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and on behalf of the People of the State of California

SUPERIOR COURT OF THE STATE OF CALIFORNIA
IN AND FOR THE COUNTY OF SANTA CRUZ

THE COUNTY OF SANTA CRUZ, individually and on behalf of THE PEOPLE OF THE STATE OF CALIFORNIA, Plaintiff, vs. CHEVRON CORP.; CHEVRON U.S.A. INC.; EXXONMOBIL CORP.; BP P.L.C.; BP AMERICA, INC.; ROYAL DUTCH SHELL PLC; SHELL OIL PRODUCTS COMPANY LLC; CITGO PETROLEUM CORP.; CONOCOPHILLIPS; CONOCOPHILLIPS COMPANY; PHILLIPS 66; TOTAL E&P USA INC.; TOTAL SPECIALTIES USA INC.; ENI S.p.A.; ENI OIL & GAS INC.; ANADARKO PETROLEUM CORP.; OCCIDENTAL	Case No. COMPLAINT FOR: 1. PUBLIC NUISANCE ON BEHALF OF THE PEOPLE OF THE STATE OF CALIFORNIA; 2. PUBLIC NUISANCE; 3. STRICT LIABILITY – FAILURE TO WARN; 4. STRICT LIABILITY – DESIGN DEFECT; 5. PRIVATE NUISANCE; 6. NEGLIGENCE; 7. NEGLIGENCE – FAILURE TO WARN; and 8. TRESPASS. JURY TRIAL DEMANDED

PETROLEUM CORP.; OCCIDENTAL CHEMICAL CORP.; REPSOL S.A.; REPSOL ENERGY NORTH AMERICA CORP.; REPSOL TRADING USA CORP.; MARATHON OIL COMPANY; MARATHON OIL CORPORATION; MARATHON PETROLEUM CORP.; HESS CORP.; DEVON ENERGY CORP.; DEVON ENERGY PRODUCTION COMPANY, L.P.; ENCANA CORP.; APACHE CORP.; and DOES 1 through 100, inclusive,

Defendants.

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I. INTRODUCTION

1. Defendants, major corporate members of the fossil fuel industry, have known for nearly a half century that unrestricted production and use of their fossil fuel products create greenhouse gas pollution that warms the planet and changes our climate. They have known for decades that those impacts could be catastrophic and that only a narrow window existed to take action before the consequences would be irreversible. They have nevertheless engaged in a coordinated, multi-front effort to conceal and deny their own knowledge of those threats, discredit the growing body of publicly available scientific evidence, and persistently create doubt in the minds of customers, consumers, regulators, the media, journalists, teachers, and the public about the reality and consequences of the impacts of their fossil fuel pollution. At the same time, Defendants have promoted and profited from a massive increase in the extraction and consumption of oil, coal, and natural gas, which has in turn caused an enormous, foreseeable, and avoidable increase in global greenhouse gas pollution and a concordant increase in the concentration of greenhouse gases,[1] particularly carbon dioxide ("CO_2") and methane, in the Earth's atmosphere. Those disruptions of the Earth's otherwise balanced carbon cycle have substantially contributed to a wide range of dire climate-related effects, including global warming, rising atmospheric and ocean temperatures, ocean acidification, melting polar ice caps and glaciers, more extreme and volatile weather, drought, wildfire, and sea level rise.[2] Plaintiffs, the People of the State of California and Santa Cruz County,[3] along with the County's residents, taxpayers, and infrastructure, suffer the consequences.

[1] As used in this Complaint, "greenhouse gases" refers collectively to carbon dioxide, methane, and nitrous oxide. Where a source refers to a specific gas or gases, or when a process relates only to a specific gas or gases, this Complaint refers to them by name.

[2] Exhibit A, attached to this Complaint, is a timeline highlighting information alleged in the paragraphs below. The timeline illustrates what the fossil fuel companies knew, when they knew it, and what they failed to do to prevent the environmental effects that are now imposing real costs on people and communities around the country. The information comes from key industry documents and other sources.

[3] As used in this Complaint, "Santa Cruz County" refers to all areas within the geographic boundaries of the County.

2. Defendants are vertically integrated extractors, producers, refiners, manufacturers, distributors, promoters, marketers, and sellers of fossil fuel products. Decades of scientific research show that pollution from the production and use of Defendants' fossil fuel products plays a direct and substantial role in the unprecedented rise in emissions of greenhouse gas pollution and increased atmospheric CO_2 concentrations since the mid-20th century. This dramatic increase in atmospheric CO_2 and other greenhouse gases is the main driver of the gravely dangerous changes occurring to the global climate.

3. Anthropogenic (human-caused) greenhouse gas pollution, primarily in the form of CO_2, is far and away the dominant cause of global warming, resulting in severe impacts, including, but not limited to, sea level rise, disruption to the hydrologic cycle, more frequent and intense drought, more frequent and intense extreme precipitation, more frequent and intense heatwaves, more frequent and intense wildfires, and associated consequences of those physical and environmental changes.[4] The primary source of this pollution is the extraction, production and consumption of coal, oil, and natural gas, referred to collectively in this Complaint as "fossil fuel products."[5]

4. The rate at which Defendants have extracted and sold fossil fuel products has exploded since the Second World War, as have emissions from those products. The substantial majority of all greenhouse gas emissions in history has occurred since the 1950s, a period known as the "Great Acceleration."[6] About three quarters of all industrial CO_2 emissions in history have

[4] See IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland. Page 6, Figure SMP.3, https://www.ipcc.ch/report/ar5/syr/.

[5] See C. Le Quéré et al., Global Carbon Budget 2016, Earth Syst. Sci. Data 8, 632 (2016), http://www.earth-syst-sci-data.net/8/605/2016/. Cumulative emissions since the beginning of the industrial revolution to 2015 were 413 GtC attributable to fossil fuels, and 190 GtC attributable to land use change. Id. Global CO_2 emissions from fossil fuels and industry remained nearly constant at 9.9 GtC in 2015, distributed among coal (41 %), oil (34 %), gas (19 %), cement (5.6 %), and gas flaring (0.7 %). Id. at 629.

[6] Will Steffen et al., The Trajectory of the Anthropocene: The Great Acceleration (2015), http://journals.sagepub.com/doi/abs/10.1177/2053019614564785.

occurred since the 1960s,[7] and more than half have occurred since the late 1980s.[8] The annual rate of CO_2 emissions from production, consumption, and use of fossil fuels has increased by more than 60% since 1990.[9]

5. Defendants have known for nearly 50 years that greenhouse gas pollution from their fossil fuel products has a significant impact on the Earth's climate and sea levels. Defendants' awareness of the negative implications of their own behavior corresponds almost exactly with the Great Acceleration, and with skyrocketing greenhouse gas emissions. With that knowledge, Defendants took steps to protect their own assets from these threats through immense internal investment in research, infrastructure improvements, and plans to exploit new opportunities in a warming world.

6. Instead of working to reduce the use and combustion of fossil fuel products, lower the rate of greenhouse gas emissions, minimize the damage associated with continued high use and combustion of such products, and ease the transition to a lower carbon economy, Defendants concealed the dangers, sought to undermine public support for greenhouse gas regulation, and engaged in massive campaigns to promote the ever-increasing use of their products at ever greater volumes. Thus, each Defendant's conduct has contributed substantially to the buildup of CO_2 in the environment that drives global warming and its physical, environmental, and socioeconomic consequences.

7. Defendants are directly responsible for 215.9 gigatons of CO_2 emissions between 1965 and 2015, representing 17.5% of total emissions of that potent greenhouse gas during that period. Accordingly, Defendants are directly responsible for a substantial portion of the physical and environmental changes attributable to anthropogenic global warming because of the consumption of their fossil fuel products.

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[7] R. J. Andres et al., A Synthesis of Carbon Dioxide Emissions from Fossil-Fuel Combustion, Biogeosciences, 9, 1851 (2012), http://www.biogeosciences.net/9/1845/2012/.

[8] Id.

[9] C. Le Quéré et al., Global Carbon Budget 2016, Earth Syst. Sci. Data 8, 630 (2016), http://www.earth-syst-sci-data.net/8/605/2016/.

8. Extreme flooding events will more than double in frequency on California's Pacific coast by 2050.[10] Flooding and storms will become more frequent and more severe, and average sea level will rise substantially along California's coast, including in Santa Cruz County. Disruptions to weather cycles, extreme precipitation and drought, increased frequency and magnitude of wildfires, and associated consequences—all due to anthropogenic global warming—will increase in Santa Cruz County. The County, flanked on its entire southern and western boundaries by the Pacific Ocean, and otherwise surrounded by dense mountain forests interspersed with commercial and residential activity, has already spent substantial sums to study, mitigate, and adapt to the effects of global warming, which already impact the County and jeopardize its utilities, beaches, parks, roads, municipal infrastructure, essential public services, and communities.

9. The County has engaged in several planning processes to prepare for the multitude of impacts from climatic shifts, and has recognized increasingly severe consequences.

