Coastal Rail

M. Not later than 12 months after the execution of this Agreement, provide a status report of double-tracking projects to the Petitioners, which includes identifying those segments that are to be implemented within next five years.

N. Seek the funding to implement an expeditious schedule for remaining segments that have been identified for double tracking in the coastal rail corridor.

O. Prepare a schedule to estimate when the remaining double track segments will be constructed, based on estimates of future available/pending funding.

P. Provide matching funds for coastal rail segments if Proposition 1B funds or other early funding sources become available for double track projects.

Q. Continue to work with NCTD, Caltrans, and Amtrak on improvements to the coastal rail corridor.

R. Continue to work at the regional, state, and federal levels to make improvements to the rail corridor as funding becomes available.

S. If SANDAG places a sales tax measure on the ballot, it will consider and fully evaluate dedicating a portion of the proceeds from the measure to unfunded segments of double-tracking of the Coastal Rail.

Smart Growth Incentive Program

T. Invite feedback from Petitioners in developing Smart Growth Incentive Program criteria.

U. Update the Smart Growth Concept Map to delineate areas that are served by existing and/or planned and "funded" transit.

V. When developing the criteria for eligibility, SANDAG will give priority when ranking projects to areas near transit and areas with the greatest potential for increasing walking and biking and shortening vehicle trips.

W. Explore opportunities for increasing funding of the Smart Growth Incentive Program and leverage Smart Growth Incentive Program funds with federal, state, and other local funds when they are available.

Safe Routes to School Strategy

X. Work through its Bicycle and Pedestrian Working Group to determine how SANDAG can expand Safe Routes to School programs in the region.

Y. Leverage state and federal funding for Safe Routes to School programs with other funding that may be available to accomplish the same or similar goals.

Z. Prepare, adopt and implement a Safe Routes Strategy ("Strategy") and provide the resources necessary for SANDAG to carry out its responsibilities under the Strategy.

AA. Include recommendations on steps for implementation and identify the roles and responsibilities of entities who should be involved in the implementation of the Strategy.

BB. Research efforts in Marin County and SACOG to determine how programs such as these can be implemented in the San Diego region as part of preparing the Strategy.

CC. Work with school districts in the region on Safe Routes to School Programs by:

i. Offering technical expertise and training (including holding workshops);
ii. Working with jurisdictions to identify necessary infrastructure improvements as part of preparing the Strategy;
iii. Collaborating on a public awareness campaign to educate parents, teachers, and students about the benefits of walking and biking to school; and
iv. Serving as a clearinghouse for Safe Routes to School programs and opportunities upon request by a school district.

5. The parties hereto hereby agree that all rights under section 1542 of the Civil Code of the State of California are hereby waived by the Parties. Section 1542 provides as follows:

A general release does not extend to claims which the creditor does not know or suspect to exist in his favor at the time of executing the release, which if known by him must have materially affected his settlement with the debtor.

Notwithstanding the provisions of section 1542 of the Civil Code of the State of California, Petitioners hereby irrevocably and unconditionally release and forever discharge SANDAG and all persons acting by, through, under, or in concert with any of them from any and all charges, complaints, claims, and liabilities of any kind or nature whatsoever, known or unknown, suspected or unsuspected which Petitioners at any time heretofore had or claimed to have or which Petitioners may have or claim to have regarding events that have occurred as of the date of this Agreement, including, without limitation, any and all claims related to or in any manner incidental to the CEQA Claims or the Project Approval.

6. Petitioners and SANDAG acknowledge and agree that they:

A. Have had a reasonable opportunity and a reasonable time to consider this Agreement before ratifying and executing it.

B. Knowingly and voluntarily agree to all the terms and conditions in this Agreement.

C. Knowingly and voluntarily agree to be completely legally bound by and to all the terms and conditions in this Agreement.

D. Have been advised and hereby are advised again in writing to consult with an attorney prior to ratifying and executing this Agreement.

E. Have consulted with an attorney prior to ratifying and executing this Agreement.

7. Petitioners understand that this Agreement shall not be binding on SANDAG unless or until it is approved and executed by SANDAG's Executive Director.

8. The parties hereby represent and acknowledge that in executing this Agreement they do not rely and have not relied upon any representation or statement made by any of the parties, agents, officers, employees or representatives with regard to the subject matter, basis, or effect of this Agreement or otherwise, other than those specifically stated in this written Agreement.

9. This Agreement shall be binding upon the parties hereto and upon their heirs, administrators, representatives, executors, successors, assigns; and shall inure the benefit of said parties and to their heirs, administrators, representatives, executors, successors and assigns. Petitioners expressly warrant that they have not transferred to any person or entity any rights, causes of action, or claims released in this Agreement.

10. This Agreement shall be governed and construed under the laws of the State of California. Should any provision of this Agreement be declared or be determined by any court of competent jurisdiction to be wholly or partially illegal, invalid, or unenforceable, the legality, validity, and enforceability of the remaining parts, terms, or provisions shall not be affected thereby, and said illegal, invalid, or unenforceable part, term, condition or provision shall be severed from this Agreement.

11. The individual executing this Agreement hereby represent that they are authorized to bind the parties they represent to this Agreement.

12. This Agreement sets forth the complete and entire agreement between the parties hereto and fully supersedes any and all prior agreements or understandings, written or oral, between the parties hereto pertaining to the subject matter hereof. No modification or addendum to this Agreement shall be effective or binding unless in writing and signed by the parties hereto. This Agreement may be signed in counterparts. Each signed copy of the Agreement shall be treated as an original.

13. This Agreement shall be interpreted in accordance with the plain meaning of its terms and not strictly for or against any of the parties hereto.

14. This Agreement may be executed in counterparts, all of which, when taken together shall constitute a fully executed original.

15. Each party agrees to cooperate and to perform such further acts and to execute and deliver any and all further analysis that may be reasonably necessary to effectuate the express purpose of this Agreement.

16. It is further understood and agreed that if, at any time, a violation of any term of this Agreement is asserted by any party hereto, that party shall have the right to seek specific performance of that term and/or any other necessary and proper relief, including but not limited to damages, from any court of competent jurisdiction, and the prevailing party shall be entitled to recover its reasonable costs and attorneys' fees.

17. Any notice to be given or other document to be delivered by any party to another party under this Agreement may be deposited in the United States mail in the State of California, duly certified or registered, return receipt requested, with postage prepaid, or by Federal Express or other similar overnight delivery service, or by facsimile addressed to the party for whom intended as follows:

To Alliance: Briggs Law Corporation
5663 Balboa Avenue, No. 376
San Diego, CA, 92111-2705
Attn: Cory J. Briggs
Phone No: (909) 949-7115
Facsimile No: (909) 949-7121

To SANDAG: 401 B Street, Suite 800
San Diego, California 92101
Attn: Julie Wiley, General Counsel
Phone No: (619) 699-1900
Facsimile No: (619) 699-1995

To SOFAR: PO Box 475
Descanso, CA 91916.
Attn: Duncan McFetridge
Phone No: 619-445-9638
Facsimile No: 619-659-8962

To SOFAR Counsel: Shute, Mihaly & Weinberger LLP
396 Hayes Street
San Francisco, CA 94102
Attn: Rachel B. Hooper
Phone No: (415) 552-7272
Facsimile No: (415) 552-5816

To SOFAR Counsel: Coast Law Group
169 Saxony Road, Suite 204
Encinitas, CA 92024
Attn: Marco Gonzalez
Phone No: 760-942-8505
Facsimile No: 760-942-8515

Any party may from time to time, by written notice to the other, designate a different address, which shall be substituted for the one above specified. Unless otherwise specifically provided for in this Agreement, all notices, payments, demands, or other communications shall be in writing and shall be deemed to have been duly given and received (i) upon personal delivery, or (ii) as of the business day after mailing by United States registered or certified mail, return receipt requested, postage prepaid, addressed as set forth above, or (iii) the immediately succeeding business day after timely deposit with Federal Express or other equivalent overnight delivery system, or (iv) if sent by facsimile, upon confirmation if sent before 5:00 p.m. on a business day or otherwise on the business day following confirmation of such facsimile, and provided that notice is

facsimile, upon confirmation if sent before 5:00 p.m. on a business day or otherwise on the business day following confirmation of such facsimile, and provided that notice is also sent on the same day by one of the methods described above.

18. Failure to insist on compliance with any term, covenant, or condition contained in this Agreement shall not be deemed a waiver of that term, covenant or condition, nor shall an waiver or relinquishment of any right or power contained in this Agreement at any one time or more times be deemed a waiver or relinquishment of any right or power at any other time or times.

SAN DIEGO ASSOCIATION OF GOVERNMENTS

4/30/08
GARY L. GALLEGOS Date
Executive Director

Approved as to form

4/30/08
JULIE D. WILEY Date
Office Of General Counsel

SOFAR

4/29/08
DUNCAN MCFETRIDGE Date

Approved as to form by counsel for SOFAR

4/29/08
RACHEL HOOPER Date
Shute, Mihaly & Weinberger

AFFORDABLE HOUSING COALITION OF SAN DIEGO COUNTY, CITIZENS FOR RESPONSIBLE EQUITABLE ENVIRONMENTAL DEVELOPMENT, AND SAN DIEGO PUBLIC-TRANSIT RIDERS' ALLIANCE BY THEIR ATTORNEY: CORY BRIGGS OF BRIGGS LAW CORPORATION

29 APR 08
CORY BRIGGS Date
Briggs Law Corporation

APPENDIX D: San Diego Regional Governance and Agencies

San Diego Association of Governments

The 18 cities and the county government of San Diego make up the San Diego Association of Governments (SANDAG), which serves as the forum for regional decision-making and planning. SANDAG is governed by a Board of Directors composed of mayors, council members, and county supervisors from each of the region's 19 local governments.[1] SANDAG has jurisdiction over activities that contribute to climate change, including land use, transportation and energy planning. The Regional Comprehensive Plan (RCP) serves as the long-term planning framework for the San Diego region. It provides a broad context in which local and regional decisions can be made that move the region toward a sustainable future, integrating local land use and transportation decisions. The SANDAG Board of Directors adopted the 2030 San Diego Regional Transportation Plan on November 30, 2007.

In June 2007 SANDAG entered into an agreement with the California Energy Commission to develop a Regional Climate Action Plan.[2] This Plan will translate the state greenhouse-gas (GHG) reduction targets under AB32 to the regional level, and include a regional GHG inventory, a business-as-usual forecast, GHG reduction scenarios, and policy planning and implementation.[3]

Regional Transportation Plan

The updated 2030 San Diego Regional Transportation Plan (RTP) was adopted by the SANDAG Board of Directors on November 30, 2007. Updated every four years, the 2030 RTP is the public policy blueprint for how people and goods will move around the San Diego region. Under the California Environmental Quality Act (CEQA), SANDAG has an obligation to consider global warming impacts in environmental documents. SANDAG received comments on the RTP Environmental Impact Report (EIR) Notice of Preparation from the State Attorney General's office, which stated that the RTP authorized projects that will result in significant increases in emissions of greenhouse gasses and requested that SANDAG "evaluate the GHG impacts of priorities and projects in the Transportation Plan and discuss feasible alternatives and mitigation measures to avoid or reduce those impacts." [Edmund G. Brown, Jr. Comments on the Notice of Preparation for Draft Environmental Impact Report for the 2007 Regional Transportation Plan (SCH Number 2007051145) June 27, 2007]

On November 29, 2007, the Attorney General's office submitted comments on the RTP EIR stating that SANDAG did not fully analyze climate change impacts and should adopt additional mitigation measures to reduce these impacts. Specifically, the letter stated that the SANDAG Smart Growth Concept Map misguidedly includes suburban and rural areas that cannot be served efficiently by transit and will not be effective in reducing GHG emissions if it directs funds to all these areas. The Attorney General also commented that:

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[1] SANDAG. 2008. About SANDAG. Retrieved on April 10, 2008. Available at: http://www.sandag.org/index.asp?fuseaction=about.home.

[2] SANDAG. White Paper on Climate Change Planning Issues. SANDAG Board of Directors Meeting, January 25, 2008.

[3] Id.

- The EIR fails to consider a reasonable alternative that would substantially reduce investment in new freeway lanes and allocate funding to projects such as expanding public transit;
- The EIR does not adequately evaluate and identify the impacts of the numerous freeway widening projects included in the proposed RTP;
- SANDAG could adopt a more comprehensive policy to require all funded projects to mitigate GHG impacts from construction; and
- SANDAG could have a significant impact on climate change by implementing a program to educate, encourage and assist jurisdictions in developing safe routes to school programs.

(Edmund G. Brown, Jr. Comments on the Draft Environmental Impact Report For the 2007 Regional Transportation Plan (SCH Number 2007051145) November 29, 2007).

County of San Diego Agencies

Land Use and Environment Group

The Land Use and Environment Group (LUEG) was established to unify the County's efforts in environmental preservation, quality of life, economic development, recreation and infrastructure development and maintenance. LUEG departments include the Air Pollution Control District, Department of Environmental Health, and the Department of Planning and Land Use.

Air Pollution Control District

The Air Pollution Control District (APCD) is the agency that regulates sources of air pollution within San Diego County. The County Board of Supervisors sits as the Air Pollution Control Board. The mission of the APCD is "to protect the public from the harmful effects of air pollution, achieve and maintain air quality standards, foster community involvement, and develop and implement cost-effective programs meeting state and federal mandates, considering environmental and economic impacts." 4 The APCD accomplishes its mission through monitoring, engineering, and compliance operations.

Department of Environmental Health

The Department of Environmental Health (DEH) "enhances San Diegans quality of life by protecting public health and safeguarding environmental quality, educating the public to increase environmental awareness, and implementing and enforcing local, State, and federal environmental laws". DEH regulates, among other things, food safety, public housing, wastewater systems, recreational water, underground storage tanks and cleanup oversight, and medical and hazardous materials and waste. In addition, DEH serves as the solid waste local enforcement agency, prevents disease carried by rats and mosquitoes, and helps to ensure safe workplaces for County employees.[5]

Department of Planning and Land Use

The purpose of the Department of Planning and Land Use (DPLU) is to "maintain and protect

[4] San Diego Air Pollution Control District. 2008. About the APCD. Retrieved on April 10, 2008. Available at: http://www.sdapcd.org/info/facts/about_us.pdf.
[5] County of San Diego. 2008. *Environmental Health*. Available at: http://www.sdcounty.ca.gov/deh/.

public health, safety and well-being" and to "(p)reserve and enhance the quality of life for County residents by maintaining a comprehensive general plan and zoning ordinance, implementing habitat conservation programs, ensuring regulatory conformance, and performing comprehensive community outreach".[6] The Multiple Species Conservation Program (MSCP), as described in Chapter 8, is a habitat conservation program which is a part of DPLU.[7]

Health and Human Services Agency

The Health and Human Services Agency (HHSA) is headed by a director who is accountable to the County's Chief Administrative Officer and the Board of Supervisors. Public Health Services, a program of HHSA, is "dedicated to community wellness and health protection in San Diego County". Public Health Services works to prevent epidemics and the spread of disease, protect against environmental hazards, prevent injuries, promote and encourage healthy behaviors, respond to disasters and assist communities in recovery and assure the quality and accessibility of health services throughout the county.[8]

San Diego County Water Authority

The San Diego County Water Authority (CWA) is a water wholesaler that provides water to 23 member agencies in the San Diego region, including six cities, four water districts, eight municipal water districts, three irrigation districts, a public utility district, and a federal military reservation.[9] The agencies are represented through the 34-member Board of Directors. The City of San Diego is the largest member agency.

