



STATE R&D PROFILE

California



Federal R&D to California by Agency and Performer, Fiscal Year 2000

(obligations in millions of dollars)

Performers	Agencies							TOTAL
	DOD	NASA	HHS	DOE	NSF	USDA	other	
Federal Labs	1,262	213	7	9	0	80	97	1,669
Industry	5,984	735	111	64	16	0	76	6,986
Univs. / Colleges	268	165	1,349	119	420	28	32	2,381
FFRDCs *	172	1,218	58	1,432	1	0	0	2,883
Nonprofits	30	87	500	20	19	1	3	661
State / Local Govts.	0	1	2	0	0	0	3	7
Total California	7,717	2,421	2,027	1,645	456	109	211	14,586
U.S. Total	33,010	9,714	18,577	6,872	2,930	1,830	2,818	75,751
CA % of U.S.	23.4%	24.9%	10.9%	23.9%	15.6%	6.0%	7.5%	19.3%

Source: National Science Foundation, *Federal Funds for Research and Development Fiscal Years 2000, 2001, and 2002*, 2002.

R&D data are for the 10 largest R&D supporting agencies only.

* Federally Funded Research and Development Centers. Government-owned, contractor-operated laboratories.

R&D = conduct of R&D and R&D plant (facilities and capital equipment).

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This AAAS State R&D Profile is one of a series of reports on the state and regional impacts of federal R&D, produced in cooperation with the AAAS Center for Science, Technology, and Congress from data provided by the National Science Foundation Division of Science Resources Statistics. More information on these reports, summary tables on R&D in the states, current profiles of the other states, and full-color, full-size versions of these charts are all available in the "State and Regional Reports" section of the AAAS R&D Web site (<http://www.aaas.org/spp/rd>). These profiles will be updated annually as new data become available.

AAAS State R&D Profiles - California

- California is an R&D powerhouse that performs nearly one-fifth of all federally funded R&D. California received \$14.6 billion in federal R&D in FY 2000, 19.3 percent of the national total, which gives it a ranking of first place among the 50 states and the District of Columbia far ahead of second-place Maryland. The state is home to 34 million people (also first in rank). Its gross state product in 2000 was \$1.3 trillion (13.5 percent of the national gross domestic product and again first among the 50 states and DC; see Facts and Rankings).

- California ranks 6th in federal R&D per capita and receives \$429 per person in federal R&D, nearly double the national average of \$269. R&D accounted for 8 percent of all the federal dollars that flowed to the state in Medicare, Social Security payments, and other federal programs. If California were a separate nation, it would be the fourth-largest R&D performer in the world after adding in private sources of R&D funds, behind only the U.S., Japan, and Germany.

- DOD is by far the largest federal supporter of R&D in California, sending \$7.7 billion to the state in FY 2000. This represents 53 percent of all federal R&D funds to the state, and also represents 23 percent of DOD's total R&D portfolio. NASA comes in second at \$2.4 billion, which represents 25 percent of the agency's total portfolio; HHS and DOE come in third and fourth at \$2.0 billion and \$1.6 billion, respectively (see Table 1 and Chart 1).

- Industry is the leading performer of federal R&D in California, receiving nearly a majority of federal funds with \$7.0 billion in FY 2000 (see Table 1 and Chart 2). DOD and NASA are the leading supporters of industrial R&D, mostly support to aerospace firms and defense contractors.

- FFRDCs are the second-largest performer of federal R&D, receiving \$2.9 billion or 20 percent of all federal R&D funds to California. DOE and NASA are the leading supporters of FFRDCs with \$1.4 billion and \$1.2 billion, respectively, in FY 2000, with small amounts from DOD and HHS also. There are eight FFRDCs in California. The largest is the Jet Propulsion Laboratory (JPL) in Pasadena, operated by the California Institute of Technology. JPL conducts R&D on solar system exploration, including work in the fields of astrophysics and earth sciences. In FY 2000, JPL received \$1.2 billion for R&D, mainly from NASA.