10. Defendants' production, promotion, and marketing of fossil fuel products, simultaneous concealment of the known hazards of those products, and their championing of anti-regulation and anti-science campaigns, actually and proximately caused Plaintiffs' injuries.

11. Accordingly, the County brings claims against Defendants for Public Nuisance on behalf of the People of California as well as itself, Strict Liability for Failure to Warn, Strict Liability for Design Defect, Private Nuisance, Negligence, Negligent Failure to Warn, and Trespass.

12. By this action, the County seeks to ensure that the parties who have profited from externalizing the responsibility for sea level rise, drought, extreme precipitation events, heatwaves, wildfires, other results of a changing hydrologic regime caused by increasing temperatures, and

[10] Sean Vitousek et al., Doubling of Coastal Flooding Frequency Within Decades Due to Sea-Level Rise, Scientific Reports, (May 18, 2017) ("Only 10 cm of SLR doubles the flooding potential in high-latitude regions with small shape parameters, notably the North American west coast (including the major population centers Vancouver, Seattle, San Francisco, and Los Angeles), and the European Atlantic coast."); USGS, In Next Decades, Frequency of Coastal Flooding Will Double Globally (May 18, 2017), https://www.usgs.gov/news/next-decades-frequency-coastal-flooding-will-double-globally.

associated consequences, bear the costs of those impacts on the County, rather than Plaintiffs, local taxpayers or residents. The County does not seek to impose liability on Defendants for their direct emissions of greenhouse gases and does not seek to restrain defendants from engaging in their business operations.

II. PARTIES

A. Plaintiffs

13. Plaintiff, the People of the State of California ("the People"), by and through the County Counsel of Santa Cruz County, brings this suit pursuant to Code of Civil Procedure section 731, and Civil Code sections 3479, 3480, 3491, and 3494, to abate the nuisance caused by sea level rise and changes to the hydrologic regime, including, but not limited to, increased frequency and magnitude of drought, increased frequency and magnitude of extreme precipitation events, increased frequency and magnitude of heatwaves, increased frequency and magnitude of wildfires, and the consequences of those physical and environmental changes in the County's jurisdiction.

14. Plaintiff County of Santa Cruz ("the County" or "Santa Cruz") is a political subdivision of the State of California. The County is located in the northern Monterey Bay along the Central Coast of California, bordered by San Mateo County to the North, Santa Clara County to the East, and Monterey County to the South.

15. The County is bordered by the Pacific Ocean to the West, and contains approximately forty miles of coastline.

16. The County covers 445.17 square miles of land, of which 417 square miles are unincorporated and rural.[11] Unincorporated County land is incredibly diverse, including redwood forests on the steep mountains north of the City of Santa Cruz, to coastal terraces along the Pacific, to alluvial soils in the southern portion of the County.

17. Sea level has already risen significantly along the County's ocean coast.[12] The

[11] Central Coast Wetlands Group, Santa Cruz County Coastal Climate Change Vulnerability Report, at 4 (June 2017).

[12] Id. at 16.

County will experience additional sea level rise over the coming decades through the year 2100.[13]

18. The sea level rise impacts to the County associated with an increase in average mean sea level height include, but are not limited to, building damage, restricted use of public amenities, destruction of storm drains and tide gates, and limitations on road use and walkways with wave run-up and overtopping; extensive rebuilding, changes in property use, or abandonment of property due to cliff erosion and/or monthly high-tide flooding; localized flooding along river mouth estuaries and collocated agricultural operations and urban development; and injuries to agricultural fields and residential and commercial development from dune loss.[14] Compounding these environmental impacts are cascading social and economic impacts, which are secondary and tertiary injuries that arise out of physical sea-level rise injuries to the County.

19. The County is already experiencing a climatic and meteorological shift toward hotter, dryer, and longer summers, with more extreme and compressed precipitation in the mid-winter; increased ambient temperature with attendant increases in heat waves; and increasingly frequent and severe drought. These changes have contributed to diminished annual water supply, which has led to increased wildfire risk, water shortages, groundwater overdraft, saltwater intrusion, impacts to biodiversity, impacts to public health, and economic injuries to important industries in the County. The County must expend substantial funds to plan for and respond to these phenomena, and to mitigate their secondary and tertiary impacts.

20. Compounding these environmental impacts are cascading social and economic impacts, which are secondary and tertiary injuries to the County that will arise out of localized climate-related damage.

21. The County owns, operates, and/or controls civil infrastructure in the County including, but not limited to, coastal armoring and roads. The County owns, leases, and/or controls real property within its jurisdiction. Much of the County's infrastructure and real property has

[13] Id. at 27-28 (employing sea level rise scenarios presented in National Research Council, Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future, National Academies Press (2012)).

[14] Id. at 17-18, 44.

already suffered damage from rising sea levels and will suffer increasing damage in the future through rising sea levels and through the exacerbation of natural climate-driven phenomena such as heatwaves, drought, and wildfires.

B. Defendants

22. Defendants' are responsible for a substantial portion of the total greenhouse gases emitted since 1965. Defendants, individually and collectively, are responsible for extracting, refining, processing, producing, promoting, and marketing fossil fuel products, the normal and intended use of which has led to the emission of a substantial percentage of the total volume of greenhouse gases released into the atmosphere since 1965. Indeed, between 1965 and 2015, the named Defendants extracted from the earth enough fossil fuel materials (i.e. crude oil, coal, and natural gas) to account for approximately one in every five tons of CO_2 and methane emitted worldwide. Accounting for their wrongful promotion and marketing activities, Defendants bear a dominant responsibility for global warming generally, and for Plaintiffs' injuries in particular.

23. When reference in this complaint is made to an act or omission of the Defendants, unless specifically attributed or otherwise stated, such references should be interpreted to mean that the officers, directors, agents, employees, or representatives of the Defendants committed or authorized such an act or omission, or failed to adequately supervise or properly control or direct their employees while engaged in the management, direction, operation or control of the affairs of Defendants, and did so while acting within the scope of their employment or agency.

24. **Chevron Entities**

a. Chevron Corporation is a multi-national, vertically integrated energy and chemicals company incorporated in the State of Delaware, with its global headquarters and principal place of business in San Ramon, California.

b. Chevron U.S.A., Inc. is a Pennsylvania Corporation with its principal place of business located in San Ramon, California. Chevron USA is a wholly owned subsidiary of Chevron Corporation.

c. "Chevron" as used hereafter, means collectively, Defendants Chevron Corp. and Chevron U.S.A., Inc.

d. Chevron operates through a web of U.S. and international subsidiaries at all levels of the fossil fuel supply chain. Chevron's and its subsidiaries' operations consist of exploring for, developing, and producing crude oil and natural gas; processing, liquefaction, transportation, and regasification associated with liquefied natural gas; transporting crude oil by major international oil export pipelines; transporting, storage, and marketing of natural gas; refining crude oil into petroleum products; marketing of crude oil and refined products; transporting crude oil and refined products by pipeline, marine vessel, motor equipment and rail car; basic and applied research in multiple scientific fields including of chemistry, geology, and engineering; and manufacturing and marketing of commodity petrochemicals, plastics for industrial uses, and fuel and lubricant additives.

25. **ExxonMobil Corporation**

a. ExxonMobil Corporation ("Exxon") is a multi-national, vertically integrated energy and chemicals company incorporated in the State of New Jersey with its headquarters and principal place of business in Irving, Texas. Exxon is among the largest publicly traded international oil and gas companies in the world.

b. Exxon consists of numerous divisions and affiliates in all areas of the fossil fuel industry, including exploration for and production of crude oil and natural gas; manufacture of petroleum products; and transportation, marketing, and sale of crude oil, natural gas, and petroleum products. Exxon is also a major manufacturer and marketer of commodity petrochemical products.

c. Exxon does substantial fossil fuel product related business in California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed and/or sold in California. Among other operations, more than 540 Exxon-, Mobil-, or Esso-branded gas stations operate throughout the state, and Exxon owns and operates a petroleum storage and transport facility in the San Ardo Oil Field in San Ardo, Monterey County, California. From 1966 to 2016, Exxon owned and operated an oil refinery in Torrance, Los Angeles County, California. Exxon Co. USA, an ExxonMobil subsidiary, operated a petroleum refinery in Benicia, Solano County, California, from 1968 to 2000.

