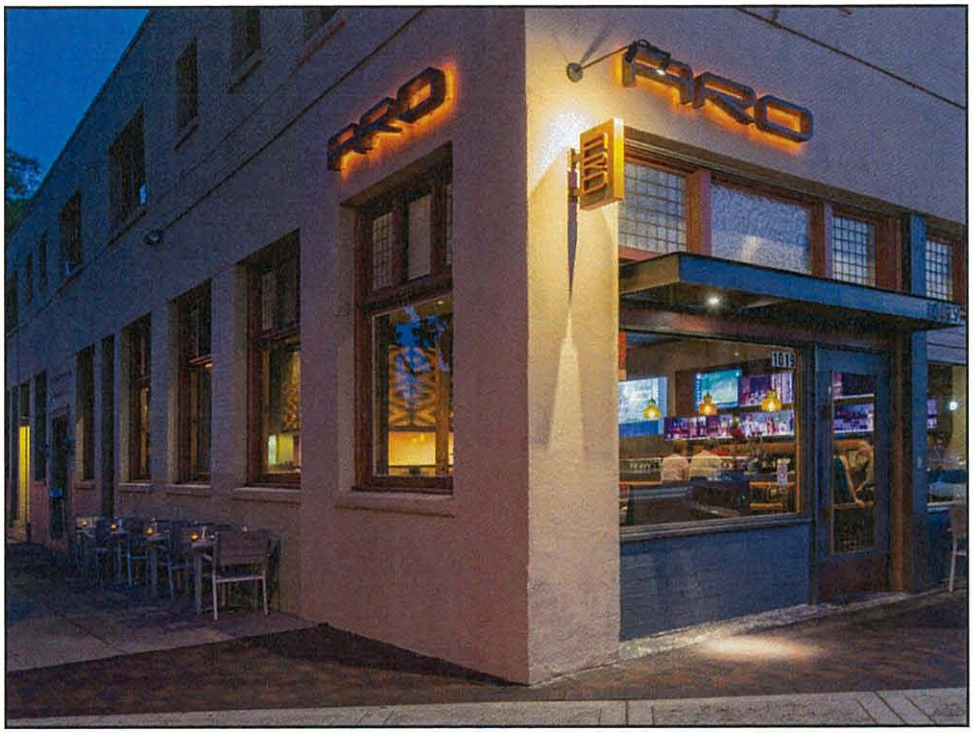
Additional Documents Distributed for the Regular City Council Meeting February 21, 2018

Item No.	Agenda Item Description	Distributor	Document
2	Presentation by the Pasadena Humane Society on Available Animal Adoptions	Jamie Holeman, Director of Public Relations & Marketing, Pasadena Humane Society	PowerPoint
3	Merchant Minute	Alejandro Chavez, Manager Aro Latin Restaurant	PowerPoint, Pictures of Aro Latin and Radhika Restaurants
4	Councilmembers Communications	Michael A. Cacciotti, Councilmember	PowerPoint, Various Photos
4	Councilmembers Communications	Robert S. Joe, Councilmember	PowerPoint: 1) Presentation of Proclamation from LA County Board of Supervisors; 2) 2018 Lunar New Year Cultural Performance; 3) Senior Scam
4	Councilmembers Communications	Marina Khubesrian, M.D., Mayor Pro Tem	PowerPoint, San Gabriel Valley Mosquito and Vector Control District
PC	Public Comment	Timothy Okitsu, Boy Scout	Picture, Interpretive Sign at Arroyo Woodland and Wildlife Nature Park
PC	Public Comment	Laurie Wheeler, President, Chamber of Commerce	PowerPoint, South Pasadena Arts Crawl Event; Bad Girls Throughout History Journal
10	Mid-Year Financial Report for Fiscal Year 2017-18	David Batt, Finance Director	PowerPoint, Mid-Year Fiscal Year 2017-18

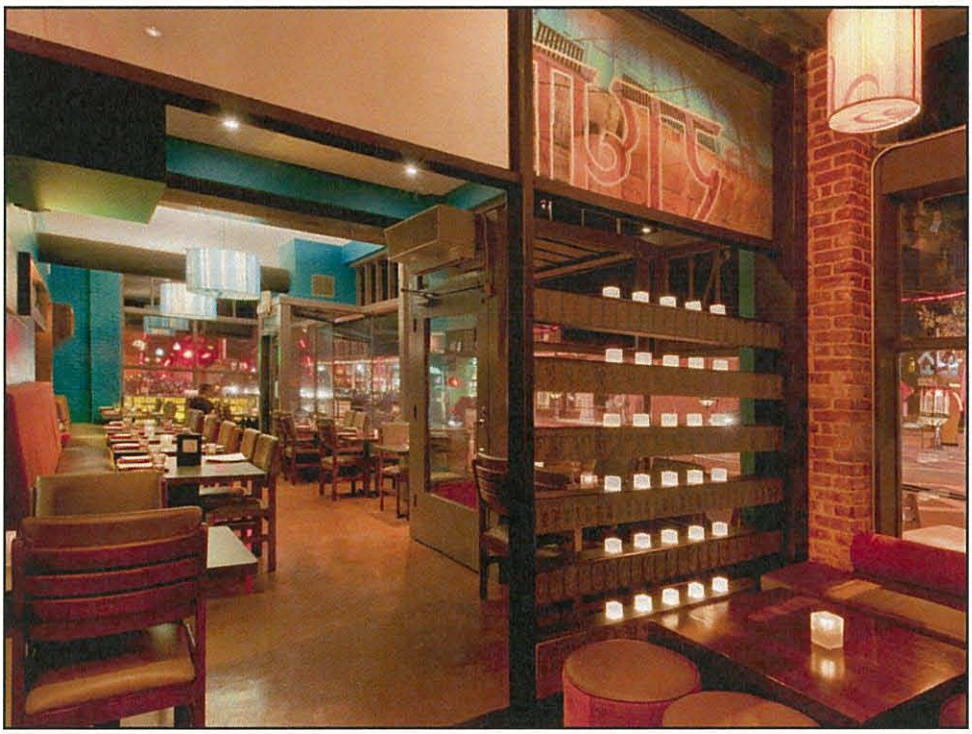
17	Award of a Multi-Year Contract to West Coast Arborists Inc., for Urban Forestry Services in an Amount Not-to-Exceed $375,000	Kristine Courdy, Public Works Operation Manager	PowerPoint, West Coast Arborists Contract Award
17	Award of a Multi-Year Contract to West Coast Arborists Inc., for Urban Forestry Services in an Amount Not-to-Exceed $375,000	Rafael Casillas, Director of Public Works	Memo to Council
17	Award of a Multi-Year Contract to West Coast Arborists Inc., for Urban Forestry Services in an Amount Not-to-Exceed $375,000	William Kelly, Chair, Natural Resources & Environmental Commission	Email to Council
18	Approve the City of South Pasadena's Default Energy Mix of Fifty Percent Renewable Energy Option for the Clean Power Alliance of Southern California	Kristine Courdy, Public Works Operation Manager	PowerPoint

Additional Material
Accepted 2/21/18 2
2/21/18
PHS



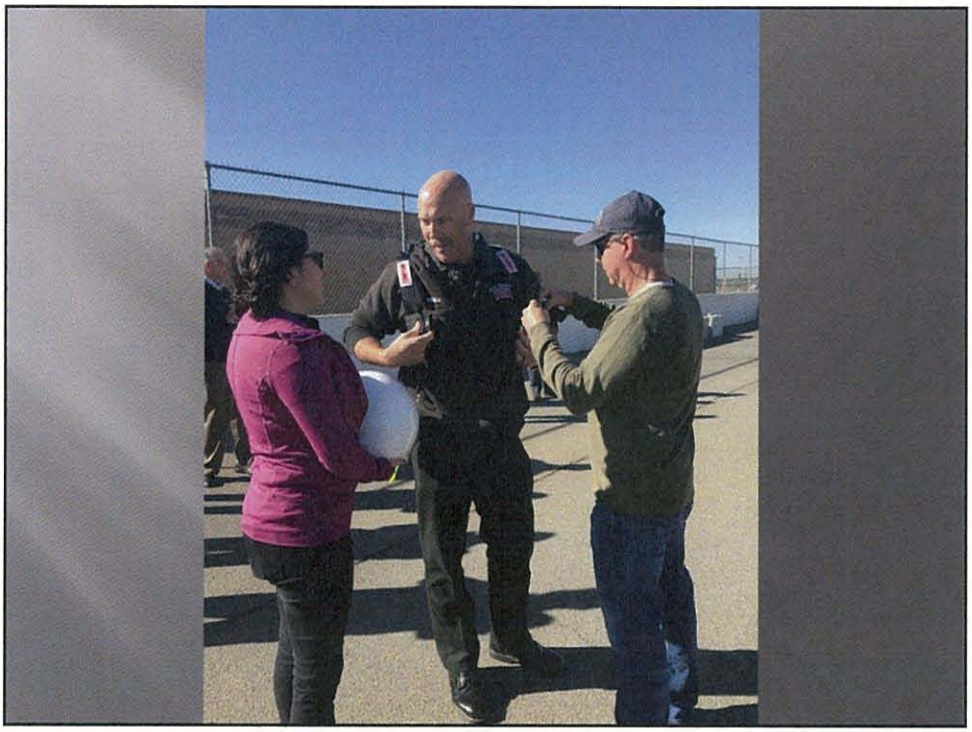
Applicant Exhibit 3
2/21/18
Merchant Min.


RADHIKA



Material 4

2/21/18 Macciotti




POLICE


TO PROTECT & SERVE
POLICE
HYBRID

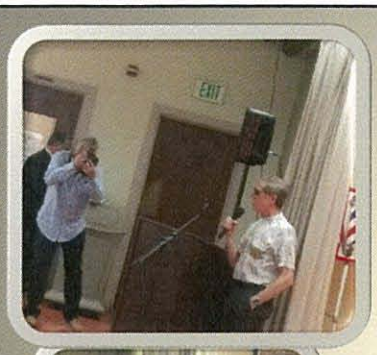

SOUTH PASADEN

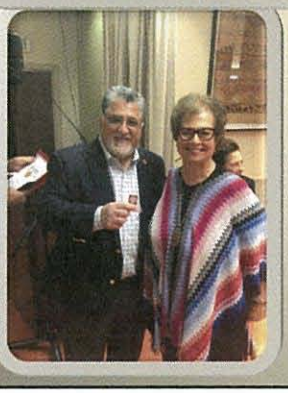

125
YEARS
Preserving the Past
Celebrating the Present
Reaching for the Future
SOUTH PASADEN

Los Angeles County Board of Supervisors
February 13, 2018 Meeting

Stop Senior Scams Performance
Friday, February 9, 2018

Sponsored by
Senator Anthony Portantino



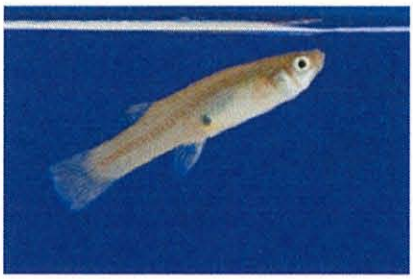


Mayor Richard Schneider welcomes the crowd of 75 + seniors (Top);

Senator Anthony Portantino and Adrienne Omansky, Theater Group Director (left)

Actors performed seven skits highlighting some of the most popular scams. Most recent scam is the Medicare replacement card coming out in April 2018.

South Pasadena has joined the San Gabriel Valley Mosquito & Vector Control District



Mosquitofish Program

San Gabriel Valley Mosquito & Vector Control District

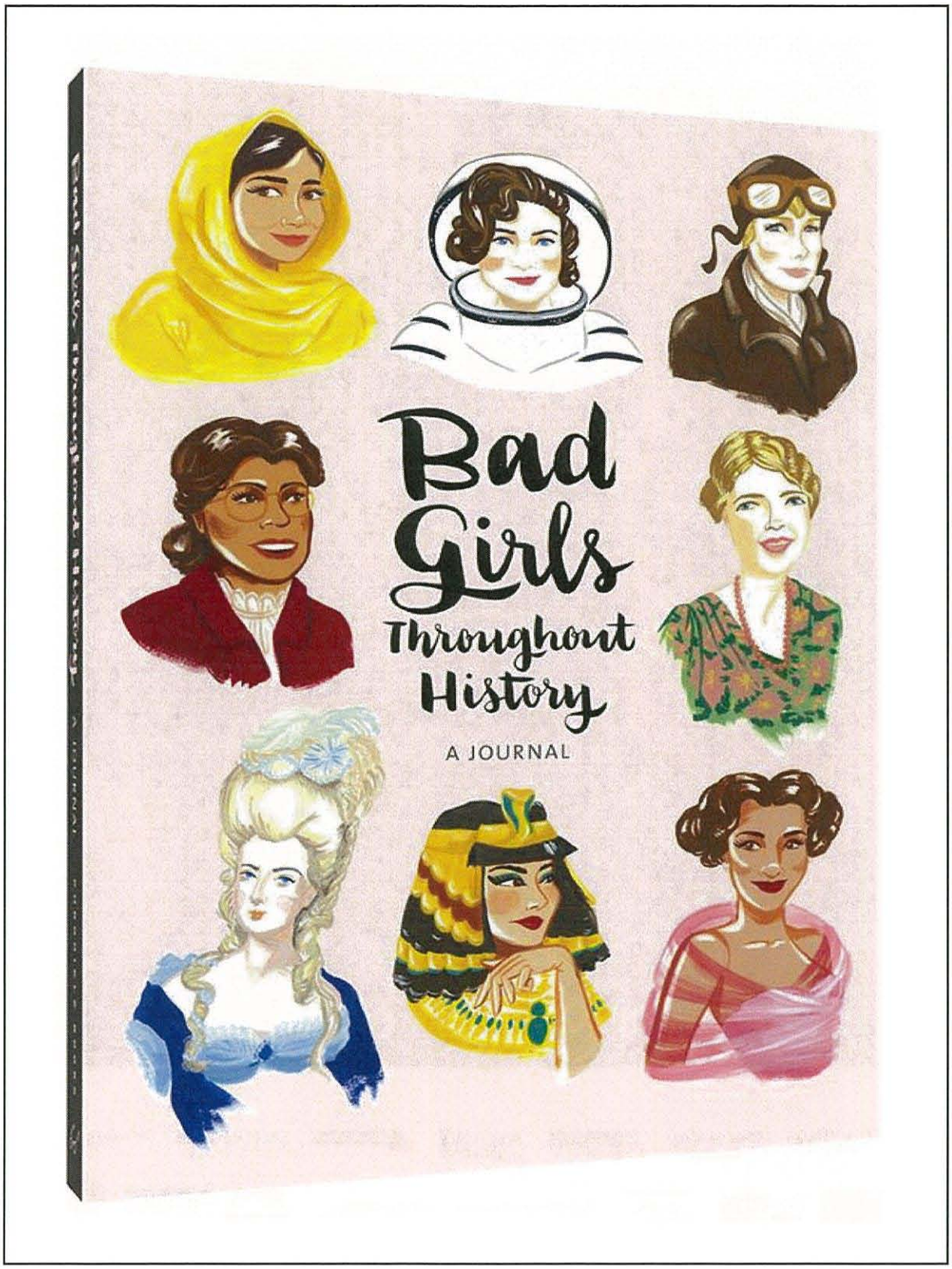
Please contact the City Public Works Department at (626) 403-7240 should you have any mosquito/vector related questions.

The Vector Control District make a Community presentation in July 2018.

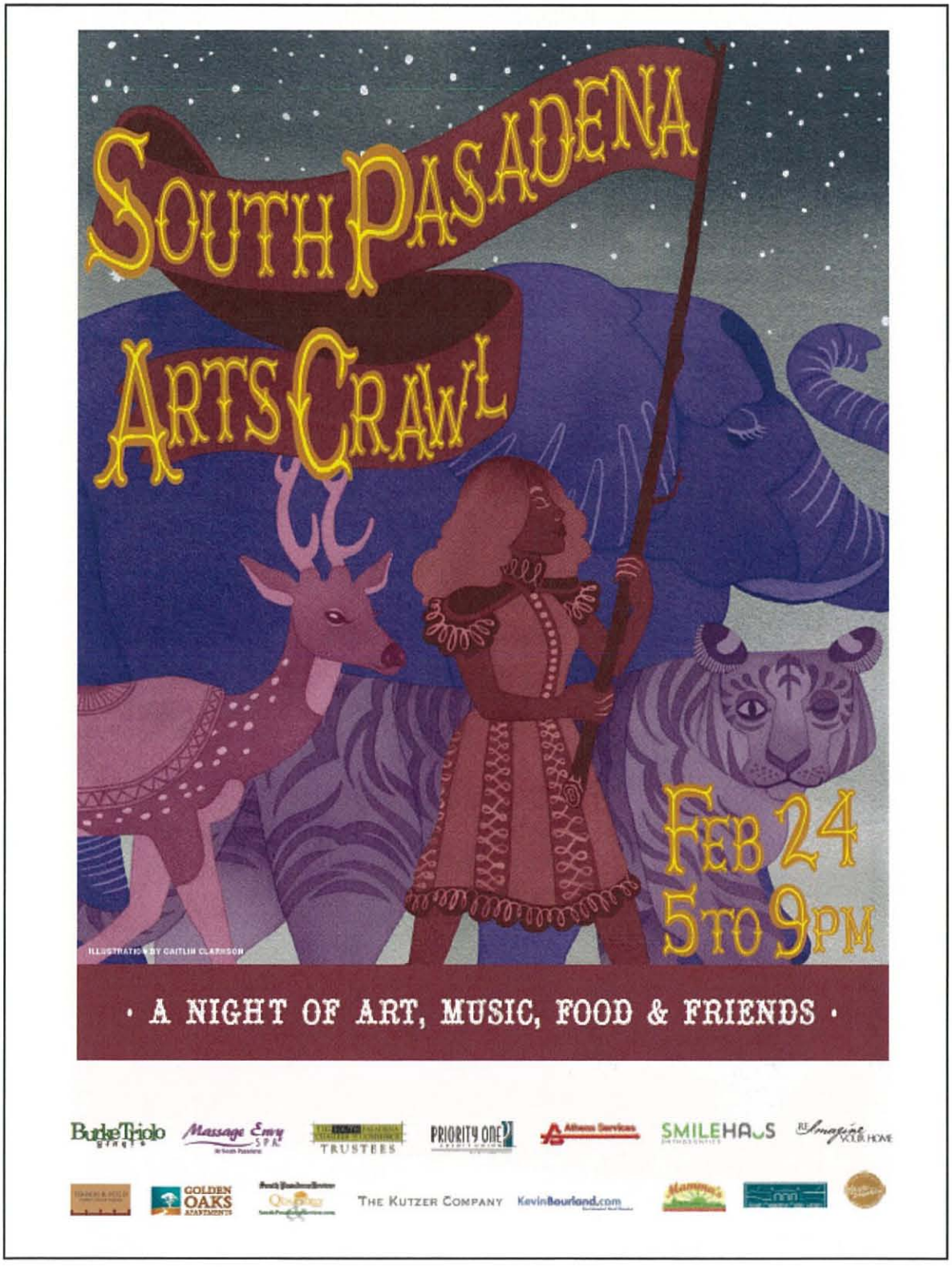
4

2/21/18 Khuberrian


sphstiger
ADDL DOC # PC
2/21/18
Tokitsu



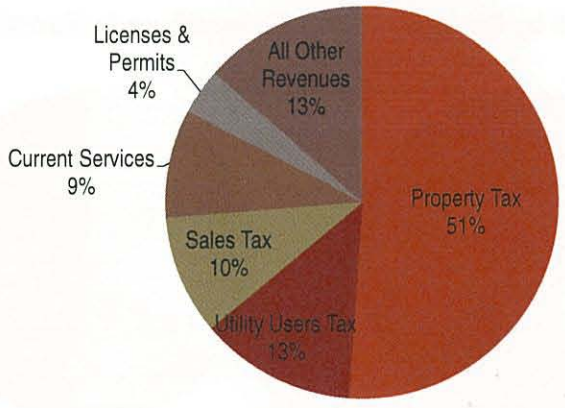
PC
2/21/18
Chamber


SOUTH PASADENA
ARTS CRAWL
FEB 24
5TO 9PM
ILLUSTRATION BY CAITLIN CLARKSON
· A NIGHT OF ART, MUSIC, FOOD & FRIENDS ·
BurdeTriolo
Massage Envy SPA
TRUSTEES
PRIORITY ONE
SMILEHAUS
GOLDEN OAKS APARTMENTS
THE KUTZER COMPANY
KevinBourland.com

Mid-Year FY 2017/18

City of South Pasadena
February 21, 2018

General Fund Revenues



FY 2017/18 General Fund Budget = **$26,734,642**

10

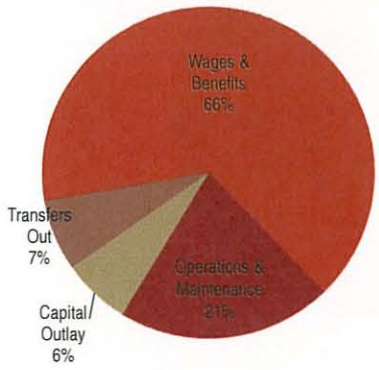
2/21/18

General Fund Revenues

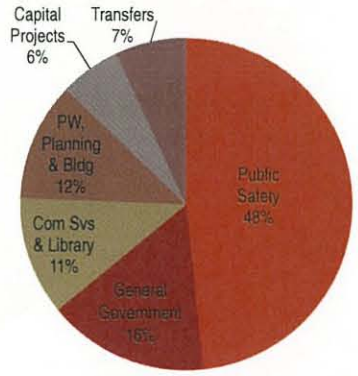
Category	Actual 2015/16	Actual 2016/17	FY 2017/18 Budget	Mid-Year Revenues	Percent Received
Property Taxes	$12,632,984	$13,236,932	$13,664,979	$4,639,430	33.9%
Sales Taxes	2,635,968	2,456,666	2,6925,000	804,533	30.7%
Utility Users Taxes	3,414,827	3,381,948	3,430,000	1,416,368	41.3%
Franchise Fees	875,303	818,724	840,000	261,142	31.1%
Licenses & Permits	1,028,583	1,054,463	1,006,440	488,726	48.6%
Fines & Forfeitures	444,556	397,738	367,000	232,726	63.4%
Use of Money & Property	681,073	541,749	632,671	247,693	39.1%
Other Agencies	136,328	76,385	670,000	-	0.0%
Current Services	2,805,481	2,915,875	2,386,050	1,287,953	54.0%
All Other Revenues	1,834,950	1,475,703	1,112,502	306,684	27.6%
TOTAL GENERAL FUND	**$26,490,053**	**$26,490,053**	**$26,734,642**	**$9,685,257**	**36.2%**

General Fund Expenses

Expenditure by Category



Expenditure by Function



FY 2017/18 General Fund Budget = **$27,420,307**

General Fund Expenditures

Category	Actual 2015/16	Actual 2016/17	FY 2017/18 Budget	Mid-Year Expenses	Percent Expended
Wages & Benefits	$15,672,149	$17,464,420	$17,960,310	$9,407,769	52.4%
Operations & Maintenance	5,564,847	5,541,052	5,751,997	2,465,795	42.9%
Capital Outlay	101,252	163,599	188,000	66,389	35.3%
Capital Projects	2,728,182	483,614	1,620,000	644,568	39.8%
Transfers Out	676,460	5,473,409	1,900,000	-	-
TOTAL GENERAL FUND	**$24,742,890**	**$29,126,094**	**$27,420,307**	**$12,584,521**	**45.9%**

Mid-Year Expenditures

Department	FY 2017/18 Budget	Mid-Year Expenses	Percent Expended
City Council/Treasurer	$ 75,637	29,650	39.2%
Management Services	2,605,711	1,192,467	45.8%
Finance	708,802	370,679	52.3%
Non-Departmental	918,378	648,467	70.6%
Police	8,620,012	4,367,458	50.7%
Fire	4,627,889	2,455,680	53.1%
Public Works	2,075,523	850,880	41.0%
Planning & Building	1,099,492	467,298	42.5%
Library	1,716,477	878,791	51.2%
Community Services	1,452,386	678,583	46.7%
Capital Projects	1,620,000	644,568	39.8%
Transfers Out	1,900,000	-	-
TOTAL	**$27,420,307**	**12,584,521**	**45.9%**

Legal Expenses

Program	Actual 2015/16	Actual 2016/17	Budget 2017/18	Mid-Year 2017/18	Percent Expended
Personnel	$49,827	$157,892	$150,000	$116,133	77.4%
Transportation	85,856	14,717	80,000	329	0.4%
City Attorney	261,454	257,588	265,000	113,695	42.9%
Successor Agency	2,133	1,033	-	-	-
CITYWIDE TOTAL	**$399,270**	**$431,230**	**$495,000**	**$230,157**	**46.5%**

WEST COAST ARBORISTS CONTRACT AWARD

FEBRUARY 21, 2018

City of South Pasadena

City of South Pasadena Urban Forestry

- City of South Pasadena Urban Forestry:
  - 10,029 Street and Median Trees
  - 468 City Park Trees
  - 113 City Reservoir Trees
- Arbor Day Foundation Tree City USA for over 18 years

17

2/21/18

Urban Forestry Maintenance Program

- An outside contractor performs urban forestry maintenance including the following services:
  - Tree Trimming
  - Services Requests
  - Tree Removals
  - Arborist Inspections
  - Emergency Response
  - Tree Planting
  - Plant Health Care
- Current tree trimming cycle is every 4-years for the City

Urban Forestry Maintenance Contract History

1999	2009	2016	2017
City awards Urban Forestry Services Contract to West Coast Arborists (WCA)	City awards Urban Forestry Services Contract to WCA	DIR establishes new tree maintenance Prevailing Wage	City issues an RFP for urban forestry maintenance services

DIR Prevailing Wage Determination

- On June 1, 2015 WCA entered into collective bargaining agreement with their labor union
- On August 22, 2015 a new tree maintenance prevailing wage was issued by the Department of Industrial Relations (DIR)
- Starting June 1, 2016 WCA was obligated to provide compensation based on the pre-determined DIR rates
- The proposed DIR rates exceeded the Consumer Price Index (CPI) increase included in the 2009 contract

West Coast Arborists

- Performing urban forestry maintenance services for the City since 1999
- Serve many other neighboring municipalities
- Offer electronic tree inventory management software

Urban Forestry Maintenance Next Steps

1) Proposed FY 2017-18 Services (March – June 2018):
   - Grid Pruning
   - Tree Planting
   - Dead Tree Removal
   - Service Requests
   - Emergency Response (if required)
2) Evaluate alternatives to close the funding gap for urban forestry services during the FY 2018-19 budget preparation
3) In July 2018 a contract amendment will be presented based on the approved FY 2018-19 budget
4) Continue to work with South Pasadena Beautiful on urban forestry programs

Questions

City of South Pasadena
Public Works

Memo

Date: February 21, 2018

To: The Honorable City Council

Via: Stephanie DeWolfe, City Manager

From: Rafael Casillas, Acting Public Works Director RC
Kristine Courdy, Acting Deputy Public Works Director KC

Re: February 21, 2018 City Council Meeting Item No. 17 Additional Document – Award of a multi-Year Contract to West Coast Arborists Inc., for Urban Forestry Services in an Amount Not-to-Exceed $375,000

The West Coast Arborist, Inc. Urban Forestry Services Contract award is agenda item number 17 at the February 21, 2018 City Council meeting. A few non-substantive corrections were requested to the contract to provide clarification and eliminate duplication within the contract. Attached a red-line copy of the contract with the proposed changes and below is also a brief summary:

- Under Section 1, General Requirements, item (c) added that "Contractor shall be responsible for carefully inspecting the tree for any bird nests before beginning any tree operations."
- Under Section 4, Definitions, moved item (d) Tree Trimming Classifications and Tasks to Section 6, General Tree Pruning Requirements.
- Under Section 4, Definitions, deleted item (e) Tree Removals. This was a duplicate item and tree removals are addressed under Section 8, Tree and Stump Removal Requirements.
- Under Section 4, Definitions, deleted item (f) Root Pruning. This was a duplicate item and tree removals are addressed under Section 9, Root Pruning.
- Under Section 4, Definitions, deleted item (g) Stump Grinding. This was a duplicate item and tree removals are addressed under Section 8, Tree and Stump Removal Requirements.
- Under Section 4, Definitions, moved item (h) to Tree Planting to a new Section 10, Tree Planting.
- Deleted duplicate wording in Section 4, Definitions, item (i) Emergency Work.