- Close behind JPL in size is the Lawrence Livermore National Laboratory in Livermore, operated by the University of California. Livermore conducts R&D primarily for DOE on physics, nuclear weapons systems, and the life and environmental sciences. Livermore is also the future home of the National Ignition Facility, a multi-laser multi-billion dollar research facility currently under construction and receiving \$200 million to \$300 million in R&D construction funds a year. In FY 2000, Livermore received \$988 million for R&D, a quarter of which was for facilities construction. Livermore's sister lab, the Ernest Orlando Lawrence Berkeley National Laboratory, also operated by the University of California, conducts mostly energy sciences research for DOE and received \$343 million for R&D in FY 2000. The Stanford Linear Accelerator Center (SLAC) at Stanford University is another DOE-funded FFRDC, receiving \$181 million in FY 2000 to perform high-energy physics R&D.

- California's universities and colleges are major recipients of federal R&D grants. Four out of the top 10 and 11 of the top 100 university recipients of federal R&D funds nationwide are located in California, led by UCLA (\$378 million) and Stanford University (\$355 million) in third and fourth place behind only Johns Hopkins and University of Washington. Nine California universities receive more than \$100 million annually in federal R&D funds. Nine campuses in the University of California system each received at least \$20 million in federal R&D funding in FY 2000. (See Table 2 and Chart 4).

- California's universities have varying strengths in their ability to compete for federal R&D funds, but demonstrate research strength across the board. UC San Diego, for example, is the third-ranked university recipient of NSF funds (\$86 million), followed by CalTech in 5th place and UC Berkeley in 6th; the private USC ranks fourth in the nation in DOD support (\$56 million), with Stanford (7th) and UC San Diego (10th) also in the top 10; UCLA ranks 4th nationwide in DOE support (\$22 million), followed by Stanford (5th) and UC Davis (6th); Stanford is third in total

NASA support (\$48 million), with CalTech (5th), UC Berkeley (7th) and UC San Diego (8th) also in the top 10; UC San Francisco is a medical research powerhouse and ranks 3rd in HHS R&D funds received (\$286 million), with UCLA close behind in 4th (\$285 million); and UC Davis is top university recipient in the nation in USDA funds (\$20 million).

- In FY 2000, California universities performed \$4.1 billion in R&D, of which 57.6 percent came from the federal government, the same ratio as the nation as a whole (see Table 3). The state's private universities such as Stanford (81 percent), USC (70 percent), and CalTech (79 percent) are even more heavily dependent on federal funds, compared to their state-supported counterparts. Public universities in the state tend to rely more heavily on state government funds and institutional funds (a large portion of which comes indirectly from state appropriations). Industry funded \$295 million of R&D at California universities in FY 2000. Leading recipients of industrial R&D include Stanford (\$41 million), UC San Francisco (\$35 million), UC San Diego (\$35 million), and UCLA (\$33 million), which rank 7th, 9th, 11th, and 12th, respectively, among the top university recipients of industry's R&D funds. Cal Tech and UC Berkeley are also in the top 20.

- More than half of federal R&D to California's universities comes from HHS, mostly from the National Institutes of Health (see Table 2 and Chart 3). NIH funds research grants for biomedical research mostly in medical schools and life sciences departments. NIH's continuing support is crucial to the ability of many universities to carry out of research. For example, NIH accounts for 99 percent of federal R&D support to UC San Francisco. Five other university campuses in California receive more than \$100 million annually from NIH alone.

- The next-largest source of federal support for university R&D in California is NSF, which funds merit-reviewed research in a wide range of disciplines. NSF sent 15.6 percent of its R&D budget to California in FY 2000, for a total of \$456 million.

- Federal agencies performed \$1.7 billion worth of R&D in their own laboratories in California in FY 2000 (see Table 1 and Chart 2). DOD was the largest sponsor of intramural research, with \$1.3 billion spent at labs including the Naval Warfare Center Weapons Division in China Lake, the Air Force Flight Test Center at Edwards Air Force Base, and the Space and Naval Warfare Systems Command in San Diego. NASA's major facilities in California (total \$213 million) are the Ames Research Center in Moffett Field and the Dryden Flight Research Center in Edwards. USDA has a network of laboratories throughout the state, which collectively performed \$80 million in R&D in FY 2000.