26. **BP Entities**

a. BP P.L.C. is a multi-national, vertically integrated energy and petrochemical public limited company, registered in England and Wales with its principal place of business in London, England. BP P.L.C. consists of three main operating segments: (1) exploration and production, (2) refining and marketing, and (3) gas power and renewables.

b. BP P.L.C. does substantial fossil-fuel related business in the United States, by marketing through licensure; franchising its petroleum products in the U.S. under the BP, ARCO and ARAL brands; and by operating oil and gas extraction and refining projects in the Gulf of Mexico, Alaska, Arkansas, Colorado, New Mexico, Oklahoma, Texas, and Wyoming.

c. BP America, Inc., is a wholly-owned subsidiary of BP P.L.C. BP America Inc. is a vertically integrated energy and petrochemical company incorporated in the State of Delaware with its headquarters and principal place of business in Houston, Texas. BP America, Inc., consists of numerous divisions and affiliates in all aspects of the fossil fuel industry, including exploration for and production of crude oil and natural gas; manufacture of petroleum products; and transportation, marketing, and sale of crude oil, natural gas, and petroleum products. BP is also a major manufacturer and marketer of commodity petrochemical products. BP America Inc. is registered to do business in the State of California and has a registered agent for service of process with the California Secretary of State.

d. Defendants BP P.L.C. and BP America, Inc. are collectively referred to herein as "BP."

e. BP does substantial fossil fuel product-related business in California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed, and/or sold in California. Among other operations, BP operates 275 ARCO-licensed and branded gas stations in California and more than 70 compressed natural gas and liquefied natural gas fueling stations, provides natural gas used to power more than 6.9 million California households, and distributes and markets petroleum-based lubricants marketed under the "Castrol" brand name throughout the state. From 2000 to 2013, BP also owned and operated an oil refinery in Carson, Los Angeles County, California. BP's marketing and trading business maintains an

office in Irvine, Orange County, California. BP maintains an energy research center in San Diego, San Diego County, California.

27. **Shell Entities**

a. Royal Dutch Shell PLC is a vertically integrated, multinational energy and petrochemical company. Royal Dutch Shell is incorporated in England and Wales, with its headquarters and principle place of business in the Hague, Netherlands. Royal Dutch Shell PLC consists of numerous divisions, subsidiaries and affiliates engaged in all aspects of the fossil fuel industry, including exploration, development, extraction, manufacturing and energy production, transport, trading, marketing and sales.

b. Shell Oil Products Company LLC is a wholly-owned subsidiary of Royal Dutch Shell PLC. Shell Oil Products Company LLC is incorporated in the State of Delaware and maintains its principal place of business in Houston, Texas. Shell Oil Products Company LLC is registered to do business in the State of California and has a registered agent for service of process in California. Shell Oil Products Company LLC is an energy and petrochemical company involved in refining, transportation, distribution and marketing of Shell fossil fuel products.

c. Defendants Royal Dutch Shell PLC and Shell Oil Products Company LLC are collectively referred to as "Shell."

d. Shell does substantial fossil fuel product-related business in California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed and/or sold in California. Among other endeavors, Shell operates a petroleum refinery in Martinez, Contra Costa County, California; operates a distribution center in Carson, California; and produces heavy oil and natural gas within the state. Shell also owned and operated a refinery in Wilmington (Los Angeles), Los Angeles County, California from 1998 to 2007, and a refinery in Bakersfield, Kern County, California from 2001 to 2005. Shell also operates hundreds of Shell-branded gas stations in California.

28. **Citgo Petroleum Corporation ("Citgo")**

a. Citgo is a direct, wholly owned subsidiary of PDV America, Incorporated, which is a wholly owned subsidiary of PDV Holding, Incorporated. These organizations' ultimate

parent is Petroleos de Venezuela, S.A. ("PDVSA"), an entity wholly owned by the Republic of Venezuela that plans, coordinates, supervises and controls activities carried out by its subsidiaries. Citgo is incorporated in the State of Delaware and maintains its headquarters in Houston, Texas.

b. Citgo and its subsidiaries are engaged in the refining, marketing, and transportation of petroleum products including gasoline, diesel fuel, jet fuel, petrochemicals, lubricants, asphalt, and refined waxes.

c. Citgo is registered to do business in the State of California and has designated an agent for service of process in California. Citgo further does substantial fossil fuel product-related business in California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed, and/or sold in California. For instance, Citgo sells significant volumes of fossil-fuel derived consumer motor oils and automobile lubricants through retail and wholesale distributers. Citgo further sells a wide variety of greases and oils for use in construction, mining, agricultural, and metalworking machinery and vehicles, and in many other industrial and commercial settings, through licensed distributors in California.

29. **ConocoPhillips Entities**

a. ConocoPhillips is a multinational energy company incorporated in the State of Delaware and with its principal place of business in Houston, Texas. ConocoPhillips consists of numerous divisions, subsidiaries, and affiliates engaged in all aspects of the fossil fuel industry, including exploration, extraction, production, manufacture, transport, and marketing.

b. ConocoPhillips Company is 100% owned by ConocoPhillips. ConocoPhillips Company is registered to do business in California and has a registered agent for service of process in California.

c. Phillips 66 is a multinational energy and petrochemical company incorporated in Delaware and with its principal place of business in Houston, Texas. It encompasses downstream fossil fuel processing, refining, transport, and marketing segments that were formerly owned and/or controlled by ConocoPhillips. Phillips 66 is registered to do business in the State of California and has a registered agent for service of process in California.

d. Defendants ConocoPhillips, ConocoPhillips Company, and Phillips 66 are collectively referred to herein as "ConocoPhillips."

e. ConocoPhillips does substantial fossil fuel product-related business in California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed, and/or sold in California. For instance, ConocoPhillips owns and operates oil and natural gas terminals in California, owns and operates refineries in Arroyo Grande (San Luis Obispo County), Colton (San Bernardino County), and Wilmington (Los Angeles County), California, and distributes its products throughout California. Phillips 66 also owns and operates oil refineries in Rodeo (Contra Costa County), Santa Maria (Santa Barbara County), and Wilmington (Los Angeles County), California, each of which was owned and operated by ConocoPhillips and its predecessors in interest from 1997 to 2012.

30. **Total Entities**

a. Total E&P USA Inc. is a wholly owned subsidiary of Total S.A.—a French energy conglomerate—engaged in the North American segment of Total SA's fossil fuel products-related business. Total E&P USA Inc. and its subsidiaries are involved in the exploration for, extraction, transportation, research, and marketing of Total S.A.'s fossil fuel products. Total E&P USA Inc. is registered to do business in the State of California and has designated an agent for service of process in California.

b. Total Specialties USA Inc., is a wholly owned subsidiary of Total SA, involved in the marketing and distribution of Total S.A.'s fossil fuel products. Total Specialties USA Inc. is incorporated in the State of Delaware and headquartered in Houston, Texas. Total Specialties USA Inc. is registered to do business in the State of California and has designated an agent for service of process in California. Total Specialties USA Inc. does substantial fossil fuel product-related business in California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed, and/or sold in California. For instance, Total Specialties USA Inc. maintains regular distributorship relationships with several California distributors of Total fossil fuel products, including engine oils, lubricants, greases, and industrial petroleum products.

31. **Eni Entities**

a. Eni S.p.A. ("Eni") is a vertically integrated, multinational energy company focusing on petroleum and natural gas. Eni is incorporated in the Republic of Italy, with its principal place of business in Rome, Italy. With its consolidated subsidiaries, Eni engages in the exploration, development and production of hydrocarbons; in the supply and marketing of gas, liquid natural gas, and power; in the refining and marketing of petroleum products; in the production and marketing of basic petrochemicals, plastics and elastomers; in commodity trading; and in electricity marketing and generation.

b. Eni Oil & Gas Inc. is incorporated in Texas, with its principal place of business in Houston, Texas. Eni Oil & Gas Inc., is a wholly owned subsidiary of Eni America Ltd., a Delaware corporation doing business in the United States. Eni America, Ltd. Is a wholly owned subsidiary of Eni UHL Ltd., a British corporation with its registered office in London, United Kingdom. Eni UHL Ltd. is a wholly owned subsidiary of Eni ULT, Ltd., a British corporation with its registered office on London, United Kingdom. Eni ULT, Ltd. is a wholly owned subsidiary of Eni Lasmo Plc, a British corporation with its registered office on London, United Kingdom. Eni Investments Plc, a British corporation with its registered office in London, United Kingdom, holds a 99.9% ownership interest in Eni Lasmo Plc (the other 0.01% ownership interest is held by another Eni entity, Eni UK Ltd, a British corporation with its registered office in London, United Kingdom). Eni S.p.A owns a 99.99% interest in Eni Investments Plc. Eni UK Ltd. holds the remainder interest in Eni Investments Plc. Collectively, these entities are referred to as "Eni."

c. Eni Oil & Gas Inc. is a successor-in-interest to Golden Eagle Refining Company, Inc. ("Golden Eagle"). At times relevant to this complaint, Golden Eagle did substantial fossil fuel-related business in California. Specifically, Golden Eagle owned and/or operated oil refineries in Carson (Los Angeles County) and Martinez (Contra Costa County), California, and owned and/or operated oil pipelines in or near Long Beach (Los Angeles County), California.