MAINTENANCE AGREEMENT
Providing Payment of Prevailing Wages

(City of South Pasadena / West Coast Arborists Inc.)

1. IDENTIFICATION

This MAINTENANCE AGREEMENT ("Agreement") is entered into by and between the City of South Pasadena, a California municipal corporation ("City"), and West Coast Arborists Inc. ("Contractor").

2. RECITALS

2.1. City has determined that it requires the following recurring maintenance services from a contractor: Urban forestry services for the City of South Pasadena trees including tree trimming, tree removal, tree planting, tree health care, arborist services, emergency tree related response, and consulting arborist services.

2.2. Contractor represents that it is fully qualified to perform such maintenance services by virtue of its experience and the training, education and expertise of its principals and employees. Contractor further represents that it is willing to accept responsibility for performing such maintenance services in accordance with the terms and conditions set forth in this Agreement.

NOW, THEREFORE, for and in consideration of the mutual covenants and conditions herein contained, City and Contractor agree as follows:

3. DEFINITIONS

3.1. "Scope of Services": Such maintenance services as are set forth in the Special Provisions attached hereto as "Exhibit A" and incorporated herein by this reference.

3.2. "Agreement Administrator": The Agreement Administrator for this project is Kristine Courdy, Public Works Operations Manager. The Agreement Administrator shall be the principal point of contact at the City for this project. All services under this Agreement shall be performed at the request of the Agreement Administrator. The Agreement Administrator will establish the timetable for completion of services and any interim milestones. City reserves the right to change this designation upon written notice to Contractor.

3.3. "Maximum Amount": The highest total compensation and costs payable to Contractor by City under this Agreement. The Maximum Amount under this Agreement is three hundred and seventy five thousand Dollars ($375,000.00). Breakdown of the cost of

each item is included in the Payment for Services attached hereto as "Exhibit "B and incorporated herein by this reference.

3.4. "Payment for Services": City shall pay for the services performed by the Contractor pursuant to the terms of this Agreement. The compensation is set forth in the "Payment for Services" attached hereto as "Exhibit B" and incorporated herein by this reference.

3.5. "Commencement Date": February 21, 2018.

3.6. "Termination Date": June 30, 2021.

4. TERM

The term of this Agreement shall commence at 12:00 a.m. on the Commencement Date and shall expire at 11:59 p.m. on the Termination Date unless extended by written agreement of the parties or terminated earlier under Section 15 ("Termination") below. The contract may be extended for an additional two years under the same terms and conditions at the sole discretion of the City Manager or his/her representative, unless earlier terminated as provided in Section 15 herein. If the City desires to exercise the two year renewal option, the City shall notify the Contractor in writing. If the Contractor desires to adjust the rates as set forth in "Exhibit B" for such extension period, Contractor shall give City written notice sixty (60) days in advance for such adjustment. In no case shall said adjustment exceed the increase (or decrease) represented by the United States Department of Labor, Bureau of Labor Statistics Consumer Price Index for all Urban Consumers for the Los Angeles-Anaheim-Riverside standard Metropolitan Statistical Area ("Index") for March of the term then expiring from the Index for March one year prior thereto.

5. CONTRACTOR'S DUTIES

5.1. **Services**. Contractor shall perform the services identified in the Scope of Services. City shall have the right to request, in writing, changes in the Scope of Services. Any such changes mutually agreed upon by the parties, and any corresponding increase or decrease in compensation, shall be incorporated by written amendment to this Agreement. No additional work should be performed unless otherwise authorized by the City in writing.

5.2. **Performance to Satisfaction of City**: Contractor agrees to perform all the work to the complete satisfaction of the City and within the hereinafter specified. Contractor agrees that the services rendered pursuant to this Agreement shall be performed in accordance with the standards customarily provided by an experienced and competent professional organization rendering the same or similar services. Evaluations of the

work will be done by the Agreement Administrator of their designee. If the quality of the work is not satisfactory, the City in its sole discretion has the right to:

- Meet with the Contractor to review the quality of the work and resolve the matter of concern;
- Require the Contractor to repeat the work at no additional fee until satisfactory; and/or
- Terminate the Agreement as hereinafter set forth.

5.3. Coordination with City. In performing services under this Agreement, Contractor shall coordinate all contact with City through its Agreement Administrator.

5.4. Budgetary Notification. Contractor shall notify the Agreement Administrator, in writing, when fees and expenses incurred under this Agreement have reached eighty percent (80%) of the Maximum Amount. Contractor shall concurrently inform the Agreement Administrator, in writing, of Contractor's estimate of total expenditures required to complete its current assignments before proceeding, when the remaining work on such assignments would exceed the Maximum Amount.

5.5. Business License. Contractor shall obtain and maintain in force a City business license for the duration of this Agreement.

5.6. Professional Standards. Contractor shall perform all work to the highest standards of Contractor's profession and in a manner reasonably satisfactory to City. Contractor shall keep itself fully informed of and in compliance with all local, state, and federal laws, rules, and regulations in any manner affecting the performance of this Agreement, including all Cal/OSHA requirements, the conflict of interest provisions of Government Code § 1090 and the Political Reform Act (Government Code § 81000 et seq.).

5.7. Appropriate Personnel. Contractor has, or will secure at its own expense, all personnel required to perform the services identified in the Scope of Services. All such services shall be performed by Contractor or under its supervision or by subcontractor(s) of Contractor, and all personnel engaged in the work shall be qualified to perform such services. Herminio Padilla shall be Contractor's project administrator and shall have direct responsibility for management of Contractor's performance under this Agreement. No change shall be made in Contractor's project administrator without City's prior written consent.

5.8. Prevailing Wages. This Agreement is subject to the prevailing wage law as more fully set forth in Section 8 (Labor Code), for all work performed under this Agreement for which the payment of prevailing wages is required under the California Labor Code. In particular, Contractor acknowledges that prevailing wage determinations are available for work performed under this Agreement.

5.9. Permits and Approvals. Contractor shall obtain, at its sole cost and expense, all permits and regulatory approvals necessary, if any, for Contractor's performance of this Agreement including, but not limited to, professional licenses and permits.

5.10. Notification of Organizational Changes. Contractor shall notify the Agreement Administrator, in writing, of any change in name, ownership or control of Contractor's firm or of any subcontractor. Change of ownership or control of Contractor's firm may require an amendment to this Agreement.

5.11. Records. Contractor shall maintain any and all ledgers, books of account, invoices, vouchers, canceled checks, and other records or documents evidencing or relating to charges for services or expenditures and disbursements charged to City under this Agreement for a minimum of three (3) years, or for any longer period required by law, from the date of final payment to Contractor under this Agreement. All such documents shall be made available for inspection, audit, and/or copying at any time during regular business hours, upon oral or written request of City. In addition, pursuant to Government Code Section 8546.7, if the amount of public funds expended under this Agreement exceeds ten thousand dollars, all such documents and this Agreement shall be subject to the examination and audit of the State Auditor, at the request of City or as part of any audit of City, for a period of three (3) years after final payment under this Agreement.

6. SUBCONTRACTING AND ASSIGNMENT

6.1. General Prohibition On Assignment. This Agreement covers services of a specific and unique nature. Except as otherwise provided herein, Contractor shall not assign or transfer its interest in this Agreement or subcontract any services to be performed without amending this Agreement.

6.2. Contractor Responsible. Contractor shall be responsible to City for all services to be performed under this Agreement.

6.3. Subcontracting. Contractor shall not subcontract any portion of the performance contemplated and provided for herein unless (1) such subcontracting is specifically described in the proposal attached hereto or (2) the City provides prior written approval. In any event, Contractor shall supervise all work subcontracted by Contractor in performing the services described in the Scope of Services and shall be responsible for all work performed by a subcontractor as if Contractor itself had performed such work. The subcontracting of any work shall not relieve Contractor from any of its obligations under this Agreement with respect to the services described in the Scope of Services. Contractor is obligated to ensure that any and all subcontractors performing any services under this Agreement shall be fully insured in

all respects and to the same extent as set forth under Section 13 (Insurance), to City's satisfaction.

6.4. Compensation for Subcontractors. Contractor shall be liable and accountable for any and all payments, compensation, and federal and state taxes to all subcontractors performing services under this Agreement. City shall not be liable for any payment, compensation, or federal and state taxes for any subcontractors.

7. COMPENSATION

7.1. General. City agrees to compensate Contractor for the services provided under this Agreement, and Contractor agrees to accept payment, the Maximum Amount in full satisfaction for such services. Compensation shall not exceed the Maximum Amount. Contractor shall not be reimbursed for any expenses unless provided for in this Agreement or authorized in writing by City in advance.

7.2. Invoices. Contractor shall submit to City an invoice, on a monthly basis or as otherwise agreed to by the Agreement Administrator, for services performed pursuant to this Agreement. Each invoice shall identify the Maximum Amount, the services rendered during the billing period, the amount due for the invoice, and the total amount previously invoiced. Contractor shall include a copy of each subcontractor invoice, if any, for which reimbursement is sought in the invoice.

7.3. Taxes. City shall not withhold applicable taxes or other payroll deductions from payments made to Contractor except as otherwise required by law. Contractor shall be solely responsible for calculating, withholding, and paying all taxes.

7.4. Disputes. The parties agree to meet and confer at mutually agreeable times to resolve any disputed amounts contained in an invoice submitted by Contractor.

8. LABOR CODE

8.1. Prevailing Wage Law. Prevailing Wage Law. This Agreement is subject to the requirements of the prevailing wage laws, including, but not limited to, Labor Code Section 1720 et seq., and Labor Code Section 1770 et seq., as well as Code of Regulations, Title 8, Section 16000 et seq., which require payment of prevailing wage rates and the performance of other requirements on certain "public works" and "maintenance" projects. Contractor shall defend, indemnify, and hold harmless City, and its officers, employees, agents, and volunteers free and harmless from any claim or liability arising out of failure or alleged failure of Contractor to comply with such prevailing wage laws.

8.2. Payment of Prevailing Wages. Contractor shall pay the prevailing wage rates for all work performed under this Agreement. When any craft or classification is omitted

from the general prevailing wage determinations, the Contractor shall pay the wage rate of the craft or classification most closely related to the omitted classification.

8.3. **Forfeiture.** Contractor shall forfeit as a penalty to City Two Hundred Dollars ($200.00), or any greater penalty provided in the Labor Code, for each calendar day, or portion thereof, for each worker paid less than the prevailing wage rates for any work done under this Agreement employed in the performance of the Scope of Services by Contractor or by any subcontractor of Contractor in violation of the provisions of the Labor Code. In addition, the difference between such prevailing wage rates and the amount paid to each worker for each calendar day, or portion thereof, for which each worker was paid less than the prevailing wage rate shall be paid to each worker by Contractor.

8.4. **Apprentices.** Contractor shall comply with the provisions of Labor Code Section 1777.5 concerning the employment of apprentices on public works projects. Contractor shall be responsible for ensuring compliance by its subcontractors with Labor Code Section 1777.5.

8.5. **Payroll Records.** Pursuant to Labor Code Section 1776, Contractor and any subcontractor(s) shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by Contractor in connection with this Agreement. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following: (1) The information contained in the payroll record is true and correct; and (2) The employer has complied with the requirements of Labor Code Section 1811 and Labor Code Section 1815 for any work performed by his or her employees on the public works project. The payroll records shall be certified and shall be available for inspection at all reasonable hours as required by Labor Code Section 1776.

8.6. **8-Hour Work Day.** This Agreement is subject to 8-hour work day and wage and hour penalty laws, including, but not limited to, Labor Code Section 1810 and Labor Code Section 1813. Contractor and any subcontractor(s) of Contractor shall strictly adhere to the provisions of the Labor Code regarding 8-hour work day and 40-hour work week requirements, and overtime, Saturday, Sunday, and holiday work. Pursuant to the Labor Code, eight hours' labor shall constitute a legal day's work. Work performed by Contractor's employees in excess of eight hours per day, and 40 hours during any one week, must include compensation for all hours worked in excess of eight hours per day, or 40 hours during any one week, at not less than one and one-half times the basic rate of pay. Contractor shall forfeit as a penalty to City $25.00, or any greater penalty set forth in the Labor Code, for each worker employed in the execution of the work by Contractor or by any subcontractor(s) of Contractor, for each calendar day during which such worker is required or permitted to the work

more than eight hours in one calendar day or more than 40 hours in any one calendar week in violation of the Labor Code.

8.7. Registration with DIR. Contractor and any subcontractor(s) of Contractor shall comply with the provisions of Labor Code Section 1771 and Labor Code Section 1725.5 requiring registration with the Department of Industrial Relations (DIR).

9. OWNERSHIP OF WRITTEN PRODUCTS

All reports, documents or other written material ("written products" herein) developed by Contractor in the performance of this Agreement shall be and remain the property of City without restriction or limitation upon its use or dissemination by City except as provided by law. Contractor may take and retain copies of such written products as desired, but no such written products shall be the subject of a copyright application by Contractor.

10. RELATIONSHIP OF PARTIES

10.1. General. Contractor is, and shall at all times remain as to City, a wholly independent contractor.

10.2. No Agent Authority. Contractor shall have no power to incur any debt, obligation, or liability on behalf of City or otherwise to act on behalf of City as an agent. Neither City nor any of its agents shall have control over the conduct of Contractor or any of Contractor's employees, except as set forth in this Agreement. Contractor shall not represent that it is, or that any of its agents or employees are, in any manner employees of City.

10.3. Independent Contractor Status. Under no circumstances shall Contractor or its employees look to the City as an employer. Contractor shall not be entitled to any benefits. City makes no representation as to the effect of this independent contractor relationship on Contractor's previously earned California Public Employees Retirement System ("CalPERS") retirement benefits, if any, and Contractor specifically assumes the responsibility for making such a determination. Contractor shall be responsible for all reports and obligations including, but not limited to: social security taxes, income tax withholding, unemployment insurance, disability insurance, and workers' compensation, and other applicable federal and state taxes.

10.4. Indemnification of CalPERS Determination. In the event that Contractor or any employee, agent, or subcontractor of Contractor providing services under this Agreement claims or is determined by a court of competent jurisdiction or CalPERS to be eligible for enrollment in CalPERS as an employee of the City, Contractor shall indemnify, defend, and hold harmless City for the payment of any employee and/or

employer contributions for CalPERS benefits on behalf of Contractor or its employees, agents, or subcontractors, as well as for the payment of any penalties and interest on such contributions, which would otherwise be the responsibility of City.

11. INDEMNIFICATION

11.1. Definitions. For purposes of this Section 11, "Contractor" shall include Contractor, its officers, employees, servants, agents, or subcontractors, or anyone directly or indirectly employed by either Contractor or its subcontractors, in the performance of this Agreement. "City" shall include City, its officers, agents, employees and volunteers.

11.2. Contractor to Indemnify City. To the fullest extent permitted by law, Contractor shall indemnify, hold harmless, and defend City from and against any and all claims, losses, costs or expenses for any personal injury or property damage arising out of or in connection with Contractor's alleged negligence, recklessness or willful misconduct or other wrongful acts, errors or omissions of Contractor or failure to comply with any provision in this Agreement.

11.3. Scope of Indemnity. Personal injury shall include injury or damage due to death or injury to any person, whether physical, emotional, consequential or otherwise, Property damage shall include injury to any personal or real property. Contractor shall not be required to indemnify City for such loss or damage as is caused by the sole active negligence or willful misconduct of the City.

11.4. Attorneys Fees. Such costs and expenses shall include reasonable attorneys' fees for counsel of City's choice, expert fees and all other costs and fees of litigation. Contractor shall not be entitled to any refund of attorneys' fees, defense costs or expenses in the event that it is adjudicated to have been non-negligent.

11.5. Defense Deposit. The City may request a deposit for defense costs from Contractor with respect to a claim. If the City requests a defense deposit, Contractor shall provide it within 15 days of the request.

11.6. Waiver of Statutory Immunity. The obligations of Contractor under this Section 12 are not limited by the provisions of any workers' compensation act or similar act. Contractor expressly waives its statutory immunity under such statutes or laws as to City.

11.7. Indemnification by Subcontractors. Contractor agrees to obtain executed indemnity agreements with provisions identical to those set forth here in this Section 12 from each and every subcontractor or any other person or entity involved in the performance of this Agreement on Contractor's behalf.

11.8. Insurance Not a Substitute. City does not waive any indemnity rights by accepting any insurance policy or certificate required pursuant to this Agreement. Contractor's indemnification obligations apply regardless of whether or not any insurance policies are determined to be applicable to the claim, demand, damage, liability, loss, cost or expense.

12. INSURANCE

12.1. Insurance Required. Contractor shall maintain insurance as described in this section and shall require all of its subcontractors, Contractors, and other agents to do the same. Approval of the insurance by the City shall not relieve or decrease any liability of Contractor. Any requirement for insurance to be maintained after completion of the work shall survive this Agreement.

12.2. Documentation of Insurance. City will not execute this agreement until it has received a complete set of all required documentation of insurance coverage. However, failure to obtain the required documents prior to the work beginning shall not waive the Contractor's obligation to provide them. Contractor shall file with City:

- Certificate of Insurance, indicating companies acceptable to City, with a Best's Rating of no less than A:VII showing. The Certificate of Insurance must include the following reference: South Pasadena Urban Forestry Services.
- Documentation of Best's rating acceptable to the City.
- Original endorsements effecting coverage for all policies required by this Agreement.
- City reserves the right to obtain a full certified copy of any required insurance policy and endorsements. Failure to exercise this right shall not constitute a waiver of the right to exercise later.

12.3. Coverage Amounts. Insurance coverage shall be at least in the following minimum amounts:

• Professional Liability Insurance:	$2,000,000 per occurrence, $4,000,000 aggregate
• General Liability:	
• General Aggregate	$4,000,000
• Products Comp/Op Aggregate	$4,000,000
• Personal & Advertising Injury	$2,000,000
• Each Occurrence	$2,000,000
• Fire Damage (any one fire)	$ 100,000
• Medical Expense (any 1 person)	$ 10,000

- Workers' Compensation:
  - Workers' Compensation — Statutory Limits
  - EL Each Accident — $1,000,000
  - EL Disease - Policy Limit — $1,000,000
  - EL Disease - Each Employee — $1,000,000

- Automobile Liability:
  - Any vehicle, combined single limit — $1,000,000

Any available insurance proceeds broader than or in excess of the specified minimum insurance coverage requirements or limits shall be available to the additional insured. Furthermore, the requirements for coverage and limits shall be the greater of (1) the minimum coverage and limits specified in this Agreement, or (2) the broader coverage and maximum limits of coverage of any insurance policy or proceeds available to the named insured

12.4. General Liability Insurance. Commercial General Liability Insurance shall be no less broad than ISO form CG 00 01. Coverage must be on a standard Occurrence form. Claims-Made, modified, limited or restricted Occurrence forms are not acceptable.

12.5. Worker's Compensation Insurance. Contractor is aware of the provisions of Section 3700 of the Labor Code which requires every employer to carry Workers' Compensation (or to undertake equivalent self-insurance), and Contractor will comply with such provisions before commencing the performance of the work of this Agreement. If such insurance is underwritten by any agency other than the State Compensation Fund, such agency shall be a company authorized to do business in the State of California.

12.6. Automobile Liability Insurance. Covered vehicles shall include owned if any, non-owned, and hired automobiles and, trucks.

12.7. Claims-Made Policies. If any of the required policies provide coverage on a claims-made basis the Retroactive Date must be shown and must be before the date of the contract or the beginning of contract work. Claims-Made Insurance must be maintained and evidence of insurance must be provided for at least five (5) years after completion of the contract of work. If coverage is canceled or non-renewed, and not replaced with another claims-made policy form with a Retroactive Date prior to the contract effective date, the Contractor must purchase "extended reporting" coverage for a minimum of five (5) years after completion of contract work.

12.8. Additional Insured Endorsements. The City, its City Council, Commissions, officers, and employees of South Pasadena must be endorsed as an additional insured for each policy required herein, for liability arising out of ongoing and completed

operations by or on behalf of the Contractor. Contractor's insurance policies shall be primary as respects any claims related to or as the result of the Contractor's work. Any insurance, pooled coverage or self-insurance maintained by the City, its elected or appointed officials, directors, officers, agents, employees, volunteers, or Contractors shall be non-contributory. All endorsements shall be signed by a person authorized by the insurer to bind coverage on its behalf. General liability coverage can be provided using an endorsement to the Contractor's insurance at least as broad as ISO Form CG 20 10 11 85 or both CG 20 10 and CG 20 37.

12.9. Failure to Maintain Coverage. In the event any policy is canceled prior to the completion of the project and the Contractor does not furnish a new certificate of insurance prior to cancellation, City has the right, but not the duty, to obtain the required insurance and deduct the premium(s) from any amounts due the Contractor under this Agreement. Failure of the Contractor to maintain the insurance required by this Agreement, or to comply with any of the requirements of this section, shall constitute a material breach of this Agreement.

12.10. Insurance Notices. Contractor shall provide immediate written notice if (1) any of the required insurance policies is terminated; (2) the limits of any of the required policies are reduced; (3) or the deductible or self-insured retention is increased. Contractor shall provide no less than 30 days' notice of any cancellation or material change to policies required by this Agreement. Contractor shall provide proof that cancelled or expired policies of insurance have been renewed or replaced with other policies providing at least the same coverage. Such proof will be furnished at least two weeks prior to the expiration of the coverages. The name and address for Additional Insured Endorsements, Certificates of Insurance and Notices of Cancellation is: City of South Pasadena, Attn: Public Works Department, 1414 Mission Street, South Pasadena, CA 91030.

12.11. Contractor's Insurance Primary. The insurance provided by Contractor, including all endorsements, shall be primary to any coverage available to City. Any insurance or self-insurance maintained by City and/or its officers, employees, agents or volunteers, shall be in excess of Contractor's insurance and shall not contribute with it.

12.12. Waiver of Subrogation. Contractor hereby waives all rights of subrogation against the City. Contractor shall additionally waive such rights either by endorsement to each policy or provide proof of such waiver in the policy itself.

12.13. Report of Claims to City. Contractor shall report to the City, in addition to the Contractor's insurer, any and all insurance claims submitted to Contractor's insurer in connection with the services under this Agreement.

12.14. Premium Payments and Deductibles. Contractor must disclose all deductables and self-insured retention amounts to the City. The City may require the Contractor to provide proof of ability to pay losses and related investigations, claim administration, and defense expenses within retention amounts. Ultimately, City must approve all such amounts prior to execution of this Agreement.

City has no obligation to pay any premiums, assessments, or deductibles under any policy required in this Agreement. Contractor shall be responsible for all premiums and deductibles in all of Contractor's insurance policies. The amount of deductibles for insurance coverage required herein are subject to City's approval.

12.15. Duty to Defend and Indemnify. Contractor's duties to defend and indemnify City under this Agreement shall not be limited by the foregoing insurance requirements and shall survive the expiration of this Agreement.

13. MUTUAL COOPERATION

13.1. City Cooperation in Performance. City shall provide Contractor with all pertinent data, documents and other requested information as is reasonably available for the proper performance of Contractor's services under this Agreement.

13.2. Contractor Cooperation in Defense of Claims. If any claim or action is brought against City relating to Contractor's performance in connection with this Agreement, Contractor shall render any reasonable assistance that City may require in the defense of that claim or action.

14. NOTICES

Any notices, bills, invoices, or reports required by this Agreement shall be deemed received on: (i) the day of delivery if delivered by hand, facsimile or overnight courier service during Contractor's and City's regular business hours; or (ii) on the third business day following deposit in the United States mail if delivered by mail, postage prepaid, to the addresses listed below (or to such other addresses as the parties may, from time to time, designate in writing).

If to City:

Kristine Courdy
City of South Pasadena
Public Works Department
1414 Mission Street
South Pasadena, CA 91030
Telephone: (626) 403-7240
Facsimile: (626) 403-7241

If to Contractor:

Victor Gonzales
West Coast Arborists Inc.
Vice President, Marketing
2200 East Via Burton
Anaheim, CA 92806
Telephone: (714) 991-1900
Facsimile: (714) 956-3745

With courtesy copy to:

Teresa L. Highsmith, Esq.
South Pasadena City Attorney
Colantuono, Highsmith & Whatley, PC
790 E. Colorado Blvd., Ste 850
Pasadena, CA 91101
Telephone: (213) 542-5700
Facsimile: (213) 542-5710

15. SURVIVING COVENANTS

The parties agree that the covenants contained in paragraph 5.10 (Records), paragraph 10.4 (Indemnification of CalPERS Determination), Section 11 (Indemnification), paragraph 12.7 (Claims-Made Policies), paragraph 13.2 (Contractor Cooperation in Defense of Claims), and paragraph 18.1 (Confidentiality) of this Agreement shall survive the expiration or termination of this Agreement, subject to the provisions and limitations of this Agreement and all otherwise applicable statutes of limitations and repose.

16. TERMINATION

16.1. City Termination. City may terminate this Agreement for any reason on thirty calendar days' written notice to Contractor. Contractor agrees to cease all work under this Agreement on or before the effective date of any notice of termination. All City data, documents, objects, materials or other tangible things shall be returned to City upon the termination or expiration of this Agreement.

16.2. Contractor Termination. Contractor may terminate this Agreement for a material breach of this Agreement upon thirty calendar days' notice.