- California's independent nonprofit research institutions received \$661 million in federal funds in FY 2000 (see Table 1 and Chart 2). The largest of these is the SRI International in Menlo Park, which received \$59 million in R&D funds, mostly from DOD. SRI International ranks 16th among nonprofit recipients of federal R&D. The Salk Institute in LaJolla received \$34 million (21st) for its medical research, mostly from HHS.

- Federal R&D funding to California has had its ups and downs over the years. Federal R&D peaked in the 1980s during the Cold War defense buildup when the state's defense contractors benefited enormously from increased DOD investments in R&D. After the end of the Cold War, federal R&D fell sharply in the early 1990s but there have been recent signs of renewed growth, led by dramatic increases in the NIH budget. California accounted for more than a quarter of all federal R&D funding in the height of the Cold War era, but its share of the federal R&D portfolio fell below 20 percent as defense R&D spending fell dramatically in the 1990s. Recently, however, there have been signs of growth as California's universities and nonprofits grow increasingly successful at competing for NIH, NSF, and other agencies' R&D funds (see Chart 6).

- Total R&D performance in California totaled \$55 billion in 2000, a fifth of the total U.S. R&D effort (see Table 4). By far the largest funding source for R&D was private industry, which funded \$42 billion in 2000, nearly all of it performed in industry's own labs. Almost a quarter (23 percent) of U.S. industry's R&D spending takes place in California.

Click on the charts to view or download full-size color PDF versions of these charts.

**Table 2. Federal R&D to California Universities and Colleges,
Fiscal Year 2000**
(obligations in millions of dollars)

	HHS	NSF	DOD	NASA	DOE	USDA	other	TOTAL
UC LA (3)	285	31	25	8	21	0	6	378
Stanford U (4)	196	47	37	48	21	0	5	355
UC San Diego (7)	180	86	30	21	10	0	4	332
UC San Francisco (9)	286	2	1	0	1	0	0	290
U Southern CA (22)	118	22	56	4	2	0	4	207
UC Berkeley (23)	88	50	23	22	8	3	2	196
UC Davis (29)	77	37	6	2	17	20	3	162
CA Inst Tech (34)	27	57	19	29	11	0	1	145
Scripps Res. Inst. (35)	135	1	3	1	1	0	0	142
UC Irvine (54)	65	14	5	7	6	0	0	98
UC Santa Barbara (75)	8	31	20	6	4	0	3	72
UC Santa Cruz (118)	8	17	2	2	3	0	1	32
UC Riverside (134)	7	7	2	0	2	3	2	24
Loma Linda U (140)	5	0	16	0	0	0	1	22
San Diego State (152)	12	3	3	0	0	0	0	19
U CA Office Pres (173)	0	1	0	0	0	0	13	14
San Jose State (178)	0	3	1	7	0	0	2	12
All Other	21	12	5	7	1	1	7	54
Total California	1,519	420	257	166	108	28	55	2,554
U.S. Total	10,533	2,475	1,832	872	696	564	557	17,529
CA % of U.S.	14.4%	17.0%	14.0%	19.1%	15.5%	5.0%	9.8%	14.6%

Source: National Science Foundation, *Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions, Fiscal Year 2000*, 2002.

Figures may differ from other tables because of differing survey methods.

Figures in parentheses denote national rank among universities and colleges in federal R&D funds received.

R&D = conduct of R&D and R&D plant (facilities and capital equipment).

Facts and Rankings for California

	CA	U.S.	CA % of U.S.	Rank *
Total Federal R&D	14,586 million \$ ('00)	75,751	19.3%	1
Population	34.00 million ('00)	282.13	12.1%	1
Federal R&D Per Capita	\$ 429 ('00)	\$ 269	159.5%	6
Total Federal Expenditures	175,751 million \$ ('00)	1,637,170	10.7%	1
Federal R&D / Total Federal	8.3% ('00)	4.6%		5
Total R&D (all funds)	55,093 million \$ ('00)	264,616	20.8%	1
Total R&D Per Capita	\$ 1,620 ('00)	\$ 938	172.7%	8
Gross State Product (GSP)	1,344,623 million \$ ('00)	9,941,552	13.5%	1
GSP Per Capita	\$ 39,547 ('00)	\$ 35,238	112.2%	8
R&D Intensity (R&D / GSP)	4.10% ('00)	2.66%	154.1%	8

Source: Federal R&D: National Science Foundation, *Federal Funds for Research and*

Development: Fiscal Years 2000, 2001, and 2002 and other data, 2002; Population: U.S. Bureau of the Census;

Federal Expenditures: U.S. Bureau of the Census, *Federal Expenditures by State*

for Fiscal Year 2000, 2001; GSP: U.S. Department of Commerce, Bureau of Economic Analysis.