32. **Anadarko Petroleum Corp.**

a. Anadarko Petroleum Corporation ("Anadarko") is incorporated in the State of Delaware and maintains its principal place of business in The Woodlands, Texas. Anadarko is

a multinational, vertically integrated energy company comprised of multiple upstream and downstream segments. These include exploration, production, gathering, processing, treating, transporting, marketing, and selling fossil fuel products derived primarily from petroleum and natural gas. In the United States, Anadarko entities operate fossil fuel product exploration and production concerns in Texas, the Gulf of Mexico, Alaska, the Powder River Basin, Utah, Colorado, and the Marcellus Shale Formation. Anadarko operates fossil fuel product production and exploration activities internationally in Algeria, Ghana, Mozambique, and Columbia, among others. Anadarko Petroleum Corporation is registered to do business in California and has designated an agent for service of process in California.

b. Anadarko Petroleum Corporation is a successor-in-interest to HS Resources Inc. ("HS"). HS was an energy company headquartered in San Francisco, San Francisco County, California. It owned natural gas reserves in Colorado, North Dakota, South Dakota, Montana, and along the coasts of Texas and Louisiana, which it extracted and imported to California. HS was acquired by Kerr-McGee Corporation in 2001. Kerr-McGee was an energy exploration and production company owning oil and natural gas rights in the Gulf of Mexico, Colorado, and Utah, with its corporate headquarters in Oklahoma. Anadarko Petroleum Corporation acquired Kerr-McGee Corporation in 2006.

33. **Occidental Entities**

a. Occidental Petroleum Corporation is a multinational, vertically integrated energy and chemical company incorporated in the State of Delaware and with its principal place of business in Houston, Texas. Occidental's operations consist of three segments: Occidental's operations consist of three segments: (1) the exploration for, extraction of, and production of oil and natural gas products; (2) the manufacture and marketing of chemicals and vinyls; and (3) processing, transport, storage, purchase, and marketing of oil, natural gas, and power. Occidental Petroleum Corporation is registered to do business in the State of California and has designated an agent for service of process in the State of California.

b. Occidental Chemical Corporation, a manufacturer and marketer of petrochemicals, such as polyvinyl chloride resins, is a wholly owned subsidiary of Occidental

Petroleum Corporation. Occidental Chemical Corporation is registered to do business in the State of California and has designated an agent for service of process in the State of California.

c. Defendants Occidental Petroleum Corporation and Occidental Chemical Corporation are collectively referred to as "Occidental."

d. Occidental does substantial fossil fuel product-related business in the State of California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed and/or sold in California. For instance, Occidental extracted and transported its fossil fuel products from approximately 30,900 drilling locations within the San Joaquin, Los Angeles, Ventura, and Sacramento Basins in California.

e. In addition, Occidental has conducted substantial activities in the state, including marketing and promotion; efforts to avoid or minimize regulation of greenhouse gas pollution in and from California; and efforts to influence statutory and regulatory debate regarding fossil fuel consumption, electric power distribution, and greenhouse gas pollution policies such that the exercise of jurisdiction comports with traditional notions of fair play and substantial justice. Since 1999, Occidental Petroleum Corp. and its subsidiaries have reported more than $4.6 million in lobbying expenditures directed at numerous statutory and regulatory proposals before the California legislature and executive agencies, including the California Energy Commission, California Air Resources Board, and California Public Utilities Commission, related to its fossil fuel products business.

34. **Repsol S.A.**

a. Repsol S.A. ("Repsol") is a vertically integrated, multinational global energy company, incorporated in the Kingdom of Spain, with its principal place of business in Madrid, Spain. Repsol is involved in multiple aspects of the fossil fuel industry, including exploration, production, marketing, and trading. Repsol engages in significant fossil fuel exploration and production activities in the United States, including in the Gulf of Mexico, the Marcellus Shale in Pennsylvania, the Eagle Ford Shale in South Texas, the Mississippi Lime in Oklahoma and Kansas, the North Slope in Alaska, and the Trenton-Black River in New York

b. Repsol does substantial fossil fuel product-related business in the State of

California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed and/or sold in California. For instance, Repsol subsidiary Repsol Energy North America Corporation, incorporated in the State of Texas and with its principal place of business in The Woodlands, Texas, is listed as a natural gas procurement, storage, transportation, scheduling, and risk management provider by Pacific Gas and Electric, a California utility. Repsol Energy North America Corporation is registered to do business in California and has designated an agent for service of process in California. Repsol subsidiary Repsol Trading USA Corporation, incorporated in the State of Texas and with its principal place of business in The Woodlands, Texas, is also registered do business in California and has designated an agent for service of process in California. Additionally, Repsol represents on its website that it is engaging in strategic opportunities involving its fossil fuel products in California, which may consist of crude oil, gasoline, diesel, and/or jet fuel.

35. **Marathon Entities**

a. Marathon Oil Company is an energy company incorporated in the State of Ohio and with its principal place of business in Houston, Texas. Marathon Oil Company is registered to do business in California and has designated an agent for service of process in California. Marathon Oil Company is a corporate ancestor of Marathon Oil Corporation and Marathon Petroleum Company.

b. Marathon Oil Company is a successor-in-interest to Husky Oil Ltd. ("Husky"), which it acquired in 1984. During times relevant to this Complaint, Husky operated oil production facilities near Santa Maria (Santa Barbara County), California, where it produced nearly 1,100 barrels per day. During the period relevant to this litigation, Husky did substantial fossil fuel product-related business in California.

c. Marathon Oil Corporation is a multinational energy company incorporated in the State of Delaware and with its principal place of business in Houston, Texas. Marathon Oil Corporation consists of multiple subsidiaries and affiliates involved in the exploration for, extraction, production, and marketing of fossil fuel products.

d. Marathon Petroleum Corporation is a multinational energy company

incorporated in Delaware and with its principal place of business in Findlay, Ohio. Marathon Petroleum Corporation was spun off from the operations of Marathon Oil Corporation in 2011. It consists of multiple subsidiaries and affiliates involved in fossil fuel product refining, marketing, retail, and transport, including both petroleum and natural gas products.

e. Defendants Marathon Oil Company, Marathon Oil Corporation, and Marathon Petroleum Corporation are collectively referred to as "Marathon."

36. **Hess Corporation**

a. Hess Corp. ("Hess") is a global, vertically integrated petroleum exploration and extraction company incorporated in the State of Delaware with its headquarters and principal place of business in New York, New York.

b. Hess is engaged in the exploration, development, production, transportation, purchase, marketing and sale of crude oil and natural gas. Its oil and gas production operations are located primarily in the United States, Denmark, Equatorial Guinea, Malaysia, Thailand, and Norway. Prior to 2014, Hess also conducted extensive retail operations in its own name and through subsidiaries. Hess owned and operated more than 1,000 gas stations throughout the United States, including in California during times relevant to this complaint. Prior to 2013, Hess also operated oil refineries in the continental United States and U.S. Virgin Islands.

37. **Devon Energy Corporation**

a. Devon Energy Corp. is an independent energy company engaged in the exploration, development, and production of oil, and natural gas. It is incorporated in the State of Delaware and maintains its principal place of business in Oklahoma City, Oklahoma. Devon is engaged in multiple aspects of the fossil fuel industry, including exploration, development, production, and marketing of its fossil fuel products.

b. Devon Energy Production Company, L.P. is a Devon subsidiary registered to do business in the State of California and with a designated agent for service of process in California. Devon Energy does substantial fossil fuel product-related business in California.

c. Devon Energy Corp. is a successor-in-interest to the Pauley Petroleum Company ("Pauley"). At times relevant to this complaint, Pauley did substantial fossil-fuel related

business in California. Specifically, this included owning and operating a petroleum refinery in Newhall (Los Angeles County), California from 1959 to 1989, and a refinery in Wilmington (Los Angeles, Los Angeles County), California from 1988 to 1992. Pauley merged with Hondo Oil and Gas Co. ("Hondo") in 1987. Subsequently, Devon Energy Corp. acquired Hondo in 1992.

d. Defendants Devon Energy Production Company, L.P. and Devon Energy Corp. are collectively referred to as "Devon."

38. **Encana Corporation**

a. Encana Corp. is a Canadian corporation with its principal place of business in Calgary, Alberta, Canada. Encana is an extractor and marketer of oil and natural gas and has facilities including gas plants and gas wells in Colorado, Texas, Wyoming, Louisiana, and New Mexico. By approximately 2005, Encana was the largest independent owner and operator of natural gas storage facilities in North America.

b. Encana has done and continues to do substantial fossil fuel product-related business in California. Between 1997 and 2006, Encana owned and operated the Wild Goose Storage underground natural gas storage facility in Butte County, California. In 2003, Encana began transporting natural gas through a 25-mile pipeline from the Wild Goose Station to a Pacific Gas & Electric Co. ("PG&E") compressor station in Colusa County, where gas entered the main PG&E pipeline. Encana invested in a 100 billion cubic foot expansion of the facility in 2004, bringing gas storage capacity at Wild Goose to 24 billion cubic feet.

39. **Apache Corporation**

a. Apache Corp. is a publicly traded Delaware corporation with its principal place of business in Houston, Texas. Apache is an oil and gas exploration and production company, with crude oil and natural gas exploration and extraction operations in the United States, Canada, Egypt, and in the North Sea.

b. During the time at issue, Apache extracted natural gas from wells developed on approximately seven million acres of land held in the Canadian provinces of British Columbia, Alberta, and Saskatchewan, and Apache did substantial fossil fuel product-related business in California. Apache transported a substantial volume of the natural gas extracted from its Canadian

holdings to California, where it sold that gas to electric utilities, end-users, other fossil fuel companies, supply aggregators, and other fossil fuel marketers. Apache directed sales of its natural gas to California in addition to markets in Washington state, Chicago, and western Canada, to intentionally retain a diverse customer base and maximize profits from the differential price rates and demand levels in those respective markets.