16.3. Compensation Following Termination. Upon termination, Contractor shall be paid based on the work satisfactorily performed at the time of termination. In no event shall Contractor be entitled to receive more than the amount that would be paid to Contractor for the full performance of the services required by this Agreement. The City shall have the benefit of such work as may have been completed up to the time of such termination.

16.4. Remedies. City retains any and all available legal and equitable remedies for Contractor's breach of this Agreement.

17. INTERPRETATION OF AGREEMENT

17.1. Governing Law. This Agreement shall be governed and construed in accordance with the laws of the State of California.

17.2. Integration of Exhibits. All documents referenced as exhibits in this Agreement are hereby incorporated into this Agreement. In the event of any material discrepancy between the express provisions of this Agreement and the provisions of any document incorporated herein by reference, the provisions of this Agreement shall prevail. This instrument contains the entire Agreement between City and Contractor with respect to the transactions contemplated herein. No other prior oral or written agreements are binding upon the parties. Amendments hereto or deviations herefrom shall be effective and binding only if made in writing and executed on by City and Contractor.

17.3. Headings. The headings and captions appearing at the commencement of the sections hereof, and in any paragraph thereof, are descriptive only and for convenience in reference to this Agreement. Should there be any conflict between such heading, and the section or paragraph thereof at the head of which it appears, the language of the section or paragraph shall control and govern in the construction of this Agreement.

17.4. Pronouns. Masculine or feminine pronouns shall be substituted for the neuter form and vice versa, and the plural shall be substituted for the singular form and vice versa, in any place or places herein in which the context requires such substitution(s).

17.5. Severability. If any term or provision of this Agreement or the application thereof to any person or circumstance shall, to any extent, be invalid or unenforceable, then such term or provision shall be amended to, and solely to the extent necessary to, cure such invalidity or unenforceability, and shall be enforceable in its amended form. In such event, the remainder of this Agreement, or the application of such term or provision to persons or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected, and each term and provision of this Agreement shall be valid and be enforced to the fullest extent permitted by law.

17.6. No Presumption Against Drafter. Each party had an opportunity to consult with an attorney in reviewing and drafting this agreement. Any uncertainty or ambiguity shall not be construed for or against any party based on attribution of drafting to any party.

18. GENERAL PROVISIONS

18.1. Confidentiality. All data, documents, discussion, or other information developed or received by Contractor for performance of this Agreement are deemed confidential and Contractor shall not disclose it without prior written consent by City. City shall grant such consent if disclosure is legally required. All City data shall be returned to City upon the termination or expiration of this Agreement.

18.2. Conflicts of Interest. Contractor maintains and warrants that it has not employed nor retained any company or person, other than a bona fide employee working solely for Contractor, to solicit or secure this Agreement. Further, Contractor warrants that it has not paid nor has it agreed to pay any company or person, other than a bona fide employee working solely for Contractor, any fee, commission, percentage, brokerage fee, gift or other consideration contingent upon or resulting from the award or making of this Agreement. Contractor further agrees to file, or shall cause its employees or subcontractor to file, a Statement of Economic Interest with the City's Filing Officer if required under state law in the performance of the services. For breach or violation of this warranty, City shall have the right to rescind this Agreement without liability. For the term of this Agreement, no member, officer, or employee of City, during the term of his or her service with City, shall have any direct interest in this Agreement, or obtain any present or anticipated material benefit arising therefrom.

18.3. Non-assignment. Contractor shall not delegate, transfer, subcontract or assign its duties or rights hereunder, either in whole or in part, without City's prior written consent, and any attempt to do so shall be void and of no effect. City shall not be obligated or liable under this Agreement to any party other than Contractor.

18.4. Binding on Successors. This Agreement shall be binding on the successors and assigns of the parties.

18.5. No Third-Party Beneficiaries. Except as expressly stated herein, there is no intended third-party beneficiary of any right or obligation assumed by the parties.

18.6. Time of the Essence. Time is of the essence for each and every provision of this Agreement.

18.7. Non-Discrimination. Contractor shall not discriminate against any employee or applicant for employment because of race, sex (including pregnancy, childbirth, or related medical condition), creed, national origin, color, disability as defined by law, disabled veteran status, Vietnam veteran status, religion, age (40 and above), medical

condition (cancer-related), marital status, ancestry, or sexual orientation. Employment actions to which this provision applies shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; or in terms, conditions or privileges of employment, and selection for training. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, the provisions of this nondiscrimination clause.

18.8. Waiver. No provision, covenant, or condition of this Agreement shall be deemed to have been waived by City or Contractor unless in writing signed by one authorized to bind the party asserted to have consented to the waiver. The waiver by City or Contractor of any breach of any provision, covenant, or condition of this Agreement shall not be deemed to be a waiver of any subsequent breach of the same or any other provision, covenant, or condition.

18.9. Excused Failure to Perform. Contractor shall not be liable for any failure to perform if Contractor presents acceptable evidence, in City's sole judgment that such failure was due to causes beyond the control and without the fault or negligence of Contractor.

18.10. Remedies Non-Exclusive. Each right, power and remedy provided for herein or now or hereafter existing at law, in equity, by statute, or otherwise shall be cumulative and shall be in addition to every other right, power, or remedy provided for herein or now or hereafter existing at law, in equity, by statute, or otherwise. The exercise, the commencement of the exercise, or the forbearance from the exercise by any party of any one or more of such rights, powers or remedies shall not preclude the simultaneous or later exercise by such party of any or all of such other rights, powers or remedies.

18.11. Attorneys' Fees. If legal action shall be necessary to enforce any term, covenant or condition contained in this Agreement, each party shall pay its own costs, including any accountants' and attorneys' fees expended in the action.

18.12. Venue. The venue for any litigation shall be Los Angeles County, California and Contractor hereby consents to jurisdiction in Los Angeles County for purposes of resolving any dispute or enforcing any obligation arising under this Agreement.

TO EFFECTUATE THIS AGREEMENT, the parties have caused their duly authorized representatives to execute this Agreement on the dates set forth below.

"City" City of South Pasadena	"Contractor" West Coast Arborists Inc.
By:_____ *Signature*	By:_____ *Signature*
Printed:_____	Printed:_____
Title:_____	Title:_____
Date:_____	Date:_____

Attest:

By:_____
Evelyn G. Zneimer, City Clerk

Date:_____

Approved as to form:

By:_____
Teresa L. Highsmith, City Attorney

Date:_____

WORKER'S COMPENSATION INSURANCE ACKNOWLEDGEMENT

I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract. If any class of employees engaged in work under this contract at the site of the Project is not protected under any Worker's Compensation law, Contractor shall provide and shall cause each subcontractor to provide adequate insurance for the protection of employees not otherwise protected. Contractor shall indemnify and hold harmless City for any damage resulting from failure of either Contractor or any subcontractor to take out or maintain such insurance.

Date:_____

_____
Signature

_____
Printed Name

_____
Title

Exhibit A
Scope of Services

SCOPE OF SERVICE

Contractor shall perform completely all work and incidentals appurtenant to the Specifications of the contract. Any mention herein or indication on the drawings of materials, operations, or methods, requires that the contractor provide each item mentioned, perform each operation described and provide all necessary labor, equipment, materials and incidentals.

Urban forestry services include complete responsibility for proper care of all trees including tree trimming, tree removal, tree planting, tree health care, emergency response, and consulting arborist services in the City of South Pasadena.

REQUIRED QUALIFICATIONS

The firm must hold a valid State of California Contractor's License (D49 and C27) in addition to providing current OSHA certification for all aerial devices to be used during this project. Contractor's Account Manager, Supervisor and Consulting Arborist must have a valid ISA Certified Arborist credential. These provisions must be kept current throughout the entirety of the contract.

Persons performing the work outlined in the contract must be qualified and trained in the urban forestry services industry. The use of subcontractors is not allowed except for specialized services. The subcontractor must be approved by the City prior to performing any work. The Contractor shall also maintain at least one (1) English-speaking foreman on-site at all times.

The firm is required to provide and operate an electronic tree inventory and work order system that is Geographical Information System (GIS) based so the City can view the tree inventory on a map, submit work orders, update tree history, generate reports about work history within the City, and view the maintenance records for each City tree. The Contractor must submit and overview and information on their proposed electronic tree inventory and work order system for prior City approval before use.

The firm shall provide the City with a "Quality Control Plan" with an effective and efficient means of identifying and correcting problems throughout the entire scope of operations. In addition, the firm must submit to the City for approval, a current Safety Manual that meets Senate Bill 198 requirements for injury and illness prevention.

ADDITIONS/DELETIONS OF SERVICE

The City reserves the right to add and/or delete services to this contract. Should a service requirement be deleted, payment to the Contractor will be reduced proportionally, to the amount of service reduced in accordance with the Proposal price. Should additional services be required from this contract, prices for such additions shall be in accordance with the Payment for Services schedule set for in "Exhibit B". No additional work should be performed unless otherwise authorized by the City in writing.

CONTRACTOR'S RESPONSIBILITY

The Contractor shall be responsible for any damages whatsoever to City property as applicable when such property is the responsibility or in custody of the Contractor, his/her employees or subcontractors.

RECORDS AND REPORTS

Contractor shall prepare and submit to the Parks Supervisor/Public Works Operations Manager such reports concerning the performance of the services required by this Agreement as required.

Contractor shall keep such books and records as shall be necessary to perform the services required by this Agreement and enable the Parks Supervisor/Public Works Operations Manager to evaluate the performance of such services. The Parks Supervisors/Public Works Operations Manager shall have full and free access to such books and records at all reasonable times, including the right to inspect, copy, audit, request certified payrolls, and make records and transcripts from such records.

All reports, records, documents and other materials prepared by Contractor in the performance of this Agreement shall be the property of City and shall be delivered to City upon request of the Parks Supervisor/Public Works Operations Manager upon the termination of this Agreement, and Contractor shall have no claim for further compensation as a result of the exercise by City of its full right of ownership of the documents and materials hereunder. Contractor may retain copies of such documents for its own use. It shall have an unrestricted right to use the concepts embodied therein.

The drawings, specifications, reports, records, documents and other materials prepared by Contractor in the performance of services under this Agreement shall not be released publicly without the prior written approval of the Parks Supervisor/Public Works Operations Manager.

SPECIAL PROVISIONS

1) **General Requirements:**

a. Contractor must hold a valid, in good standing California D-49 and C-27 Contractor's License through the duration of the contract term.

b. Normal ~~W~~working hours shall be 7:00 a.m. to 5:00 p.m. Monday through Friday. Use of motorized equipment must follow Chapter 19A of the City Municipal Code. Any afterhours work must be approved by the City in writing.

c. Contractor shall be responsible for carefully inspecting the tree for any bird nests before beginning any tree operations Contractor shall stop work and notify the City if a bird nest is found while performing services. Services shall be scheduled after the bird nesting s complete. Contractor shall follow the Los Angles Audubon Society Guide to Bird Friendly Tree and Shrub Trimming and Removals Guidelines.

d. Assembly Bill 73:

i. The Contractor shall comply with the requirements of Assembly Bill 73. The law states that, "...every person planning to conduct any excavation is required to contact a regional notification center at least two (2) days prior to excavation..."

ii. Assembly Bill 73 defines excavation as, "any operation in which earth, rock, or other material in the ground is moved, removed or otherwise displaced by means of tools, equipment, or explosives in any of the following ways: grading, trenching, digging, ditching, drilling, auguring, tunneling, scraping, cable or pipe and driving, or any other way.

iii. Two (2) working days before starting any work below ground level, the Contractor shall contact Dig Alert at 1-800-227-2600. Contractor shall make sure utilities are located in the area and arrange their work so as not to damage any utility services. The Contractor is responsible for providing Dig Alert related field markings and coordination.

e. The City will own all final documents developed ruing the services.

2) **Services to be Provided:** Contractor shall furnish all labor, equipment, materials and supervision to perform maintenance services for City trees as described herein including, but not limited to, the following:

a. Tree Pruning (Grid Trim or Service Request Trim);
b. Tree Removal;
c. Stump Removal;
d. Root Pruning;
e. Tree Planting;
f. Tree Staking;
g. Removal of Hazardous Branches;
h. Removal of tree debris and/or tree trimmings;
i. Worksite Cleanup;
j. Repair of Damaged Sprinklers;
k. Repair or Replacement of Damaged Fences or Walls;
l. Soil Replacement;
m. Damaged Tree and /or Shrub Replacement;
n. Collection of Tree Inventory Data;
o. Distribution of No Parking Signs and Door hangers;
p. Contact with the Public;
q. Employee Uniforms with Company Logo or Designation;
r. Vehicles and Equipment with Company Logos or Designation;
s. Traffic Control; and
t. Other Services Set Forth in this Agreement.

All work shall conform to the latest edition of Pruning Standards of the Western Chapter ISA and these specifications. In all cases the Director of Public Works, or their designee, shall have complete and sole discretion in determining conformance and acceptability of the trees trimmed by the Contractor. Trimmed trees rejected by the Director, or their designated representative(s), shall be excluded from payment.

Contractor shall have the duty to provide services for City trees as assigned.

Contractors shall be available twenty four (24) hours per day, seven (7) days a week to respond to all emergencies within two (2) hours of notification.

Contractor has the duty to familiarize and fully acquaint themselves with the conditions and possible difficulties associated with the performance of the contract. Contractor shall be responsible for carefully verifying the number of trees, tree varieties, and tree locations for any proposed work.

No additional compensation or relief from any obligation of the contract will be granted because of lack of knowledge of the site and /or conditions under which work will be accomplished.

3) **Areas to be Maintained:** Worksites will include City trees within the Public right-of-way. Worksites will also include Parks, Water Reservoirs, Medians, Parkways, Public Facilities or other areas where trees are under the jurisdiction of the City of South

Pasadena. Trees to be serviced will be provided on a monthly basis and may consist of individual trees located throughout the City. It should be understood that this project may not be solely "section" or "block" type tree trimming.

4) Definitions:

a. Where "as directed", "as required", "as permitted", "approved", "acceptance", or words of similar importance are used, it shall be understood that the direction, requirement, permission, approval or acceptance of the Public Works Director is intended unless otherwise stated. As used herein, "provide" shall be understood to mean "provide complete", "in place", "this is", "furnish and install"; the work "site" as used hereinafter shall be understood to mean the location receiving the service. The use of the word "Director" shall be construed to mean the Director of Public Works, or their delegated representative(s). The use of the word "Contractor" shall be held to mean the Contractor and/or any person employed by him and working under this contract.

b. The use of the words "shall" and "may" shall be held to mean "mandatory" and "permissive" respectively. The use of the words "his" or "him" shall be construed to mean either gender, as appropriate.

c. The following are definitions for terms used in this project:

i. Branch Collar shall mean wood tissue ridges that form around the base of a branch between the main stem and the branch usually as a branch begins to die the branch collar begins to increase in size.

ii. Callus shall refer to the new growth made by the cambium layer around all of a wound.

iii. Cambium Layer shall mean the growing point between bark and sapwood.

iv. Closure shall refer to the roll of the callus growth around the wound area.

v. Crown shall mean the head or canopy of tree foliage.

vi. The Cut shall mean the exposed wood area that remains after the branch has been removed.

vii. Cut Back Drop Crotch shall mean the specified reduction of the overall size of a tree or individual branches, but may include the overall reduction of the sides as well as the top of the tree.

viii. Dormant shall refer to a condition of non-active growth. Deciduous trees are considered to be dormant from the time the leaves fall until new foliage begins to appear.

ix. Girdling Roots are located above or below ground level, whose circular growth around the base of the trunk or over the individual roots applies pressure to the bark area, thereby choking or restricting the flow of sap.

x. Grid Trim shall consist of a group of trees to be pruned in a localized area as defines by the Director.

xi. Leader shall mean central growth shoot.

xii. Lifting shall refer to the removal of lower branches for under clearance.

xiii. Parent System shall mean the main trunk system of the tree.

xiv. Pre-cut or Pre-cutting shall mean the removal of the branch at least beyond the finished cut, to prevent splitting into parent stem or branch.

xv. Pruning shall mean the removal of dead, dying, diseased, live, interfering, objectionable and weak branches in a scientific manner.

xvi. Sap Flow shall mean the definite course assumed by sap in its movement through the tree.

xvii. Scars or Injuries shall refer to natural or man-made lesions of the bark in which wood is exposed.

xviii. Scatter Trim shall consist of the trimming of a tree, or group of trees, that do not consist of eight or more in a localized area.

xix. Service Request Trim shall mean trees requiring service prior to their regularly scheduled grid or annual trim or to rectify a specific problem such as blocked street lighting or signs, right-of-way clearance, utility line clearance, or broken limbs will be performed as a "Service Request."

xx. Suckers shall mean the abnormal growth of small branches usually not following the general pattern of the tree.

xxi. Thinning Out shall mean the removal of live branches to reduce wind resistance and to create more space.

xxii. Topping see Cut Back.

xxiii. Tracing shall mean carefully cutting the bark along the lines of sap flow to encourage closure and to be the outline of the wound area.

xxiv. Trimming see Pruning.

xxv. Inspector shall mean the duly authorized representative of the Director who shall monitor the contractor's progress within the Urban Forestry project area he/she is assigned to.

xxvi. Trash and Litter shall mean any debris generated by the Contractor within the Urban Forestry project area such as paper, cans, bottles, limbs three inches in diameter or less, rocks, etc., which is not intended to be present as part of the landscape.

d. ~~Tree Trimming Classifications and Tasks:~~

i. ~~Full Trim shall consist of: Removal of all dead, dying, diseased, crossing or rubbing, and weak limbs or branches within the canopy; Clearing limbs from all wires, lights, buildings, and/or traffic signal devices; Raising the canopy to a minimum of 14 feet above the curb; Restructuring the crown to provide thinning out of, reduction of, and/or restoration of; Removal of trunk sprouts, water sprouts and suckers; Balancing of the crown; Removal of "v" crotches and establishing scaffold branches of young trees while maintaining clearance for vehicle and pedestrian traffic in public right-of-ways.~~

ii. ~~A Clearance Trim shall consist of: Removing branches to provide a 14 foot clearance from the top of the curb; clearing limbs or branches away from wires, lights, buildings, and/or traffic signal devices; removal of trunk sprouts, water sprouts and suckers; clearing limbs or branches to provide for pedestrian travel.~~

iii. ~~A Palm Trim shall consist of: Removing all dead or drooping fronds and fruiting clusters as close to the trunk as possible without cutting into outer trunk line, leaving approximately five to seven healthy fronds evenly spaced no more than 45 degrees above horizontal.~~

~~f. Tree Removals:~~

~~. Trees identified for removal are to be cut back and lowered to the ground in sections. Sections shall be no larger than can be safely controlled. Extreme care must be taken to prevent unsafe working or other hazardous~~

~~conditions to individuals, landscape, structures, obstacles, or private property.~~

~~. Trees shall not be stump cut and felled. Tree stumps to be removed shall be completely ground a minimum of eighteen inches (18") below soil surface unless utilities prevent an 18" depth. All surface roots within a depth of eight inches (8") in a twelve foot (12') zone around the tree shall be removed by grinding. Grinding of stump shall be completed within 48 hours of tree removal.~~

~~. All excavation as a result of this process shall be back filled exactly level with surrounding soil, compacted and fine graded. Excess debris, trimmings, branches, and wood shall be removed from the worksite and shall follow as closely as possible to the removal operation. All debris shall be properly removed off site and at the contractor's expense. However, twigs, branches, leaves, and large wood shall be removed from the site prior to the crew vacating the worksite.~~

~~n. Root Pruning:~~

~~. Root pruning consists of cutting the roots vertically along a straight, linear plane, usually along the curb and sidewalk to an 18" depth. Root pruning is done to prevent further damage to infrastructure and/or private property caused by surface roots of City trees. Root pruning is also done to accommodate repairs of sidewalk, curbs, asphalt, and other infrastructure.~~

~~.~~

~~. Root pruning shall be done with a power stump grinder or power root cutter, unless the Director of Public Works Department gives prior approval. Extreme care should be taken to prevent damage to landscape, irrigation, structures, obstacles, individuals, or private property.~~

~~t. Stump Grinding:~~

~~. Stumping consists of grinding tree stumps to a minimum of eighteen inches (18") below soil surface unless utilities prevent a 18" depth. All surface roots within a depth of a 12 ft. zone around the tree shall be removed by grinding. Extreme care should be taken to prevent damage to landscape, irrigation, structures, obstacles, individuals, utilities, or private property. Contractor shall notify Dig Alert two working days prior to stump grinding at 1-800-227-2600.~~

~~x.~~c. ~~Tree Planting:~~

i. ~~The City shall prepare a work order of tree planting locations throughout the City.~~

ii. ~~Contractor shall follow the ANSI Planting Standards and ISA Best Management Practices for Tree Planting.~~

iii. ~~Contractor shall provide a ninety (90) day warranty for all tree plantings. Contractor is responsible for tree watering and maintenance during the warranty period. Any trees that die or do not establish during the warranty period shall be replaced at the Contractor's sole expense. The warranty period will start over for any trees that require replacement.~~

~~x.~~ Emergency Work Charges:

~~x.~~

~~x.~~f. Emergency work charges shall include all personnel, equipment and other material used in completing work in an emergency situation. This includes night work and work on weekends and holidays. ~~Contractor shall respond to emergency calls within two (2) hours from time of notification.~~

~~x.~~ Hourly Work Charges:

~~x.~~

~~x.~~g. Regular hourly work charges shall include trimming and cleanup of broken limbs, thinning, restaking and/or removal of young trees, and other services need generally as a result of storm damage. This work shall occur during normal working hours.

5) <u>Information Technology and System Requirements:</u>

a. Contractor is required to provide and operate an electronic tree inventory and work order system that is GIS based so the City can view the tree inventory on a map, submit work orders, update tree history, generate reports about work history within the City, and view the maintenance records for each City tree.

b. Contractor is responsible for providing the City representative and their staff with login and password information for the system.

c. Contractor is required to maintain the system through the entire contract term and issue any system updates needed.

d. The existing City tree inventory will be provided to the Contractor in an Excel and Shape file format so it can be uploaded into the Contractor's system. The existing City's tree inventory contains the following information: Inventory Identification, District, Address, Tree Location (example: park, median, side, front), Tree Number, Tree Species (both common name and botanical name),

diameter at breast height (DBH) expressed in a range, height expressed in a range, Tree Condition, Latitude, Longitude, parkway width, location information, and past work history.

e. Contractor's crews shall be provided with mobile devices to perform any updates to the tree inventory from the field.

f. Maintaining and Updating City Tree Inventory:

i. During any services performed by the Contractor, the Contractor shall update the tree inventory including maintenance performed, updated condition, updated DBH, and updated height.

ii. If the City requests additional trees to be planted in the City, then the Contractor shall create new planting sites at the City requested location.

iii. The City tree inventory including any updates or revisions shall belong to the City. The Contractor shall supply the City with an updated Excel file of the tree inventory at the end of the contract term.

iv. The City will own all final documents and data developed during the services.

6) **General Tree Pruning Requirements:** All cuts shall be made sufficiently close to the trunk or parent limbs, without cutting into the branch collar or leaving a protruding stub, so that closure can readily start under normal conditions. Clean cuts shall be made at all times.

a. Removal of Laterals: The final cut in removing a lateral branch should be immediately beyond the branch bark ridges, preserving the branch collar. Do not make stub cuts (an inch or more beyond the branch collar). Do not make flush cuts (through the branch collar). For any branch too large to be held while being cut, remove by means of the following cuts:

i. Under cut the branch 4 to 10 inches beyond the base (to prevent splitting or peeling).

ii. Cut off the branch beyond the undercut where necessary. to prevent property damage, branches shall be lowered to the ground by ropes and/or proper equipment.

iii. Remove the remaining stub via a final cut, as described above (Section 6 a 1).

b. Removal of Terminals (Tip Thinning and Drop Crotching): Thinning or "Lacing out" terminal portions of branches by cutting terminals back to laterals. (The

basal diameter of the remaining lateral should be 1/3 the diameter of the terminal being removed). Remove numerous small terminals and laterals rather than taking out a few large ones.

Size Reduction takes out portions of the crown for height, remove terminals back to laterals. Each lateral should be suitably situated to serve as the new terminal, thus establishing the crown at a lower level. The basal diameter of a lateral should be at least 1/3 the basal diameter of the terminal being removed. Laterals smaller than this cannot function effectively as new terminals, and the effect is then similar to a stub cut.

Branches that pose a threat to the health, safety, and welfare of the general public shall be removed. In addition, branches that disrupt the aesthetic or general integrity of the tree shall be removed. Kinds of branches to be removed:

i. Obstructing branches. Clear walks, traffic ways, buildings and other manmade structures. Clear other trees, plants as needed.

ii. Dead, broken, diseased or weak branches. (Also, stubs left by previous pruners).

iii. Crossing branches. This includes potentially crossing branches, also upright shoots (water sprouts) vigorous, and interior-directed branches.

iv. Narrow crotch-angle branches. For most kinds of trees, branches with a crotch angle narrower than 30 degrees should be removed.

v. Parallel branches. Branches less than a foot apart which run parallel for several feet may eventually damage each other. The less desirable one should be removed.

vi. Wind-breakage risks. Crowns that are too high and/or too dense should be thinned, and sometimes lowered to suitable laterals. Reducing wind resistance by thinning out many small branches is safer and better for the tree than taking out several large branches.

vii. Branches that disrupt tree form. Excessively vigorous branches, or those that run against the general branching pattern, should be trimmed for better balance and shape. (This does not mean the tree must be made perfectly symmetrical: asymmetry as such can be both attractive and safe).

c. On trees known to be diseased, tools are to be disinfected with methyl alcohol at seventy percent (denatured wood alcohol diluted appropriately with water) or a

Clorox (bleach) solution after each cut and between trees where there is known to be a danger of transmitting the disease on tools.

d. Old injuries are to be inspected. Those not closing properly and where the callus growth is not already completely established should be traced where appropriate.

e. All girdling roots visible to the eye are to be reported to the Director.

f. The presence of any structural weakness, disease conditions, decayed trunk or branches, split crotches or branches, shall be reported in writing to the Director and corrective measures recommended.

g. When pruning trees, the contractor shall make all trees shapely and typical of their species. Under no circumstances shall the any tree have their central leader removed without written consent from the Director.

~~g.~~h. Tree Trimming Classifications and Tasks:

i. Full Trim shall consist of: Removal of all dead, dying, diseased, crossing or rubbing, and weak limbs or branches within the canopy; Clearing limbs from all wires, lights, buildings, and/or traffic signal devices; Raising the canopy to a minimum of 14 feet above the curb; Restructuring the crown to provide thinning out of, reduction of, and/or restoration of; Removal of trunk sprouts, water sprouts and suckers; Balancing of the crown; Removal of "v" crotches and establishing scaffold branches of young trees while maintaining clearance for vehicle and pedestrian traffic in public right-of-ways.

ii. A Clearance Trim shall consist of: Removing branches to provide a 14 foot clearance from the top of the curb; clearing limbs or branches away from wires, lights, buildings, and/or traffic signal devices; removal of trunk sprouts, water sprouts and suckers; clearing limbs or branches to provide for pedestrian travel.

iii. A Palm Trim shall consist of: Removing all dead or drooping fronds and fruiting clusters as close to the trunk as possible without cutting into outer trunk line, leaving approximately five to seven healthy fronds evenly spaced no more than 45 degrees above horizontal.