The Water Authority was formed in 1944 by the California State Legislature, and operates under the County Water Authority Act under the California State Water Code. The Water Authority is one member of the Metropolitan Water District of Southern California, supplying up to 90% of San Diego County's water. In February 2008, the County Water Authority formed the Water Utility Climate Alliance (WUCA), made up of eight of the nation's largest water providers. The alliance will "work to improve research into the impacts of climate change on water utilities, develop strategies for adapting to climate change and implement tactics to reduce their greenhouse gas emissions."[10]

[6] County of San Diego. 2008. *Planning and Land Use*. Available at: http://www.sdcounty.ca.gov/dplu/
[7] County of San Diego. 2008. *Multiple Species Conservation Program*. Available at: http://www.sdcounty.ca.gov/dplu/mscp/index.html
[8] County of San Diego. 2008. *About HHSA*. Available at: http://www2.sdcounty.ca.gov/hhsa/
[9] San Diego County Water Authority Water Resources Department. 2007. Updated 2005 Urban Water Management Plan. Available at: http://www.sdcwa.org/manage/2005UWMP.phtml .
[10] San Diego County Water Authority. February 26, 2008. Metropolitan, Water Authority Join Other Major U.S. Water Agencies to Form New National Climate Alliance. Retrieved on April 10, 2008. Available at: http://www.sdcwa.org/news/2008_0226_climatealliance.phtml.

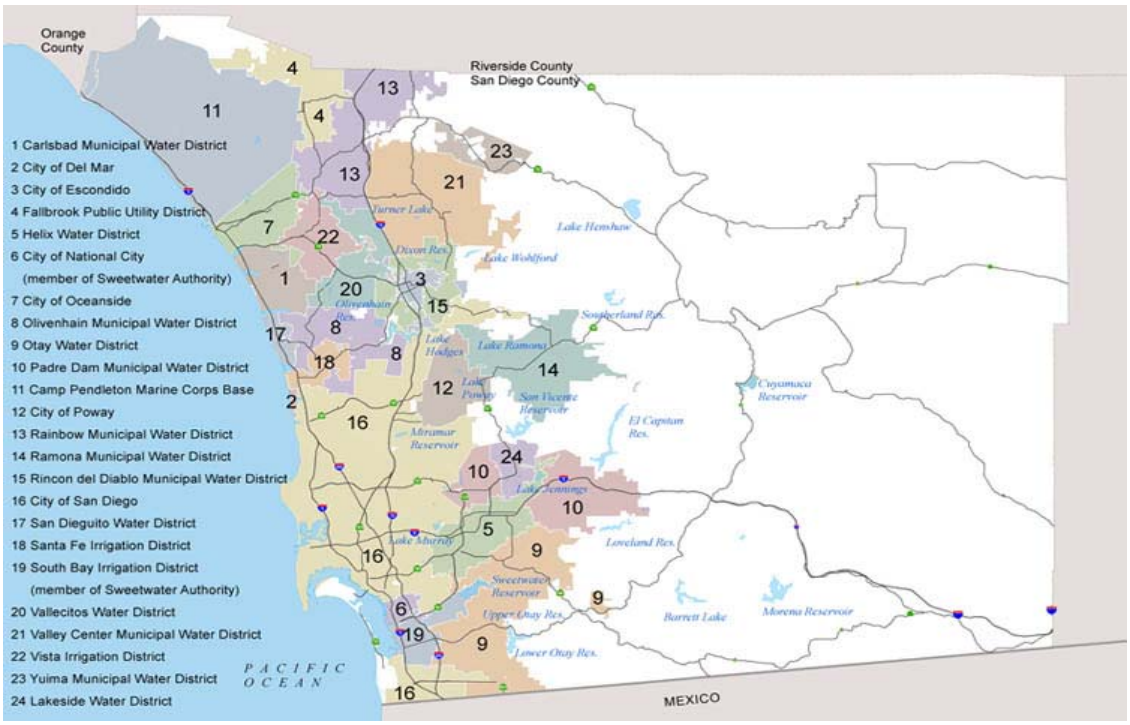

Figure D-1. Map of County Water Authority Member Agencies

The California Water Code requires all urban water suppliers in the state to prepare urban water management plans and update them every five years. The County Water Authority adopted its Updated Urban Water Management Plan in 2005, identifying water resources projected to be developed by 2030 in order to plan for long-term water supply reliability for the region.

San Diego County Regional Airport Authority

The San Diego County Regional Airport Authority is a public entity created by state law to operate the Airport and plan for the region's future air transportation needs. The Department of Environmental Affairs' key responsibilities are to plan for and promote sustainable airport development; ensure compliance with all environmental laws and regulations; responsibly manage environmental issues pertaining to the airport's operations and its potential impacts to surrounding areas; protect and promote the natural resources within the Airport Authority's jurisdiction; and disseminate public information.

Port of San Diego

The Port of San Diego is a special government entity, created in 1963 by an act of the California legislature, to manage San Diego Harbor and administer the public lands along San Diego Bay. The Port is governed by a seven-member Board of Port Commissioners. One commissioner each is appointed by the city councils of Chula Vista, Coronado, Imperial Beach and National City, and three commissioners are appointed by the San Diego City Council. The Board establishes policies under which the Port's staff – supervised by the Executive Director – conducts its daily operation.

The Port of San Diego's mission is to balance economic benefits, community services, environmental stewardship and public safety on behalf of the citizens of California, while protecting the Tidelands Trust resources.

City of San Diego

The City of San Diego is the second-largest city in California and the eighth largest in the United States, with a population in 2006 of 1,256,951.[11] San Diego is the county seat for the County of San Diego.

On January 29, 2002, the San Diego City Council approved the San Diego Sustainable Community Program. The program identifies actions including: participation in the Cities for Climate Protection (CCP) program, coordinated through the International Council of Local Environmental Initiatives (ICLEI); establishment of a 15 percent GHG reduction goal set for 2010, using 1990 as a baseline; and direction to use the recommendations of a scientific *Ad Hoc* Advisory Committee as a means to improve the GHG Emission Reduction Action Plan within the City organization and to identify additional community actions. In July 2005 the City adopted the City of San Diego Climate Protection Action Plan, where the Advisory Committee and City staff made recommendations to reduce the volume of GHG emissions.[12] Specifically, the plan states that the City shall consider strategies related to Transportation, Energy, Waste, the Urban Heat Island, and Environmentally Preferable Purchasing.

California state law requires each city to adopt a general plan to guide its future development and mandates that the plan be periodically updated to assure its continuing relevance and value. The City of San Diego General Plan update was adopted by the City Council on March 10, 2008. The new General Plan sets out a long-range vision and comprehensive policy framework for how the City should plan for projected growth and development, provide public services and maintain the qualities that define San Diego over the next 20 to 30 years. This plan is "the foundation upon which all land use decisions in the City are based."[13]

The updated General Plan adopts a "City of Villages" strategy which focuses growth into mixed-use activity centers that are pedestrian-friendly districts linked to an improved regional transit system. Because of the size and diversity of the communities in the City of San Diego, there are more than 50 planning areas called community plans**.** All the community plans combined constitute the Land Use Element of the General Plan. The community plans work to implement General Plan and, as such, are written to be consistent with the policies and recommendations of the other parts of the General Plan.

In response to public comments, Assembly Bill 32 (the Global Warming Solutions Control Act), and a comment letter from the Attorney General, the Draft General Plan and the Final Environmental Impact Report accompanying the General Plan was revised to address more comprehensively global climate change.[14] The "Conservation Element" of the General Plan incorporates an overview of climate change issues and establishes comprehensive policies to

[11] US Census Bureau
[12] City of San Diego. 2005. *Climate Protection Action Plan*. Available at: www.sandiego.gov/environmental-services/sustainable/pdf/action_plan_07_05.pdf
[13] City of San Diego. 2007. *Draft General Plan*. Available at: http://www.sandiego.gov/planning/genplan/index.shtml
[14] City of Chula Vista. *Report to the City Council*, No. 07-194. November 28, 2007

reduce GHG emissions, including a policy to "reduce the City's carbon footprint" and to "develop and adopt new or amended regulations, programs and incentives as appropriate to implement the goals and policies set forth" related to climate change.[15]

City of Chula Vista

Since the early 1990s, the City of Chula Vista has been working to address climate and Environmental Services implements programs including GHG reduction, energy conservation, alternative transportation and urban heat island effect.

Working with ICLEI's Cities for Climate Protection campaign, the City created a CO_2 Reduction Plan to help guide its GHG emission reduction efforts. The Plan assessed 1990 emission levels and outlined 20 actions the City could undertake to help reach the ultimate emissions target of 80 emission of 1990 levels by 2010. The Department of Conservation and Environmental Services coordinates implementation of the CO_2 Reduction Plan and monitors the City's progress by performing annual emission inventories.

[15] City of San Diego. 2007. *Draft General Plan*: Conservation Element CE-A.2. Available at: http://www.sandiego.gov/planning/genplan/index.shtml.

APPENDIX E: Overview of Regulatory Framework Affecting Electricity Use and GHG Emissions

The regulatory landscape pertaining to electricity use and the associated emissions is changing rapidly at both the state and federal levels. There will very likely be a combination of utility requirements, utility-sponsored efficiency incentives, and market-based programs affecting electricity consumption in the San Diego region and the GHG emissions associated with the electricity use.

State law and regulations impacting electricity use and GHG emissions

Assembly Bill 2021 – This law requires that all utilities aggressively invest in all cost-effective energy efficiency programs in their service territories. Utilities are required to reduce forecasted electricity demand by 10 percent over the next 10 years. AB 2021 requires all utilities to work with the California Public Utilities Commission (CPUC) to determine energy efficiency goals and achieve all cost effective measures within each service territory. Cost-effective efficiency potentials are identified every three years and are translated into annual targets based on a 10-year period. The utilities have responded by offering a broad range of incentives for their customers to reduce their energy use. SDG&E is no exception and provides residential and business customers with energy efficiency incentives described on its web site at http://www.sdge.com/esc/.

Senate Bill 1368 - SB 1368 – requires the California Energy Commission (CEC), in consultation with the CPUC and the California Air Resources Board (CARB), to establish and adopt a greenhouse gases emission performance standard and implementing regulations for all long-term baseload generation commitments made by local publicly-owned electric utilities.[1] The CPUC was required to establish an emission performance standard for investor-owned utilities (including SDG&E) by February 1, 2007 and did so – establishing a standard of 1,100 lbs. of CO_2 per MWh for all new long-term contracts for baseload power. The effect of this law is that all new long-term power contracts will be required to achieve emission levels at least as good as burning natural gas in efficient combined cycle plants.

Renewable Portfolio Standard - In 2002 Senate Bill 1078 established the California Renewable Portfolio Standard (RPS) program. SB 1078 required an annual increase in renewable generation by utilities equivalent to at least 1 percent of sales, with an aggregate goal of 20 percent by 2017. Senate Bill 107 codified an acceleration of this goal, requiring the utilities to obtain 20 percent of their power from renewable resources by 2010. The CEC and the CPUC are working collaboratively to effectively implement California's RPS of 20 percent by 2010.

Governor Schwarzenegger has recently set a long-term goal of 33 percent RPS by 2020, and the CPUC and CEC are currently considering ways to achieve that goal. In November 2005, the CPUC issued "Achieving a 33 Percent Renewable Energy Target," which concludes that it is economically and technologically feasible to achieve a 33 percent RPS in California by 2020. They determined that a 33 percent RPS "is likely to result in net savings to California's electricity customers over a twenty year period." However, the California Independent System Operator Corporation (CISOC) has expressed concern regarding the impacts of an expanded RPS on the overall reliability of transmission of electricity, given that some renewable energy sources like

[1] California Energy Commission. *Implementation of SB 1368 Emission Performance Standard*. November 2006, Available at: http://www.energy.ca.gov/2006publications/CEC-700-2006-011/CEC-700-2006-011.PDF

wind and solar will be located in areas not necessarily well-matched to existing transmission capacity.

Assembly Bill 32 - AB 32, passed in August 2006, requires the state to reduce CO_2 emissions to 1990 emission levels by 2020. Under AB 32, the California Air Resources Board is required to:

- Adopt regulations to require reporting and verification of statewide GHG emissions and to monitor and enforce compliance;
- Adopt a statewide GHG emissions limit equivalent to 1990 level;
- Adopt rules and regulations in a public process to achieve the maximum technologically feasible and cost-effective GHG emission reductions;
- Adopt market-based compliance mechanisms, such as an emissions trading system;
- Monitor compliance and enforce any relevant rules, regulations, orders, emissions limits, emissions reduction measures, or market-based compliance mechanisms, a violation of which would be a crime; and
- Adopt a fee schedule for regulated sources of GHG emissions

Although AB 32 does not directly include an emissions trading program, it grants CARB the authority to create one as a tool to meet the reduction requirements. CARB is now developing the overall strategy for the trading program – called their Scoping Plan. Details of the Scoping plan will be better known in mid-2008.

AB 32 and the mandatory reductions of CO_2 specified in the bill are a key driving issue for current utility energy planning. Although a number of options are under consideration for tools to achieve the greenhouse gas reductions set out in AB 32, a state-based market system, such as a cap-and-trade program, is one of the most prominent approaches moving forward in discussions.

Federal activities relating to electricity and GHG emissions

The 110th Congress includes proposals for a number of federal cap-and-trade programs that may supersede state laws. Seven relatively prominent proposals vie for national support. In the House, these include H.R. 1590, and H.R. 620, and in the Senate, S. 2191, S. 485, S. 317, S. 280, and S. 309. See Table in Appendix F for further details on the federal bills.

The Lieberman Warner (S. 2191) bill is considered the most likely to move forward. On October 18, 2007, Senators Lieberman and Warner introduced "*America's Climate Security Act of 2007*." The bill calls for a 70 percent reduction in greenhouse-gas emissions by 2050 through implementation of an economy-wide, cap-and-trade program, and includes provisions from a number of the other climate bills. It initially requires electric utilities, major industrial manufacturers and petroleum refiners and importers to limit their emissions to 2005 levels beginning in 2012. Those sources must then cut their greenhouse gases by 15 percent by 2020, with an end target of a 70 percent reduction by 2050. The proposal also establishes a mandatory greenhouse-gas registry and creates an emissions-monitoring system for regulated industries to be administered by the Environmental Protection Agency (EPA). The proposal would set up a seven-member Carbon Market Efficiency Board with the task of tracking the cap-and-trade system; including monitoring prices for CO_2 in the emerging U.S. market and allowing industry flexible options if compliance prices remain too high for an extended period of time. U.S. trading partners must purchase pollution credits for carbon-intensive exports if they do not

have sufficient climate change policies themselves, and trade restrictions would be imposed on nations if not in compliance within eight years. Finally, the plan allows industry to meet up to 15 percent of its emission requirement through the purchase of carbon offsets.