**Table 3. Total R&D Expenditures at California Universities and Colleges
by Source of Funds, Fiscal Year 2000**
(expenditures in millions of dollars)

	Federal	State/ Local	Industry	Institutional Funds	All Other	TOTAL R&D	Federal / Total R&D
UC LA (4)	274	18	33	118	87	531	51.6%
UC San Diego (6)	326	24	35	88	47	519	62.9%
UC Berkeley (7)	208	65	28	168	49	519	40.2%
Stanford U (8)	367	6	41	19	21	455	80.7%
UC San Francisco (9)	249	22	35	71	66	443	56.2%
UC Davis (17)	142	31	18	144	30	365	38.9%
U Southern CA (28)	211	11	25	53	0	300	70.2%
CA Inst Tech (45)	176	3	30	14	0	223	79.1%
UC Irvine (67)	88	5	19	27	19	158	55.7%
UC Santa Barbara (88)	81	2	5	19	11	118	68.3%
UC Riverside (108)	21	4	3	46	9	84	25.2%
UC Santa Cruz (128)	26	1	2	21	7	56	46.2%
San Diego State (129)	23	7	2	18	5	55	41.5%
Naval Postgrad (149)	36	0	0	0	0	38	97.3%
CA St Long Beach (159)	13	13	1	4	2	33	39.8%
C R Drew U (163)	22	8	1	0	0	31	70.8%
Loma Linda U (182)	19	0	4	1	0	24	77.2%
San Jose State (192)	12	3	4	2	1	21	56.3%
All Other	41	12	9	7	13	82	50.1%
Total California	<u>2,335</u>	<u>236</u>	<u>295</u>	<u>821</u>	<u>366</u>	4,053	57.6%
U.S. Total	17,493	2,204	2,178	5,924	2,262	30,062	58.2%
CA % of U.S.	13.3%	10.7%	13.5%	13.9%	16.2%	13.5%	

Source: National Science Foundation, *Survey of Research and Development Expenditures at Universities and Colleges, Fiscal Year 2000*, 2002.

These data differ significantly from the federal R&D data for the following reasons:

1/ data are from performer surveys rather than funding sources; 2/ data are in expenditures rather than obligations; and 3/ R&D in this survey does not include R&D facilities.

Figures in parentheses denote national rank among universities and colleges in total R&D performed.