~~8)~~7) **General Palm Trimming Requirements:** All work shall be done in accordance with the following guidelines:

a. Live fronds shall be removed as close as possible to the trunk. The remaining fronds are to be approximately forty five (45) degrees to the trunk.

b. All dead fronds and parts thereof shall be removed to a sound, intact portion, neatly and closely trimmed to the circumference of the trunk.

c. All vines shall be removed from the trunk and cut at ground level.

d. Only full, live fronds shall remain at the crown. Precaution shall be taken so that remaining fronds and stalks are not partially cut.

e. Climbing spurs are not to be used when trimming trees, because of the damage caused to trees. Under special conditions, the Director may consider the use of climbing spurs. The request must be in writing and there is no assurance that permission to use climbing spurs will be granted.

f. The work shall include daily clean up and disposal of all branches, fronds, stubs, twigs, leaves and other debris resulting from the trimming operation including debris that fell into a neighboring tree resulting from the trimming operation.

~~9~~8) **Tree and Stump Removal Requirements:**

a. Trees identified for removal are to be cut back and lowered to the ground in sections. Sections shall be no larger than can be safely controlled. Extreme care must be taken to prevent unsafe working conditions and/or other hazardous conditions to individuals, landscape, structures, or obstacles.

b. Trees shall not be stump cut and felled.

c. Tree stumps not designated for removal shall be cut flush with the ground.

d. Tree stumps to be removed shall be completely ground a minimum of eighteen inches (18") below soil surface unless utilities prevent an 18" depth removal. All surface roots within a depth of eight inches (8") in a twelve foot (12')~~ft.~~ diameter zone around the tree shall also be removed by grinding. Grinding of stump shall be completed within 48 hours of tree removal. Extreme care should be taken to prevent damage to landscape, irrigation, structures, obstacles, individuals, utilities, or private property. Contractor shall notify Dig Alert two working days prior to stump grinding at 1-800-227-2600.

e. All excavation as a result of this process shall be back filled exactly level with surrounding soil, compacted and fine graded.

f. Excess debris, trimmings, branches, and wood shall be removed from the worksite and shall follow as closely as possible to the removal operation. At all times the Contractor shall maintain access to the public right of way, such as street, sidewalks, and driveway aprons prior to vacating the worksites ~~shall cleanup and remove trimmings and debris~~.

g. All areas shall be left clean and free of debris at the close of each day's operation.

h. All debris shall be properly disposed of offsite and at the Contractor's expense. All green waste products from Contractor's work shall be recycled. Contractor to provide weight slips or documentation on the disposal of the material.

~~11~~)9) Root Pruning:

a. Root pruning consists of cutting the roots vertically with a power root cutter, along a straight, linear plane, usually along the curb and sidewalk and adjacent to the tree, to an 18" depth. Root pruning is done to prevent further damage to infrastructure and/or private property caused by surface roots of City trees. Root pruning is also done to accommodate repairs of sidewalk, curbs, asphalt, and other infrastructure.

b. Extreme care should be taken to prevent damage to landscape, irrigation, structures, obstacles, individuals, or private property.

c. All excavation as a result of this process shall be back filled exactly level with surrounding soil, compacted and fine graded. The sprinkler system shall be verified as operational, with any damage repaired within 24 hours.

~~12~~)10) Tree Planting:

~~.~~a. The City shall prepare a work order of tree planting locations throughout the City.

~~.~~b. Contractor shall follow the ANSI Planting Standards and ISA Best Management Practices for Tree Planting.

~~.~~c. Contractor shall provide a ninety (90) day warranty for all tree plantings. Contractor is responsible for tree watering and maintenance during the warranty period. Any trees that die or do not establish during the warranty period shall be replaced at the Contractor's sole expense. The warranty period will start over for any trees that require replacement.

~~19~~)11) Work Schedule:

a. Work will be assigned and completed on a monthly basis.

b. Contractor shall provide the City with a proposed schedule one (1) week in advance of performing services. Contractor shall notify City representative when they arrive on site to perform services within the City.

c. Contractor will secure a list of tree maintenance locations from the Public Works Department during the last week of the month that identifies work assignments for the following month.

d. Contractor shall keep the Public Works Department informed of their progress at all times.

e. Upon submission of each monthly invoice during the term of this contract, the contractor shall submit to the Director a report describing in detail all work performed during the previous month. Said report shall be in a form easily transferred or downloaded into the City of South Pasadena Urban Forestry Database and include the following:

i. Date the work was performed.
ii. Tree address and location.
iii. Tree species (within attribute range).
iv. Diameter of trunk at breast height (within attribute range).
v. Tree height (within attribute range).
vi. Tree condition (within attribute range).
vii. Any visible decay, conks or hazardous condition.

~~20)~~12) **Contractor's Liability:**

a. The Contractor will be held responsible for the preservation of all public and private property along and adjacent to the work being done, and will be required to exercise due precaution to avoid and prevent any damage or injury thereto as a consequence of their operation. All trees, shrubs, ground covers, fences, warning signals, street signs, walks, walls, structures, stairways, sprinklers or any other property, shall be adequately protected and should not be removed or disturbed without permission from the City. Any damages resulting from Contractor neglect shall be repaired and/or replaced at the Contractor's own expense.

b. Such repairs and/or replacement shall be performed by the Contractor at no cost to the City, and shall be accomplished as directed by the Director or their representative. Repairs shall be made immediately after damage or alteration occurs. Deductions shall be made from the Contractor's payment in the amount

necessary to compensate the City for such repairs in the event such repair work is done by City forces or another source.

~~d.~~c. Irrigation damage shall be repaired or replaced within the following time limits:

i. Mainline irrigation breaks shall be repaired within two (2) hours.

ii. All other irrigation repair and/or replacement shall be completed within twenty four (24) hours.

~~e.~~d. All damages to turf, ground cover, shrubs or trees shall be repaired or replaced within forty-eight (48) hours:

i. Damage to turf shall be repaired by replacement with the appropriate variety of sod; reseeding shall not be considered as an adequate repair. Prior to trimming or removing any trees in large turf areas, the Contractor is required to lay down ¾ inch thick plywood sheets or approved equal to protect turf from damage and settling from vehicles traffic. Plywood is to be removed immediately after the completion of work. No plywood or mats are to be left more than five (5) hours on turf to prevent turf burn or compaction. Any physical damages incurred by the Contractor to private or public property shall be corrected by the Contractor in a manner and within a time period dictated by the Public Works Department. Failure by the Contractor to make such corrections may result in the City causing said corrections to be made and deducting the cost for the same from payments due the contractor for work performed. An additional 20% penalty charge shall be added as compensation to the City of overhead cost incurred in causing said corrections to be made.

ii. Damage to ground cover shall be repaired by replacement with the appropriate variety of plant material. Size and spacing shall be determined by the Director.

iii. Damage to shrubs may be corrected by appropriate pruning; however, if in the opinion of the Director the damage is severe, the shrub shall be removed and replaced with the same variety and size.

iv. Damage to trees shall be addressed in the following manner:

1. Trees in the contract area may be checked before contract work begins, and random checks may be carried out during the contract period.

2. The Contractor should inspect all trees for existing damages prior to conducting any work activity in the assigned project area. Observed tree damage shall be documented by memo to the assigned area inspector.

~~f.~~e. Any damage to public or private property shall be reported to the City within one (1) hour.

~~g.~~f. All work shall be inspected, verified, and completed to the satisfaction of the Director, or their authorized representative.

~~21)~~13) **Unauthorized Removals:** Unauthorized tree removals will incur the following penalties:

a. Under twelve inch (12") diameter: $ 1,200.00

b. 12" to thirty six inch (36") diameter: $ 2,400.00

c. 36" diameter or greater: $ 3,600.00

~~22)~~14) **Public Relations:**

a. Contractor shall maintain good public relations at all times. The work shall be conducted in a manner that will cause the lease possible interference or annoyance to the public.

b. Contractor shall have the duty to purchase and supply door hangers printed in English, acceptable to the City, and distribute to residents where tree maintenance is planned seventy two (72) hours prior to the work being completed.

~~23)~~15) **Inspections:**

a. Inspections will be performed at times mutually agreed upon by the Parks Supervisor and the Contractor representative. The Parks Supervisor may make random visits when the Contractor is working in a specific area at their discretion.

b. All inspections called for by the Contractor shall be requested at least forty-eight (48) hours prior to the anticipated inspection.

c. All work shall meet the approval of the Director or their designated representative, or is rectified by the Contractor to a condition that does meet this acceptance. Corrective action shall be performed at no additional cost to the City.

d. If the Contractor calls for inspections and is not ready for the inspections, the Contractor shall be back charged at the hourly rate, including travel time, for all members of the team of inspectors involved.

~~25)~~16) Hazardous Conditions:

a. It shall be the Contractor's responsibility to inspect, and identify, any condition(s) that renders any areas within this Agreement unsafe, as well as any unsafe practices occurring thereon. The Director shall be notified immediately of any unsafe condition that requires major correction.

b. Contractors shall be responsible for making minor corrections including, but not limited to, filling holes in landscaped areas, using barricades or traffic cones to alert persons of the existence of hazards so as to protect all persons from injury.

c. Contractors shall inspect all work sites for hazards, or potential hazards, prior, during and after performing the required work.

d. During the required inspection of all work sites for hazards, or potential hazards, the Contractors shall keep a log indicating the date the area was inspected, any unsafe conditions, and the action taken.

e. Contractors shall cooperate fully with the City of South Pasadena in the investigation of any accidental injury or death occurring on the premises, including the submission of a complete written report thereof to the Director within five (5) days following the occurrence.

~~26)~~17) Safety:

a. Contractors shall perform all work outlined in these specifications in such a manner as to provide maximum safety to the public, and meet all accepted standards for safe practices during the maintenance operation; to safely maintain equipment, machines, and materials or other hazards consequential or related to the work; furthermore, to accept the sole responsibility for complying with all local, County, State or other legal requirements including, but not limited to, Senate Bill (SB) 198, California Department of Transportation (Caltrans) traffic control, American National Standards Institute (ANSI), OSHA and California OSHA (CALOSHA).

b. The Director, or their representative, reserves the right to issue restraint, or cease and desist orders, to the Contractors when unsafe or harmful acts are observed or reported relative to the performance of work under this contract.

c. Contractors shall so conduct its operation as to cause the least possible obstruction and inconvenience to public traffic. The Contractor shall furnish, erect and maintain such fences, barriers, lights and warning signs as deemed necessary by the Director. The Contractor must abide by the provisions of the "2016 WORK AREA TRAFFIC CONTROL HANDBOOK" published by Building News, Inc., and Caltrans traffic control requirements. When work is in progress, no street may be closed. Work may be only performed on one (1) side of the street at a time with proper traffic control and flagging.

d. High Level Warning Devices provide advance warning of a work area by being visible to a driver even when the work area is obstructed from view by vehicles or construction equipment.

   i. High Level Warning Devices shall be at least 9 feet high with legs, base, or truck mounting designed to resist overturning in brisk winds. Sandbags may be used to add weight to the base or legs. High Level Warning Devices shall be equipped with a yoke at the top to accommodate at least three flags. Flags shall be fabricated of high visibility orange material and equipped with stays to keep flags extended. Torn or dirty flags shall be immediately replaced.

   ii. The warning signs are intended to be permanently mounted to the High Level Warning Device. These signs must be approved by the proper authorizing agency. When required, all signs must be provided, installed and maintained by the Contractors. No signs or supports shall bear any commercial advertising. These warning signs shall be high visibility orange material with black lettering.

   iii. High Level Warning Devices shall be used where indicated by the Director, such as, at street approaches to locations where construction or maintenance work is being performed within or immediately adjacent to a traffic lane.

e. Signs shall be installed immediately before work is to commence and must be removed immediately after work is complete. The location of the signs will depend upon alignment, grade, location of street intersections, and posted speed limit. Signs shall face and be visible to oncoming traffic and be mounted so as to resist displacement. The center of the warning sign shall be at least 4 1/2 feet above the roadway. The Advance Warning signs shall be located on the right hand side of traffic lanes. On divided roadways, supplemental Advance Warning signs shall be placed on the divider.

~~28~~18) Contractor's Field Staff:

a. Contractors shall furnish sufficient supervisory and working personnel capable of promptly accomplishing all work on schedule and to the satisfaction of the Director.

b. Contractors shall have competent field supervisors furnished with a cell phone, who may be working supervisors, on the job at all times work is being performed who are capable to communicate effectively both in written and oral English, and discuss matters pertaining to this contract. Supervisors must be able to demonstrate to the satisfaction of the Director that they possess adequate technical background. Adequate and competent supervision shall be provided for all work done by the Contractor's employees to ensure accomplishment of high quality work which will be acceptable to the Director. Any order or communication given to the supervisor shall be deemed as delivered to the Contractor. Contact information for the Supervisor shall be provided to the City.

c. Contractors, and their employees, shall conduct themselves in a proper and efficient manner at all times and shall cause the least possible annoyance to the public. The Director may require a Contractor to remove from the work site any employee(s) deemed careless, incompetent, or otherwise objectionable, whose continued employment on the job is considered to be contrary to the best interest of the City of South Pasadena.

d. Contractors shall require each of their employees to wear basic public works working uniform with clear identification. These are basically proper boots, and other gear required by State Safety Regulation, and proper wearing of the clothing. Shirts shall be worn and buttoned at all times; safety vests are required when indicated by the Work Area Traffic Control Handbook, or the Director.

e. The Director may require the Contractors to establish an identification system for personnel assigned to service this Agreement which clearly indicates to the public the name of the Contractor responsible for the tree maintenance services. The identification system shall be furnished at the Contractor's expense and may include appropriate attire and/or name badges as specified by the Director.

~~29)~~19) Contractor's Office Staff:

a. Contractor shall have a responsible person(s) with the ability to take necessary action regarding all inquiries and/or complaints received from the City of South Pasadena or the Director.

    i. This person(s) shall be reachable twenty-four (24) hours per day.

ii. An answering service shall be considered an acceptable substitute to full-time coverage, outside of prescribed working hours, provided the Contractors are notified of any communication within one (1) hour after receipt of said communication.

iii. The telephone number(s) of the Contractor or responsible person(s) of the Contractor shall be a toll-free number for the City of South Pasadena.

iv. During normal working hours, the Contractor and/or supervisors, who are responsible for providing tree maintenance services, shall be available for notification through pager, cellular telephone and/or radio communication.

~~30)~~20) **Storage Facilities:** The City of South Pasadena shall not provide any storage facilities for the Contractor.

~~31)~~21) **Signs:**

a. Contractors shall not post signs or advertising matter upon the areas under maintenance or improvements thereon, unless prior written approval is obtained from the Director.

b. Contractors shall, at all times, remove all unauthorized signs and advertising matter from trees receiving maintenance.

~~32)~~22) **Non-Interference:** Contractors shall not interfere with the public use of the premises, and shall conduct their operations so as to offer the least possible obstruction and inconvenience to the public, nor disrupt the peace and quiet of the area within which the services are performed.

~~33)~~23) **Parking:**

a. Contractors shall park their vehicles and equipment within designated parking areas or in such a location to insure normal vehicular traffic.

b. The Contractor's vehicles and equipment shall not be parked or set in such a manner that they block pedestrian access or vehicular right-of-way except as required to comply with all safety standards of OSHA or CAL-OSHA.

c. The City of South Pasadena will not allow the Contractor to park or store any equipment or materials, used in the performance of this contract, in the City right-of-way or on City property.

~~35)~~24) **General Clean-up:**

a. The Contractor shall promptly clean all job sites when work is completed, including the raking of leaves, twigs, and other debris generated from their operation, from the lawn, sidewalk and parkway and sweep the street.

b. Each day's scheduled work shall be completed and cleaned up prior to the Contractor vacating the work site. Under no circumstances shall any brush, leaves, debris or equipment be left on the street overnight.

~~36)~~25) Aerial Utilities:

a. Contractor shall trim limbs a minimum of five (5) feet from street lights.

b. Contractor shall comply with Standards of CAL OSHA and the American National Standard Institute, Z133.1-1988, Safety Requirements.

c. The Contractor shall exercise precautions as necessary when working adjacent to aerial utilities. In the event that aerial utility wires present a hazard to the Contractor's personnel or others near the work site, work is to immediately cease and the appropriate utility company notified. Work shall then commence in accordance with instructions from the utility company.

~~37)~~26) Temporary "No Parking" Signs:

a. During tree services, the contractor shall post "No Parking" signs forty eight (48) hours in advance of commencing work and they shall be placed at regular intervals 150 feet in advance and 150 feet beyond the restricted area.

b. All costs for furnishing, posting and maintaining temporary "No Parking" signs shall be included in the various bid items and the Contractor shall be awarded no additional compensation for performing this function.

c. "No Parking" signs shall be supplied by the Contractor and be constructed as follows:

   i. Minimum size nine inches (9") by twelve inches (12").

   ii. Color shall be red on white background.

   iii. Markings and materials will be suitable so as to withstand exposure to inclement weather.

iv. Lettering size shall be a minimum of half inch in height.

v. Sign shall be approved by the Director prior to placement.

d. The following information will appear on each posted "No Parking" sign:

i. "Temporary No Parking", "Tow Away", "By Order of the Police Department".

ii. Date(s) sign is in effect.

iii. Time period sign is in effect.

iv. Reason for posting (i.e. Tree Trimming, Tree Removal, Tree Planting, etc.).

v. Date and time the sign was posted.

e. Signs shall be posted conspicuously so as to allow unobstructed visibility of oncoming traffic and to the operators of vehicles parked in the restricted areas.

f. Signs shall not be posted more than fifty feet (50') apart.

g. Signs shall not be posted on private property.

h. Signs shall be posted within the parkway area or as close to the roadway as practical.

i. Signs shall be posted at the height so as to be visible over parked vehicles, but not higher.

j. Signs shall be securely fastened but in such a manner as to not damage the item to which they are affixed.

k. Signs may be posted on any standard or tree within the parkway, except that in the absence of such items, signs may be attached to traffic barricades.

l. Signs must be removed after tree services are completed.

~~38)~~27) **Removal of Brush, Debris and All Equipment:** It shall be the responsibility of the Contractor to ensure that the street, parkway, sidewalk, and slope areas of all property shall be left free of debris and equipment. This includes, but is not limited to cones, signs, dumpsters, safety devices, and all heavy and light equipment and vehicles, which

shall be removed at the close of each day's operation. With the exception of the actual work performed, all sites shall be in their original condition at the conclusion of each working day. An exception to this paragraph is if the homeowner desires that the wood be cut up and left in the parkway. If this is the case, Contractor will cut up wood and stack in parkway.

~~40~~28) Emergency Calls for Tree Services:

a. The Contractor is required to respond on an on-call basis for emergency work such as downed trees and branches. Emergency work may occur twenty-four (24) hours a day, seven (7) days a week including weekdays, weekends, and holidays.

b. The Contractor shall have the capability to receive and to respond immediately to call of an emergency nature during normal working hours and during hours outside of normal working hours. Calls of an emergency nature received by the City shall be referred to the Contractor for immediate disposition.

c. The Contractor shall have the duty to respond to emergency calls within two (2) hours from time of notification.

d. Contractor must designate a person within their company who will respond to emergency calls twenty four (24) hours a day.

e. Contractor shall submit telephone number(s) to the City that can be used to obtain emergency service on a twenty four (24) hour basis. The Contractor's name and telephone number will also be listed with the Police Department.

f. Upon arriving at any emergency situation it shall be the responsibility of the Contractor to eliminate all unsafe conditions that would adversely affect the health, safety or welfare of the public.

g. Failure to respond within two (2) hours of attempt to contact may result in a $200 penalty per incident. Failure to respond to an emergency at any level will subject Contractor to any primary or secondary cost arising from said emergencies.

~~41~~29) Consulting Arborist Services and Inspections:

a. Contractor shall have a Consulting Arborist on staff that is a ISA Certified Arborist.

b. The Contractor's Consulting Arborist shall provide and tree assessments, inspections, appraisals, surveys, and/or reports requested by the City

representative at the approved hourly rates. The Consulting Arborist shall follow all ISA guidelines.

c. Contractor shall provide one (1) hard copy and one (1) electronic copy of all tree assessments, inspections, appraisals, surveys, and/or reports requested by the City representative. The City will own all final documents.

d. The City requires permits for residents to remove trees and trim trees. The Consulting Arborist, at the request of the City representative, may be required to perform the site inspections and confirm if the permit meets the requirements of Chapter 34 of the South Pasadena Municipal Code. All permit inspections and documentation will be performed at the approved hourly rates.

e. The City has the right to receive a second opinion from another ISA Certified Arborist on the documents submitted by the Contractor.

~~42)~~**30) Extraordinary Services:**

a. Contractors may be responsible for providing extraordinary tree maintenance services:

   i. Extraordinary tree maintenance shall include answering emergency calls as required. Contractors shall respond to an emergency call within two (2) hours. Contractors shall maintain a twenty four (24) hours per day on-call service for emergency calls.

   ii. The Contractor shall notify the Director of Public Works or their representative by telephone within twenty four (24) hours of any emergency extraordinary work that is performed. Non-emergency extraordinary work requires written approval before the work is performed.

   iii. Contractors shall be compensated for extraordinary work as defined in the Schedule of Compensation.

b. In situations involving emergency repair work after normal work hours, Contractors shall dispatch qualified personnel and equipment to reach the site within two (2) hours.

   i. The Contractor's vehicle shall carry sufficient equipment to effect safe control of traffic.

ii. When the work site Contractor arrives at the site, the Contractor shall set up traffic warning and control devices, if deemed necessary, and proceed to repair on a temporary/permanent basis.

c. If a City Representative is still at the site when the Contractor arrives, the Contractor shall quickly evaluate the situation and discuss it with that responsible person.

i. If the repair will take only a few minutes, the City Employee may stay to continue to direct traffic while the Contractor makes the repairs.

ii. If the repair will take longer than the City Employee can wait, the Contractor shall immediately set up temporary traffic control devices and all other necessary warning devices and relieve the City Representative.

d. The following individuals or agencies may call an emergency at any time for extraordinary services involving emergency work:

i. City Manager or their designee;
ii. Public Works Director;
iii. Community Services Director;
iv. South Pasadena Police Department; and
v. South Pasadena Fire Department

Summary of South Pasadena Tree Inventory:

11,287 Trees in the City Tree Inventory
10,029 Street and Median Trees
822 Vacant Tree Wells
468 Trees in City Parks
113 Trees at City Water Reservoirs (Two Water Reservoirs located outside of South Pasadena city limits: 1) Wilson Reservoir is located at 545 Adelyn Dr., San Gabriel, CA; and 2) Graves Reservoir is located at 2225 El Molino Ave., San Marino, CA.)

SUPPLEMENTAL INFORMATION

- South Pasadena Municipal Code Chapter 34 – Trees and Shrubs: (http://www.codepublishing.com/CA/SouthPasadena/#!/SouthPasadena34.html)
- South Pasadena Municipal Code Chapter 19A – Noise Regulations: (http://www.codepublishing.com/CA/SouthPasadena/#!/SouthPasadena19A.html)
- South Pasadena Municipal Code Chapter 35, Article 35.41-35.43 – Hose Use: (http://www.codepublishing.com/CA/SouthPasadena/#!/SouthPasadena35.html#35.41)
- City Observed Holidays:

1) January 1st: New Year's Day
2) 3rd Monday in January: Martin Luther King, Jr. Birthday
3) 3rd Monday in February: President's Day
4) Last Monday in May: Memorial Day
5) July 4th: Independence Day
6) 1st Monday in September: Labor Day
7) 2nd Monday in October: Columbus Day
8) November 11th: Veteran's Day
9) 4th Thursday in November: Thanksgiving Day
10) Friday after Thanksgiving
11) December 25th: Christmas Day

If a holiday falls on a Saturday, the previous Friday shall be deemed the holiday. If a Holiday falls on a Sunday, the following Monday shall be deemed the holiday.