APPENDIX F: Federal Regulation Comparison Table

Table F-1. GHG Emission Cap-and-Trade Legislation in the 110th U.S. Congress

Bill*	Point of Regulation**	Distribution of Allowances: Free Allocation or Auction	Offsets**
Leiberman-Warner (S.2191)	Downstream (i.e., point source of emissions) for electric power, industrial, and commercial*** sectors. Upstream for transportation fuels and nonfuel chemical sectors • Electric power and industrial sectors: entities owning or controlling the point sources of greenhouse gas emissions within that sector • Transportation sector: Importers of refiners/producers of transport fuels • Other: Importers of producers of nonfuel chemicals that are or produce GFGs • Commercial sector: Large emitters, ***sector included in S.280 but not S.2191	In 2012, only 18% to be auctioned. Auction would increase incrementally through 2035, then held at73% to be auctioned. Free allocations include 19% to power sector:2012-2016, reduced 1% per yr. through 2034. Also given for early (since '94) GHG reduction actions, and to qualifying states, and other.	May satisfy up to 30% of reduction requirements by a combination of domestic offsets/reductions and international allowances. S.2191 limits use to 15% domestic and 15% foreign.
Lieberman-McCain (S.280) and Olver (H.R.620)		TBD by Administrator	

Bill*	Point of Regulation**	Distribution of Allowances: Free Allocation or Auction	Offsets**
Bingaman-Specter (S. 1766)	Downstream for coal facilities (that use over 5,000 tons of coal per year). Upstream for coal mines, petroleum, natural gas, and nonfuel chemicals. Specific sectors: • Electric generation facilities: post-2006 electric generation facilities subject to NGCC CO_2 rate for gas-fired units, and lowest economically achievable CO_2 rate for coal-fired units. • Coal mines • Petroleum refineries • Producers of syn. fuel from coal. • Natural gas processing • Petroleum or nat. gas importer • Nonfuel regulated facilities • Carbon-intensive mfrg.	2012-2016: 24% to be auctioned, increasing in subsequent years. Free allocations to Electric Power Eligible Electric Generation Facilities include 29%: 2012-2016, declining in subsequent years. Also given for early GHG reduction actions, states, and other.	Allows domestic offsets. 5% of allowances are set aside for agricultural sequestration. President may allow international offsets to satisfy up to 10% of reduction requirements.
Kerry-Snowe (S. 485) and Waxman (H.R. 1590)	Economy wide, specific sources or sectors TBD by Administrator [EPA analysis assumes same covered entities as S. 280] Retail elec. Suppliers must implement EE perform stds. Transport sector: includes equivalent of CARB's motor vehicle GHG emission standards. Establishes renewable portfolio std.	TBD by President.	Potential for offsets generated by biological carbon sequestration activities.

Bill*	Point of Regulation**	Distribution of Allowances: Free Allocation or Auction	Offsets**
Sanders-Boxer (S. 309)	Economy-wide, specific sources or sectors TBD by EPA. Electric power sector: beginning 2016, requires that all new units (as of 2012) with capacity factor of at least 60% must not exceed GHG emission rate of a new NGCC unit. For 2017-2029, adminstrator may increase stringency of emission standard. After 2030, administrator shall require that all units of any age comply with initial emission rate (of a new NGCC unit). Creates a Low-Carbon Generation Credit Trading Program and imposes requirements for low-carbon generation on electricity generators with annual fuel input at least 50% of which is provided by coal, petroleum coke, and/or lignite. Requires peak demand reduction and establishes renewable portfolio std. Transport sector: imposes motor vehicle GHG emission standards and a renewable fuels standard.	TBD.	Not specified.

***Source: http://thomas.loc.gov/, version as introduced, with exception of S.2191, for which source is given.**
***Note: List of bills is not all-inclusive.**
****Note: SAIC analysis using NEMS modeling found that even though CO_2 cap-and-trade legislation may impose economy-wide limits, the impact falls primarily on the electric generation sector through 2030. However, after 2030, few additional CO_2 emission cuts are available from the electric sector, especially if offsets are limited. SAIC found, also, that the impacts of proposed Federal legislation on the U.S. economy will be heavily dependent on the features and functionality of legislative provisions allowing market mechanisms, such as carbon offset projects and a tradable carbon allowance market. If offsets are authorized, the number of offsets available will make a very large difference in domestic economic impacts, almost as much as the choice of technologies used to curb emissions.**

APPENDIX G: Climate Change Scenarios

Notes and details on the methodology used to develop the 2050 Projection Maps for six low-lying locations in San Diego County that are presently prone to flooding (Chapter 3, Figures 3-6 to 3-11).

- A scenario of future offshore wave conditions, seawards of the Channel Islands, was provided by Dr. Nicholas Graham. The wave model forecasts were derived from the global climate model simulation used by Cayan et al. to develop projected sea level sequences for the San Diego area. Therefore, the waves and sea level inputs are consistent and synchronous over a projected time period extending from present day to 2050.
- The offshore wave conditions were transformed to 10 meters depth, just offshore of each inundation site, using the Coastal Data Information Program (CDIP, Scripps Institution of Oceanography) spectral refraction model. This model accounts for island sheltering, refraction and shoaling of waves in the southern California Bight (Figure A.D-1).
- There is significant variation in extreme wave conditions at the selected inundation sites as a result of the offshore islands and complex coastal bathymetry. In general, southern San Diego County is exposed to larger waves than the northern portion of the county owing to island sheltering of North Pacific storm waves. However, local bathymetric features, like the Scripps submarine canyon, significantly alter this trend.
- The super-elevation of the shoreline water level owing to wave run-up is estimated from the wave conditions in 10 meters depth, using a simple empirical, engineering formula: Run-up elevation = 0.4 * Wave Height @ 10m depth.
- The estimated wave-induced super-elevation is combined with tides, weather effects, El Niño effects and longer-term sea level changes (provided by Cayan et al.) to develop a time series of shoreline water level at each site. Empirical run-up coefficients between 0.2 and 0.8 can be found in scientific literature for different nearshore settings. The current state-of-the-art spectral wave run-up models estimate run-up elevations as a function of wavelength, bottom slope and bottom type, but require field observations for proper implementation and are beyond the scope of this study. An empirical run-up coefficient of 0.4 was chosen to best represent the relatively mild-sloped cross-shore beach profiles that are typically seen in the low-lying areas being studied here. However, it is important to note that there is significant uncertainty in these run-up estimates owing to a lack of field data.
- Highly accurate digital elevation data, developed from October 21, 2006, LIDAR (Light Detection and Ranging remote sensing system) surveys, were combined with an extremal analysis of the shoreline water level time series to create maps of potential inundation (Chapter 3, Figures 3-6 to 3-11).

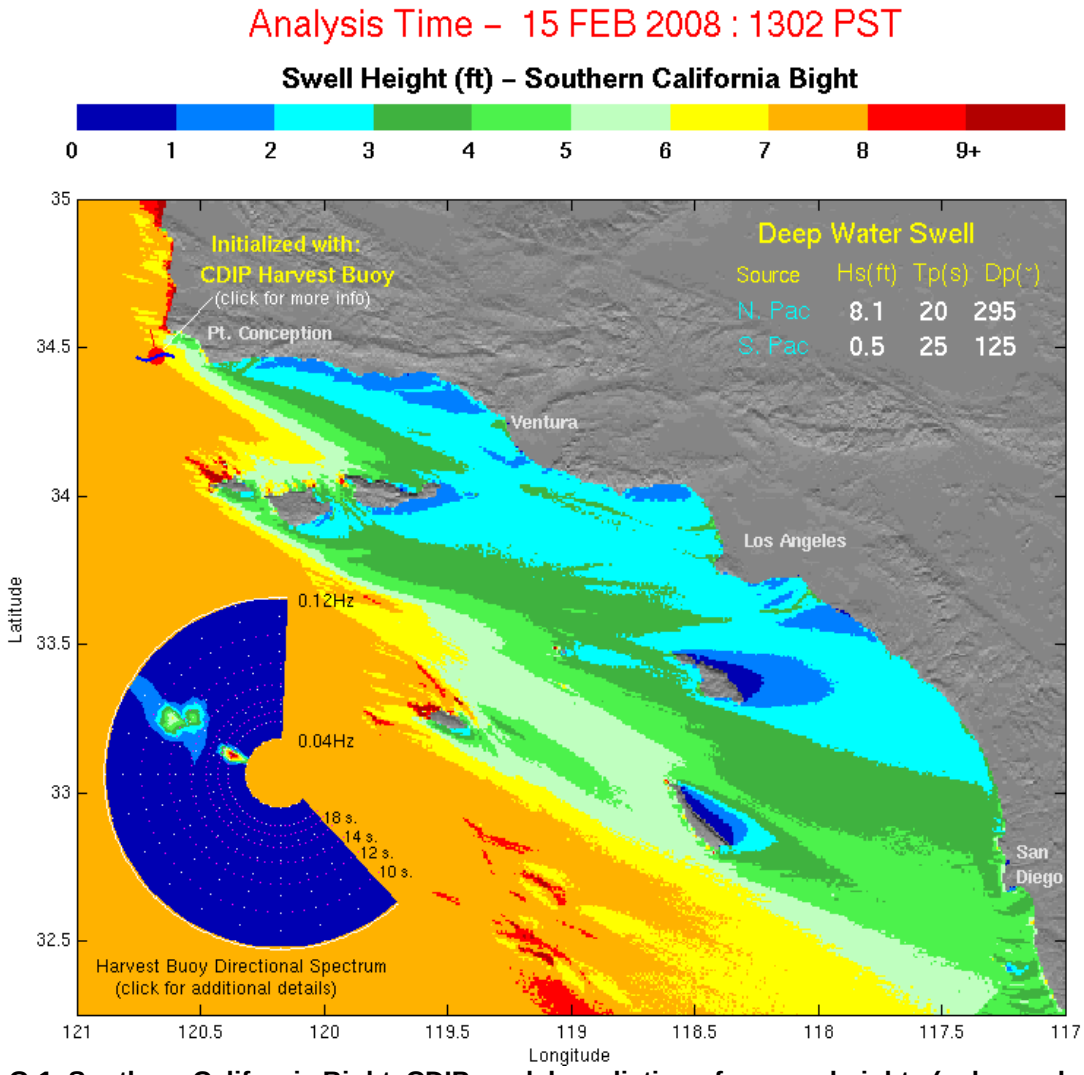

Figure G-1. Southern California Bight. CDIP model predictions for wave heights (color scale at top) in southern California. In this example, wave heights are about 4 feet at San Diego (green), compared with 8 feet seaward of the Channel Islands (orange).

Additional Temperature Change Figures and Tables

Table G-1. Observed Temperature Trends, San Diego Region

	1911-2007			1931-2007			1948-2007		
	Tmax	**Tmin**	**Tavg**	**Tmax**	**Tmin**	**Tavg**	**Tmax**	**Tmin**	**Tavg**
May-October									
San Diego Airport	**0.009**	**0.030**	**0.020**	**0.005**	**0.031**	**0.018**	-0.008	**0.031**	**0.012**
Alpine	**-----**	**-----**	**-----**	**-----**	**-----**	**-----**	-0.019	**0.050**	**0.016**
El Capitan Dam	**-----**	**-----**	**-----**	**-----**	**-----**	**-----**	**0.038**	-0.032	**0.003**
Palomar Mountain	**-----**	**-----**	**-----**	**0.005**	**0.03**	**0.018**	-0.004	**0.038**	**0.017**
Oceanside	**-----**	**-----**	**-----**	**-----**	**-----**	**-----**	-0.037	**0.030**	-0.004
Chula Vista	**0.044**	**0.022**	**0.033**	**0.049**	**0.024**	**0.037**	**0.069**	**0.031**	**0.050**
SIO Pier			**0.010**			**0.016**			**0.029**
November-April									
San Diego Airport	**0.002**	**0.021**	**0.012**	-0.005	**0.023**	**0.009**	-0.008	**0.029**	**0.011**
Alpine	**-----**	**-----**	**-----**	**-----**	**-----**	**-----**	-0.005	**0.040**	**0.018**
El Capitan Dam	**-----**	**-----**	**-----**	**-----**	**-----**	**-----**	**0.037**	-0.016	**0.011**
Palomar Mountain	**-----**	**-----**	**-----**	-0.025	**0.017**	-0.004	-0.036	**0.026**	-0.005
Oceanside	**-----**	**-----**	**-----**	**-----**	**-----**	**-----**	-0.015	**0.028**	**0.007**
Chula Vista	**0.037**	**0.023**	**0.030**	**0.044**	**0.027**	**0.0355**	**0.068**	**0.031**	**0.050**
SIO Pier			**0.012**			**0.014**			**0.025**
Annual									
San Diego Airport	**0.006**	**0.026**	**0.016**	**0.003**	**0.028**	**0.016**	-0.007	**0.031**	**0.012**
Alpine	**-----**	**-----**	**-----**	**-----**	**-----**	**-----**	-0.009	**0.047**	**0.019**
El Capitan Dam	**-----**	**-----**	**-----**	**-----**	**-----**	**-----**	**0.041**	-0.025	**0.008**
Palomar Mountain	**-----**	**-----**	**-----**	-0.011	**0.023**	**0.006**	-0.018	**0.034**	**0.008**
Oceanside	**-----**	**-----**	**-----**	**-----**	**-----**	**-----**	-0.028	**0.026**	-0.001
Chula Vista	**0.040**	**0.023**	**0.032**	**0.047**	**0.026**	**0.037**	**0.069**	**0.032**	**0.051**
SIO Pier			**0.011**			**0.015**			**0.028**

Trends are given in degree C/year.
Positive trends shown as bold face.

Table G-2. Hourly Sea Level Exceedences, La Jolla (SIO Pier)
Number of hours sea level exceeds 99.99th historical (1961-2000) percentile level

Model	Scenario	2001-2018	2019-2036	2037-2054
CNRM CM3	SRESB1	32	330	1614
CNRM CM3	SRESA2	28	228	1273
GFDL CM2.1	SRESB1	19	161	1052
GFDL CM2.1	SRESA2	16	178	1127
NCAR CCSM3	SRESB1			
NCAR CCSM3	SRESA2	56	372	2339

99.99th historical (1961-2000) percentile levels in cm (relative to historical mean sea level)

Model	99.99th percentile
CNRM CM3	138.43
GFDL CM2.1	143.98
NCAR CCSM3	140.50

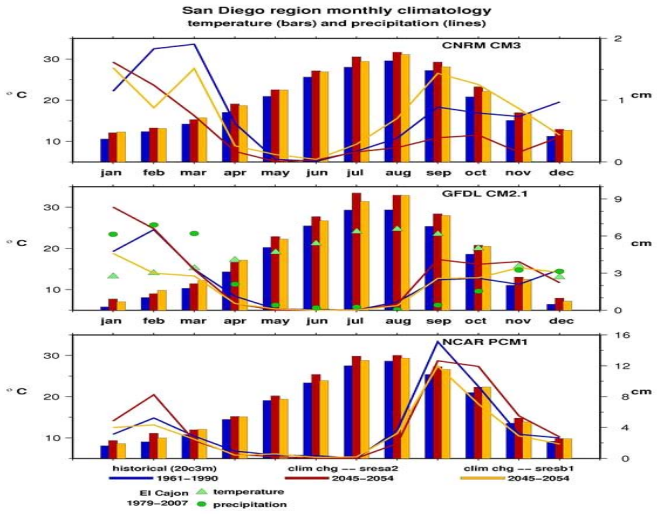

Figure G-2. Three GCMs run under A2 and B1 emission scenarios, project that San Diego would retain its strong Mediterranean climate. Observed temperature and precipitation averages (1961-1990) from Chula Vista. A2 temperature warming does not rise much above that of B1 by 2050. Fall precipitation peak shown by PCM model is dubious.