40. **Doe Defendants**

41. The true names and capacities, whether individual, corporate, associate, or otherwise of Defendants Does 1 through 100, inclusive, are unknown to Plaintiffs, who therefore sue said Defendants by such fictitious names pursuant to California Code of Civil Procedure Section 474. Plaintiffs are informed and believe, and on that basis allege, that each of the fictitiously named Defendants is responsible in some manner for the acts and occurrences herein alleged, and that Plaintiffs' damages were caused by such Defendants.

42. **Relevant Non-Parties: Fossil Fuel Industry Associations**

43. As set forth in greater detail below, each Defendant had actual knowledge that its fossil fuel products were hazardous. Defendants obtained knowledge of the hazards of their products independently and through their membership and involvement in trade associations.

44. Each Defendant's fossil fuel promotion and marketing efforts were assisted by the trade associations described below. Acting on behalf of the Defendants, the industry associations engaged in a long-term course of conduct to misrepresent, omit, and conceal the dangers of Defendants' fossil fuel products.

a. **The American Petroleum Institute (API)**: API is a national trade association representing the oil and gas industry, formed in 1919. The following Defendants and/or their predecessors in interest are and/or have been API members at times relevant to this litigation: Chevron, ExxonMobil, Shell, ConocoPhillips, Anadarko, Occidental, Repsol, Marathon, EnCana, and Apache.[15]

[15] American Petroleum Institute, Members (webpage) (accessed June 1, 2017) available at http://www.api.org/membership/members.

b. **The Western States Petroleum Association (WSPA)**: WSPA is a trade association representing oil producers in Arizona, California, Nevada, Oregon and Washington.[16] Membership has included, among other entities: BP, Chevron, Shell, Phillips 66, ConocoPhillips, and ExxonMobil.[17]

c. **The American Fuel and Petrochemical Manufacturers (AFPM)** is a national association of petroleum and petrochemical companies. At relevant times, its members included, but were not limited to, BP Petrochemicals, BP Products North America, Chevron U.S.A. Inc., CITGO Petroleum Corporation, Exxon Mobil Corporation, Occidental Chemical Corporation, Phillips 66, Shell Chemical Company, and Total Petrochemicals & Refining USA, Inc. [18]

d. **The Information Council for the Environment (ICE)**: ICE was formed by coal companies and their allies, including Western Fuels Association and the National Coal Association. Associated companies included Pittsburg and Midway Coal Mining (Chevron),[19] and Island Creek Coal Company (Occidental).

e. **The Global Climate Coalition (GCC)**: GCC was an industry group formed to oppose greenhouse gas emission reduction policies and the Kyoto Protocol. It was founded in 1989 shortly after the first Intergovernmental Panel on Climate Change meeting was held, and disbanded in 2001. Founding members included the National Association of Manufacturers, the National Coal Association, the Edison Electric Institute, and the United States Chamber of Commerce. The GCC's early individual corporate members included Amoco (BP), API, Chevron, Exxon, Ford, Shell Oil, Texaco (Chevron) and Phillips Petroleum (ConocoPhillips). Over its

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[16] Western States Petroleum Association, About (webpage) (accessed December 18, 2017), https://www.wspa.org/about/.

[17] Western States Petroleum Association, Member Companies (webpage) (accessed December 18, 2017), https://www.wspa.org/about/.

[18] American Fuel and Petrochemical Manufacturers, Membership Directory (webpage) (accessed June 30, 2017), available at https://www.afpm.org/membership-directory/ (accessed June 30, 2017).

[19] Hereinafter, parenthetical references to Defendants indicate corporate ancestry and/or affiliation.

existence other members and funders included ARCO (BP), BHP, and the Western Fuels Association. The coalition also operated for several years out of the National Association of Manufacturers' offices.

III. AGENCY

45. At all times herein mentioned, each of the Defendants was the agent, servant, partner, aider and abettor, co-conspirator, and/or joint venturer of each of the remaining Defendants herein and was at all times operating and acting within the purpose and scope of said agency, service, employment, partnership, conspiracy, and joint venture and rendered substantial assistance and encouragement to the other Defendants, knowing that their conduct was wrongful and/or constituted a breach of duty.

IV. JURISDICTION AND VENUE

46. This court's personal jurisdiction over Defendants named herein is proper because each Defendant maintains substantial contacts with California by and through their fossil fuel business operations in this state, as described above, and because Plaintiffs' injuries described herein arose out of and relate to those operations and occurred in California.

47. The Superior Court of California for Santa Cruz County is a court of general jurisdiction and therefore has subject matter jurisdiction over this action.

48. Venue is proper in Santa Cruz County pursuant to Code of Civil Procedure sections 395 and 395.5 because the injuries giving rise to the County's claims occurred in Santa Cruz County.

V. FACTUAL BACKGROUND

A. Global Warming—Observed Effects and Known Cause

49. Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes to the climate system are unprecedented over decades to millennia. Globally, the atmosphere and ocean have warmed, sea level has risen, and the amounts of snow and ice have

diminished, thereby altering hydrologic systems.[20] As a result, extreme weather events have increased, including heat waves, droughts, floods, wildfires, and increased heavy precipitation events.[21]

50. Ocean and land surface temperatures have increased at a rapid pace during the late 20th and early 21st centuries:

a. 2016 was the hottest year on record by globally averaged surface temperatures, exceeding mid-20th century mean ocean and land surface temperatures by approximately 1.69°F.[22] Eight of the twelve months in 2016 were hotter by globally averaged surface temperatures than those respective months in any previous year. October, November, and December 2016 showed the second hottest average surface temperatures for those months, second only to temperatures recorded in 2015.[23]

b. The Earth's hottest month ever recorded was February 2016, followed immediately by the second hottest month on record, March 2016.[24]

c. The second hottest year on record by globally averaged surface temperatures was 2015, and the third hottest was 2014.[25]

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[20] IPCC, Climate Change 2014: Synthesis Report, 40 (2014).

[21] Id. at 8.

[22] NOAA, Global Summary Information – December 2016, https://www.ncdc.noaa.gov/sotc/summary-info/global/201612; NASA, NASA, NOAA Data Show 2016 Warmest Year on Record Globally (press release) (January 18, 2017), https://www.nasa.gov/press-release/nasa-noaa-data-show-2016-warmest-year-on-record-globally.

[23] NASA, NASA, NOAA Data Show 2016 Warmest Year on Record Globally (press release) (January 18, 2017), https://www.nasa.gov/press-release/nasa-noaa-data-show-2016-warmest-year-on-record-globally.

[24] Jugal K. Patel, How 2016 Became Earth's Hottest Year on Record, N.Y. Times (January 18, 2017), https://www.nytimes.com/interactive/2017/01/18/science/earth/2016-hottest-year-on-record.html.

[25] NASA, NASA, NOAA Data Show 2016 Warmest Year on Record Globally (press release) (January 18, 2017), https://www.nasa.gov/press-release/nasa-noaa-data-show-2016-warmest-year-on-record-globally.

d. The ten hottest years on record by globally averaged surface temperature have all occurred since 1998, and sixteen of the seventeen hottest years have occurred since 2001.[26]

e. Each of the past three decades has been warmer by average surface temperature than any preceding decade on record.[27]

f. The period between 1983 and 2012 was likely the warmest 30-year period in the Northern Hemisphere since approximately 700 AD.[28]

51. The average global surface and ocean temperature in 2016 was approximately 1.7°F warmer than the 20th century baseline, which is the greatest positive anomaly observed since at least 1880.[29] The increase in hotter temperatures and more frequent positive anomalies during the Great Acceleration is occurring both globally and locally, including in Santa Cruz County. The graph below shows the increase in global land and ocean temperature anomalies since 1880, as measured against the 1910–2000 global average temperature.[30]

[26] Id.