Exhibit B
Payment for Services

Contractor shall furnish all labor, materials, equipment and transportation, and to do all work required to complete the said work in accordance with the said Scope of Services for the unit prices named in the following schedule, with specific work determined by the City Public Works Director:

Item No.	Description	Bid Item Price
A1	Grid or annual tree trimming All trees	$ 80.00 (each)
A2	Service Request Tree Pruning 0" to 6"	$60.00 (each)
A3	Service Request Tree Pruning 7" to 12"	$120.00 (each)
A4	Service Request Tree Pruning 13" to 18"	$180.00 (each)
A5	Service Request Tree Pruning 19" to 24"	$260.00 (each)
A6	Service Request Tree Pruning 25" to 30"	$320.00 (each)
A7	Service Request Tree Pruning 31" and Over	$400.00 (each)
A8	Palm Tree Pruning "Washingtonia Palm", any size	$80.00 (each)
A9	Palm Tree Pruning "Canary Is. Date Palm", any size	$180.00 (each)
A10	Tree Removal and Stump Grinding	$34.00 (per inch DBH)
A11	Stump Grinding Only	$11.00 (per inch DBH)
A12	Tree Removal Only	$24.00 (per inch DBH)
A13	Root Pruning	$16.00 (per LF)
A14	Scheduled Work Crew (3 Staff, Aerial Unit, Box Truck, Chipper, Chain Saws & Misc. Equipment) Regular Business Hours	$210.00 (per hour)

Item No.	Description	Bid Item Price
A15	Emergency Response Crew (3 Staff, Aerial Unit, Box Truck, Chipper, Chain Saws & Misc. Equipment) After Hours, Weekends & City Holidays	$300.00 (per hour)
A16	Tree Planting (All Species) including Purchase & Planting of Tree, Tabs, Amendments & Stakes Twist Brace, and 15 gallon w/ root barrier	$145.00 (each)
A17	Tree Planting (All Species) including Purchase & Planting of Tree, Tabs, Amendments & Stakes Twist Brace, and 15 gallon w/out root barrier	$120.00 (each)
A18	Tree Planting (All Species) including Purchase & Planting of Tree, Tabs, Amendments & Stakes Twist Brace, and 24" Box w/ root barrier	$335.00 (each)
A19	Tree Planting (All Species) including Purchase & Planting of Tree, Tabs, Amendments & Stakes Twist Brace, and 24" Box w/ out root barrier	$305.00 (each)
A20	Tree Planting (All Species) including Purchase & Planting of Tree, Tabs, Amendments & Stakes Twist Brace, and 36" Box w/ root barrier	$800.00 (each)
A21	Tree watering with Water Truck	$70.00 (per hour)
A22	Consulting Arborist Services	$120.00 (per hour)
A23	Tree Inventory Using GPS (outside of the above tree services)	$3.00 (per tree site)
A24	Crane (outside of the above tree services)	$180.00 (per hour)
A25	95-foot Aerial Tower (outside of the above tree services)	$180.00 (per hour)

Below are the hourly rates of Contractor's key personnel:

Personnel	Hourly rate
Pest Control Advisor	$120.00 (per hour)
Pest Control Applicator	$100.00 (per hour)
Sr. Tree Trimmer, Tree Trimmer or Grounds person	$70.00 (per hour)

Below are the rates of Contractor's Plant Health Care Services:

Description	Unit rate
Tree Canopy Spraying from the Ground Level (Foliar hydraulic spraying of recommended material)	$2.00 (per DBH)
Tree Canopy Spraying from an Aerial Tower (Foliar hydraulic spraying of recommended material)	$4.00 (per DBH)
Insecticide or Fungicide Trunk Banding (Trunk spraying of recommended material)	$5.00 (per DBH)
Plant Growth Regulator (PGR) Trunk Banding (Trunk spray of the recommended material to regulate plant growth)	$2.00 (per DBH)
Insecticide or PGR Soil Application (Cambistat) (Recommended insecticide soil injection or drench material to regulate plant growth)	$4.00 (per DBH)
Insecticide or Fungicide Soil Application (Soil applied drench of recommended material)	$2.00 (per DBH)
Soil Injection Fertilization (Soil applied drench of recommended material)	$3.00 (per DBH)
Soil Drenching Fertilization (Soil application of recommended material)	$2.00 (per DBH)
Trunk Injection (Insecticide/Miticide) (Trunk injected recommended material)	$4.50 (per DBH)
Trunk Injection (Fungicide) (Trunk injected recommended material)	$4.50 (per DBH)
Trunk Injection (Insecticide & Fungicide Combo) (Trunk injected recommended material)	$8.00 (per DBH)
Avermectin Class Insecticide Injection (Recommended trunk injection of Emamectin benzoate active ingredient)	$6.00 (per DBH)

Desiree Jimenez

From: Lucy Demirjian
Sent: Wednesday, February 21, 2018 4:58 PM
To: Stephanie DeWolfe; Desiree Jimenez; Natalie Sanchez
Subject: FW: Health Benefits of Urban Forests During Heat Waves
Attachments: UCLA-IOES-ClimateProjectionsForLAArea-2015.pdf; Trees&ClimateChange.docx

From: William Kelly [redacted]
Sent: Wednesday, February 21, 2018 4:18 PM
To: Dr. Richard Schneider - Personal <Rdschneider0@yahoo.com>; Michael Cacciotti - Personal <macacciotti@yahoo.com>; Marina Khubesrian <mkhubesrian@southpasadenaca.gov>; Diana Mahmud <dmahmud@southpasadenaca.gov>; Robert Joe <rjoe@southpasadenaca.gov>; City Manager's Office <cmoffice@southpasadenaca.gov>
Cc: Kristine Courdy <kcourdy@southpasadenaca.gov>; Rafael Casillas <rcasillas@southpasadenaca.gov>
Subject: Health Benefits of Urban Forests During Heat Waves

Greetings:

It is imperative that the city of South Pasadena make a substantial and long-term commitment to maintaining and replenishing our urban forest. It's a matter of health and welfare due to our warming climate.

The proposed contract with West Coast Arborists is at best an interim solution and will not adequately address the decline of the public tree canopy.

Residents need education re: the benefits and role of trees in our community and substantially more city money and additional city staff resources must be dedicated to replenishing the declining tree canopy, which is ravished by drought, pests, higher water bills, and age.

Parkway trees shade front yards, thereby reducing the need to water (see article on research out of the University of Utah done here in Southern California [https://unews.utah.edu/throw-shade-on-lawns/] and this link [http://climatechangepolicies.legislature.ca.gov/sites/climatechangepolicies.legislature.ca.gov/files/Background%20Document_2.15.2018_Revised.pdf] to a background paper prepared for a state legislative committee; see page 2). Therefore planting parkway trees should be eligible for funding from revenues collected in water rates. In particular, the council should increase the water conservation fee in conjunction with the 2018-19 budget year to plant more parkway trees. Climate ready trees should be planted (see attached, which is a paper I wrote for NREC and a paper describing climate ready trees being researched out of the University of California at Davis).

The health benefits of trees, and the health effects of a lack of trees, are covered below in the outline of testimony given by Deborah Weinstein Bloome, government affairs director for Tree People, to the state Legislature's Joint Committee on Climate Change Policies Feb. 15 in Sacramento during a hearing on urban forests and climate change in California. Please note the

V7
2/21/18 BKelly

parts I highlighted in color about the health benefits of trees during heat waves and the impact on absorption of solar energy by pavement.

While health impacts are discussed in terms of Huntington Park and Cudahy, the same UCLA modeling of the region's future climate forecasts that the number of days over 95 degrees in South Pasadena, the level at which ill health effects rise, will rise from 32 to 74 over the next 20 years.

NREC is working on a recommendation to contract with a non-profit to plant more trees and educate residents about how to water them efficiently similar to what Claremont has done, but this will be no substitute for a commitment of real resources, plus a higher priority for the urban canopy at city hall.

Thanks,
Bill Kelly
NREC Chair
[redacted]

Ηι τηερε...ηερε ψου γο! Σορρψ τηε φοντ ανδ σπαχινγ ισ μεσσεδ υπ ιν τηε εμαιλ...

Βεστ,

Δεβοραη

- It's clear we are facing a more rapid increase in climate impacts than anyone anticipated.
- We don't have time to waste.
- But the good news is-- to get answers -- we don't have to recreate the wheel.
- TreePeople has spent years studying how Australia has dealt with different emergencies, especially those linked to climate change. Specifically:
    - How they survived their devastating 12 year Millennium Drought; and
    - How they are dealing with their extreme heat.
- TreePeople has focused on Australia as our two countries are quite similar in many ways. In addition to language, lifestyle:
    - The City of Melbourne, for example, is same size as the City of LA – 4M
        - Facing some of the same climate challenges as we are – drought, extreme heat, and on the flipside, can have had too much water, creating floods

- City of Adelaide – has a Mediterranean climate similar to that of much of CA

- CA can and should **adopt and then adapt** the most fitting solutions from Australia's experiences.

- Regarding UF in particular:

  - While Australia proactively deployed emergency tactics to save their heritage trees, vegetation and trees over huge areas died.

  - This was because during this drought -- as there was only months left of water in watershed – no irrigation was allowed.

- When they evaluated what happened, they realized the **huge negative impacts** to the public – both physically and psychologically

- In fact, they saw that without the **ecosystem services provided** through the **shade and evaporative cooling** of leafy tree canopies, the **urban heat island intensified, and at times, became lethal**.

  - For example, In 2009, **Melbourne experienced a 62% increase in heat-related mortality,** prompting the city to rethink the way drought restrictions impact public green space.

  - Avg Jan temp in Melbourne is approximately 70 d F

  - During this extreme heat event, temps were exceeding 109 for 3 consecutive days.

  - Public health researchers determined the best way to protect lives in times of extreme heat – **is to ensure everyone lives in a community with dense tree canopy.**

  - If you take a look at the first handout – the City of M came up with a strategy…

    - Double tree canopy cover

    - Increase permeability

    - Increase green space

    - Increase sw harvesting

  - All to cool the City by 4 degrees C -- approximately 7 degrees F.

- How have they changed given their experiences?

  - Began to **significantly invest** in keeping trees healthy and maintained.

    - The City of M. alone invested $50M over 5 years into the 4 strategies I just mentioned.

  - They created sew sources of water—stormwater capture, in some cases tapping into sewers, treating the water and then using it to help keep their GI and trees alive.

o Changed laws, policies and incentives to help their urban forests thrive –taking an **aggressive stance against** their new harsh climate reality

1) We can also look in our backyard – TP leading a national collaborative on urban cooling with Yale, UCLA and several others to model the optimal prescription of how increases in vegetation and reflective surfaces in LA could DECREASE HUMAN MORTALITY.

a. Some initial results:

i. **LA's unique distinction:** greater number of *winter* days above 90° F than any other region in the country. This means we occasionally have heat related death – even in the winter.

ii. Mortality increases about 5X from the first to the fifth consecutive day, and…

iii. After the fifth day, mortality risk increases 46% in Hispanic communities and 48% in elderly black communities.

b. Importantly, results show that **any combination of increased vegetation (including trees)** and reflective surfaces **result in a double digit percentage DECREASEs in human mortality**.

2) Shift to provide 2 local examples -- (for TP this means LA) - of our plantings and their impacts

a. First – As part of our "School Greening Initiative", TP received CALFIRE funding for some great work at Chatsworth Park Elementary School

ii. Concrete was removed and 24 trees were planted all around the playground,

iii. they even created a "Reading Grove" of trees

iv. The kids have really taken ownership of the trees, water them

v. Providing the kids with needed shade and wind breaks from this hot and windy area.

[IF YOU LOOK AT THE OTHER SLIDE ON THE HANDOUT, YOU'LL SEE A PHOTO OF A TYPICAL STREET ON A FAIRLY COOL DAY—73 DEGREES.

HOWEVER, WITH SPECIAL CAMERA, YOU CAN SEE THAT:

- UNSHADED SIDEWALK IS 107
- SHADED SIDEALK IS 82 DEGREES
- THAT TREE MAKES A 25 DEGREE DIFFERENCE IN TEMP TO THE PEDESTRIAN.]

c. 2nd-CalFire has granted TP with funds to plant 1400 trees in parkways and commercial corridors in Huntington Park and Cudahy through March 2020;

i. **These plantings will:**

- Improve **public health and build healthier communities** through heat-reducing shade and cleaner air
- In addition to **increasing the Urban Forest Canopy** by 1,400 trees
- It will create local jobs, and inspire residents to create behavioral change.
    - **This COMMUNITY ENGAGEMENT and EDUCATION is extremely important to us and the work**
    - **Volunteers in the community are recruited** directly by our Regional Manager through high schools, churches, CBOs and their constituents.

- Residents on each planting street participate.

- Every volunteer work day begins with education on tree planting or care.

- Education materials are distributed to homes near where trees are planted are based on research into motivators to caring for the new trees.

We chose this community because:

- High population density with 85,000 residents live in just 4.25 square miles

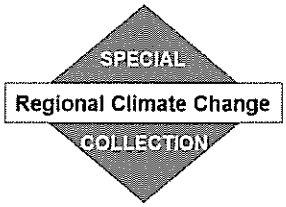
- These communities have a lack of air conditioning, low % tree canopy and other coping strategies

- modeling suggests that Huntington Park/Cudahy could have **3-4 times the number of days with temperatures over 95F in as little as 25 years**

- Air quality is also a challenge

- This is just one example of a community. There are 124 identified DAC's in Los Angeles and Ventura County alone.

- Huge parts of our population are at risk. The legislature should invest in UF now through as many funding vehicles as possible. This should be among our highest priorities to protect our communities.



A Hybrid Dynamical–Statistical Downscaling Technique. Part II: End-of-Century Warming Projections Predict a New Climate State in the Los Angeles Region

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(Manuscript received 12 March 2014, in final form 4 March 2015)

ABSTRACT

Using the hybrid downscaling technique developed in part I of this study, temperature changes relative to a baseline period (1981–2000) in the greater Los Angeles region are downscaled for two future time slices: midcentury (2041–60) and end of century (2081–2100). Two representative concentration pathways (RCPs) are considered, corresponding to greenhouse gas emission reductions over coming decades (RCP2.6) and to continued twenty-first-century emissions increases (RCP8.5). All available global climate models from phase 5 of the Coupled Model Intercomparison Project (CMIP5) are downscaled to provide likelihood and uncertainty estimates. By the end of century under RCP8.5, a distinctly new regional climate state emerges: average temperatures will almost certainly be outside the interannual variability range seen in the baseline. Except for the highest elevations and a narrow swath very near the coast, land locations will likely see 60–90 additional extremely hot days per year, effectively adding a new season of extreme heat. In mountainous areas, a majority of the many baseline days with freezing nighttime temperatures will most likely not occur. According to a similarity metric that measures daily temperature variability and the climate change signal, the RCP8.5 end-of-century climate will most likely be only about 50% similar to the baseline. For midcentury under RCP2.6 and RCP8.5 and end of century under RCP2.6, these same measures also indicate a detectable though less significant climatic shift. Therefore, while measures reducing global emissions would not prevent climate change at this regional scale in the coming decades, their impact would be dramatic by the end of the twenty-first century.

1. Introduction

In Walton et al. (2015, hereinafter Part I), we described a hybrid dynamical–statistical technique for downscaling the global climate models (GCMs) from phase 5 of the Coupled Model Intercomparison Project (CMIP5) to a 2-km resolution over the greater Los Angeles region. As an example of its capabilities, we applied this technique to all available CMIP5 GCMs for the RCP8.5 anthropogenic greenhouse gas emissions scenario and projected the midcentury most likely (ensemble mean) surface air warming and uncertainties arising from multiple GCMs. Part I was a proof-of-concept study demonstrating that the hybrid dynamical–statistical technique is capable of accurately capturing both large-scale warming and the spatial gradients in warming within the region because of its complex orography and coastlines. In this study, we use the hybrid dynamical–statistical technique to make a comprehensive assessment of the effects of twenty-first-century warming in the region as a function of time period and forcing scenario.

CMIP5 provides a multimodel context for understanding global climate and climate change and also provides a range of multicentury climate responses across GCMs under multiple anthropogenic forcing scenarios (Taylor et al. 2012). The organizers of the CMIP5 archive have adopted a set of forcing scenarios known as representative concentration pathways (RCPs; Moss et al. 2008; Meinshausen et al. 2011; Taylor et al. 2012). Four RCPs have been developed: RCP2.6, RCP4.5, RCP6, and RCP8.5, corresponding to the approximate radiative forcing they would produce at the end of the twenty-first century (2.6, 4.5, 6.0, and 8.5 $W m^{-2}$, respectively). The radiative forcing from 1850 to 2100 is shown in Fig. 1a for each scenario, with the historical forcing also shown

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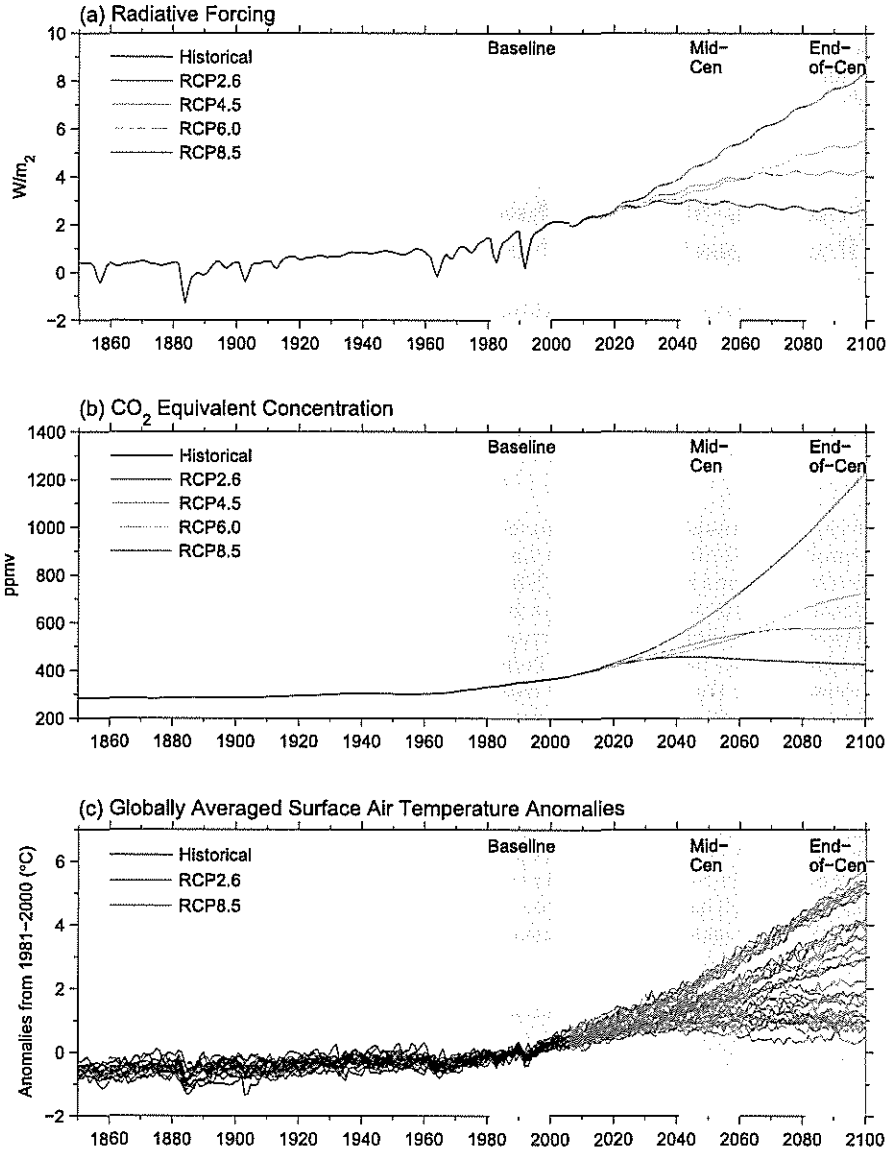

FIG. 1. (a) Total radiative forcing (anthropogenic plus natural) and (b) CO_2-equivalent concentrations for approximately the past century and four representative concentration pathways: RCP8.5, RCP6, RCP4.5, and RCP2.6 (also called RCP3-PD). (c) Global-mean surface air temperature departures from 1981–2000 mean as simulated in CMIP5 GCMs used in this study for the historical forcing (black), RCP8.5 (red), and RCP2.6 (blue). Gray shaded regions denote the baseline (1981–2000), midcentury (2041–60), and end-of-century (2081–2100) periods used in this study.

up to the year 2005. RCP2.6 is representative of a "mitigation" scenario, in which greenhouse gas emissions peak within the next three decades. The resulting carbon dioxide (CO_2)-equivalent concentration, encompassing the net effect of all anthropogenic forcing agents, reaches a maximum level of approximately 460 ppmv around 2050 and declines thereafter to approximately 420 ppmv by 2100 (Fig. 1b). Total radiative forcing relative to preindustrial levels peaks at about 3 $W m^{-2}$ in the middle of the twenty-first century and declines to 2.6 $W m^{-2}$ by 2100. In contrast to RCP2.6, RCP8.5 represents a "business as usual" scenario, in which greenhouse gas emissions continue to increase throughout the twenty-first century. The result is a total radiative forcing of 8.5 $W m^{-2}$ and CO_2-equivalent concentrations greater than 1200 ppmv by 2100. Between the mitigation RCP2.6 scenario and the most aggressive business-as-usual RCP8.5 scenario are two "stabilization" scenarios, RCP4.5 and RCP6. In this study, however, we focus on the climate response to the two scenarios at either extreme (i.e.,

RCP8.5 and RCP2.6) to approximately sample the full range of climate outcomes associated with potential future emissions.

A sampling of the global-mean surface air temperature response to the RCP2.6 and RCP8.5 scenarios seen in the CMIP5 GCMs is shown in Fig. 1c. (Table 1 of Part I summarizes the available global climate models used in this study.) For both scenarios, there are clearly significant model-to-model differences in the warming response over the twenty-first century. For example, by 2100, for RCP2.6 scenario, surface air warming ranges from about 0.5° to 2.5°C, while for RCP8.5 scenario, the warming is about 3°–6°C. The variations in warming arise principally from differences in the GCM spatial resolutions and physical parameterizations, representing subgrid processes (e.g., cloud and the atmospheric boundary layer schemes). Thus, the various lines seen in Fig. 1c approximately represent the range of warming outcomes associated with different GCMs. For this reason, we interpret the range of outcomes as the climate change uncertainty associated with a given emissions scenario. We also interpret the average response of all the GCMs for a given emissions scenario (the ensemble mean) as the most likely outcome for that scenario. This assumes the GCMs randomly sample the true uncertainty space associated with the simulated response to anthropogenic forcing. This is the same approach to likelihood and climate change uncertainty quantification used in the Intergovernmental Panel on Climate Change (IPCC) report (Stocker et al. 2013).

In this study, we focus on three time periods: baseline (1981–2000), midcentury (2041–60), and end of century (2081–2100). These time periods are shaded in Fig. 1. Climate change is quantified by comparing midcentury and end-of-century climate states to that of the baseline. Previously, the vast majority of regional climate change studies have been performed for only 1–3 different GCMs (e.g., Hayhoe et al. 2004; Duffy et al. 2006; Déqué et al. 2007; Sato et al. 2007; Cayan et al. 2008; Salathé et al. 2010; Cabré et al. 2010). This is partly because of the computational expense of dynamically downscaling each GCM. The hybrid dynamical–statistical technique described in Part I allows us to perform downscaling of the temperature change signal for each of these future time periods and scenarios and for every available CMIP5 model.

This hybrid dynamical–statistical technique combines the ability of dynamical downscaling to capture finescale dynamics with a computationally efficient statistical model to downscale a large ensemble of GCMs. First, the Weather Research and Forecasting (WRF) Model, a regional-scale model, is used to perform two types of simulations: 1) a baseline simulation using the North American Regional Reanalysis (NARR) data as boundary and initial conditions; and 2) multiple midcentury future simulations under RCP8.5 emissions scenario by applying a previously established method (e.g., Schär et al. 1996; Hara et al. 2008; Kawase et al. 2009) to five selected GCMs, which adequately sample the range of warming amplitudes across all GCMs. In this method, initial and boundary conditions are given by adding a mean climate change signal from a given GCM to the 3-hourly NARR data. We did not downscale changes in GCM variability. Thus, any future changes in variability in the regional simulations are solely the result of WRF's dynamical response. We further discuss the caveats of this approach in section 4. Guided by an understanding of the underlying local dynamics, a simple statistical regression model is constructed relating the GCM output and the dynamically downscaled output. The statistical model consists of mathematical relationships between key aspects of the GCM warming and the warming patterns produced by dynamically downscaling. This statistical model is then used to approximate the warming patterns of the remaining GCMs, as if they had been dynamically downscaled. For more details on this hybrid approach, refer to Part I. Because we downscale the entire ensemble of GCMs, we can quantify both the ensemble-mean warming and the intermodel spread. This allows us to provide estimates of the most likely outcome and the associated uncertainty.

A robust baseline simulation (validated for surface air temperature in Part I) allows us to evaluate these climate change signals in the context of the region's substantial natural variability (Wilkinson and Rounds 1998; Abatzoglou et al. 2009). Global-mean temperatures have already increased beyond the envelope of variability (Bindoff et al. 2013). However, elevated levels of natural variability at the regional scale make this a more difficult test for regional temperatures, depending on location (Deser et al. 2012a,b, 2013; Wallace et al. 2015). This is not just an abstract statistical question. The envelope of natural variability maps out a range of physical states to which the region's inhabitants and ecosystems are already adapted. Any perturbation resulting from anthropogenic climate change therefore must be assessed against this background. Here, we present multiple analyses designed to reveal whether changes in the region's temperatures represent significant departures from the baseline state for each scenario and time slice. These include a comparison of the climate change signal to interannual variability and the region's seasonal cycle, a "similarity" metric that quantifies the degree of correspondence between the daily temperature variability of future climate and the baseline, and quantification of changes in extremely hot and cold days.

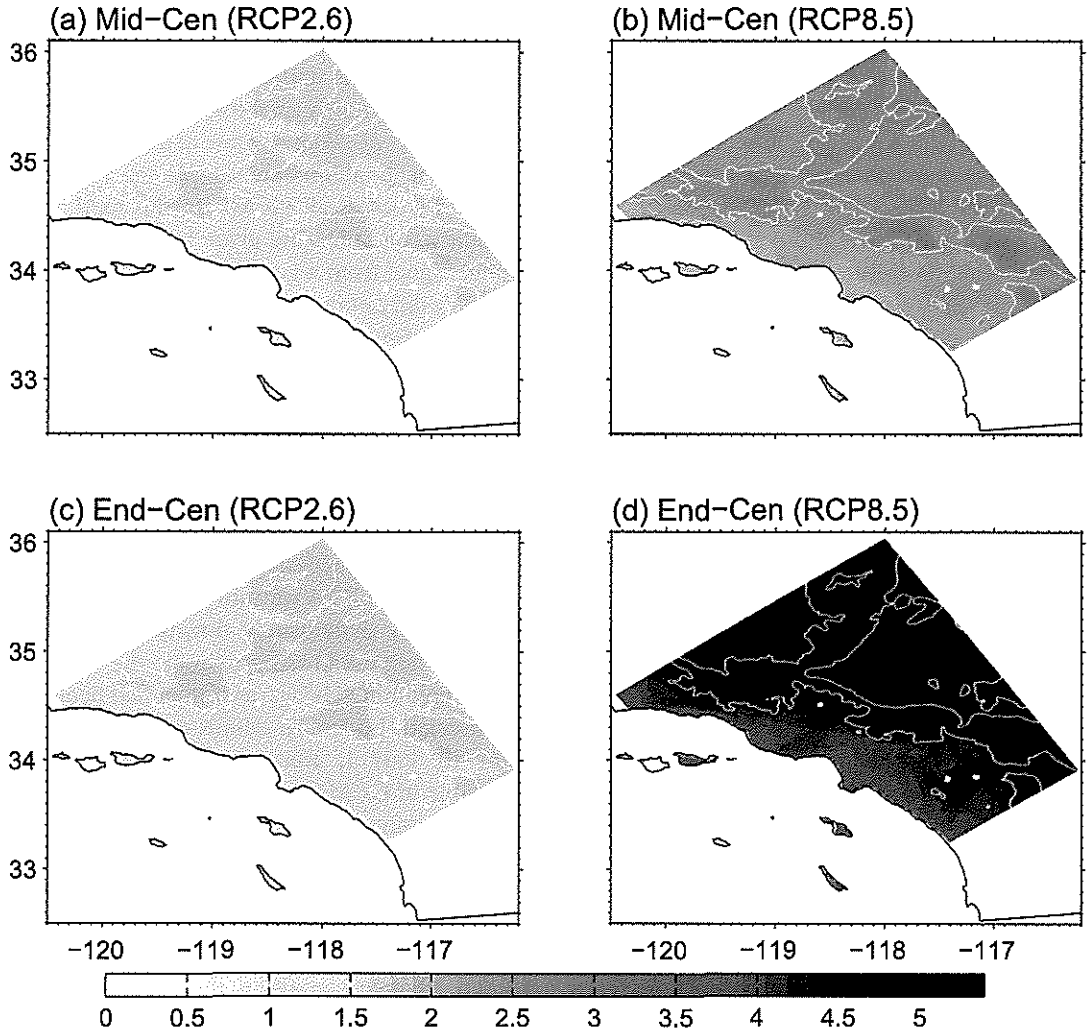

FIG. 2. Ensemble mean of downscaled annual-mean surface warming (°C) for (a) midcentury (2041–60) under RCP2.6, (b) midcentury under RCP8.5, (c) end of century (2081–2100) under RCP2.6, and (d) end of century under RCP8.5. White contours are plotted at 1000-m elevation.