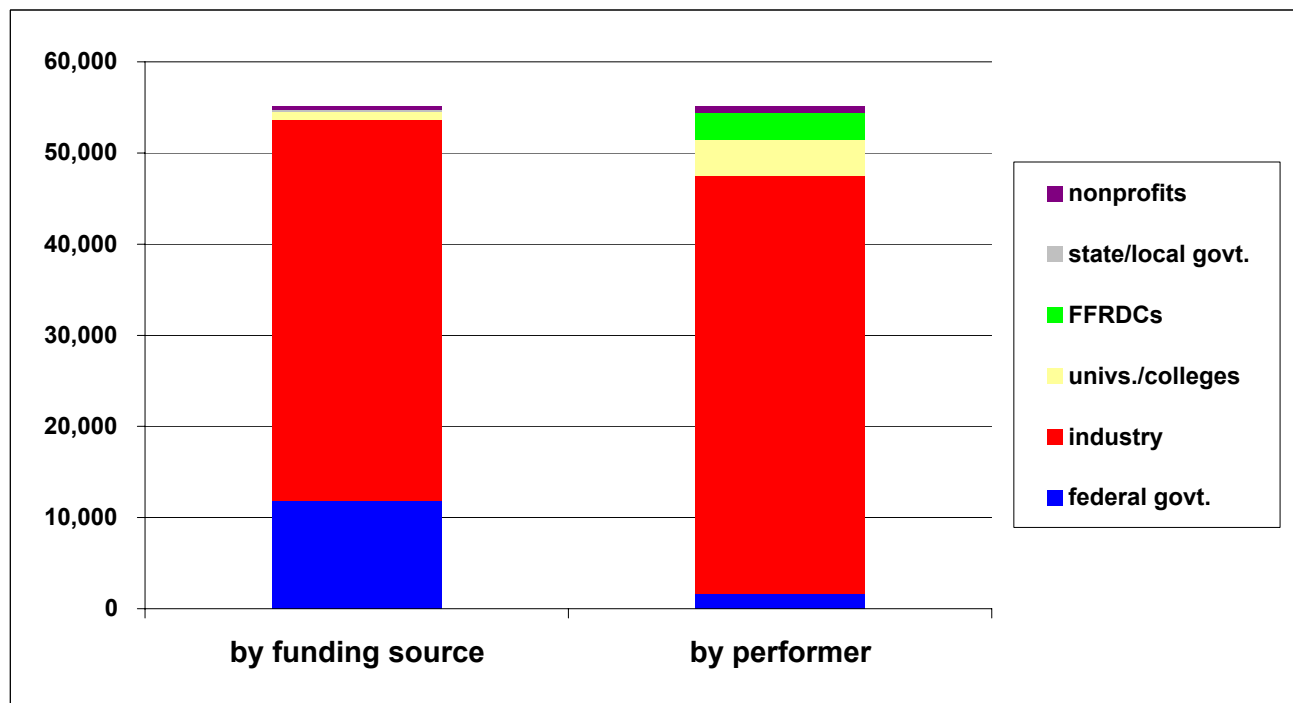
Table 4. Total R&D (all funding sources) in California by Funding Source and Performer, 2000
(expenditures in millions of dollars)

Performers	Funding Sources					Total
	Federal Government	Industry	Univs./ Colleges	State / Local Government	Nonprofits	
Federal Labs	1,656	--	--	--	--	1,656
Industry	4,229	41,540	--	--	--	45,769
Universities / Colleges	2,335	295	821	236	366	4,053
FFRDCs*	2,955	--	--	--	--	2,955
Nonprofits	661	--	--	--	--	661
Total California	11,835	41,835	821	236	366	55,093
U.S. Total	66,208	182,622	6,210	2,257	7,320	264,617
CA % of U.S.	17.9%	22.9%	13.2%	10.4%	5.0%	20.8%

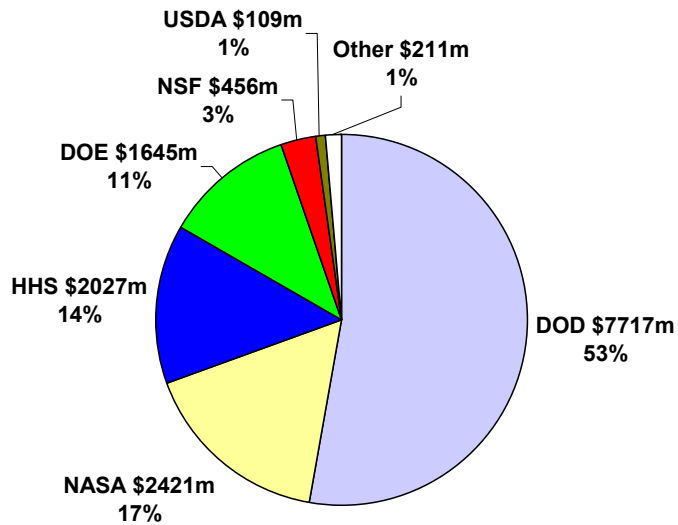
Source: National Science Foundation, 2002.