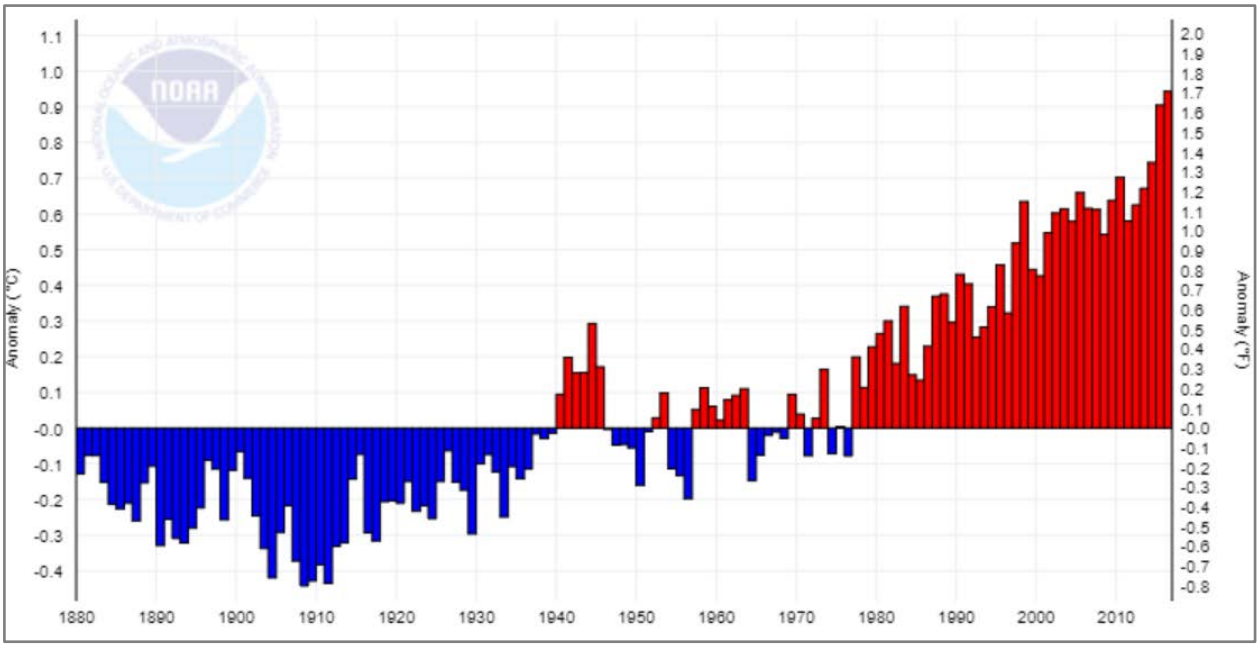
[27] IPCC Climate Change 2014: Synthesis Report at 2 (2014).

[28] Id.

[29] NOAA, National Centers for Environmental Information, Climate at a Glance (Global Time Series) (June 2017) https://www.ncdc.noaa.gov/cag/timeseries/global/globe/land_ocean/ytd/12/1880-2016.

[30] Id.

Global Land and Ocean Temperature Anomalies, January - December



52. The mechanism by which human activity causes global warming and climate change is well established: ocean and atmospheric warming is overwhelmingly caused by anthropogenic greenhouse gas emissions.[31]

53. When emitted, greenhouse gases trap heat within the Earth's atmosphere that would otherwise radiate into space.

54. Greenhouse gases are largely byproducts of humans combusting fossil fuels to produce energy, and using fossil fuels to create petrochemical products.

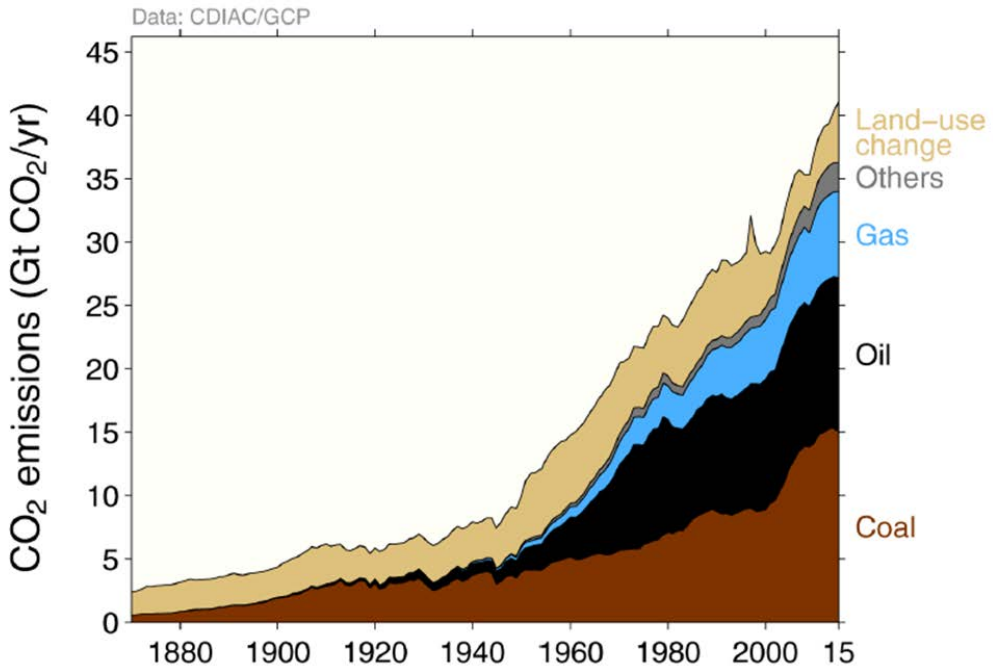
55. Human activity, particularly greenhouse gas emissions, is the primary cause of global warming and its associated effects on Earth's climate.

56. Prior to World War II, most anthropogenic CO_2 emissions were caused by land-use practices, such as forestry and agriculture, which altered the ability of the land and global biosphere to absorb CO_2 from the atmosphere; the impacts of such activities on Earth's climate were relatively minor. Since the beginning of the Great Acceleration, however, both the annual rate and total volume of anthropogenic CO_2 emissions have increased enormously following the advent of

[31] IPCC Climate Change 2014: Synthesis Report at 4 (2014).

major uses of oil, gas, and coal. The graph below shows that while CO_2 emissions attributable to forestry and other land-use change have remained relatively constant, total emissions attributable to fossil fuels have increased dramatically since the 1950s.[32]

Total Annual Carbon Dioxide Emissions by Source, 1860-2015:



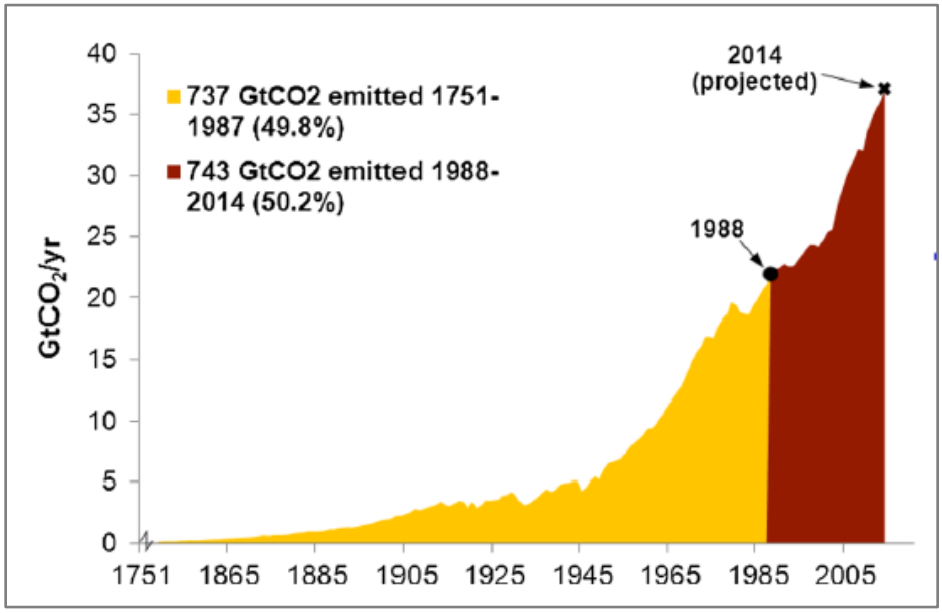
57. As human reliance on fossil fuels for industrial and mechanical processes has increased, so too have greenhouse gas emissions, especially of CO_2. The Great Acceleration is marked by a massive increase in the annual rate of fossil fuel emissions: more than half of all cumulative CO_2 emissions have occurred since 1988.[33] The rate of CO_2 emissions from fossil fuels and industry, moreover, has increased threefold since the 1960s, and by more than 60% since

[32] C. Le Quéré et al., Global Carbon Budget 2016, Earth Syst. Sci. Data 8 (2016), citing CDIAC; R.A. Houghton et al., Carbon Emissions from Land Use and Land-Cover Change, Biogeosciences 9, 5125-5142 (2012), http://www.biogeosciences.net/9/5125/2012/bg-9-5125-2012.html; Louis Giglio et al., Analysis of Daily, Monthly, and Annual Burned Area Using the Fourth-Generation Global Fire Emissions Database, Biogeosciences Vol. 118:1 (2013), http://onlinelibrary.wiley.com/doi/10.1002/jgrg.20042/abstract.

[33] R. J. Andres et al., A synthesis of carbon dioxide emissions from fossil-fuel combustion, Biogeosciences, 9, 1851 (2012), http://www.biogeosciences.net/9/1845/2012/.