Such definitive assessments of most likely outcomes and uncertainty estimates against the background of natural variability allow us to address how choices relating to greenhouse gas emissions affect climate outcomes at the regional scale and when these outcomes will emerge. This information is a foundation for efforts to adapt to climate change and also reveals the climate benefits of mitigation strategies.

The paper is organized as follows. The surface air warming comparison for multiple time periods and scenarios is shown in section 2, followed by analyses of these changes relative to the baseline seasonal cycle and interannual variability. Changes in temperature distribution and temperature extremes are assessed in section 3. In section 4, we summarize the major findings and discuss the caveats and limitations of this hybrid dynamical–statistical downscaling approach and the implications for interpreting the downscaled changes.

2. Changes in mean temperature

a. Ensemble-mean change and spread

First, we examine the annual-mean, ensemble-mean surface air warming (Fig. 2). In each scenario and time slice, the coastal areas warm less than inland areas, with the mountain peaks warming the most. These differences are most pronounced in RCP8.5. As discussed in Part I, spatial variations in the warming are due to 1) generally lower warming over the ocean in response to increasing greenhouse gases because of the ocean's relatively larger effective heat capacity and the more

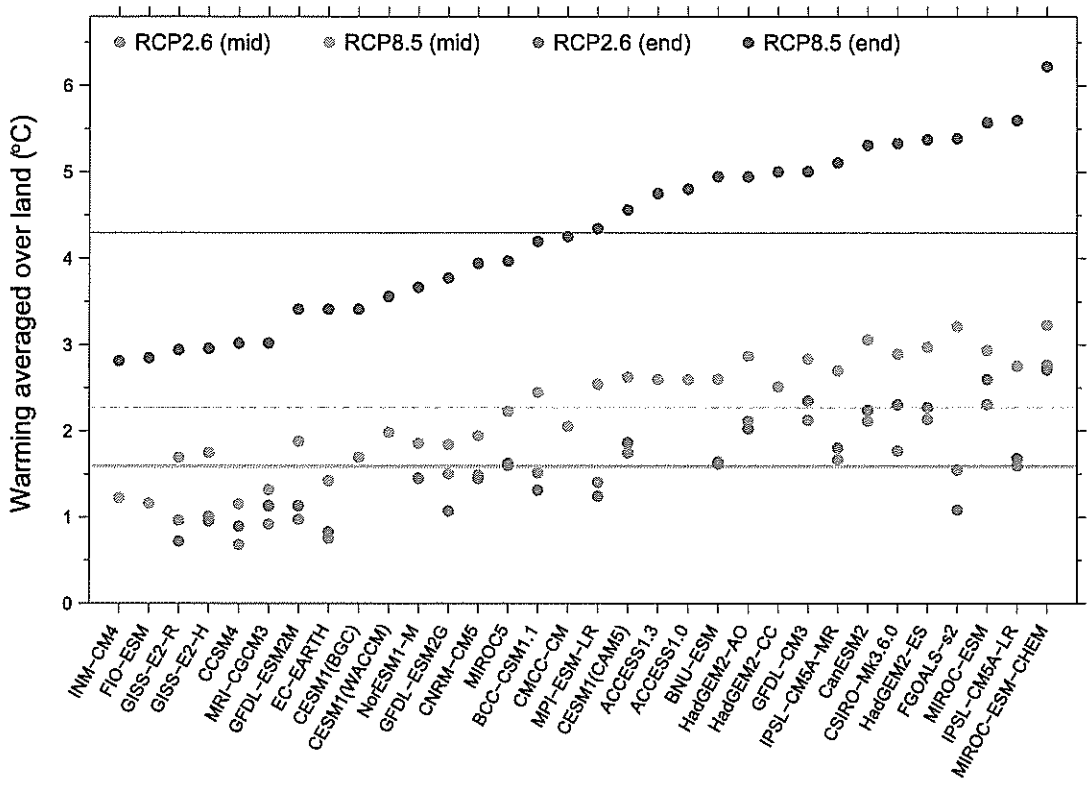

FIG. 3. Land-averaged annual-mean surface warming (°C) downscaled from each GCM for midcentury (2041–60) under RCP2.6 (green dots), midcentury under RCP8.5 (orange dots), end of century (2081–2100) under RCP2.6 (magenta dots), and end of century under RCP8.5 (red dots). Horizontal lines denote the corresponding ensemble mean across all GCMs for each scenario. (Expanded GCM names can be found online at http://www.ametsoc.org/PubsAcronymList.)

efficient ventilation of the ocean surface through latent heat fluxes, which allows enhanced downward infrared radiation in the warmer climate to be balanced with a smaller surface temperature increase over the ocean compared to land; and 2) the land–sea breeze circulation, which introduces a marine influence in the coastal zone, in this case bringing the milder warming of the ocean to the coastal zone. The annual-mean warming is highest in mountain areas mainly because they experience strong snow–albedo feedback, which is strongest in the spring months.

As shown in Figs. 2a,b and Fig. 3, the emissions scenario has only a relatively small influence on the warming at midcentury. The midcentury warming under RCP2.6 is 70% of the warming under RCP8.5. By the end of century, however, the gap between the scenarios has grown much larger. Under RCP2.6, end-of-century warming remains almost unchanged compared with midcentury warming, whereas under RCP8.5, end-of-century warming approximately doubles compared with midcentury warming, shown in Figs. 2c,d and Fig. 3. This indicates that, although the impact of global measures to reduce greenhouse gas emissions would be modest in the coming decades, it would be significant by the time the twenty-first century draws to a close.

To examine intermodel spread, we look at the annual-mean warming for each GCM, averaged over the land areas within the region (Fig. 3). The intermodel spread scales approximately with the ensemble-mean warming, with the largest spread being associated with end-of-century RCP8.5 (red dots). In this case, the ensemble-mean warming is 4.3°C, with the model predicting the most warming (MIROC-ESM-CHEM) giving a 6.2°C increase, and the model predicting the least warming (INM-CM4.0) giving a 2.8°C increase. In contrast, under the RCP2.6 scenario, the ensemble-mean warming at end of century is 1.6°C, with a maximum of 2.7°C and a minimum of 0.8°C. Thus, by the end of the century, even the model with the least warming under RCP8.5 warms more than any model under RCP2.6, despite the large intermodel spread.

b. Comparison of change signal to interannual variability

To determine if these changes in temperature are outside the variations the region is already adapted to,

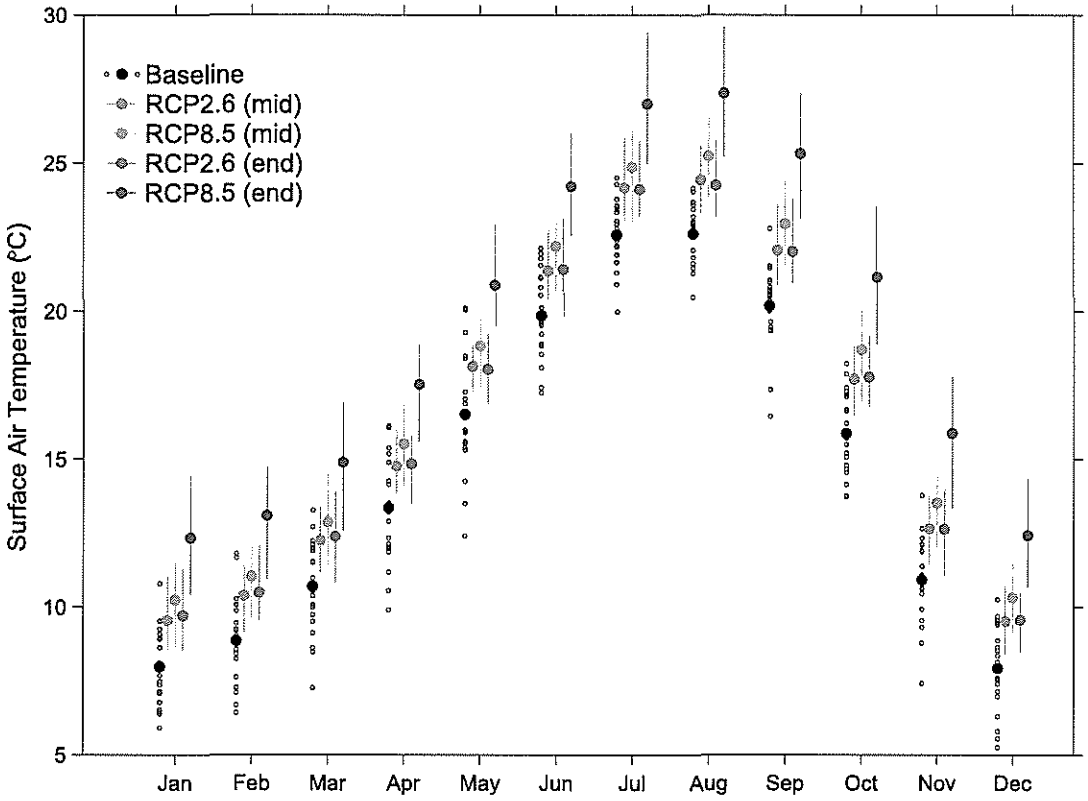

FIG. 4. Annual cycle of land-averaged surface air temperature (°C) for the baseline period (black), midcentury under RCP2.6 (green), midcentury under RCP8.5 (orange), end of century under RCP2.6 (magenta), and end of century under RCP8.5 (red). Black solid dots denote the 20-yr baseline climatology, and black open circles denote monthly mean for each year during baseline period (1981–2000). Other solid dots denote the ensemble-mean climatology for their respective scenario and time slice; bars denote the range across all the downscaled GCMs.

we compare them to the region's interannual variability. Figure 4 shows, for each month of the calendar year, the year-to-year variability in monthly mean temperatures averaged over land areas in the baseline period and the associated monthly mean warming and its intermodel spread for each future scenario and time slice. First, we note that the interannual variability for each month itself varies considerably, with the least variability occurring during the summer months, especially August, and the most variability occurring during the spring and fall months. Thus, the emergence of the climate change signal from the noise of interannual variability would be a function of time of year, even if the warming were the same for all months.

Indeed, partly because of low variability in summer, the summer warming signals are most distinct from the background variability. For example, by midcentury under RCP8.5, the most likely average future August (predicted by the ensemble mean) is warmer than the hottest August during the baseline period. Other months also show most likely future average temperatures that are outside or near the upper edge of the variability envelope for this scenario and time slice. By the end of century under RCP8.5, the ensemble-mean warming puts average temperatures well outside the baseline range for every month, even during spring, when variability is highest. Again, the effect is most dramatic in the summer months. For June, July, August, September, and October, even the model with the least warming predicts average monthly temperatures that are warmer than the hottest month within the baseline period. For the model with the most warming, the average future warm-season temperature is about 5°C greater than the warmest of the warm months in the baseline period. For the rest of the months, there is little overlap between the model spread in the average temperatures and the variability envelope. In fact, December, January, and February will be most similar to average baseline April. Future March is likely to be warmer than average baseline April; future April is likely to be warmer than average baseline May. Thus, the end-of-century warming signals under RCP8.5 represent a pronounced shift in climate compared to the baseline.

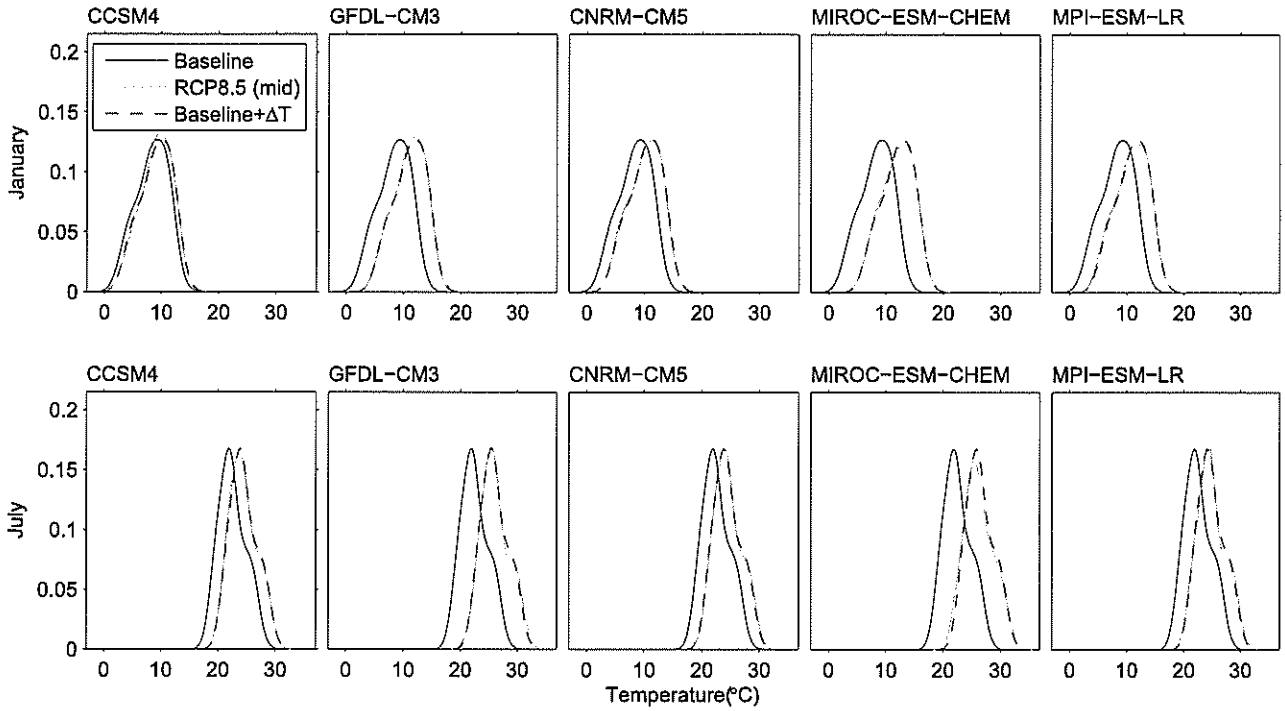

FIG. 5. PDFs of daily mean, land-averaged surface air temperature during (top) January and (bottom) July, during the baseline period (black) and at midcentury under RCP8.5 (orange) for five dynamically downscaled GCMs. The baseline distribution shifted by the statistically downscaled mean temperature change (dashed black) is shown for comparison.

Unlike the end-of-century temperatures under RCP8.5, future temperatures under RCP2.6 are mostly within the range of baseline variability for both time slices.

3. Changes in temperature distribution

In this section, we examine changes in daily temperature distribution associated with overall warmer conditions for midcentury and end-of-century time slices under RCP2.6 and RCP8.5 emissions scenarios.

The statistical model presented in Part I was designed only to calculate the change in the monthly climatological mean temperatures for each GCM in the ensemble and cannot be used directly to calculate changes in temperature distribution. However, changes in daily variability were examined for the five models that were downscaled dynamically. The solid lines of Fig. 5 show probability density functions (PDFs) of baseline and future daily land-averaged temperatures generated through dynamical downscaling for January and July. The shape of future PDF is clearly very similar to that of the baseline for every GCM and for both months. In fact, the future PDF is nearly perfectly approximated by simply shifting the baseline PDF by the mean temperature difference (black dashed lines). This approximation holds equally well for the other 10 months (not shown). We took advantage of this finding to generate future PDFs for all statistically downscaled GCMs, starting with the baseline PDF and then shifting the mean by the temperature change given by the statistical model. To create the ensemble-mean future PDF, we started with the baseline PDF and shifted the mean by the ensemble-mean temperature change. All of the results in this section are based on this technique.

a. Daily average temperature distributions

Ensemble-mean land-averaged daily temperature distributions are shown for selected months corresponding to the four phases of the annual cycle in Figs. 6a–d. The most likely warming involves noticeable shifts of the temperature distribution toward higher values. The PDFs themselves are widest in the spring months, such as April, and narrowest in summer months, such as July. (This is consistent with the smaller levels in interannual variability in summer compared with spring seen in Fig. 4.)

To assess the degree to which daily average future temperatures will be similar to the baseline, we use a metric that quantifies how similar the current and future temperature distributions are: the fractional overlap between the two PDFs (an example shown in Fig. 6d).

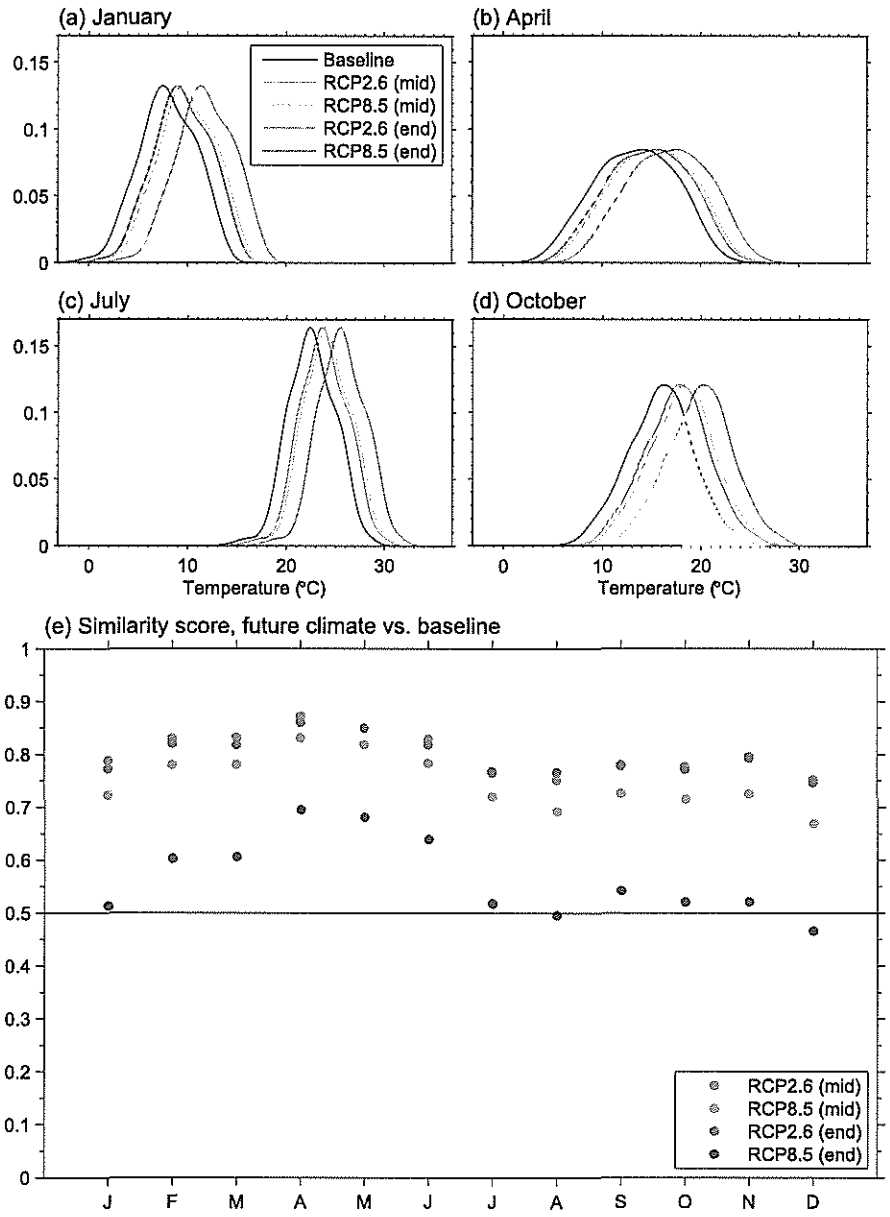

FIG. 6. PDFs of ensemble-mean, daily mean land-averaged surface air temperature (°C) during (a) January, (b) April, (c) July, and (d) October, representing each season in the baseline period (black) and at midcentury under RCP2.6 (green), midcentury under RCP8.5 (orange), end of century under RCP2.6 (magenta), and end of century under RCP8.5 (red). (e) Similarity score for each future scenario and time slice, defined as the percentage of area overlapping between future PDF and baseline PDF.

The interpretation of this similarity metric is the fraction of days in the future experiencing similar temperatures to the baseline period. The similarity metric is shown in Fig. 6e for each month and for both time slices and scenarios. In general, it is highest in the spring months and lowest in the late summer and early fall. This can be traced partly to the differences in variability between these two seasons noted above and also to the greater warming in late summer/early fall. Both of the time slices associated with the RCP2.6 emissions scenario give similarity scores of about 80%, indicating a pronounced but modest change in climate. The similarity scores for RCP8.5 midcentury are typically about 5% lower than those associated with the RCP2.6 cases. The RCP8.5 end-of-century case involves a dramatic reduction in the similarity scores, which hover around 45%–70%. Thus, under RCP8.5 only ½–⅔ of the end-of-century days will experience similar temperatures to

the baseline period. This is a strong indicator of a future climate state that is qualitatively different from the baseline.

b. Comparison of future and baseline percentiles

We also provide a complete mapping of the correspondences between baseline and future days. The percentile rank of each day in the baseline is paired with the percentile rank a day with the same temperature would have in a future period. Curves mapping these correspondences between percentiles of daily averaged temperature in the baseline (x axis) and future (y axis) for each time slice and scenario and for each calendar month are presented in Fig. 7. The corresponding percentiles in a future period to the baseline 50th percentile are shown at the intersections with the vertical lines. The $y = x$ gray lines show what the result would be if there were no changes in the distributions. For example, for July the 50th percentile in the baseline corresponds to the 7th percentile under RCP8.5 at end of century (intersection of red curve and vertical gray line). Therefore, 93% of future July days in this time slice and scenario will be warmer than the baseline median temperature. In the case of RCP2.6 at end of the century, 71% of future July days will be warmer than the baseline median temperature (intersection of magenta curve and vertical gray line), again indicating a noticeable but relatively smaller change in climate. Intersections of curves and horizontal lines show the corresponding baseline percentile to the 50th percentile temperature in a given future period under a certain scenario. For example, the 50th percentile for January under RCP8.5 at end of century corresponds to the 90th percentile in the baseline; while in the case of RCP2.6 at end of century the 50th percentile for January corresponds to the 66th percentile in the baseline. In general, the shape of each curve indicates the similarity of the future state to the baseline, with higher concavity corresponding to a more dramatic shift. The concavity is largest in RCP8.5 at end of century, with each percentile in the baseline typically corresponding to a future percentile that ranks tens of percentage points lower in the distribution. The concavity is least under RCP2.6, with RCP8.5 at midcentury being somewhat less similar to the baseline than the two RCP2.6 time slices.

c. Heat extremes

In this study, an extremely hot day is defined as one in which the daily maximum temperature (T_{max}) exceeds 35°C (95°F). See the appendix for how daily maximum surface air temperature is calculated in this case. Our dynamically downscaled simulation generates temperature snapshots every three hours, and we selected a 1600 local time (LT) snapshot because it is the closest to the time that the observed maximum temperature typically occurs. The model-calculated daily maximum temperatures from the baseline still validate well against a network of 21 weather stations (see the appendix). This gives us confidence that modeled extremely hot days correspond to actual hot days experienced throughout the region.

In the baseline period, most of the coastal and mountain areas have fewer than 10 extremely hot days per year (Fig. 8a). In contrast, inland regions such as the Mojave Desert, Coachella Valley, and Central Valley all contain areas exceeding 100 extremely hot days per year. While frequent extreme temperatures are mostly limited to inland regions, parts of the coastal zone have more than 60 extremely hot days per year. These regions are valleys that are somewhat removed from the moderating effects of the sea breeze, despite lying on the coastal side of the major mountain complexes. Strong gradients in the number of extremely hot days—such as those within the coastal zone—are an important reason to perform dynamical downscaling to such high resolution. With lower resolution, it could be difficult to distinguish important differences in extreme temperature behavior between these locations.

To quantify future extremely hot days, we started by examining the dynamically downscaled simulations. We found that the distributions of future daily maximum temperatures could be approximated almost perfectly by the baseline distribution shifted by the change in average temperature. (These results are not shown, but they are very similar to the daily mean results shown in Fig. 5.) Taking advantage of this finding, we created future distributions of daily maximum temperatures by shifting the baseline distributions by the temperature changes provided by the statistical model. These future distributions, generated based on the ensemble-mean warming, were used in the analysis that follows.