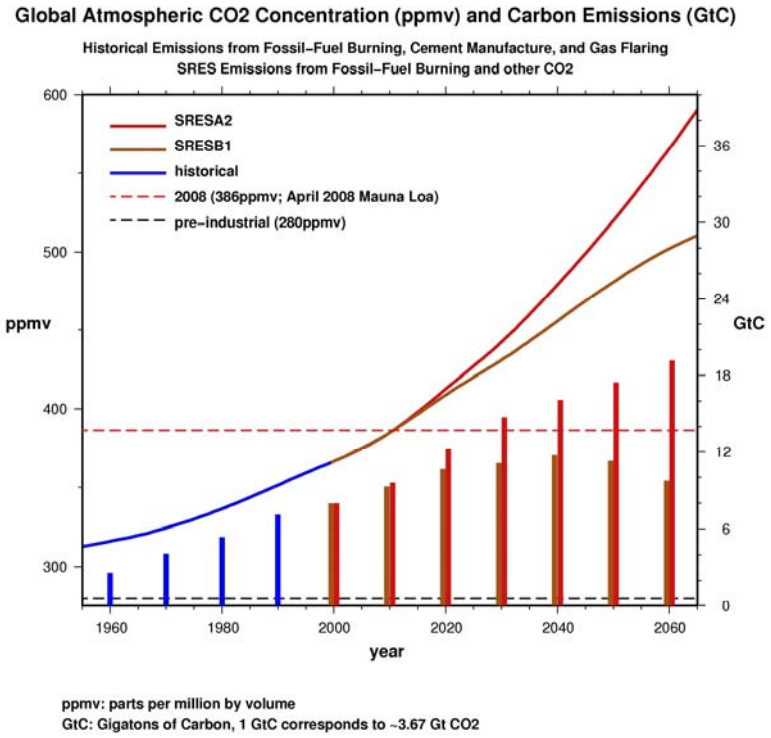

Figure G-3. Global carbon emissions (GtC), shown by bars, and CO2 concentrations (ppmv), shown by lines, for historical period (blue) and for SRES B1 (brown) and SRES A2 (red) emissions scenarios. Pre-industrial and present day CO2 concentrations indicated by gray and mauve dashed lines.

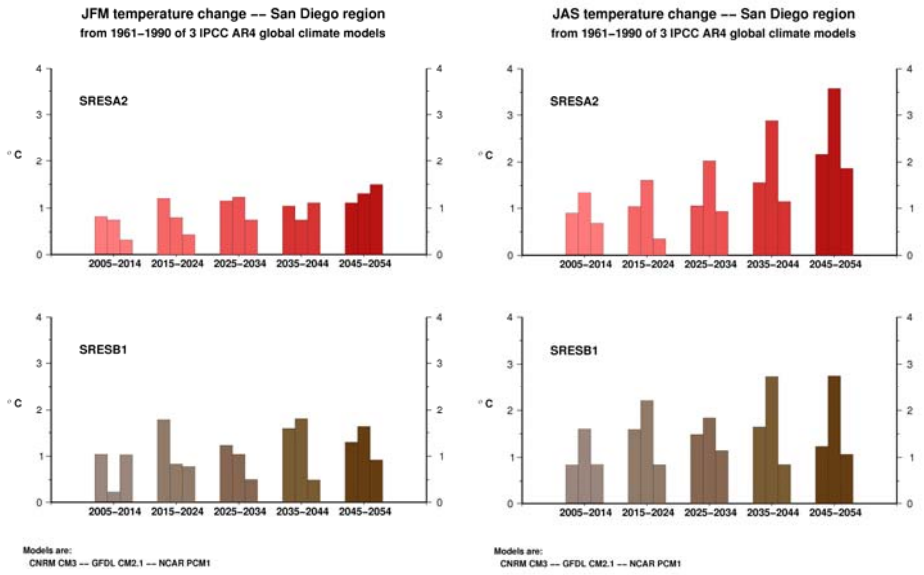

Figure. G-4. Winter (Jan.-March) and summer (July-September) temperature changes from the three GCMs, under A2 and B1 GHG emissions scenarios, averaged over each decade between present time and 2050. There is considerable variability between models and also internal variability within models that results in decadal variability. Summer tends to warm more than winter, especially for the A2 projections.

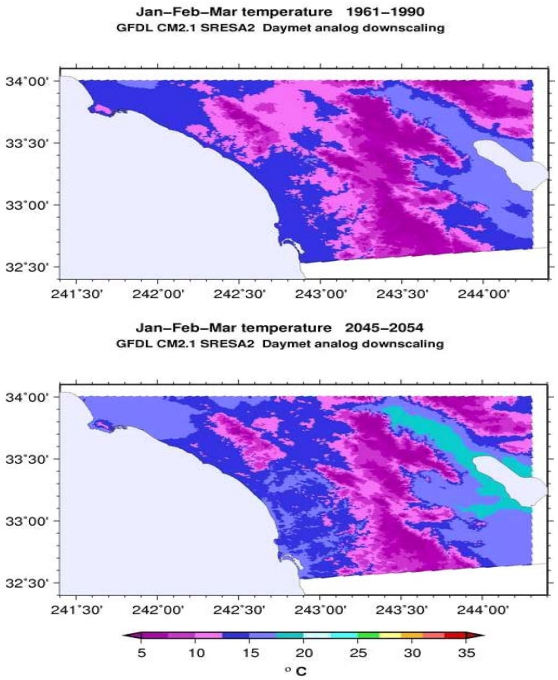

Figure G-5. Winter (Jan. -March) temperature downscaled over San Diego County from GFDL A2 simulation for 2045 -2054 (bottom panel) and historical (1961 -1990) periods.

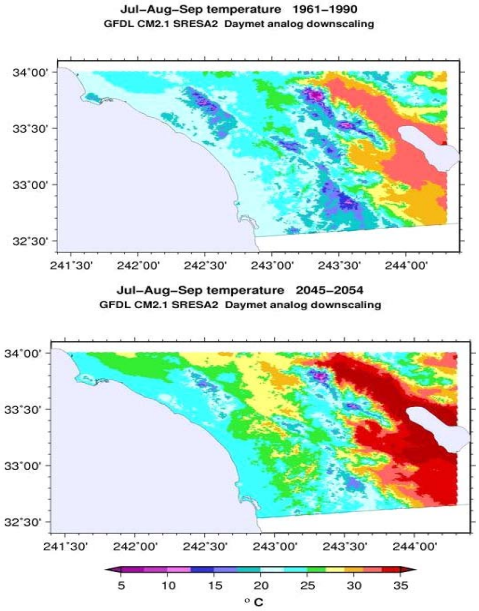

Figure G-6. Summer (July - September) temperature downscaled over San Diego County from GFDL A2 simulation for 2045-2054 (bottom panel) and historical (1961-1990) periods.

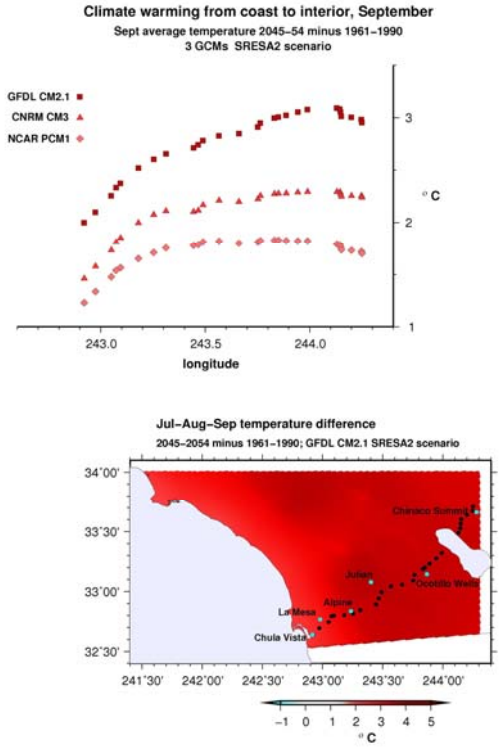

Figure G-7. Amount of warming, 2045-2054 minus 1961-1990 along a coast-to-interior transect in September for three GCMs under A2 simulation downscaled to San Diego County. Transect shown in map at bottom, which illustrates the amount of warming for July-September for the GFDL A2 simulation.

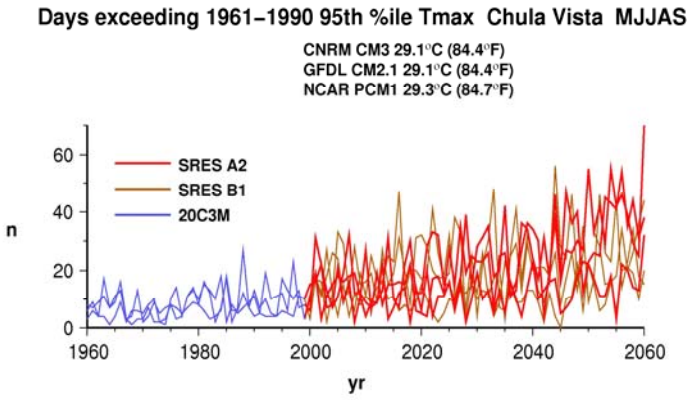

Figure G-8.Projected increase in hot days, as indicated by counts of days whose daily maximum temperature is equal or greater than the 95th percentile of May-September daily maximum temperatures from the 1961-1990 historical period. Plot shows historical (blue), and A2 (red) and B1 (brown) emission scenario projections for the three models downscaled to the Chula Vista location.

Additional Precipitation Figures

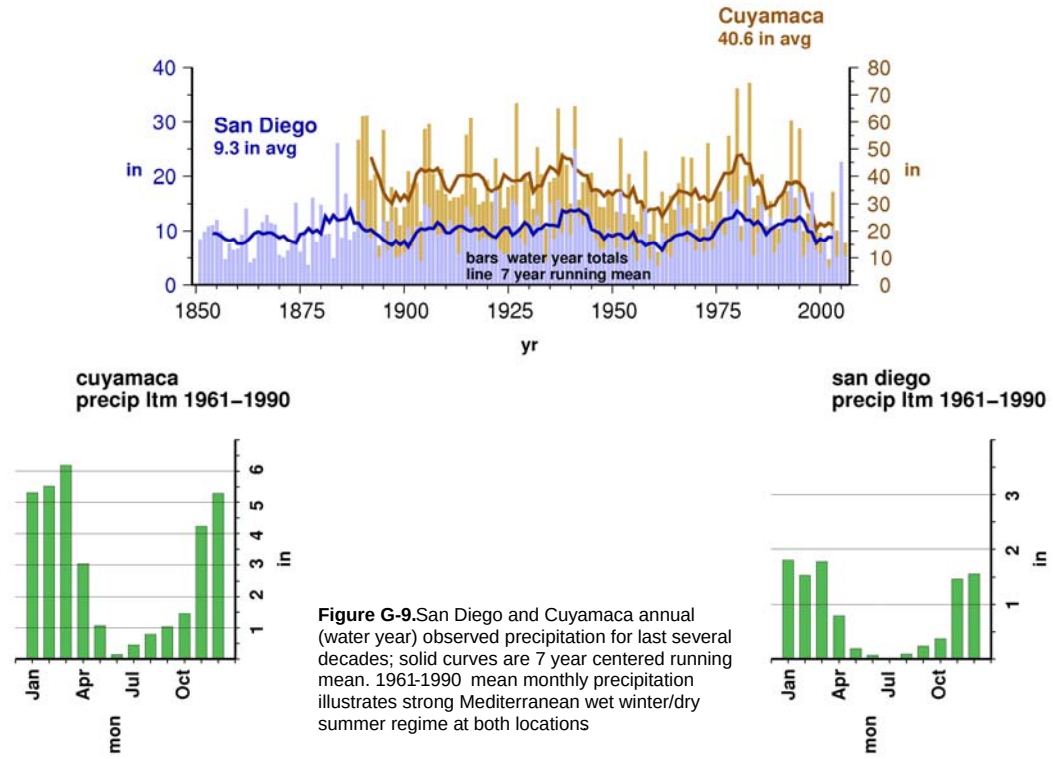

Figure G-9. San Diego and Cuyamaca annual (water year) observed precipitation for last several decades; solid curves are 7 year centered running mean. 1961-1990 mean monthly precipitation illustrates strong Mediterranean wet winter/dry summer regime at both locations

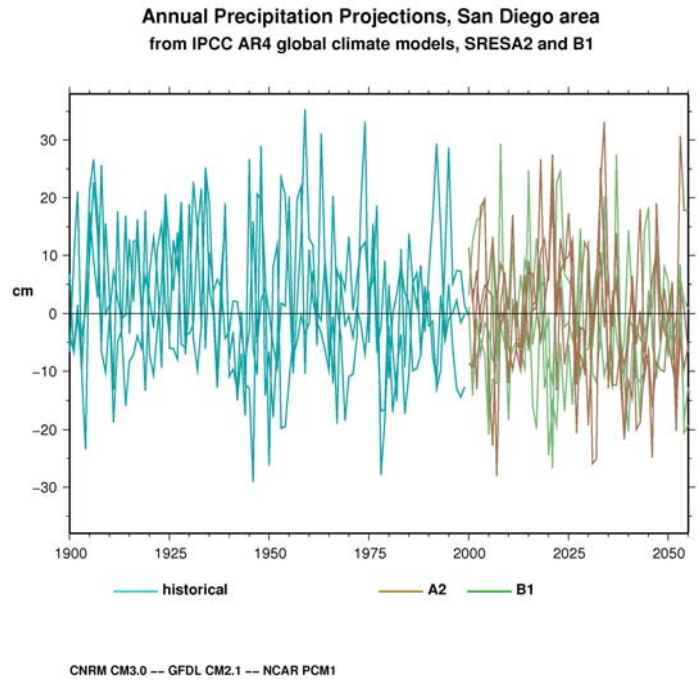

Figure G-10. Change in annual mean precipitation, San Diego region from the three GCMs, for historical period (blue) and for A2 (brown) and B1 (green) emission scenarios. Historical average precipitation has been removed from each model to more easily compare changes.