1990.[34] The graph below illustrates the increasing rate of global CO_2 emissions since the industrial era began.[35]

Cumulative Annual Anthropogenic Carbon Dioxide Emissions, 1751-2014:



58. Because of the increased use of fossil fuel products, concentrations of greenhouse gases in the atmosphere are now at a level unprecedented in at least 800,000 years.[36] The graph below illustrates the nearly 30% increase in atmospheric CO_2 concentration above pre-Industrial levels since 1960.[37]

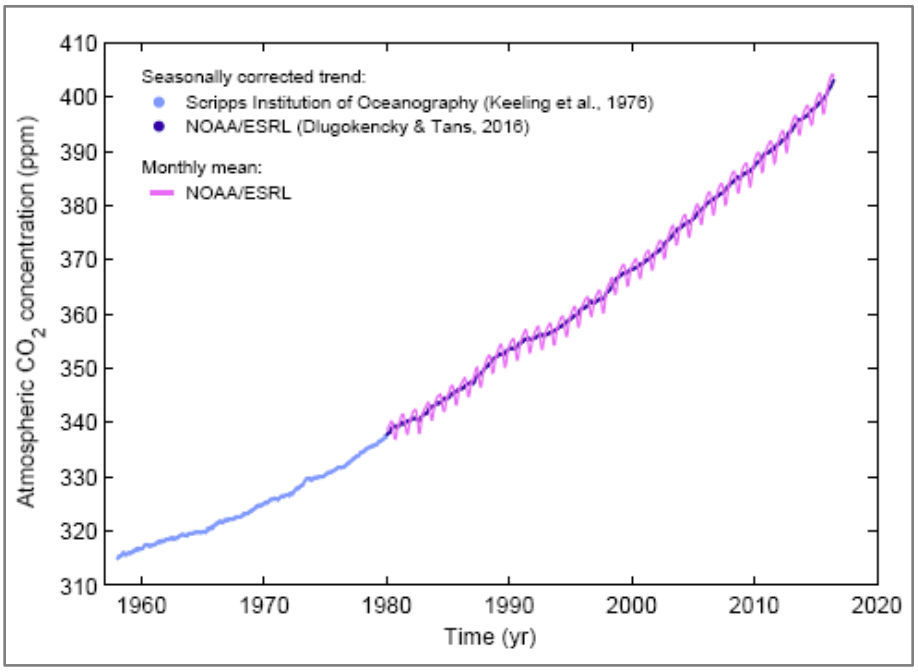
[34] C. Le Quéré et al., Global Carbon Budget 2016, Earth Syst. Sci. Data 8, 625, 630 (2016), http://www.earth-syst-sci-data.net/8/605/2016/ ("Global CO_2 emissions from fossil fuels and industry have increased every decade from an average of 3.1±0.2 GtC/yr in the 1960s to an average of 9.3±0.5 GtC/yr during 2006–2015").

[35] Peter Frumhoff, et al. The Climate Responsibilities of Industrial Carbon Producers, Climatic Change 132:157-171, 164 (2015).

[36] IPCC Climate Change 2014: Synthesis Report at 4 (2014).

[37] C. Le Quéré et al., Global Carbon Budget 2016, Earth Syst. Sci. Data 8, 608 (2016), http://www.earth-syst-sci-data.net/8/605/2016/.

Atmospheric Carbon Dioxide Concentration in Parts Per Million, 1960-2015:



B. Sea Level Rise—Known Causes and Observed Effects

59. Sea level rise is the physical consequence of (a) the thermal expansion of ocean waters as they warm; (b) increased mass loss from land-based glaciers that are melting as ambient air temperature increases; and (c) the shrinking of land-based ice sheets due to increasing ocean and air temperature.[38]

60. Of the increase in energy that has accumulated in the Earth's atmosphere between 1971 and 2010, more than 90% is stored in the oceans.[39]

61. Anthropogenic forcing, in the form of greenhouse gas pollution largely from the production, use and combustion of fossil fuel products, is the dominant cause of global mean sea level rise since 1970, explaining at least 70% of the sea level rise observed between 1970 and 2000.[40] Natural radiative forcing—that is, causes of climate change not related to human activity—

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[38] NOAA, Is Sea Level Rising Ocean Facts (webpage) available at http://oceanservice.noaa.gov/facts/sealevel.html.

[39] IPCC Climate Change 2014: Synthesis Report at 2 (2014).

[40] Aimee B. A. Slangen, et al., Anthropogenic Forcing Dominates Global Mean Sea-Level Rise Since 1970, Nature Climate Change, Vol. 6, 701 (2016).

"makes essentially zero contribution [to observed sea level rise] over the twentieth century (2% over the period 1900–2005)."[41]

62. Anthropogenic greenhouse gas pollution is the dominant factor in each of the independent causes of sea level rise, including the increase in ocean thermal expansion,[42] in glacier mass loss, and in more negative surface mass balance from the ice sheets.[43]

63. There is a well-defined relation between cumulative emissions of CO_2 and committed global mean sea level. This relation, moreover, holds proportionately for committed regional sea level rise.[44]

64. Nearly 100% of the sea level rise from any projected greenhouse gas emissions scenario will persist for at least 10,000 years.[45] This owes to the long residence time of CO_2 in the atmosphere that sustains temperature increases, and inertia in the climate system.[46]

65. Anthropogenic greenhouse gas pollution caused the increased frequency and severity of extreme sea level events (temporary sea level height increases due to storm surges or extreme tides, exacerbated by elevated baseline sea level) observed during the Great Acceleration.[47] The incidence and magnitude of extreme sea level events has increased globally since 1970.[48] The impacts of such events, which generally occur with large storms, high tidal events, offshore low-pressure systems associated with high winds, or the confluence of any of

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[41] Id.

[42] Id.

[43] Id.

[44] Peter U. Clark, et al., Consequences of Twenty-First-Century Policy for Multi-Millennial Climate and Sea-Level Change, Nature Climate Change Vol. 6, 365 (2016).

[45] Id. at 361.

[46] Id. at 360.

[47] IPCC, 2013: Summary for Policymakers, page 7, Table SPM.1 (2013), https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WGIAR5_SPM_brochure_en.pdf.

[48] IPCC, Climate Change 2013: The Physical Science Basis, Contribution of Working Group I to the Fifth Assessment Report of the IPCC, 290 (2013), http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf.

these factors,[49] are exacerbated with higher average sea level, which functionally raises the baseline for the destructive impact of extreme weather and tidal events. Indeed, the magnitude and frequency of extreme sea level events can occur in the absence of increased intensity of storm events, given the increased average elevation from which flooding and inundation events begin. These effects, and others, significantly and adversely affect Plaintiffs, with increased severity in the future.

66. Historical greenhouse gas emissions alone through 2000 will cause a global mean sea level rise of at least 7.4 feet.[50] Additional greenhouse gas emissions from 2001–2015 have caused approximately 10 additional feet of committed sea level rise. Even immediate and permanent cessation of all additional anthropogenic greenhouse gas emissions would not prevent the eventual inundation of land at elevations between current average mean sea level and 17.4 feet of elevation in the absence of adaptive measures.

67. The relationship between anthropogenic CO_2 emissions and committed sea level rise is nearly linear and always positive. For emissions, including future emissions, from the year 2001, the relation is approximately 0.25 inches of committed sea level rise per 1 $GtCO_2$ released. For the period 1965 to 2000, the relation is approximately 0.05 inches of committed sea level rose per 1 $GtCO_2$ released. For the period 1965 to 2015, normal use of Defendants' fossil fuel products caused a substantial portion of committed sea level rise. Each and every additional unit of CO_2 emitted from the use of Defendants' fossil fuel products will add to the sea level rise already committed to the geophysical system.

68. Projected onshore impacts associated with rising sea temperature and water level include, but are not limited to, increases in flooding and erosion; increases in the occurrence, persistence, and severity of storm surges; infrastructure inundation; public and private property damage; and pollution associated with damaged wastewater infrastructure. All of these effects significantly and adversely affect Plaintiffs.

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[49] Id.

[50] Peter U. Clark, et al., Consequences of Twenty-First-Century Policy for Multi-Millennial Climate and Sea-Level Change, Nature Climate Change Vol. 6, 365 (2016).

69. Sea level rise has already taken grave tolls on inhabited coastlines. For instance, the U.S. National Oceanic and Atmospheric Administration ("NOAA") estimates that nuisance flooding occurs from 300% to 900% more frequently within U.S. coastal communities today than just 50 years ago.[51]

70. Nationwide, more than three quarters (76%) of flood days caused by high water levels from sea level rise between 2005 and 2014 (2,505 of the 3,291 flood days) would not have happened but for human-caused climate change. More than two-thirds (67%) of flood days since 1950 would not have happened without the sea level rise caused by increasing greenhouse gas emissions.[52]

71. Regional expressions of sea level rise will differ from the global mean, and are especially influenced by changes in ocean and atmospheric dynamics, as well as the gravitational, deformational, and rotational effects of the loss of glaciers and ice sheets.[53] Due to these effects, Santa Cruz County will experience significantly greater absolute committed sea level rise than the global mean.[54]

72. Santa Cruz's topography, geography, and land use patterns make it particularly susceptible to injuries from sea level rise. Sea level in California, including Santa Cruz County, will continue to rise significantly through at least 2150.[55]

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[51] NOAA, Is Sea Level Rising, Ocean Facts, http://oceanservice.noaa.gov/facts/sealevel.html, (as of June 1, 2017).