The number of extremely hot days increases most under the RCP8.5 scenario at end of century. With the exception of the highest elevations and a narrow swath very near the coast, where the increases are confined to a few days, land locations see 60–90 additional extremely hot days per year by the end of century (Fig. 8e). Thus, most land areas will effectively experience a new season of extreme heat. Downtown Los Angeles will see a rise from 6 to 54 extremely hot days, while at Riverside the number will roughly double, from 58 to 128 (Table 1). For midcentury under RCP8.5, and under RCP2.6 for both time slices, the spatial pattern is similar to RCP8.5 at end of century, but the increases are smaller. Most land areas see increases of roughly 20–40 additional extremely hot days per year. Downtown Los Angeles will experience a dozen or so more extremely hot days,

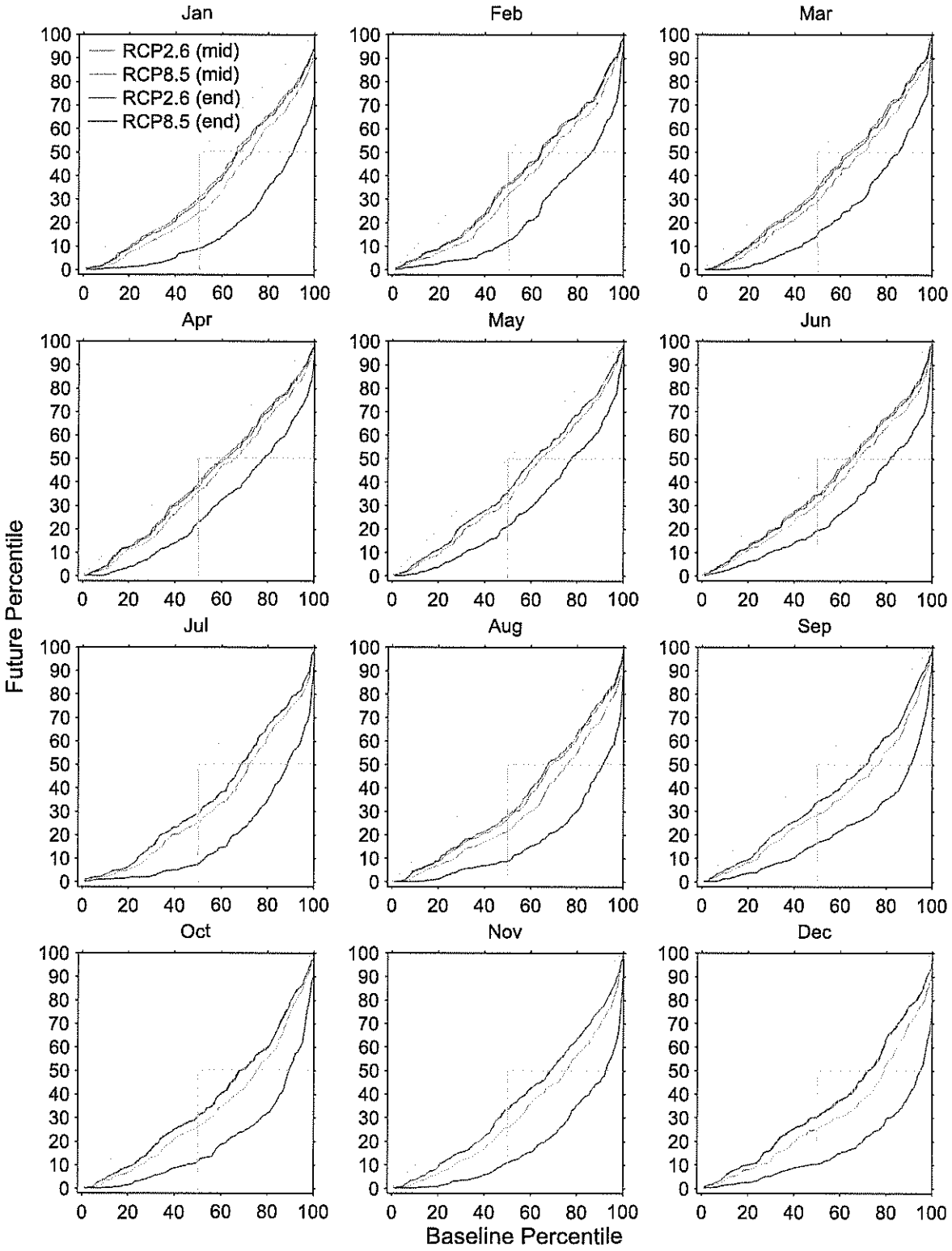

FIG. 7. Correspondence between percentiles of daily averaged temperature in the baseline (x axis) and future period (y axis) for each calendar month and for midcentury and end of century for RCP8.5 and RCP2.6 scenarios. The corresponding percentile in the future (baseline) to the baseline (future) 50th percentile is shown at the intersection with the vertical (horizontal) gray line.

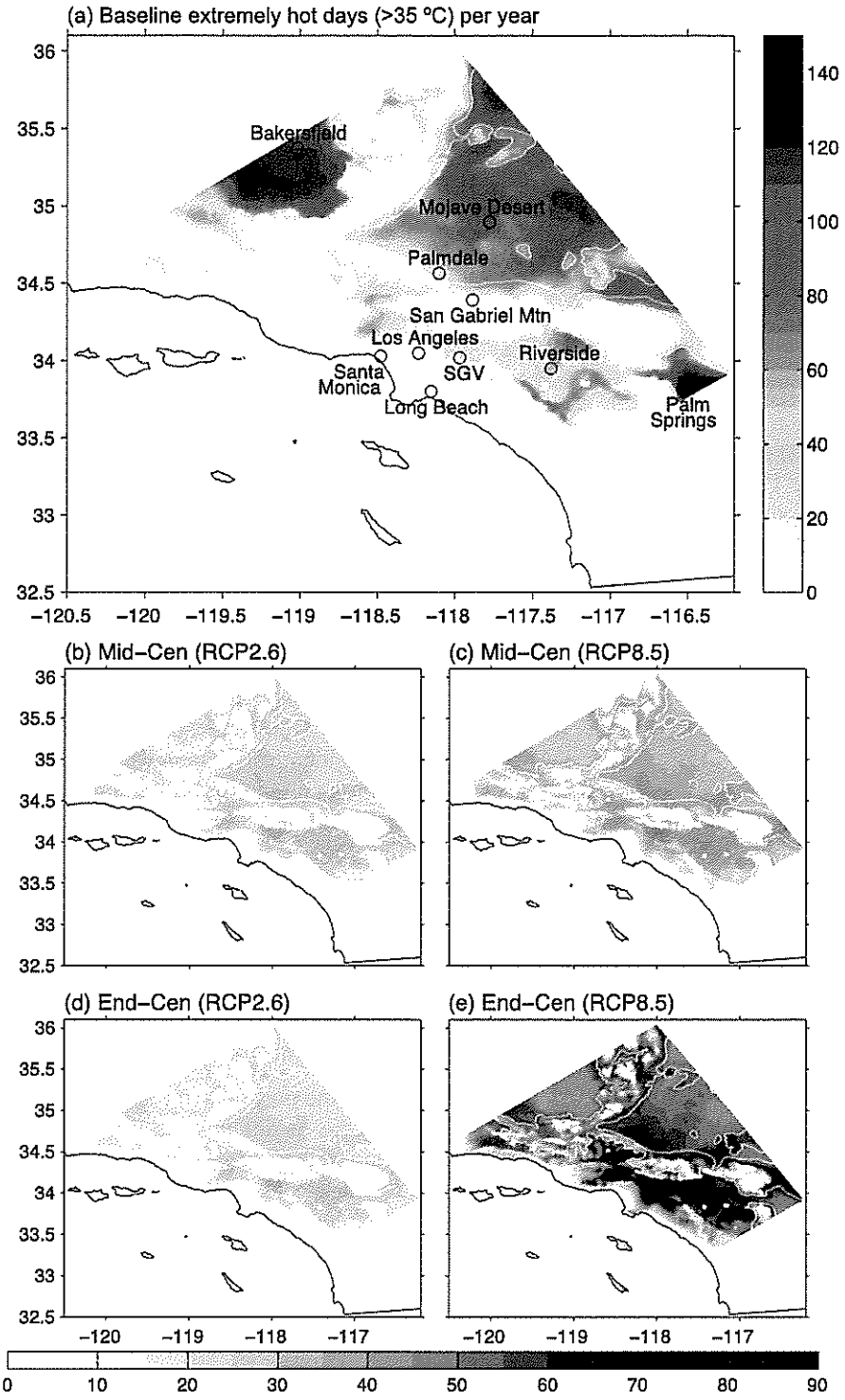

FIG. 8. (a) The number of extremely hot days per year ($T_{max} > 35°C$) for the baseline; and the change of number of extremely hot days per year for the (b) midcentury under RCP2.6, (c) midcentury under RCP8.5, (d) end of century under RCP2.6, and (e) end of century under RCP8.5. The 1000-m elevation contour is shown in white. SGV denotes the San Gabriel valley.

TABLE 1. Average number of extremely hot days (daily $T_{max} > 35°C$) per year for selected sites in the Los Angeles region. Results are shown for the baseline, midcentury, and end-of-century projections for both RCP8.5 and RCP2.6 emission scenarios.

	Baseline	RCP2.6 midcentury	RCP8.5 midcentury	RCP2.6 end of century	RCP8.5 end of century
Bakersfield	111	127	134	127	154
Long Beach	4	11	16	11	37
Los Angeles	6	16	22	15	54
Mojave Desert	90	110	120	109	141
Palm Springs	135	149	158	149	179
Palmdale	36	59	71	58	104
Riverside	58	86	98	86	128
San Gabriel valley	32	62	74	61	117
San Gabriel Mountain	0	0	1	0	8
Santa Monica	0	1	1	1	3

roughly a tripling, while Riverside will see approximately a 50% increase (Table 1). The highest elevations and locations very near the coast see almost no change in this quantity.

Although areas with more extremely hot days during the baseline period generally also see larger increases, the largest increase actually occurs in the San Gabriel valley, a part of the coastal zone. This phenomenon can be understood by examining the baseline and future distributions shown in Fig. 9. (Future distributions shown are for RCP8.5 at end of century.) At the San Gabriel valley location (Fig. 9a), where the largest increase in extremely hot days occurs (Fig. 8e), the peak in the baseline maximum temperature distribution occurs at about 32.5°C. Thus, a warming of 4°C pushes the peak of the distribution well past the 35°C threshold, resulting in nearly a quadrupling of the number of extremely hot days per year, from 32 in the baseline to 117 at the end of the century. In contrast, at a location in the Mojave Desert farther inland (Fig. 9c), the increase is smaller (from 90 to 141), even though the baseline number of extremely hot days is larger. Despite the fact that the warming is about 0.7°C (17%) larger here than in the coastal zone, the increase in extremely hot days is smaller because the baseline distribution is broader and its peak already lies above the 35°C threshold. In much cooler coastal locations closer to the ocean, such as Santa Monica (Fig. 9d), few baseline days are close to the threshold so that a warming of 4°C only results in an increase from 0 to 3 extremely hot days per year.

The generally greater warming in the interior could be a factor behind the larger increases in the numbers of extremely hot days in these locations. However, the results discussed above suggest that given an approximation of the overall warming in the region, the relationship between the baseline temperature distribution and the 35°C threshold may be more important in determining the increase in the number of extremely hot days at any particular location. A sensitivity test was performed to see if differences in warming throughout the domain were, in fact, important factors: The baseline distribution at each of our selected locations was shifted to reflect the same warming (Fig. 9, red dashed lines). In this case, we chose the warming that occurs at the coast. To assess the impact of spatial variations in the warming, the resulting number of future extremely hot days can be compared to the number that takes into account the local warming (Fig. 9, solid red lines). For the San Gabriel valley and Mojave Desert locations (Figs. 9a,c), the increase is nearly identical. A somewhat contrasting situation is seen in the San Gabriel Mountains (Fig. 9b), where a significant fraction (~50%) of the increase can be attributed to the enhanced warming occurring in the mountains. These findings suggest that even in this area of complex topography, there is only a modest benefit to dynamical downscaling in projecting future changes in extremely hot days. However, a credible downscaling approach is required to reproduce the baseline climate accurately.

d. Cold extremes

For the purposes of this study, we define an extremely cold day as one in which the daily minimum surface air temperature (T_{min}) drops below 0°C. This particular measure of cold extremes has significance to the hydrological cycle because surface air temperature relative to the freezing line is tightly linked to the partitioning between rain and snow during a precipitation event, the freezing and thawing of the snowpack, and frost formation. This measure of cold extremes also has ecological significance, since freezing temperatures can eliminate plant and animal pathogens (e.g., Chakraborty 2013; Raffa et al. 2013). Note that a blend of the surface skin temperature and 2-m temperature is used to calculate the surface air temperature (see the appendix).

In the baseline climate simulation, many parts of the region experience virtually no extremely cold days per year (Fig. 10a). However, extremely cold days occur frequently in the region's mountainous areas,

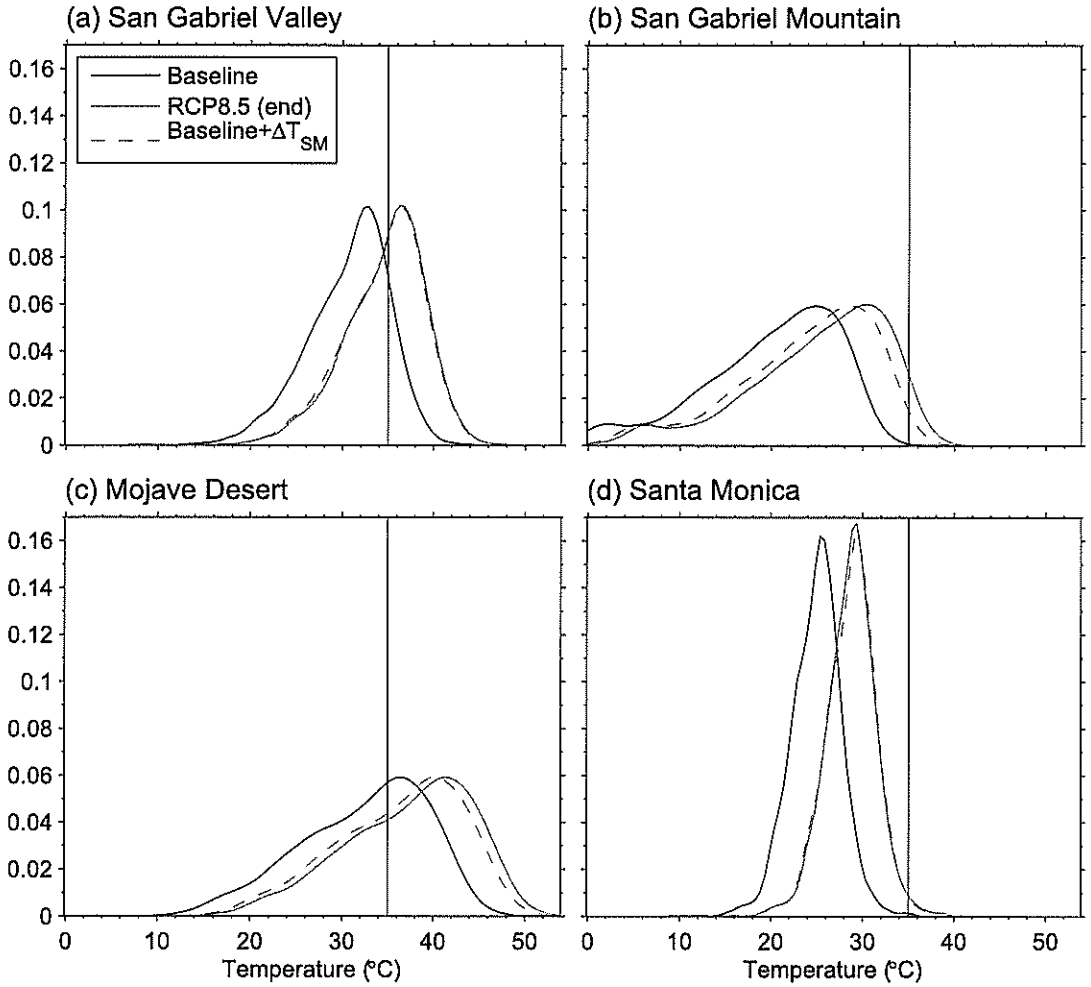

FIG. 9. PDFs of daily maximum temperature at selected sites during warm months (June–October) for baseline period (solid black), end of century under RCP8.5 (solid red), and baseline shifted by warming at Santa Monica location (dashed red). Vertical line indicates the 35°C threshold.

with some high-elevation locations experiencing as many as 200 days yr^{-1}. Here we focus on changes in the mountainous areas where freezing temperatures occur. Figures 10b–e show that in future time slices large reductions in cold days occur at high elevations. Under RCP8.5, end-of-century changes are especially dramatic, with some portions of the southern Sierra Nevada, San Gabriel Mountains, and San Bernardino Mountains seeing a decrease of roughly 50–90 days yr^{-1}. This represents nearly a full quarter of the year reduction in the number of days below freezing. In most cases, the reduction represents a majority of the baseline number. For example, at Big Bear Lake the number goes down from 142 to 55 days yr^{-1} and at Lake Arrowhead from 54 to 17 (Table 2). At Victorville and Palmdale, freezing temperatures practically disappear. The total area of the region experiencing at least 1 day per yr^{-1} with freezing temperatures decreases to less than half its value in the baseline. Under RCP2.6 for both time slices and under RCP8.5 midcentury, the reductions in the numbers of days per year are generally smaller, usually limited to 20–30 days (Fig. 10 and Table 2), and the total area of the region experiencing at least 1 day yr^{-1} with freezing temperatures decreases to roughly 80% of its value in the baseline.

Though both emissions scenarios and time slices show fewer extremely cold days overall, in none of these four future cases do extremely cold days disappear completely throughout the region. The future occurrence of weather events involving freezing temperatures in the greater Los Angeles region therefore cannot be interpreted as an absence of climate change.

4. Discussion and conclusions

Using a dynamical–statistical technique, we downscale temperature change relative to a baseline period (1981–2000) in the greater Los Angeles region for two

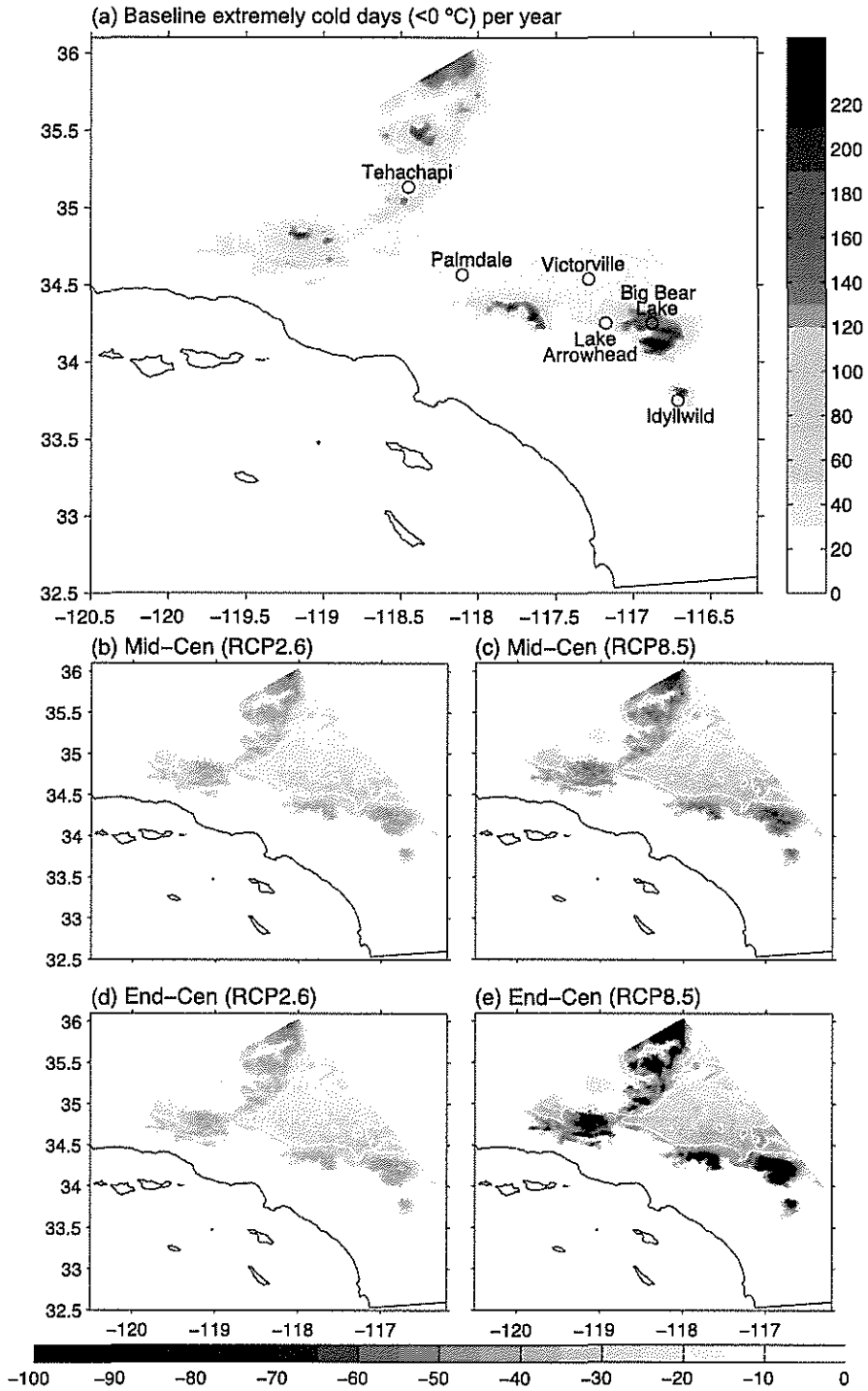

FIG. 10. (a) The number of extremely cold days per year ($T_{min} < 0°C$) for the baseline; and the change of number of extremely cold days per year for the (b) midcentury under RCP2.6, (c) midcentury under RCP8.5, (d) end of century under RCP2.6, and (e) end of century under RCP8.5. The 1000-m elevation contour is shown in white.

TABLE 2. Average number of extremely cold days (daily $T_{min} < 0°C$) per year for selected sites in the Los Angeles region. Results are shown for the baseline, midcentury, and end-of-century projections for both RCP8.5 and RCP2.6 emission scenarios.

	Baseline	RCP2.6 midcentury	RCP8.5 midcentury	RCP2.6 end of century	RCP8.5 end of century
Big Bear Lake	142	99	83	98	55
Idyllwild	77	47	38	46	21
Lake Arrowhead	54	34	28	33	17
Palmdale	26	8	4	7	1
Tehachapi	38	18	12	17	5
Victorville	44	15	9	15	2

future time slices: midcentury (2041–60) and end of century (2081–2100). We focus on two representative concentration pathways, corresponding to greenhouse gas emission reductions over coming decades (RCP2.6) and to continued twenty-first-century emission increases (RCP8.5). We downscale all available global climate models in the CMIP5 ensemble to provide likelihood and uncertainty estimates.

By the end of century under RCP8.5, a distinctly new regional climate state emerges against a background of considerable natural variability. This can be seen in more than one measure of change. First, average temperatures will almost certainly be outside the interannual variability range seen in the baseline. This statement is most applicable during the summer and fall, when the average future temperature in the model with the least warming is greater than even the very warmest year of the baseline. Second, the number of extremely hot days, defined as days when the daily maximum temperature exceeds 35°C, will increase significantly. Except for the highest elevations and a narrow swath very near the coast, land locations will likely see 60–90 additional extremely hot days per year, effectively adding an entirely new season of extreme heat. Third, days when minimum temperatures dip below freezing will decrease. In the baseline, there are typically dozens of days per year in mountainous areas when this occurs, but under RCP8.5 their number typically decreases by more than half. Finally, according to a similarity metric that quantifies the degree of correspondence between baseline and future distributions of daily temperature variability, the RCP8.5 end-of-century climate will most likely be only about 50% similar to the baseline.

Under RCP2.6 for midcentury and end-of-century time slices, these same measures indicate a climate shift that is less pronounced but still substantial. Future ensemble-mean average temperatures increase but lie just within the range of baseline interannual variability for all months except August. Therefore, future average monthly temperatures will likely be as warm as the hottest months in the baseline. Extremely hot days will occur more frequently, with roughly 20–40 additional extremely hot days per year over much of the land areas, though this is noticeably less than the 60–90 additional hot days experienced at the end of century under RCP8.5. Freezing days occur less frequently under RCP2.6 at midcentury and end of century, but again the reductions under RCP8.5 at end of century are twice as large. Similarity scores for the RCP2.6 scenario indicate that future daily temperatures will be roughly 80% similar to those experienced during the baseline period. Adaptation to this level of climate change should be easier, because future temperatures are mostly still within the envelope of variability to which human inhabitants and ecosystems are accustomed.

At midcentury, warming under RCP2.6 is nearly as large as that under RCP8.5, indicating that global emissions reductions would not prevent climate change in the region in the first half of the twenty-first century. At midcentury, warming under RCP2.6 is still 70% of the warming under RCP8.5. Similarity scores for the two cases are within roughly 5% of one another, and the changes in extremely hot and cold days are similar. Thus, some climatic changes would occur by midcentury regardless of choices regarding emission reductions. However, the impact of global emissions reductions becomes dramatic as the twenty-first century draws to a close. As we have detailed, they are necessary to prevent a dramatic shift in the regional climate state.

This downscaling approach used in this study allows us to quantify how the GCM climate change signals are expressed at the regional scale without the GCM future simulation being subject to the very large biases often found in the historical simulations of GCMs. A caveat of this work is that we only downscale the effects of a change in mean climate. In the dynamical downscaling experiments at the core of our methodology, we add the mean changes between future and baseline 20-yr climatologies for each calendar month to the baseline reanalysis boundary and initial conditions. Therefore, our simulations tell us how the baseline period would have been different if the monthly mean climatologies were altered to reflect the GCM climate change signals. This approach is independently developed and is similar to previously

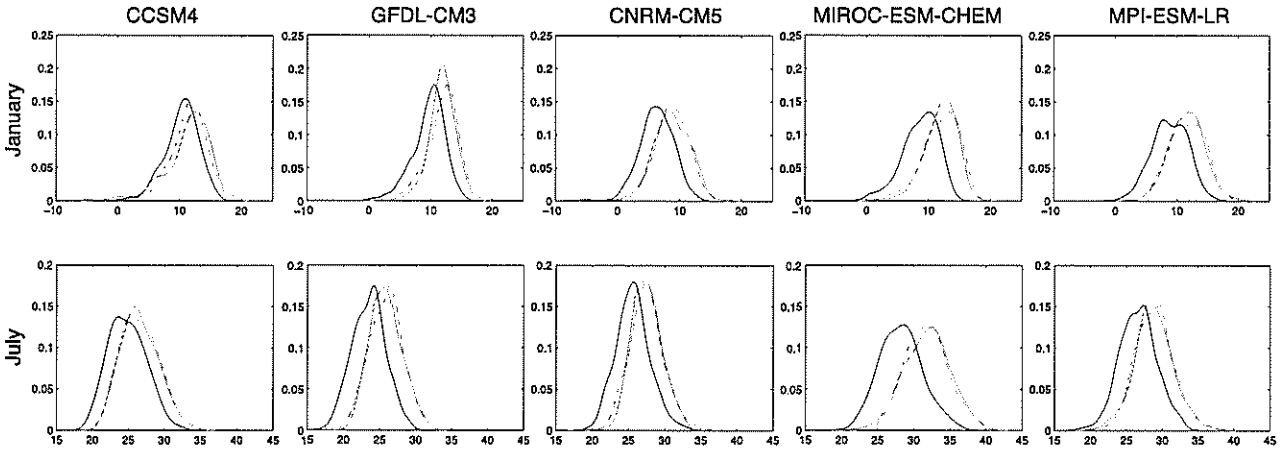

FIG. 11. PDFs of daily mean, area-mean (33°–36°N, 117°–120°W) surface air temperature in (top) January and (bottom) July during the baseline (black) and at midcentury under RCP8.5 emissions scenario (red) for five raw GCMs. The baseline distribution shifted by the mean temperature change (red dashed) for each GCM is shown for comparison.

developed procedures in recent regional climate downscaling studies (e.g., Schär et al. 1996; Hara et al. 2008; Knutson et al. 2008; Kawase et al. 2009; Lauer et al. 2010; Rasmussen et al. 2011; Seo and Xie 2011; Gutmann et al. 2012). It assumes that the weather and transient signals (e.g., frequency and intensity) applied on the model domain's boundaries remain structurally the same in the future simulation as in the baseline. Accordingly, we do not incorporate the changes in variability from daily to interannual scales in the boundary forcing (e.g., Knutson et al. 2008; Rasmussen et al. 2011). Therefore, the potential changes in GCM variability are not downscaled. This could be a limitation of our downscaling technique, especially when it comes to projecting changes in extremes.