* Federally Funded Research and Development Centers. Government-owned, contractor-operated laboratories. FFRDCs operated by universities/colleges and nonprofits only. Industry FFRDCs are included under industry. Industry funding of nonprofit R&D is not included in state data, but is included in national totals. Industry funding of industry R&D includes all non-federal funding of industry-performed R&D. Nonprofit support for nonprofits is not included in state data, but is included in national totals. Nonfederal support for FFRDCs and nonprofits are not included. State and local government performance of R&D is not included. Conduct of R&D only (R&D facilities and capital equipment excluded). These data differ significantly from the federal R&D data for the following reasons: 1/ data are for calendar year 2000 rather than FY 2000; 2/ data are from performer surveys rather than funding sources; and 3/ data are in expenditures rather than obligations.

Chart. Total R&D in California by Funding Source and by Performer, 2000
expenditures in millions of dollars



Federal R&D to California by Agency
 FY 2000 (obligations in millions of dollars)
 Total: \$14.6 billion

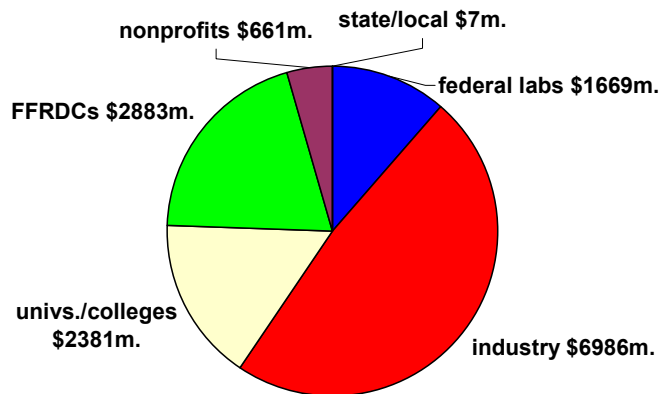


Source: National Science Foundation, Federal Funds for Research and Development, Fiscal Years 2000, 2001, and 2002, 2002.
 R&D = conduct of R&D and R&D plant.
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Chart 1.

Federal R&D to California by Performer
 FY 2000 (obligations in millions of dollars)
 Total: \$14.6 billion



Source: National Science Foundation, Federal Funds for Research and Development, Fiscal Years 2000, 2001, and 2002, 2002.
 R&D = conduct of R&D and R&D plant.
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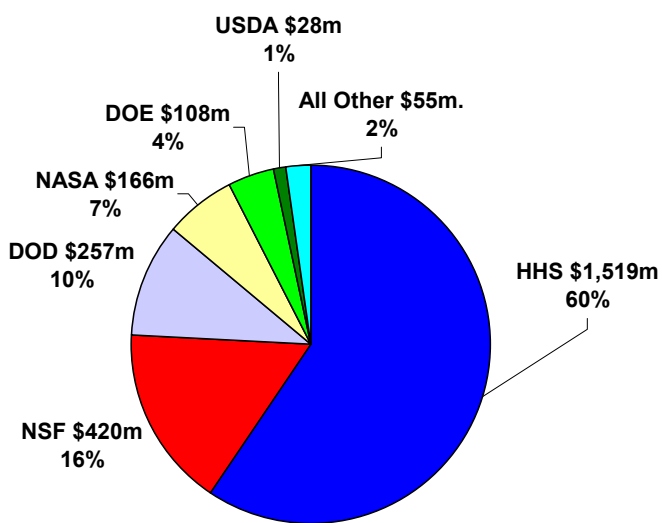


Chart 2.

Federal R&D to California Universities and Colleges

FY 2000 (obligations in millions of dollars)