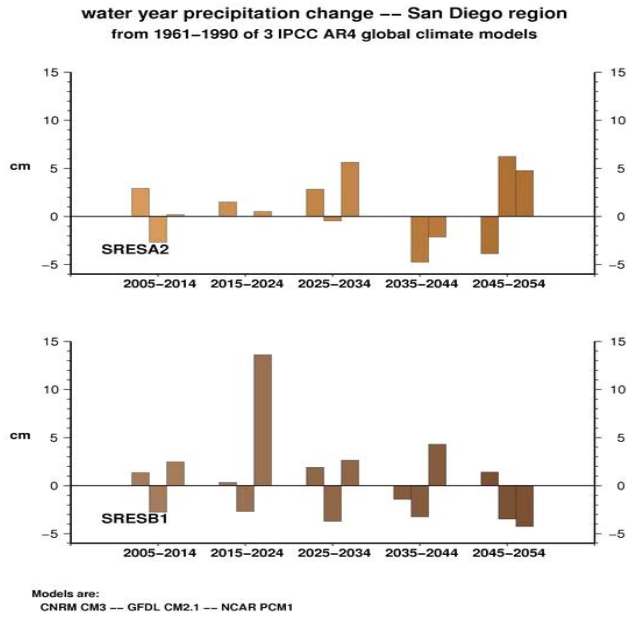

Figure G-11. Annual (water year) precipitation changes, for each decade of the first half of the 21st Century, as taken from the three GCMs for the A2 and the B1 emission scenarios. Results are quite mixed, indicating considerable variability between models and simulations, and also considerable decadal variability within each simulation.

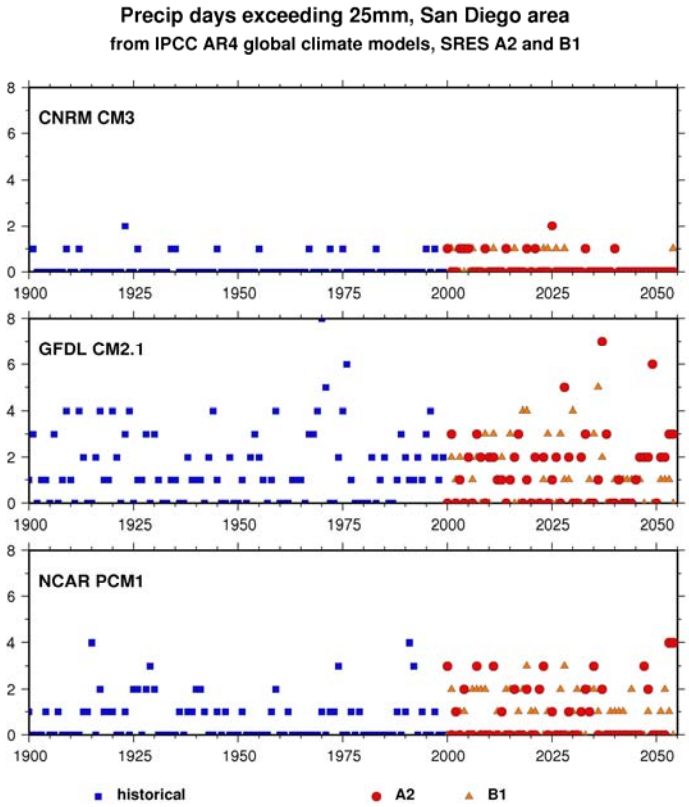

Figure G-12. Number per year of heavy precipitation events, indicated by days having 25mm or greater precipitation from the three GCMs for the historical period (blue) and for A2 (red) and B1 (brown) emission scenarios.

Additional El Niño and Storm Weather Figures

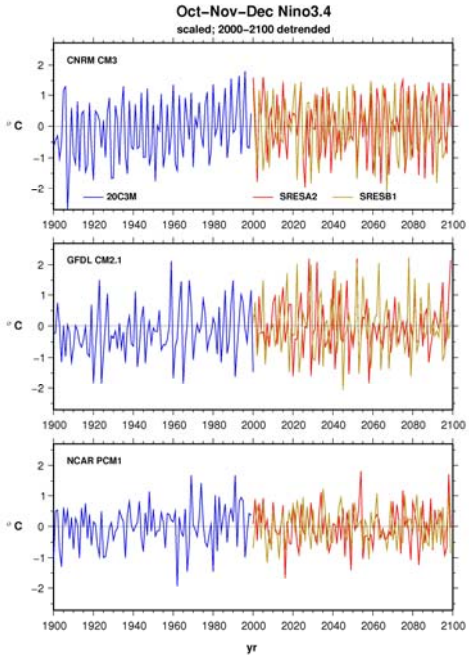

Figure G-14. El Nino occurrences in each of the three GCM's, as indicated by the Nino 3.4 sea surface temperature index, which is area average sea surface temperature departure from historical average in central equatorial Pacific Ocean, for historical period (blue) and for A2 (red) and B1 (brown) emission scenarios. Projected temperature series have been adjusted by removing the linear trend in order to better discern interannual fluctuations.

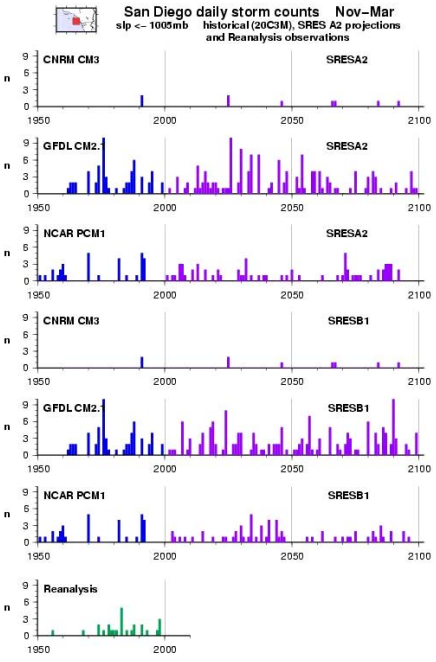

Figure G-13. Number of storms per year as indicated by days when average daily sea level pressure is 1005mb or less for historical (1950-2000) and projected (2001-2100) periods of the three GCMs for the A2 (above) and B1 (below) emissions scenarios.

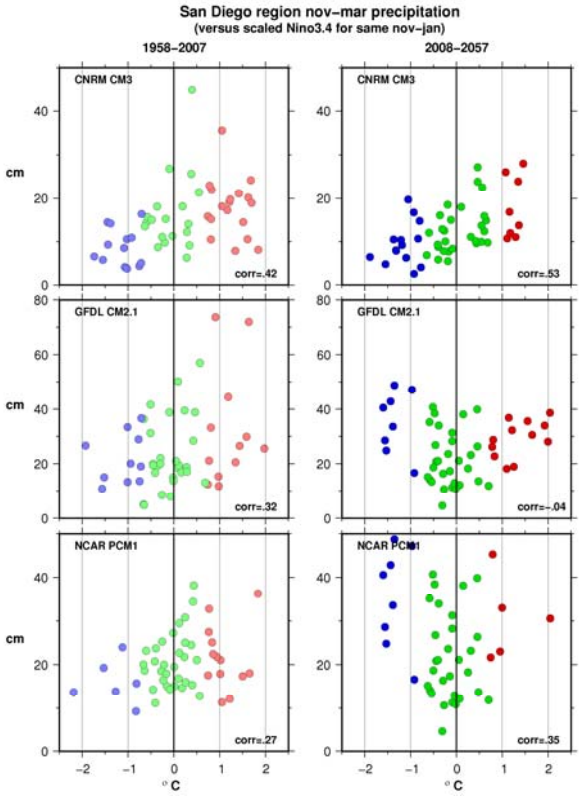

Figure G-15. Association of San Diego annual precipitation with El Nino/La Nina variability. Plot shows water year precipitation plotted against cool (blue), normal (green) and warm (red) Nino 3.4 sea surface temperatures for the historical (left) and the projected A2 (right) simulations for each of the three GCMs. Correlations between San Diego precipitation and Nino 3.4 sea surface temperature are generally positive, as indicated on each plot.

APPENDIX H: Water

Figure 4-1 in Chapter Four presented several snapshots of San Diego's water supplies and demands with little explanation of background indications of how the predictions arose. In this Appendix, two additional figures that provide some sense of the evolution of San Diego water demands (by local agency) and supply options under "normal climate" assumptions are presented.

First, officially predicted water demands through 2030, and roughly extrapolated demands by 2050, are shown in the figure below, with demands for imported water indicated for each of the San Diego County Water Authority's member agencies indicated and with the total demands from local supplies added on top.

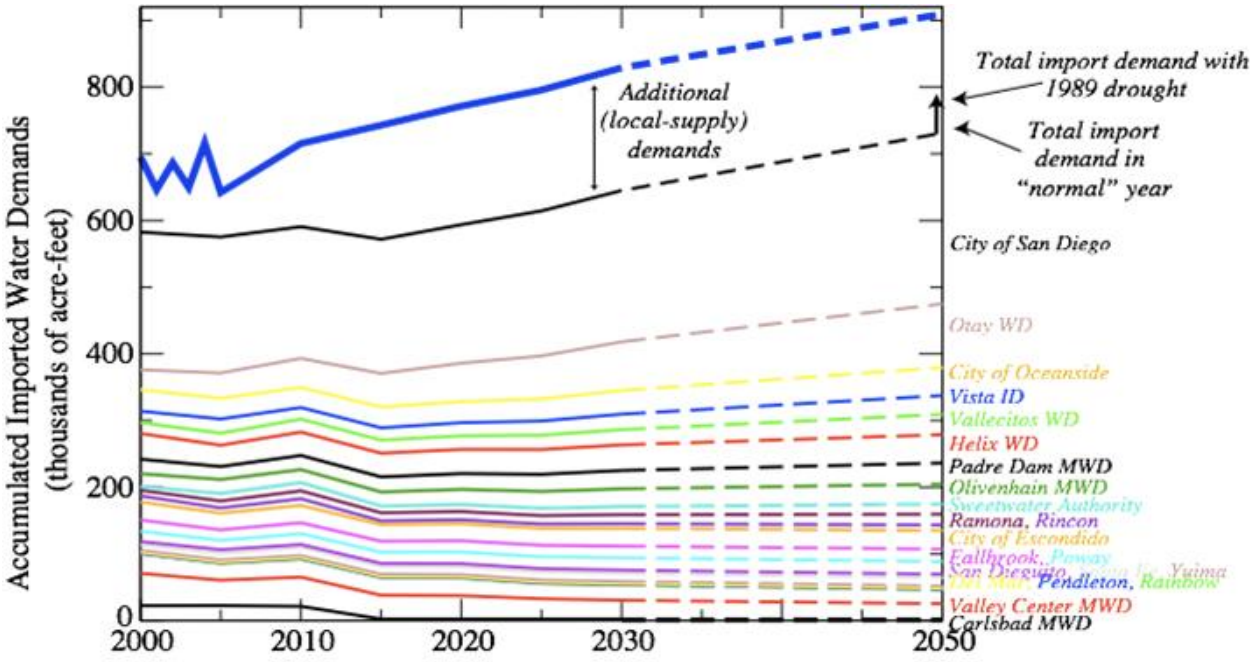

Figure H-1. San Diego County Water Authority Member Agencies Imported-Water Demand & Additional (Local-Supply) Demands. Projected demands for imported water from the San Diego Water Authority's 23 member agencies, 2000-2050, and projection total (imports plus local supplies) demands. Projections until 2030 are from the Water Authority; projections from 2030 to 2050 are straight-line continuations of trends leading up to 2030, scaled down to reflect moderate post-2030 slowing of population growth discussed in Chapter 2. Arrow in upper right corner indicates the additional demand that might be expected in a 1989-style drought year by 2050.

In order to meet these demands, the figure below shows the expected evolution of "normal year" water supplies required to meet demands shown in the preceding figure. The projected supplies shown here are simplified and summarized in Figure 4-1 for 2005, 2030, and 2050.

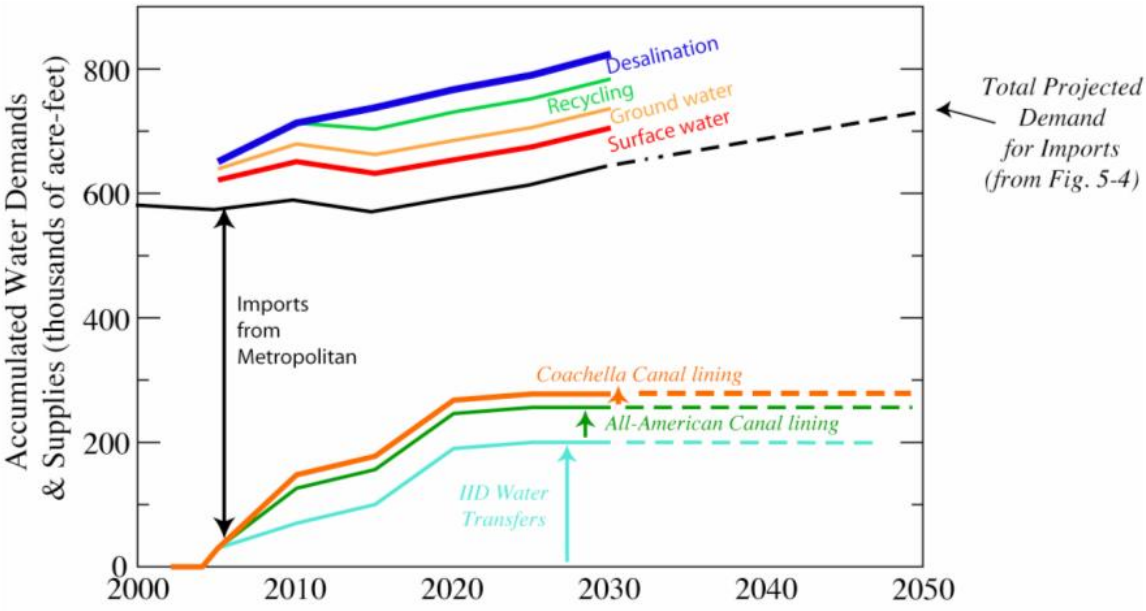

Figure H-2. San Diego county water authority member agencies; local-plus-imported water demands/supplies (Normal Years). Projected demands for imported water by the City of San Diego and other San Diego County Water Authority member agencies (2000-2050, as in Figure H-1), along with projected total demands (heavy black curve) and expected availability of local water supplies, Imperial County water transfers, and purchases of water from Metropolitan Water District required to meet overall demands.

APPENDIX I: Shrubland Models

We developed and tested the partitioned Mahalanobis D^2 presence-only habitat models for vegetation and individual species[1]. Model performance was evaluated with randomly withheld as well as independently collected validation datasets. Models best predicting occurrence of a particular vegetation type or species in current climate were used to predict potential habitat under altered climate regimes[2].

Models used variables such as average minimum January temperature, average maximum July temperature, temperature range, average annual precipitation, percent slope, aspect, and elevation. For each vegetation type and species, we selected the best performing model to assess how potential habitat might change under altered climate conditions. The best models for coastal sage scrub and chaparral vegetation included the full suite of abiotic variables. Using these models and temperature increases of +1.7°C (3°F) and +2.8°C (5°F) results in few locations across the southern California landscape that have environmental conditions similar to conditions where coastal sage scrub currently occurs. However, using a model that removes constraints placed by elevation results in 4-28% of currently suitable environmental conditions at the higher temperatures as long as precipitation is at current or lower levels.

[1] Rotenberry J.T., S.T. Knick, and J.E. Dunn. 2002. A minimalist approach to mapping species' habitat: Pearson's planes of closest fit. In J.M. Scott, P.J. Heglund, & M.L. Morrison (Eds.), *Predicting species occurrences: issues of scale and accuracy* pp 281-289. Island Press, Washington, DC.

Rotenberry J.T., K.L. Preston, and S.T. Knick. 2006. GIS-based niche modeling for mapping species' habitat. *Ecology* 87:1458-1464.