One way to shed light on this issue is to investigate variability changes in the raw GCM output. We examine the daily PDF distributions within each calendar month for the five dynamically downscaled GCM projections for the baseline period and the midcentury period under RCP8.5 emissions scenario. Figure 11 compares the distribution of daily area-mean (33°–36°N, 117°–120°W) surface air temperature in January and July in the two periods. The solid lines show the distribution of baseline (black) and midcentury (red) separately. While the shapes of the distributions are not identical between baseline and midcentury for each GCM, they are very similar for both months. Therefore, the midcentury distribution for each month can be approximated by shifting the baseline distribution by the mean temperature change (red dashed lines). Examination of PDFs for the other calendar months reveals that this approximation still holds well (not shown). These results suggest that in the domain of interest (i.e., the Los Angeles region) the GCM-derived changes in daily temperature variability are rather small and secondary to the shift of the mean. It seems unlikely the weather activities would substantially change in GCMs from the baseline to future in the domain of interest. If these changes in GCM temperature variability were downscaled, it is likely that they would be equally subtle in the downscaled data. Therefore, we conclude the local changes in extremely hot and cold days projected in this study are reasonably accurate and are not subject to the limitation of the methodology.

Acknowledgments. Support for this work was provided by the City of Los Angeles and the U.S. Department of Energy as part of the American Recovery and Reinvestment Act of 2009. Additional funding was provided by the National Science Foundation (Grant EF-1065863, "Collaborative Research: Do Microenvironments Govern Macroecology?") and the Southwest Climate Science Center. The authors thank Dr. Dan Cayan for reviewing an early draft of this work and the two anonymous reviewers for their valuable comments.

APPENDIX

Improving Model Estimates of Extremes

When we used the dynamically downscaled 2-m air temperature output from the Weather Research and Forecasting Model, a regional model, the number of simulated extremely hot days ($T_{max} > 35$°C) during the baseline period was too low in comparison with observational point measurements (Table A1). Here we explain the potential causes of the underestimation and then come up with a new formula that better quantifies

TABLE A1. Average number of extremely hot days per year for 21 sites in the greater Los Angeles area. An extremely hot day is defined as a day in which the daily maximum surface air temperature is greater than 35°C (95°F). Results are shown for station observations, T_{2m}, and weighted average of modeled T_{2m} and TSK.

Station name	Observed	T_{2m}	$\frac{1}{3}T_{2m} + \frac{2}{3}$TSK
Palmdale	75 ± 8	10	47
Lancaster	56 ± 8	14	53
Palm Springs	148 ± 7	96	144
Van Nuys	35 ± 4	8	49
Downtown Los Angeles	10 ± 3	1	6
Bakersfield	69 ± 8	50	103
Long Beach	7 ± 2	1	6
Los Angeles International Airport (LAX)	2 ± 0.4	0	0
Big Bear Lake	0.1 ± 0.03	0	0.2
Riverside	60 ± 8	10	59
Burbank	27 ± 5	4	31
Pasadena	31 ± 6	3	29
Pomona	20 ± 5	4	30
Santa Barbara	1 ± 0.3	1	5
Oxnard	0.7 ± 0.2	0.2	0.1
Santa Ana	7 ± 2	1	5
Santa Monica pier	0.2 ± 0.03	0	0
Dry Canyon Reservoir	66 ± 7	8	37
San Bernardino	59 ± 8	22	83
Torrance	2 ± 0.8	0.2	1
Redlands	61 ± 8	19	68

number of the extremely hot days. This new formula also improves estimates for extremely cold days.

The observational dataset used is a set of quality-controlled, daily maximum near-surface temperature observations taken during the baseline period (1981–2000) from 21 weather stations. These data were obtained from the National Climatic Data Center (NCDC; http://www.ncdc.noaa.gov/oa/ncdc/html). Unlike this observational dataset, where the temperatures were recorded every 10 min, in our simulations, we only saved a snapshot of the air temperature output every 3 h (at 1000, 1300, 1600, 1900 LT, etc.) Since the temperature is not recorded at the exact time the true daily maximum (minimum) is achieved, our modeled maximum (minimum) temperatures will be an underestimation (overestimation) of what WRF actually produced. This leads to an underestimation (overestimation) of the number of extremely hot (cold) days.

Another source of discrepancy may come from the height at which the temperature measurements are taken. To measure surface air temperature in WRF, we use the air temperature at a reference height of 2 m. While WRF interpolates the temperature to two meters height from the temperature of its atmospheric layer closest to the surface, the thermometer at the weather stations is set between 1 and 2 m above the ground. Because the ground is the source of heat during the day, the closer the thermometer is to the ground, the warmer the observed temperature. Therefore, the mismatch between the modeled reference height and true observed height may partially account for the model's bias of the observed surface air temperature. The particular technique used by WRF to interpolate 2-m temperatures from the temperature of the surface layer may also lead to a bias, compared with the observed surface air temperature.

To better diagnose the simulated extremes in the baseline simulation and the future changes, we developed a formula to describe the daily maximum surface air temperature more realistically. We tested a series of different combinations of model-simulated surface skin temperature (TSK) and 2-m air temperature (T_{2m}) and found that a combination of two-thirds TSK and one-third T_{2m} gives the most realistic estimation (smallest root-mean-square error) of the observed extremes (Fig. A1). The daily maximum surface air temperature is taken to be this blend of surface and surface air temperatures, taken at 1600 LT. This new method validates well against the point measurements in the observational network and provides a significant improvement over using T_{2m} alone (Table A1). For example, for the city of Lancaster, the new method produces 53 extremely hot days per year, while the observed number of extremely hot days is 56 ± 8 days yr^{-1}, a significant improvement over the 14 days yr^{-1} predicted by T_{2m} alone. Because of these improvements, this method is used for the calculations of extremely hot days.

The particular blend of two-thirds surface skin temperature plus one-third 2-m temperature was also found to produce the best results for modeling daily minimum

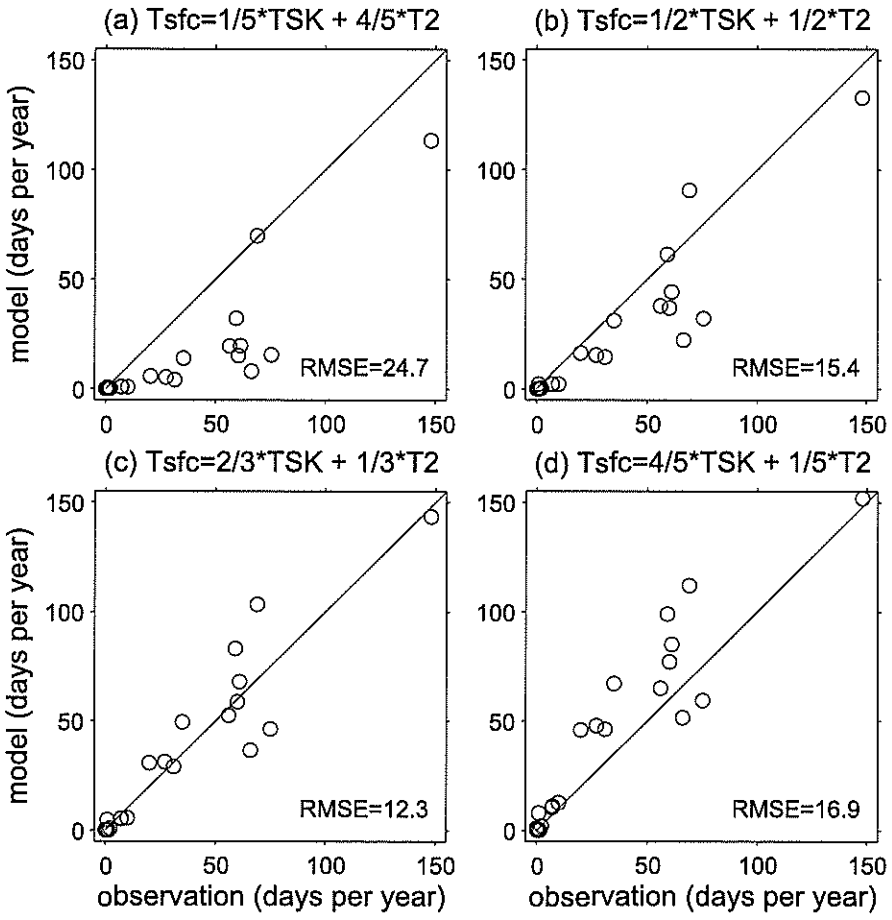

FIG. A1. Scatterplots of the numbers of extremely hot days from the observations and the dynamically downscaled simulations. Each panel presents the results based on a matrix blending TSK and T_{2m} with different weighting. The root-mean-square error (RMSE) for each matrix is denoted.

surface air temperatures (not shown). As with the maximum temperature, the minimum temperature can occur at any time. The closest time to the average observed minimum when a WRF snapshot is taken is 0400 LT. Thus, daily minimum temperatures are calculated as a weighted average of 2-m and surface skin temperatures at 0400 LT.

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Trees & Climate Change

With a dry winter forecast, city wells at historically low levels, and water rates poised to rise again, South Pasadena needs to develop an action plan for maintaining and replanting its tree canopy that takes into account the growing impacts of climate change. Days when temperatures rise above 95 degrees are expected to more than double in the San Gabriel Valley, from 32 to 74 over the next 20 years. This will make it more difficult to maintain adequate soil moisture for new trees planted to replace dying trees. It will require more watering than in the past to maintain the health of existing trees.

At the same time, without efforts to convert dark roofs, street pavement, and other hard surfaces to whiter materials that increase reflectivity, or albedo, the urban heat island effect will compound future temperature increases. Converting landscape to drought tolerant varieties that require less water also can reduce soil moisture and evaporative cooling, which compounds loss of soil moisture. Landscapes featuring cactus and stone, not only do this, but also act as heat sinks, similar to asphalt.

Meanwhile, pests and diseases have become endemic in the area and are killing many species of mature trees at an increasing rate, particularly Western Sycamores, Liquid Ambers, Crepe Myrtles, and Olives, according to plant pathologist Jerry Turney with the Los Angeles County, who recently spoke in South Pasadena a South Pasadena Beautiful event. Trees that are not sufficiently watered and subjected to high temperatures attract pests, such as the shot hole borer (http://ucanr.edu/sites/pshb/overview/Hosts/), because they produce more carbohydrates. They also lose the ability to repel boring pests when they dry out. At the same time, a warming climate increases the period during which pests are active, allowing them to prey upon more trees compared to when temperatures were cooler.

The impact of these climate change-related challenges to trees in South Pasadena is heightened by the growing age of the canopy. In essence, aging, coupled with the closely interrelated challenges of climate change, pests, and water constraints (both in terms of cost and quantity) have created a perfect storm for the city's canopy, as well as the region's. In response, scientists are rethinking how to preserve the canopy in both wild lands and urban settings and are beginning to come up with information suggesting that some of trees that have thrived in the past may not be able to thrive in the future. Indeed, one groundbreaking study aimed at developing a list of climate ready trees for replacing dying trees involves many trees that are not on South Pasadena's list of native & drought tolerant trees. Researchers in the study have included only two trees on the city's list in naming what they believe are twelve climate ready trees for the future in inland portions of Southern California, such as South Pasadena.

South Pasadena's Changing Climate

The Mediterranean climate that's dominated South Pasadena has become warmer over the last 100 years and can be expected to become even warmer in the coming century irrespective of efforts to cut greenhouse gas emissions. In essence, in the constant tug-of-war between marine and desert influence, desert air is winning as time goes by. According to Jet Propulsion Laboratory climatologist Bill Patzert, the average temperature in Los Angeles today is 6 degrees

Fahrenheit higher than 100 years ago. It's expected to get even hotter by mid-century. In fact, a UCLA Institute of the Environment projection (http://newsroom.ucla.edu/releases/climate-change-in-la-235493) shows that the average temperature will rise another 4 degrees in the San Gabriel Valley by mid-century. The projection also shows a consistent increase in the number of days over 95 degrees between valley areas of Los Angeles County and the Mojave Desert over the mountains to the north (https://www.ioes.ucla.edu/publication/a-hybrid-dynamical-statistical-downscaling-technique-part-ii-end-of-century-warming-projections-predict-a-new-climate-state-in-the-los-angeles-region/). The desert influence was particularly notable this summer with almost continual monsoon flow across the metropolitan region, a phenomenon seen on occasion here, but normally in summer mostly on the inland side of the mountains that ring greater Los Angeles. That is why some tree scientists are studying whether desert tree species may be the best choice for renewing the canopy in Southern California.

Desert Trees

Climate Ready Trees for California Communities, a 20-year study being run by the U.S. Forest Service and University of California at Davis, marks a groundbreaking effort to identify the trees mostly likely to thrive in urban settings in Southern California. To frame the study, a panel of experts assembled by researchers evaluated 50 species and recommended 12 species for inland California areas (see attachment A). Two of the trees, the Desert Willow and the Desert Museum Palo Verde, are on South Pasadena's list of suggested trees. The other ten are not on the list. They are the Mulga, Ghost Gum, Palo Blanco, Tecate Cypress, Island Oak, Netleaf Hackberry, Maverick Mesquite, Escarpment Oak, Rosewood, and Red Push Pistache. In the project, researchers have planted these trees at locations in Southern California and are monitoring how they establish themselves and fare in today's warmer climate. Results that are expected to lead to tree planting policy recommendations are expected to emerge in a couple years.

A City Conundrum

The challenges climate change presents to the city's canopy are now widely evident. And while the best policy responses have not yet fully crystallized, it's safe to say that maintaining adequate soil moisture to sustain existing trees and insuring that newly planted trees thrive is the lowest common denominator. However, achieving this is likely to be difficult among in the face of contradictory policies, namely:

- Consistent with state direction, the city has directed, until recently, residents and businesses to conserve water at a time when trees have needed more water. Many of the conservation measures have effectively become permanent, particularly landscape changes.
- Now that conservation requirements have been eased, the city is preparing to increase water rates by some 50 percent after an increase over the last decade of 100 percent. This is likely to trigger further curtailment of landscape irrigation by residents on fixed incomes and budget conscious residents, landlords, and businesses.
- More parkways trees will have to be planted to maintain the canopy as die-off has accelerated with the drought and spread of pests and disease. These trees will require

regular watering until they are established, perhaps even more water than well-established drought-tolerant trees.

- More households are converting their landscape to drought tolerant landscaping, a policy recommended by water agencies, which have offered monetary incentives for replanting yards. This results in less application of water.
- The city's recommended tree list includes species being decimated by pests, now endemic, and lacks many trees that experts believe may be the most durable in the climate that's forecast for the area.
- The city lacks the resources and needed incentives to effectively engage the residents to value and properly care for the tree canopy amid rapidly changing circumstances.

Toward Preserving the Canopy

While uncertainty remains about the exact impact of climate change on trees in Southern California, the city should pursue a variety of no regrets measures until scientists can provide more definitive policy prescriptions.

The first step should be for the city to adopt a resolution declaring its recognition that climate change and the urban heat island effect are threats to the canopy, which require proactive steps. This resolution should also declare that maintaining and replenishing the canopy is a key strategy for sequestering carbon emitted to the atmosphere, for instance from energy used to pump well-water. It should cite numerous state laws, regulations, policies, and goals that require and encourage carbon emissions reductions and carbon sequestration through improved conservation, forestry, and land management practices. It should go on to note that the city is committed to developing the needed capacity to maintain and replenish its canopy.

Another important step should be for the city to update its list of native and drought tolerant trees to remove those that are now prone to pests and to add additional species, including desert species being studied as climate ready trees. While it would be premature to begin planting desert trees on a wholesale basis, the city should begin planting some and encouraging residents to consider planting them as they are seen as likely to thrive in the coming decades.

Finally, the city should hold a summit meeting with residents, experts, and city commissioners, staff, and council members in the coming months with the goal of engaging residents regarding the importance of the tree canopy and how to maintain it. A key focus of the meeting should be on how to develop the capacity and innovations needed to deal with the challenges, including, but not limited to:

- Educating the public about the current challenges to the canopy;
- Increasing citizen engagement in valuing and caring for trees;
- Fostering volunteer efforts to plant and care for new parkway trees; and
- Developing sources of needed funding, including grants and fees.

Resources:

http://www.streettreeseminar.com/pdf/2016/ClimateReadyTreesforCACommunites-Downer.pdf

http://ecoadapt.org/data/documents/EcoAdapt_SoCalVASynthesis_OakWoodlands_FINAL2017.pdf

http://ecoadapt.org/

https://www.fs.usda.gov/ccrc/topics/urban-forests-and-climate-change

https://www.fs.fed.us/psw/publications/mcpherson/psw_2013_mcpherson002.pdf

http://selectree.calpoly.edu/

http://ucanr.edu/sites/pshb/

http://ucanr.edu/sites/WUCOLS/

Attachment A (page down to view):

Climate-Ready Trees for Southern California Inland Empire Communities – A 20-Year Evaluation

Urban forests provide many societal and ecological benefits to cities and their inhabitants such as carbon storage, reduced heat islands and energy use, improved air quality and human health, and water quality protection. Although there are an estimated 9.1 million street trees in California (about one for every four residents) street tree density has declined by 30% since 1988 because cities added more streets than trees. Los Angeles lost 667 acres of tree canopy each year from 2005 to 2009. Sadly, California cities have the lowest tree canopy per capita (108 yd^2 per capita) in the U.S.

Although street tree species composition is diverse at the state level, overreliance on certain species and genera at the city level poses a threat of catastrophic loss from pests, drought, storms and other stressors. The health and longevity of urban forests in California cities are at risk. Abiotic disorders such as drought, heat stress due to climate change, and root damage resulting from soil compaction can lead to stressed trees predisposed to disease and insect damage. The increased use of saline recycled water adversely impacts the health of sensitive trees. There is an increased probability of extreme weather events that could increase the number of tree failures as well. The tolerance of urban trees to these stressors varies considerably among species and the perpetuation of our urban forests depends on their resilience to climate induced stress.

The goal of this study is to evaluate the survival and growth of seldom used but promising trees in the Southern California Inland Empire. Trees have been selected for testing because of their apparent resilience to stressors such as heat, drought, high winds, salinity and pests. Also, they are attractive, require minimum maintenance and will pose little hazard to people or infrastructure. Long-term field testing (20 years) at a University of California Experiment Station plot in Riverside, and in 4 parks in the Los Angeles area will allow for direct comparisons of growth and longevity under a range of site conditions. Results will help urban foresters, landscape architects, planners and local tree planters select trees for planting that can improve the stability and long term success of future urban forests.

Twelve types of trees have been selected for testing, with 144 trees planted. Four individuals of each type (48 trees), were planted in the UC Experiment Station reference plot, where trees have similar soil, irrigation, and maintenance. Two individuals of each type were planted in each of 4 parks, where their performance will be observed under a variety of growing conditions. (Please see the attached map for site locations). Each tree will be measured and photographed annually for the first five years, and biannually thereafter. Soil samples have been collected and analyzed from each park and the reference plots. A web site for the project contains regular updates on tree growth and performance. By shifting the palette of planted trees to those proven to perform best when exposed to climate stressors, this study is helping create urban forests that are more resilient. Healthier and more extensive urban forests will benefit our children and our children's children. For more information visit:
http://climatereadytrees.ucdavis.edu/

Park tree plantings are conducted with staff from the Los Angeles Beautification Team, City Plants, Los Angeles Recreation and Parks Department and local volunteers.

This study is possible because of support provided by a host of partners including:

LOS ANGELES CENTER FOR URBAN NATURAL RESOURCES SUSTAINABILITY
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San Marcos Growers
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Mulga (*Acacia aneura*)

Mulga is native to arid Western Australia and tolerates hot and dry conditions. It can grow in sandy, loam, or clay soil types. This versatile and hardy tree produces ascending thornless branches and grows 15 to 20 feet in height. The leaves are evergreen and the tree has yellow, showy flowers in the spring.

Netleaf Hackberry (*Celtis reticulata*)

The netleaf hackberry is native to riparian areas in the Southwest. A deciduous tree, it reaches heights of 25 to 35 feet with a spreading or weeping canopy. The ovate leaves are medium green and turn yellow in the fall. The flowers mature into red drupes that attract birds. The netleaf hackberry is drought tolerant and able to thrive in a variety of soil types.

Desert Willow (*Chilopsis linearis* 'Bubba')

The desert willow is native to California and the Southwest. It is a small flowering desert tree that can reach a height of 15 feet. The cultivar Bubba is upright in form and has profuse, long-lasting blooms. Leaves are linear blue green and turn golden in the fall. The showy flowers are pink and white. The desert willow is very drought and heat tolerant.

Ghost Gum (*Corymbia papuana*)

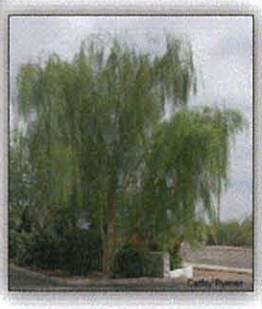
The ghost gum is native to Australia and is a smaller eucalyptus, reaching 66 feet. The trunk is smooth and snow white. It has gray green evergreen leaves that are tinged purple by frost. White flowers bloom in the summer. It tolerates drought but can be used in well-irrigated landscapes.

Rosewood (*Dalbergia sissoo*)

The Rosewood is native to Northern India and has evergreen foliage that can be damaged by frost, but tends to recover quickly in the spring. It reaches heights of 30 to 50 feet with a 40 foot canopy spread. Rosewood tolerates periods of drought and can grow in sandy, clay, and loam soil types. Its roots host nitrogen-fixing bacteria. The flowers are inconspicuous.

Palo Blanco (*Mariosousa willardiana*)

Native to Sonora Mexico, Palo Blanco thrives in full sun and tolerates great heat. It prefers good drainage and can tolerate thin rocky soil. This tree has a weeping branching habit and grows 10 to 20 feet high, spreading 5 to 10 feet. Palo Blanco is a moderate grower that has thornless branches, peeling silvery white bark, and creamy white flower catkins that are present in spring.



Tecate Cypress (*Hesperocyparis forbesii*)

Native to the coastal mountains of Southern California the tecate cypress is a fast growing, low branching evergreen tree that grows 10 to 25 feet tall and 20 feet wide. Growth rate slows after it reaches 15 feet. The bark of this tree is cherry red when young and dark brown when older.

Desert Museum Palo Verde (*Parkinsonia* x 'Desert Museum`)

Desert museum palo verde is a three way cross between *Parkinsonia microphylla*, *P. florida*, and *P. aculeate*. This tree is thornless, fast-growing to about 30 feet high and wide, and upright. Plant in full sun and well-drained soil, it will produce masses of yellow flowers from March through May. Saplings can be frost sensitive.

Red Push Pistache (*Pistacia* 'Red Push`)

The 'Red Push` is a hybrid between *P. atlantica* and *P. integerrima*. This long-lived deciduous tree has a moderate growth rate, and will reach 25 to 40 feet tall and develop a broad spreading form, 20 to 40 feet wide. The pinnately compound leaves first emerge with a red tint, mature to a medium green color, and then provide another color display in the fall. 'Red Push` is cold and drought tolerant, requires full sun, and can adapt to a variety of soils.

Maverick Mesquite (*Prosopis glandulosa* 'Maverick`)

Maverick is an upright-growing, thornless cultivar of the honey mesquite tree, which is native to the southwestern United States. This deciduous tree can quickly reach a height of 30 feet tall and 30 to 35 feet wide. The tree is cold hardy, drought tolerant, and adaptable to a range of soil types. The smooth gray bark provides contrast to the bright green foliage.

Escarpment Live Oak (*Quercus fusiformis*)

The escarpment live oak is native to west Texas, is cold hardy, drought tolerant, and requires full sun. Typically evergreen, it can be deciduous in colder climates. This live oak is a slow grower that can reach 50 feet in height and width. The escarpment live oak can tolerate a wide range of soils but prefers good drainage.

Island Oak (*Quercus tomentella*)

The island oak is native to five of the California Channel Islands and Guadalupe Island off of Baja California. It is evergreen and fast growing to a height of 20 to 50 feet and width of 25 to 40 feet, growth rate can be up to 24 inches per season. This oak refers deep, moist soils but can tolerate a wide range of soil conditions and soil types including clay, loam, and sand. This tree is considered drought tolerant and cold hardy.


Southern California Inland Empire Sites for the Climate-Ready Trees Study
Holleigh Bernson Park
Hansen Dam Recreation Area
Valley Plaza Park
Woodley Park
UC Riverside Research Center
Reference Site
Park Site
N
Val Verde
Acton
Forest
Hesperia
Mariana Ranchos
Paradise Springs
Big Pines
Wrightwood
Hidden Springs
Angeles National Forest San Gabriel Mountains
Falling Springs
Mt San Antonio
Alray
Cajon Junction
San Fernando
Mt Baldy
Scotland
Crestline
CANOGA PARK
La Cañada Flintridge
Burbank
Calabasas
Glendale
Pasadena
Azusa
Topanga State Park
HOLLYWOOD
Beverly Hills
Covina
West Covina
Los Angeles
Pomona
Ontario
Fontana
San Bernardino
Bloomington
Redland
Santa Monica
City of Industry
Chino
SOUTH LOS ANGELES
Inglewood
Downey
Chino Hills State Park
Riverside
Moreno Valley
El Segundo
Brea
Manhattan Beach
Yorba Linda
Corona
Woodcrest
March Air Reserve Base
Lakewood
Fullerton
Torrance
Anaheim
El Cerrito
Lake Mathews Estelle Mountain Reserve
Mead Valley
Perris
Long Beach
North Tustin
Rancho Palos Verdes
SAN PEDRO
Santa Ana
Silverado

DEFAULT ENERGY MIX FOR CLEAN POWER ALLIANCE

FEBRUARY 21, 2018

City of South Pasadena

Background

- On July 19, 2017 the City adopted Ordinance No. 2316 approving the Joint Powers Agreement for LACCE and authorizing implementation of a Community Choice Aggregation Program
- LACCE = Los Angeles Community Choice Energy
- LACCE is now known as Clean Power Alliance (CPA)
- One of the CPA program objectives is to provide options for a higher level of renewable energy content low rates

2/21/18

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CPA Default Energy Options

1) 36% Renewable Energy and 50% GHG Free: Cost estimate is 4% less than SCE Rates

2) 50% Renewable Energy and 50% GHG Free: Cost estimate is 3% less than SCE Rates

3) 100% Renewable Energy and 100% GHG Free: Cost estimate is 7% more than SCE Rates

GHG = Greenhouse Gas

Southern California Edison (SCE) plans to increase renewable energy to 34% of its energy portfolio in 2018

Recommended Default Energy Option for the City of South Pasadena

1) 36% Renewable Energy and 50% GHG Free: Cost estimate is 4% less than SCE Rates

2) **50% Renewable Energy and 50% GHG Free: Cost estimate is 3% less than SCE Rates**

3) 100% Renewable Energy and 100% GHG Free: Cost estimate is 7% more than SCE Rates

Note: The City is selecting a default option. Residents and business owners will be able to opt in at their preferred energy mix options offered by the CPA.