Total: \$2.6 billion



Source: National Science Foundation, *Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions, FY 2000, 2002.*
 R&D = conduct of R&D and R&D plant.
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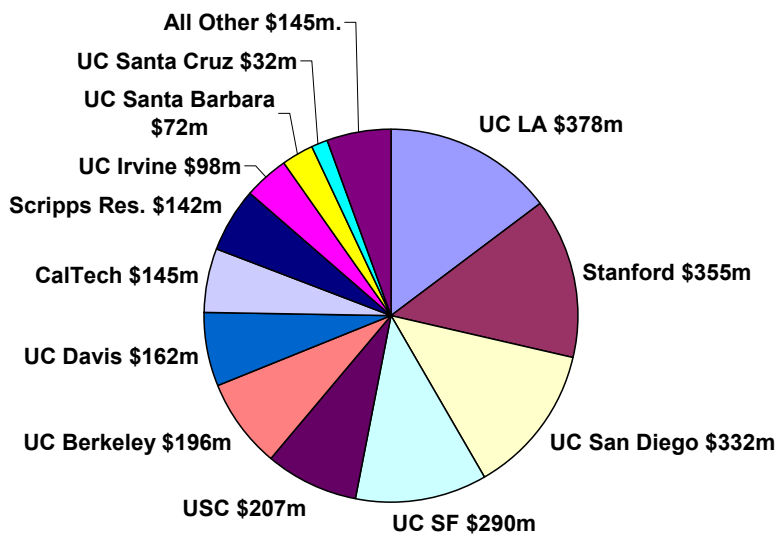


Chart 3.

Federal R&D to California Universities and Colleges

FY 2000 (obligations in millions of dollars)

Total: \$2.6 billion

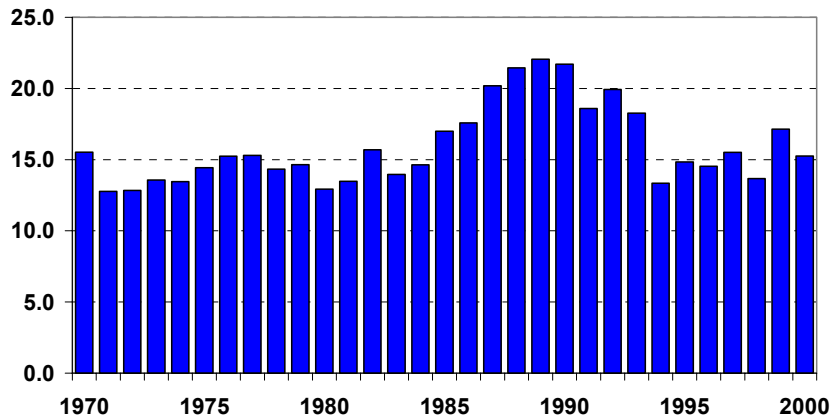


Source: National Science Foundation, *Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions, FY 2000, 2002.*
 R&D = conduct of R&D and R&D plant.
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Chart 4.

Federal R&D to California, FY 1970-2000
(billions of constant FY 2002 dollars)

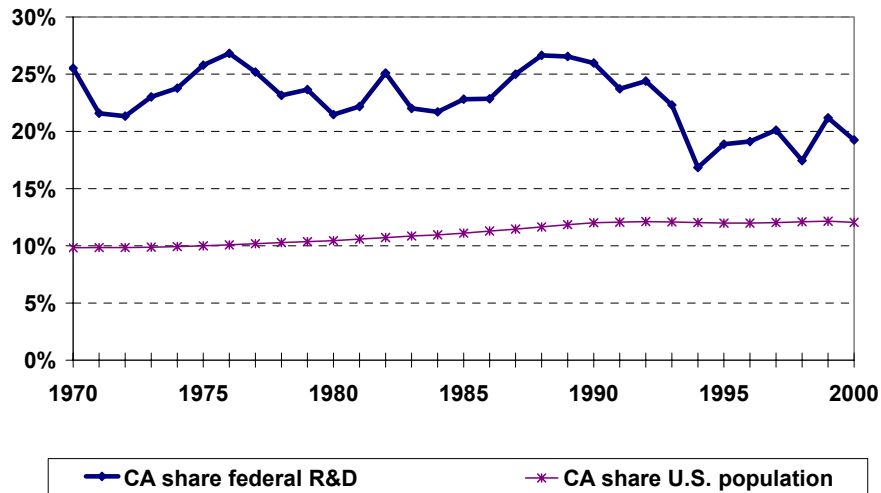


Source: National Science Foundation, Federal Funds for Research and Development Historical Tables, 2002.
R&D = conduct of R&D and R&D plan
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Chart 5.

California share of federal R&D, FY 1970-2000
(percent of total federal R&D)



Source: National Science Foundation, Federal Funds for Research and Development Historical Tables, 2002.
R&D = conduct of R&D and R&D plant.
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Chart 6.