[2] Preston, K.L., J.T. Rotenberry, R. Redak, and M.F. Allen. (In Press). Habitat shifts of endangered species under altered climate conditions: Importance of biotic interactions. *Global Change Biology*.

APPENDIX J: Species Distribution Models

Species distribution models were run for five species currently found in San Diego County: *Pinus coulteri, Ceanothus crassifolia*, *Yucca whipplei, Pinus jeffreyi, and Quercus agrifolia*. Present species occurrence data were collected from multiple sources (e.g. United States Forest Service, National Park Service). These data were then used in a computation framework, BIOMOD (Thuiller 2003), to maximize model accuracy, to predict future species distribution models. We used future climatic data generated from the Canadian General Circulation Model (CGCM3) from the IPCC A2 greenhouse gas emissions scenario. The data were divided into two subsets to calibrate and evaluate model predictions (Fielding and Bell 1997). This produced species probability occurrences to which a cut-off was applied to generate a binary presence/absence map for both current and future distributions.

The results are shown in the following figures. Differences from the present and future (2050) distributions are presented as green (gain), red (loss), and yellow (no change).

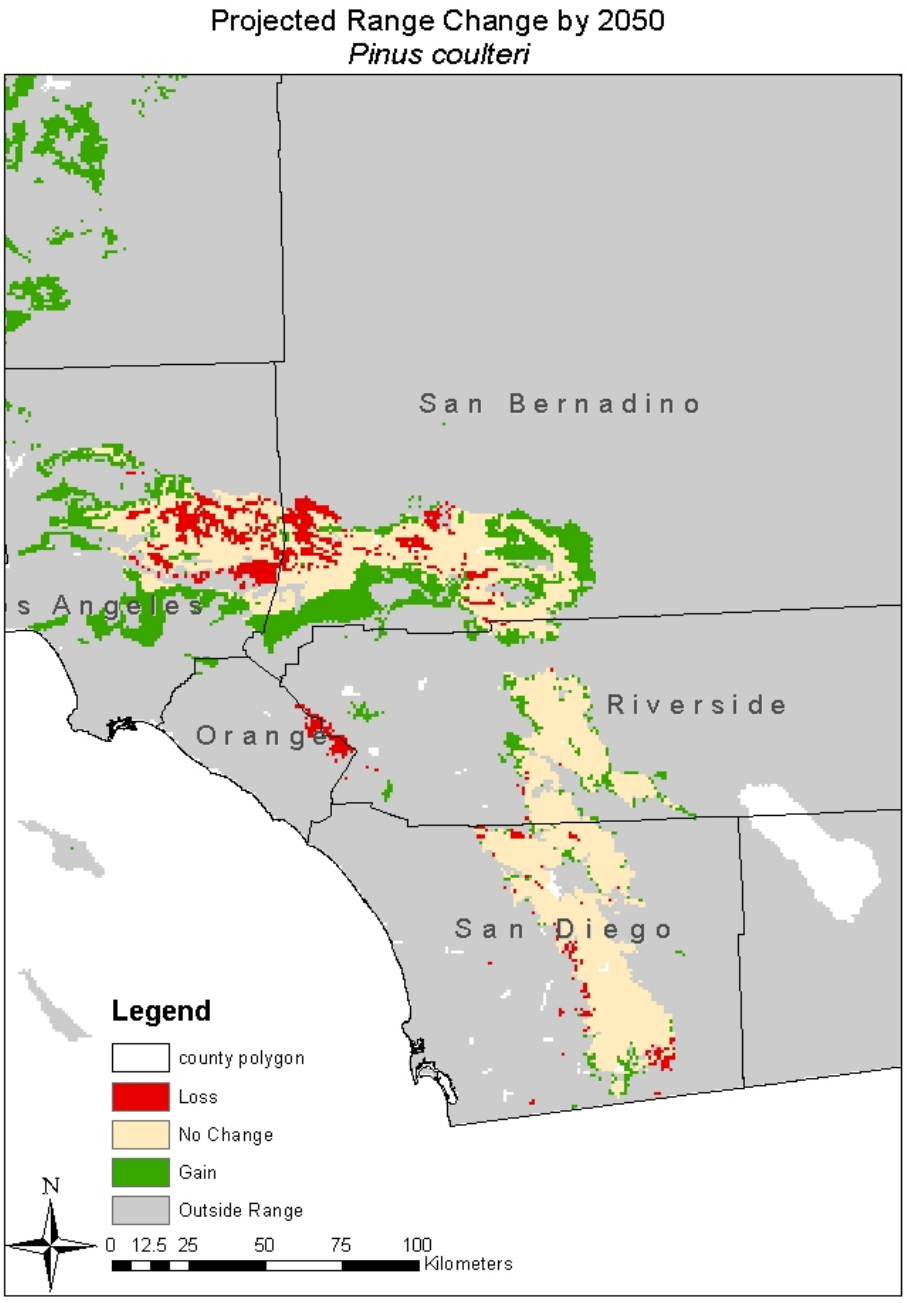

Figure J-1. ***Pinus coulteri.***

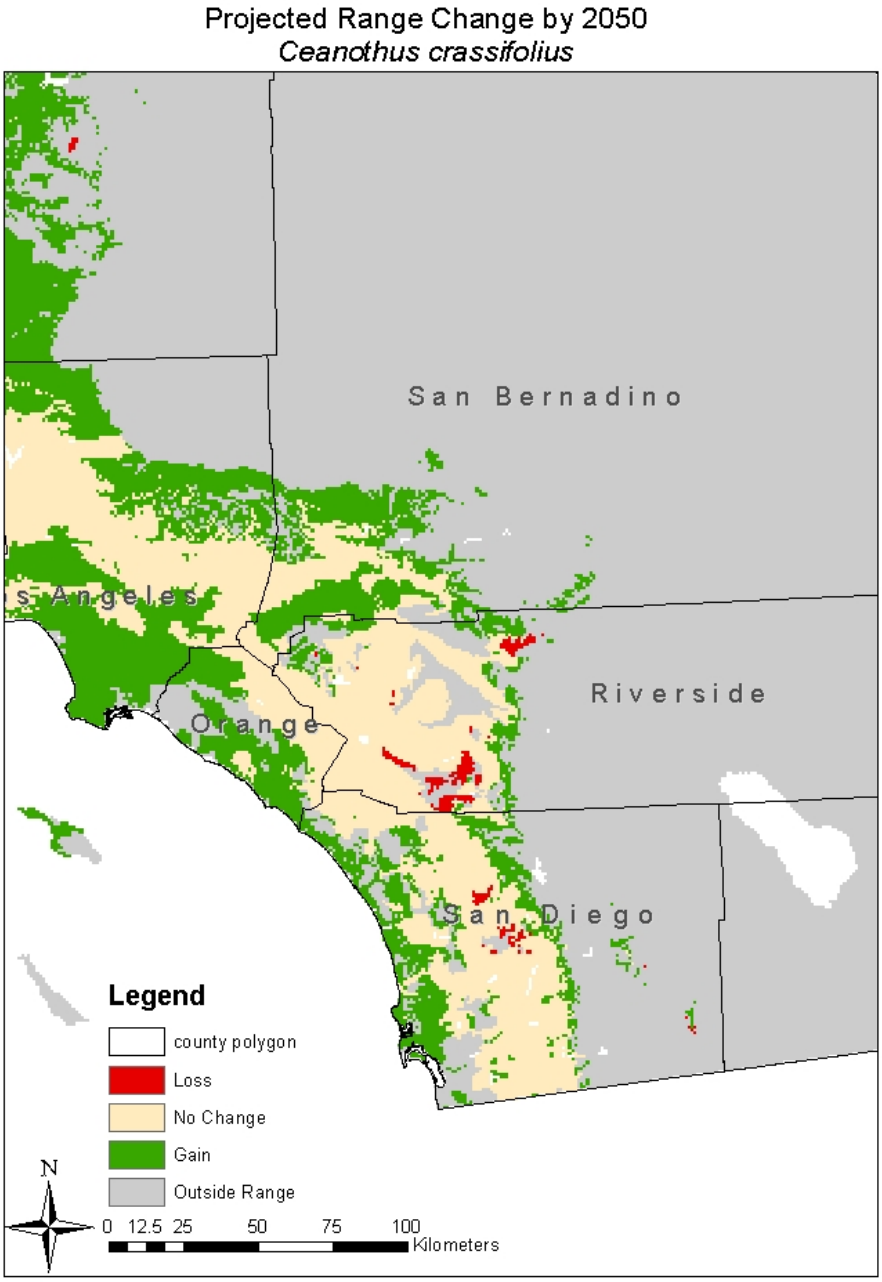

Figure J-2. ***Ceanothus crassifolia.***

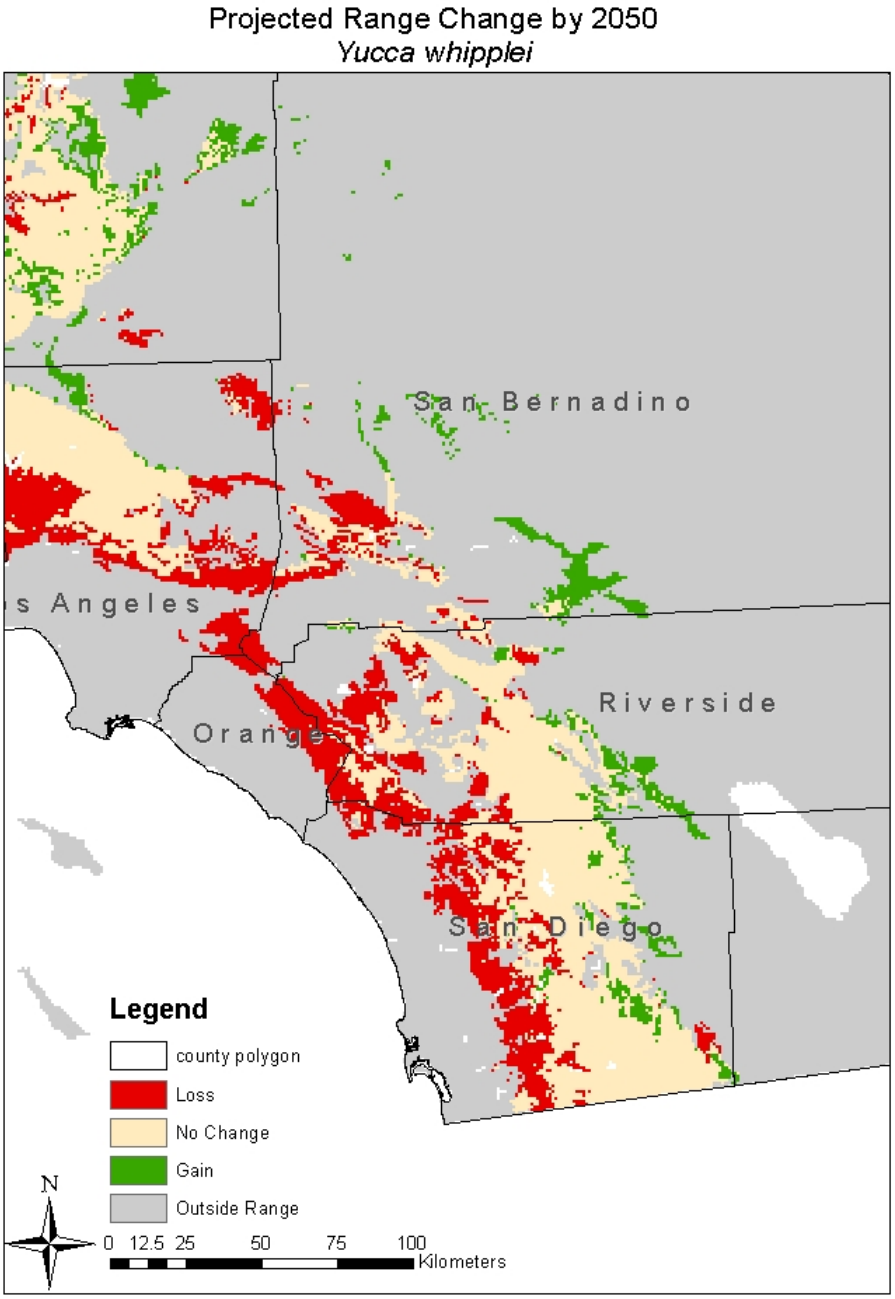

Figure J-3. *Yucca whipplei*.

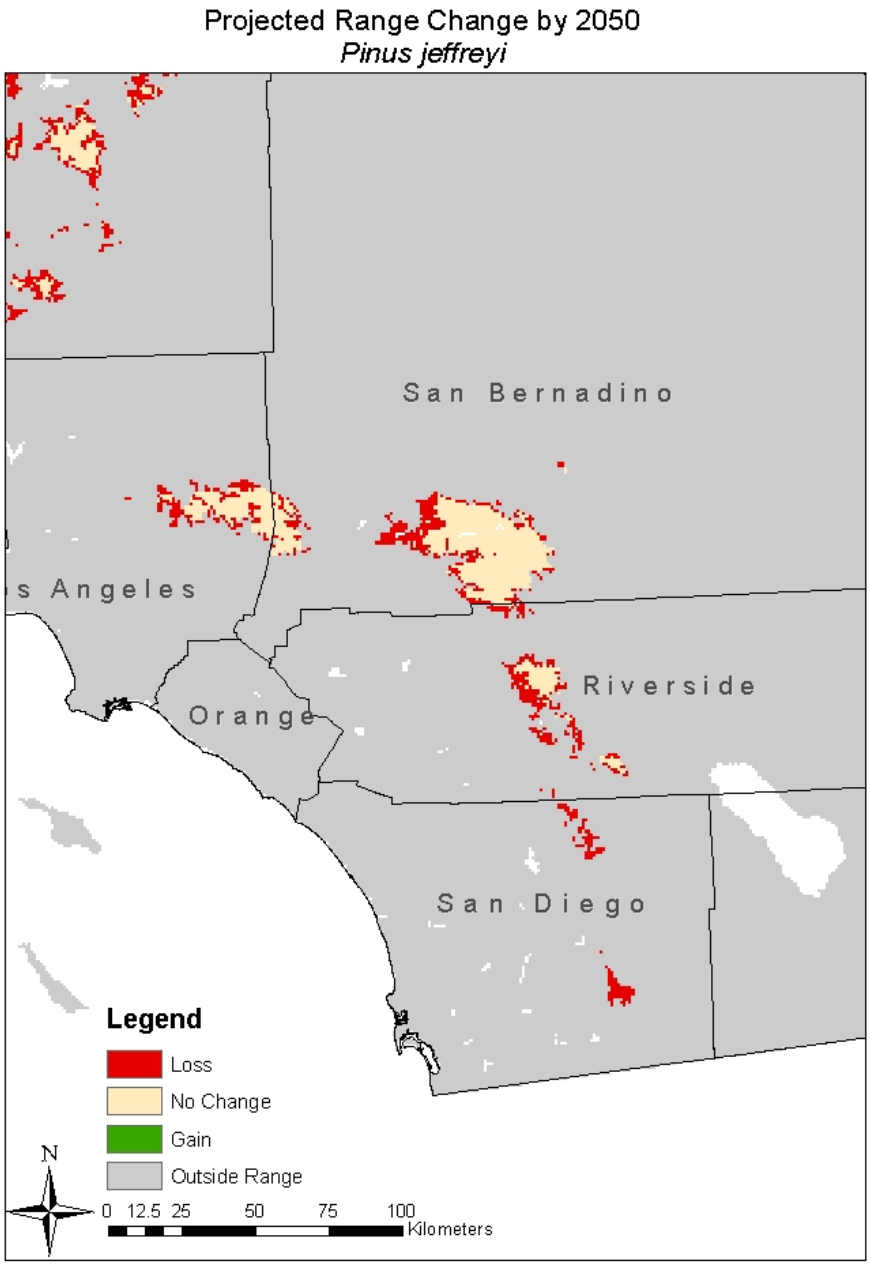

Figure J-4. Pinus jeffreyi.

Figure J-5. Quercus agrifolia.

APPENDIX K: Projections of Particulate Matter Impacts to Public Health

An air quality box model approach has been utilized to predict and project fine particle ($PM_{2.5}$) concentrations for San Diego County. Because of the limited time for this project, extensive new data analysis or creation of a sophisticated model was not feasible. The proposed box model has been simplified to permit analysis and prediction within the timeframe, but contains key parameters for San Diego, such as, current and projected air pollution emission patterns within San Diego, current and projected local meteorology, as well as, atmospheric chemical transformations and removal processes (both dry and wet depositions) for air pollutants. The PM contribution from transport from outside San Diego County has also been derived by using the CARB emissions data for 2006 and San Diego Air Pollution Control District (APCD)'s Del Mar, Camp Pendleton, and Otay Mesa monitoring stations data for 2006 since these monitors lie towards the boundary of our model.

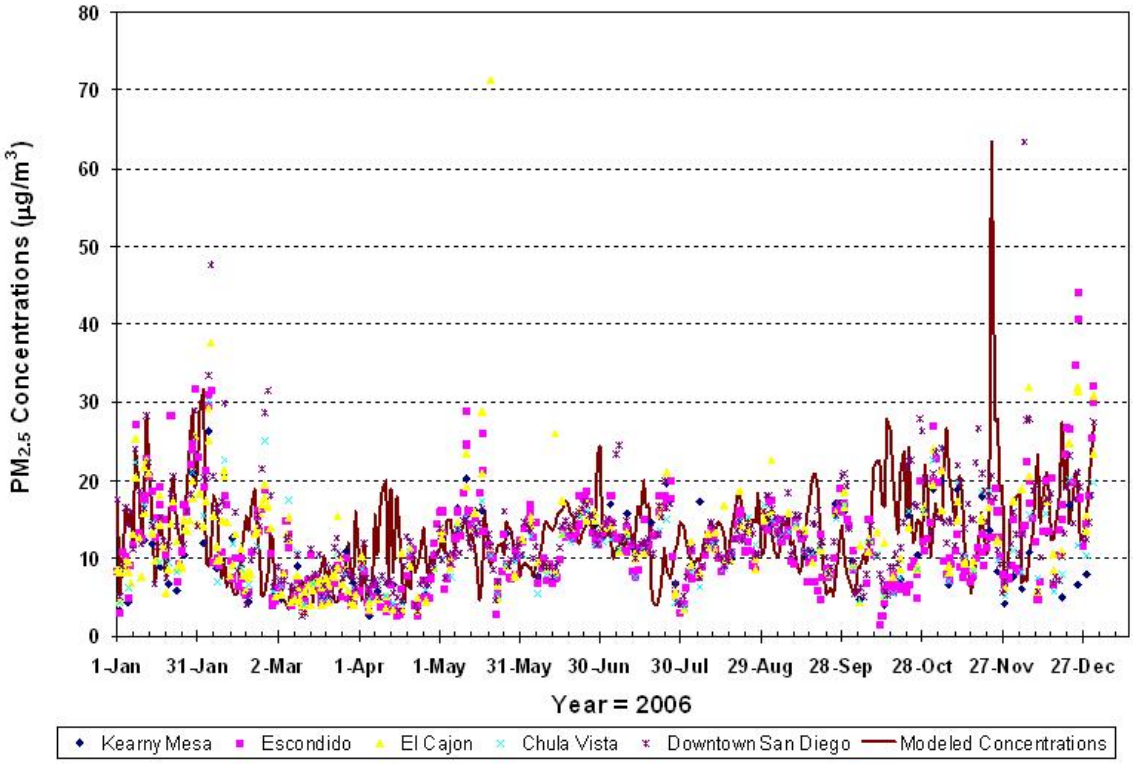

Figure K-1. Comparison of modeled and actual PM2.5 concentrations; Base Year = Year 2006

Zero emissions test was conducted to check the performance and sensitivity of emissions in the model whether it produces background levels. Finally, the validity and performance of the model was tested using the 2006 base year by comparing the modeled results with the ambient concentrations for the same year (2006) for all $PM_{2.5}$ monitoring sites in San Diego County (see Figure K-1 above). In the above figure, the thick brown line corresponds to the modeled $PM_{2.5}$ prediction for San Diego on any given day in 2006. The colored dots are actual ambient $PM_{2.5}$ concentrations as measured by the APCD monitors in Kearny Mesa, Escondido, El Cajon, Chula Vista, and Downtown San Diego for the same year. In general the model can predict the seasonal increasing and decreasing trends reasonably well.

Year 2006 was our base year for the model. The CARB emission inventory for year 2006 was utilized which contained detailed mobile, stationary, and natural contribution for $PM_{2.5}$. We also utilized the meteorological projections for maximum and minimum surface temperature and precipitation output for the years 2006-2050. Meteorological scenarios from all three models (GFDL CM2.1, CNRM CM3, and NCAR CCSM3) were applied by downscaling for San Diego county by 12 Km X 12 Km. The two growth assumptions used were consistent with IPCC scenarios and are:

- SRESA2: climate change simulation CO_2 850ppm max; self-reliance; population increases; economic growth slow
- SRESB1: climate change simulation CO_2 550ppm max; global solutions; population peaks and steadies; service and information economy

Projections:

Fine Particulate Matter Emission Projection

One major challenge to this work was the development of realistic emission inventories out to year 2050 for San Diego. For the A2 scenario, we assumed no change in emissions from the base year 2006. However, for the B1 scenario, we used the CARB emissions projection for years 2010, 2015, and 2020 and assumed emissions to be constant at the 2020 level for subsequent years until 2050. Figure 2 shows the historical as well as projected $PM_{2.5}$ emissions used by Stationary, Area, and Mobile source categories. Similar emissions are present for reactive organic carbon (ROG), NOx, and SOx which have been used in the model to drive the chemical reactions.

Health Effects Modeling:

In order to model mortality effect from $PM_{2.5}$ we collected data from the California Department of Health Statistics Website[1] for mortality rates of specific diseases found to be secondary to $PM_{2.5}$. Then we derived a model applying as described by Pope et al. (2002) by incorporating the projected $PM_{2.5}$ concentrations, thus deriving the projected mortality rate. According to Pope et al. (2002) each 10-$\mu g/m^3$ (over 16 year span) elevation in long-term average $PM_{2.5}$ ambient concentrations was associated with approximately a 4%, 6%, and 8% increased risk of all-cause, cardiopulmonary, and lung cancer mortality, respectively. In our mortality model, the results of which are displayed in Table I, we assumed that the demographic characteristics and the population were same throughout the projection and assumed that long term ecological effects will be the same.

[1] California Department of Health Statistics. Available at; http://www.applications.dhs.ca.gov/vsg/default.asp.

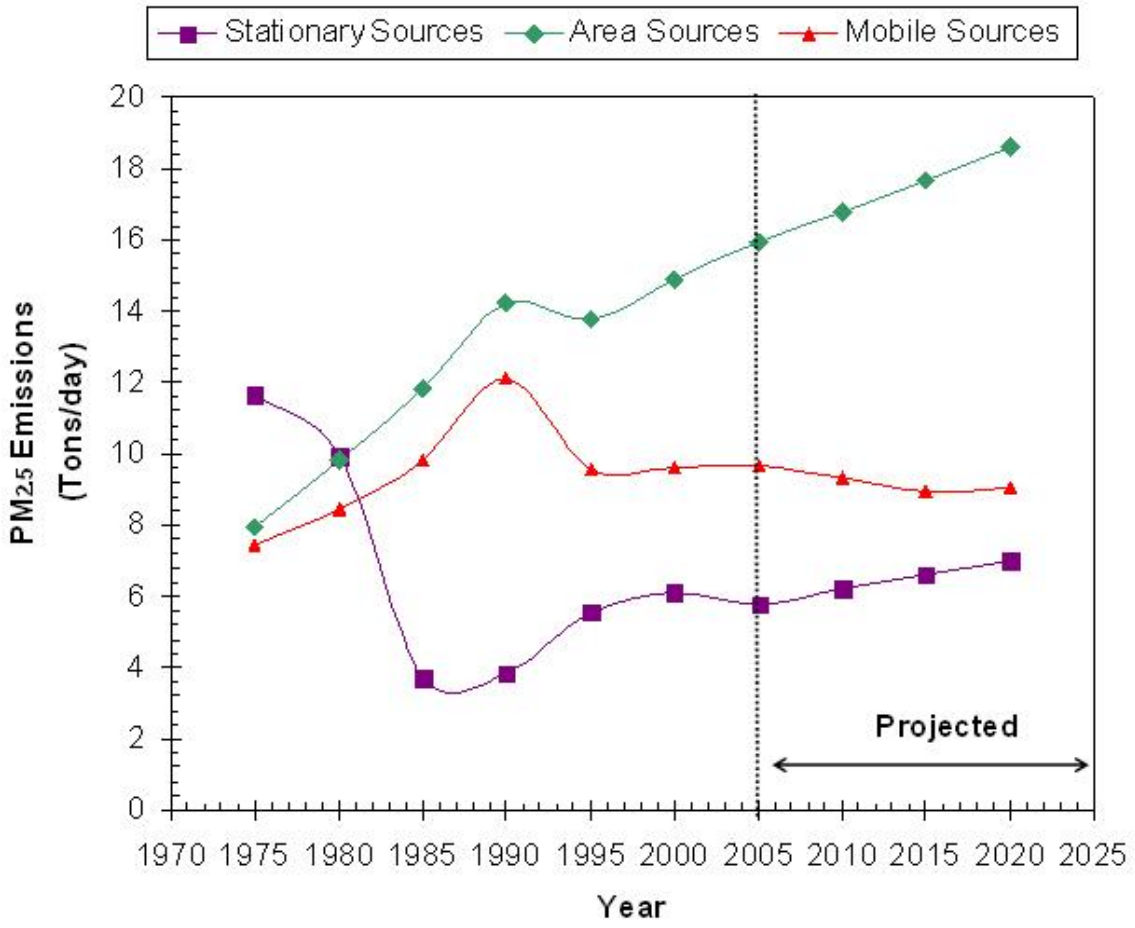

Figure K-2. $PM_{2.5}$ emissions in San Diego County from 1975 to 2020 from California Air Resources Board.

APPENDIX L: Electricity Consumption

Electricity consumption in San Diego County has increased steadily over the past 17 years (see Figure L-1) except for a noticeable dip in 2000 because of the 2000-2001 energy crisis. Voluntary efforts to reduce consumption have helped San Diego avoid extensive outages since 2001, but more recently consumption trends have resumed and even exceeded pre-crisis levels.

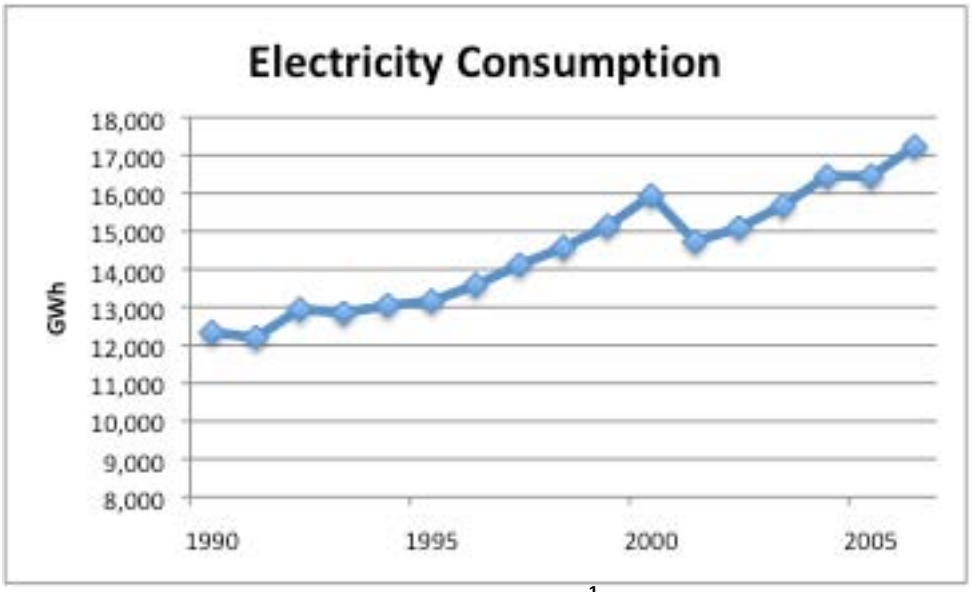

Figure L-1. Electricity Consumption in San Diego County[1]

The commercial sector consumes the most of any sector in the region, followed by the residential and industrial sectors, as illustrated in Figure 2 below.

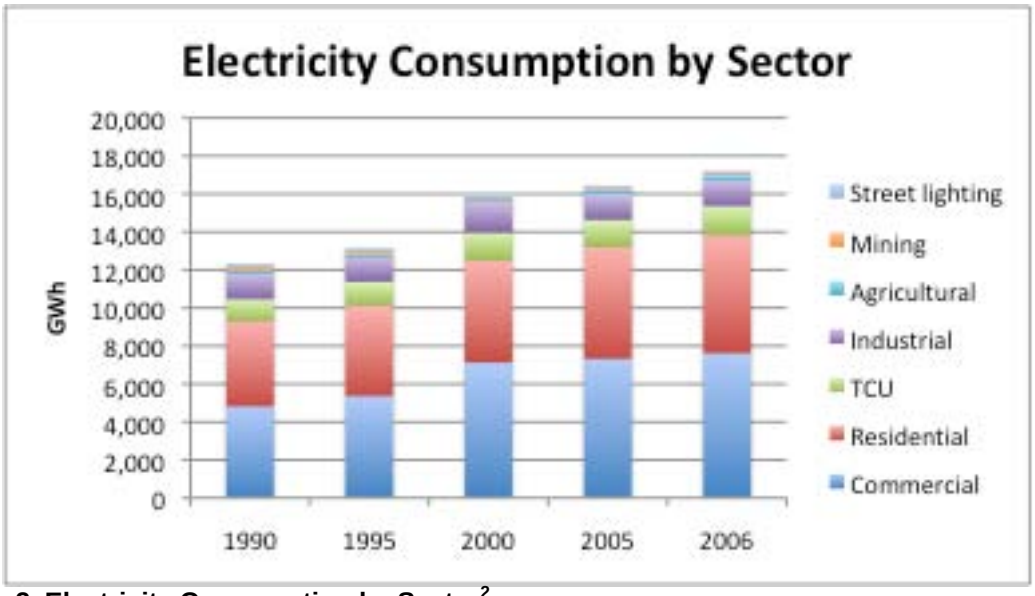

Figure L- 2. Electricity Consumption by Sector[2]

[1] California Energy Commission.

Peak Demand[3]
Peak demand, the highest level of demand in a year, in the San Diego region is approximately 4,500 MW. Peak demand also declined during the energy crisis, but has rebounded and continued to grow steadily since then. The peak demand in 2006 was the highest on record in the SDG&E territory, driven largely by cooling loads as a result of high summertime temperatures. Figure 3 shows historical peak demand.

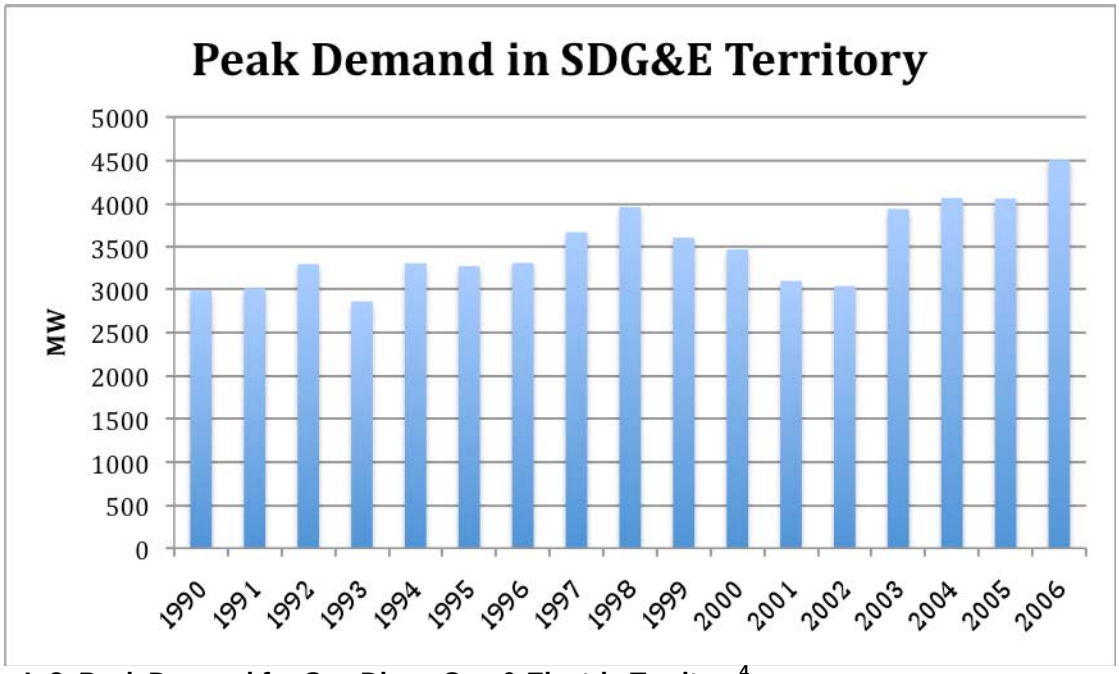

Figure L-3. Peak Demand for San Diego Gas & Electric Territory[4]

Electricity Mix
Natural gas is used to produce most of the region's electricity. No coal is used to generate electricity in the region, though electricity derived from coal is imported into the region. Energy imported into San Diego County accounts for approximately 65 percent of total consumption.[5] In 2006, according to the California Energy Commission, SDG&E's electricity was derived mostly from natural gas (50 percent) with nearly equal amounts of coal (18 percent) and nuclear (15 percent).[6] Renewable energy accounts for between 5-8 percent of total electricity sales.[7] In August 2007 SDG&E purchased about 5.3 percent of the region's power from renewable

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[2] California Energy Commission.
[3] Peak demand totals are for SDG&E's territory, which includes a portion of Orange County. No publicly available data exists for San Diego County's peak demand.
[4] Federal Energy Regulatory Commission Form 1 – Electric Energy Account.
[5] Estimate by Energy Policy Initiatives Center, University of San Diego School of Law.
[6] California Energy Commission. *California Major Utilities' Resource Mix for 2006*. Retrieved on April 18, 2008. Available at http://www.energy.ca.gov/electricity/electricity_resource_mix_pie_charts/index.html.
[7] California Energy Commission estimates included in table are 8 percent. California Public Utilities Commission estimates for August 2007 are 5.3 percent. See *Progress Towards 20 percent by 2010*, California Public Utilities Commission. Retrieved on April 18, 2008. Available at http://www.cpuc.ca.gov/PUC/energy/electric/RenewableEnergy/progress.htm.

sources. [8] Figure 4 below shows the electricity fuel mix for San Diego County in 2006.

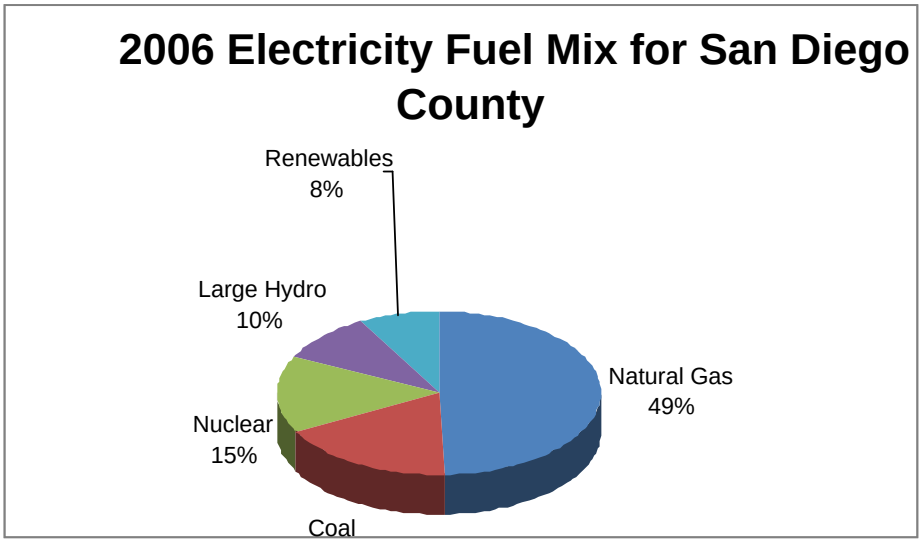

Figure L- 4. Electricity Fuel Mix for San Diego County

Greenhouse-Gas Emissions

Greenhouse-gas emissions (GHG) associated with electric-power production and consumption in San Diego County totaled approximately 8.6 million metric tons of carbon dioxide equivalent (MMCO2e) in 2006. [9] This is a 30 percent increase over 1990 levels, even though electricity *consumption* increased approximately 40 percent during the same period. Figure 5 shows the trend in GHG emissions associated with electricity from 1990 through 2006.

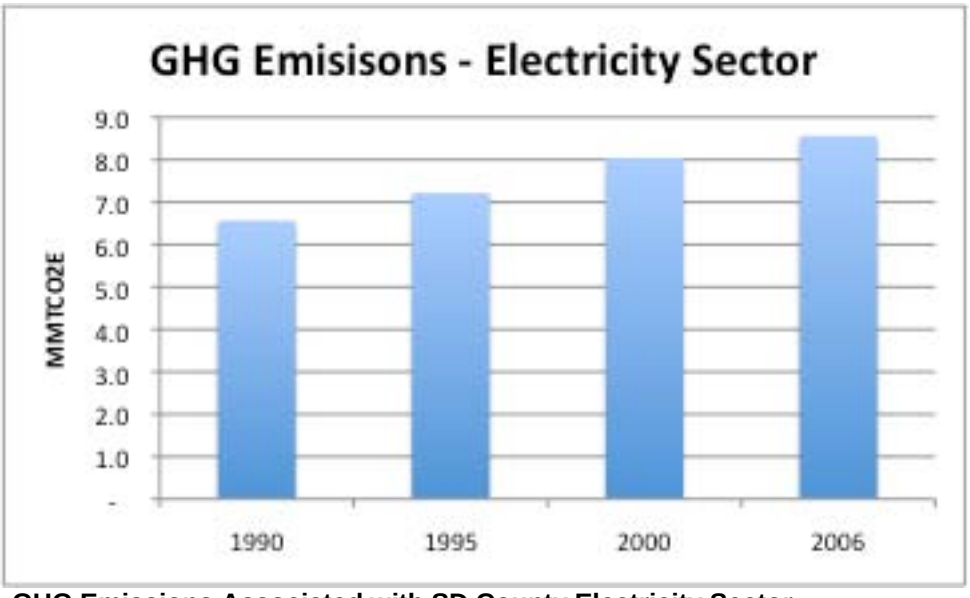

Figure L-5. GHG Emissions Associated with SD County Electricity Sector

[8] California Public Utilities Commission. 2008. *Progress Towards 20 percent by 2010*. Retrieved March 31, 2008. Available at: http://www.cpuc.ca.gov/PUC/energy/electric/RenewableEnergy/progress.htm.
[9] Estimate by Energy Policy Initiatives Center, University of San Diego School of Law.

Electric utilities generally plan ahead to meet peak-day usage, because peak days represent the maximum instantaneous loads on generation, imports, transmission and distribution resources. When these resources reach their maximum capacity, the power grid becomes unstable and can result in loss of service. Utilities address this problem through a combination of capital investment for the long term and demand response programs in the short to medium term. In San Diego, peak electric demand will typically occur when there is a series of high-temperature days. The third consecutive day of high-temperature events is usually when demand peaks.

For this report, we looked at the potential increase in frequency and monthly distribution of high-temperature day events resulting from climate change. The analysis identified the daily maximum temperature and then captured the frequency of events for a given temperature threshold. Two thresholds were evaluated for Miramar: 84 degrees F, which is currently used by SDG&E to trigger a Critical Peak Pricing event (when the cost of electricity to commercial customers increases significantly to incentivize reduced consumption); and 93.8 degrees F, which represents the one-in-10 event for maximum temperatures over the last ten years.

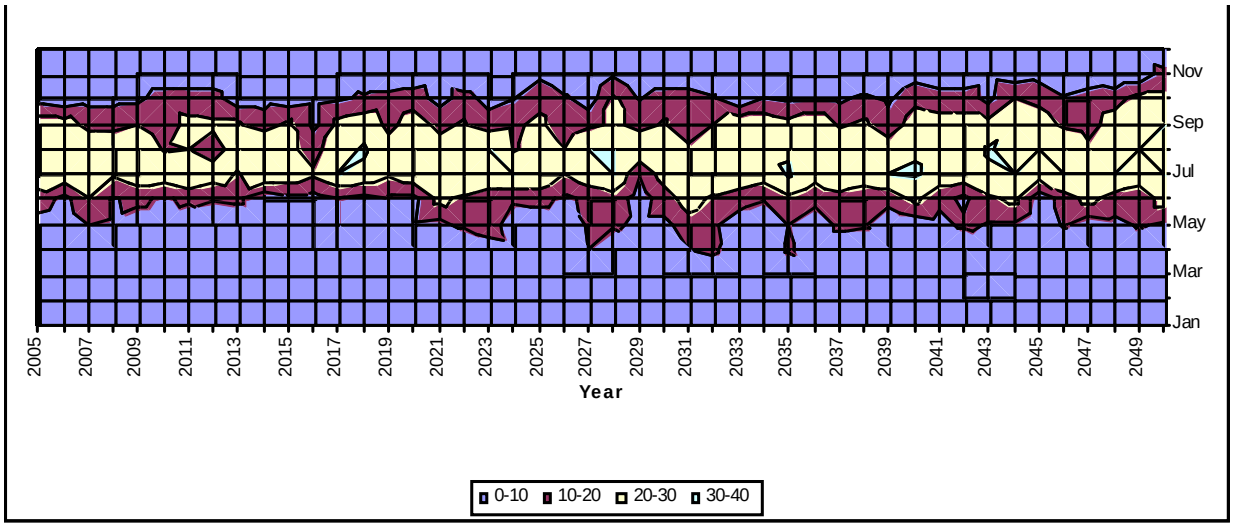

Figure L- 6. Days Exceeding 84 Degrees Fahrenheit, Miramar A2 GFDL

Figure 6 represents the results of the 84 degree F threshold analysis. The chart is a three-dimensional representation of a matrix, with the year in the x-axis, the month on the y-axis and the number of events represented by the colored areas in bins of ten events per month. The chart suggests that the region could experience increased events (represented in light green color) starting in 2017. The data also show an expansion of the months in which the events occur: in some years, peak periods start as early as April and end as late as November.

Figure 7 depicts the increased occurrence of extreme temperature events above 93.8 degrees F at Miramar (a one-in-10 event). The chart shows that through the year 2013, this is a relatively infrequent event. However, starting in the year 2014, the frequency starts to increase and continues that trend until 2043, when these events could be a regular characteristic of weather extremes in the region. This may result in the need for significant investment in utility resources or a change in consumer usage patterns – or a combination of both – in order to maintain reliable energy delivery to the region.

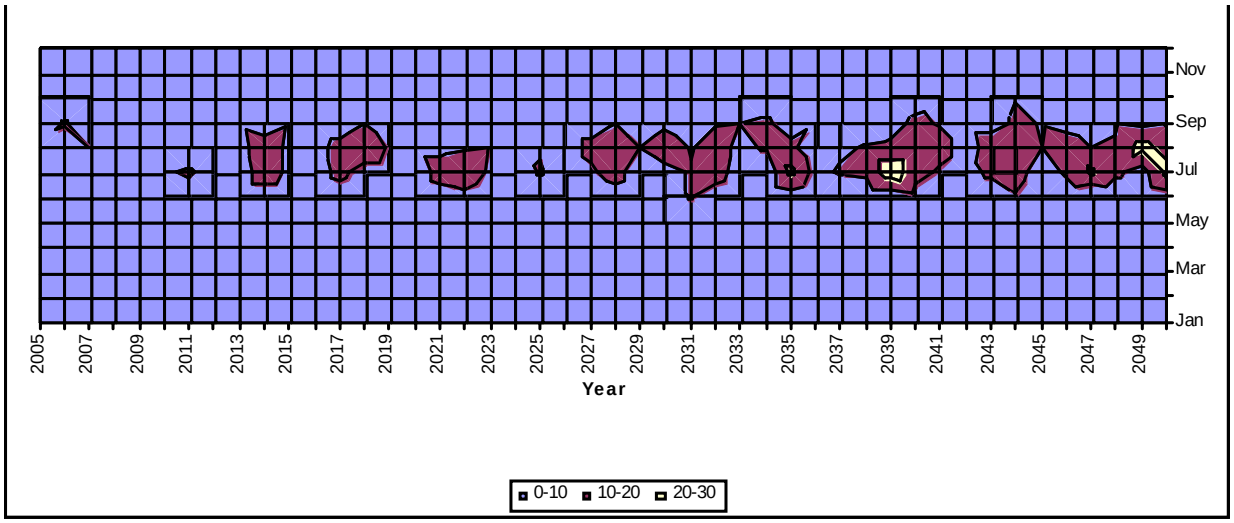

Figure L-7. Days Exceeding 93.8 Degrees F, Miramar A2 GFDL.