[52] Climate Central, Sea Level Rise Upping Ante on 'Sunny Day' Floods (October 17, 2016), http://www.climatecentral.org/news/climate-change-increases-sunny-day-floods-20784.

[53] Peter U. Clark, et al., Consequences of Twenty-First-Century Policy for Multi-Millennial Climate and Sea-Level Change, Nature Climate Change Vol. 6, 364, (2016).

[54] See id., Figure 3(c).

[55] See Gary Griggs et al., Rising Seas in California: An Update on Sea-Level Rise Science, California Ocean Science Trust, p. 26, Table 1(b) (2017), http://www.opc.ca.gov/webmaster/ftp/pdf/docs/rising-seas-in-california-an-update-on-sea-level-rise-science.pdf.

73. Without Defendants' fossil fuel-related greenhouse gas pollution, current sea level rise would have been far less than the observed sea level rise to date.[56] Similarly, committed sea level rise that will occur in the future would also be far less.[57]

C. Disruption to the Hydrologic Cycle—Known Causes and Observed Effects

74. The "hydrologic cycle" describes the temporal and spatial movement of water through oceans, land, and the atmosphere.[58] Evapotranspiration is the process by which water on Earth's surface turns to vapor and is absorbed into the atmosphere. The vast majority of evapotranspiration is due to the sun's energy heating water molecules, resulting in evaporation.[59] Plants also draw water into the atmosphere through transpiration. Volcanoes, sublimation (the process by which solid water changes to water vapor), and human activity also contribute to atmospheric moisture.[60] As water vapor rises through the atmosphere and reaches cooler air, it becomes more likely to condense and fall back to Earth as precipitation.

75. Upon reaching Earth's surface as precipitation, water may take several different paths. It can be reevaporated into the atmosphere; seep into the ground as soil moisture or groundwater; run off into rivers and streams; or stop temporarily as snowpack or ice. It is during these phases, when water is available at or near the Earth's surface, that water is captured for use by humans.

76. Anthropogenic global warming caused by Defendants' fossil fuel products is disrupting and will continue to disrupt the hydrologic cycle in Santa Cruz County by changing evapotranspiration patterns. As the lower atmosphere becomes warmer, evaporation rates have and will continue to increase, resulting in an increase in the amount of moisture circulating throughout

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[56] Robert E. Kopp, et al., Temperature-driven Global Sea-level Variability in the Common Era, Proceedings of the National Academy of Sciences, Vol. 113, No. 11, E1434-E1441, E1438 (2016), http://www.pnas.org/content/113/11/E1434.full.

[57] Peter U. Clark, et al., Consequences of Twenty-First-Century Policy for Multi-Millennial Climate and Sea-Level Change, Nature Climate Change Vol. 6, 365 (2016).

[58] NASA Earth Observatory, The Water Cycle, (webpage), accessed Nov. 29, 2017, available at https://earthobservatory.nasa.gov/Features/Water/page1.php.

[59] See USGS, The Water Cycle: Evaporation (webpage), accessed Nov. 29, 2017, available at https://water.usgs.gov/edu/watercycleevaporation.html.

[60] Id.

the lower atmosphere. An observed consequence of higher water vapor concentrations is a shift toward increased frequency of intense precipitation events, mainly over land areas. Furthermore, because of warmer temperatures, more precipitation is falling as rain rather than snow. These changes affect both the quantity and quality of water resources available to both ecological and human systems, including in Santa Cruz County.

77. California is particularly sensitive to changes in the hydrologic cycle. Annual precipitation totals in California are dependent on precipitation from a relatively few storms. If just one or two storms do not arrive in California or yield less precipitation than needed in a given year, that year's precipitation total and water resources will suffer disproportionately. Alternatively, a relatively few large or "extra" storms may result in a particularly wet year.[61] For context, approximately one-third to one-half of all the precipitation that falls in California, on average, has fallen in only five to ten wet days per year.[62] Historically, California's rainy season is narrow – that is, the opportunity for precipitation and water supply replenishment is already temporally limited – with approximately 95% of annual precipitation falling between October and May, and 66.6% confined to between November and March.

78. The maximum air temperature in the greater San Francisco Bay Area, including Santa Cruz County, has risen over the last century by approximately 1.8°F, and all model and scenario projections indicate it will continue to rise.[63] For example, ambient air temperature projections show continued increases over the coming decades, reaching between 3.6° and 7.2°F in the region by 2100.[64]

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[61] Michael D. Dettinger, et al., Atmospheric Rivers, Floods and the Water Resources of California, Water Vol. 3, 445-478, 461 (2011).

[62] Id.

[63] U.S. Geological Survey, Simulation of Climate Change in San Francisco Bay Basins, California: Case Studies in the Russian River Valley and Santa Cruz Mountains, Scientific Investigations Report 2012-5132, 12 (2012).

[64] See id.

79. As Earth's surface temperature has increased, so has evaporation.[65] Moreover, for every 1.8ºF of anthropogenic global warming, the atmosphere's capacity to hold water vapor increases by 7%.[66] Thus, anthropogenic global warming has increased the total volume of water vapor in the atmosphere at any given time.[67]

80. In Santa Cruz County, anthropogenic climate change is compressing precipitation into mid-winter (January-February) months, which will create drier than normal conditions in the County in the fall (November-December) and spring (March-April), effectively extending the summer "dry" season and compressing the winter "wet" season.

81. Additionally, California is moving toward a regime in which annual rainfall is increasingly either extremely abundant, or extremely lacking, with fewer "normal" rainfall years occurring in 1982-2015 as compared to 1949-1981.[68]

82. The upshot is that the same amount of rain will fall in a shorter period via more intense storms in Santa Cruz County. The water supply generated from those events evaporates more quickly, resulting in diminished surface water availability and diminished groundwater recharge. In turn, this will diminish water supply for both human and ecological demand. Decreased soil moisture will result in increased fuel aridity – that is, vegetation will dry out quickly and completely in the absence of water, increasing its flammability.

83. Because of anthropogenic global warming, Santa Cruz County's hydrologic regime is shifting toward one that is characterized by more frequent and severe drought, more extreme

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[65] NASA Earth Observatory, The Water Cycle, (webpage), accessed Nov. 29, 2017, available at https://earthobservatory.nasa.gov/Features/Water/page1.php.

[66] IPCC, Climate Change 2013: The Physical Science Basis, Contribution of Working Group I to the Fifth Assessment Report of the IPCC, 290 (2013), http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf.

[67] NASA Earth Observatory, The Water Cycle, (webpage), accessed Nov. 29, 2017, available at https://earthobservatory.nasa.gov/Features/Water/page1.php.

[68] Daniel L. Swain, et al., Trends in Atmospheric Patters Conducive to Seasonal Precipitation and Temperature Extremes in California, Science Advances, e10501344, p. 5 (2016); U.S. Geological Survey, Simulation of Climate Change in San Francisco Bay Basins, California: Case Studies in the Russian River Valley and Santa Cruz Mountains, Scientific Investigations Report 2012-5132, p. 36 (2012).

precipitation events, more frequent and severe heatwaves, and more frequent and severe wildfires. These individual consequences of changes to the hydrologic regime are described below.

i. Drought

84. Drought is a period of moisture deficit defined either by a deficiency in the amount or timing of precipitation relative to a reference period ("meteorological drought"), or by a shortage of water supply for specific human, ecological, or other uses ("hydrologic drought"). Drought originates from a deficiency in precipitation and/or an elevation of temperature (and therefore evaporation) relative to normal conditions, resulting in a water shortage for an activity, group, or ecological use.[69]

85. As a result of anthropogenic global warming, Santa Cruz County's hydrologic regime is shifting toward one that is characterized by more frequent, more intense drought.[70]

86. California and Santa Cruz County most recently experienced a record-setting drought in 2012-2016, which featured the lowest multi-year precipitation total recorded in the state, as well as the highest annual temperature.[71] Anthropogenic warming was a substantial contributing cause of the severity of that drought, [72] which caused significant and material injuries in Santa Cruz County.

87. As annual rainfall concentrates into a shorter time span, the annual dry period is growing longer, resulting in conditions of moisture deficiency over longer periods. Even in the absence of substantial changes in average precipitation in the County, precipitation will fall in a shorter time span and therefore be less susceptible to capture and use.

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[69] See, e.g., Donald A. Wilhite and Michael H. Glantz, Understanding the Drought Phenomenon: The Role of Definitions, Drought Mitigation Center Faculty Publications 20 (1985)

[70] Union of Concerned Scientists, Causes of Drought: What's the Climate Connection? (webpage), http://www.ucsusa.org/global_warming/science_and_impacts/impacts/causes-of-drought-climate-change-connection.html#.WgCiK2i3w0F (accessed Nov. 6, 2017).

[71] Noah S. Diffenbaugh, et al., Anthropogenic Warming Has Increased Drought Risk in California, Proceedings of the National Academy of Sciences, 3931-3936, 3931 (2015).

[72] See A. Park Williams, et al., Contribution of Anthropogenic Warming to California Drought During 2012-2014 Geophysical Research Letters, 42, 6819-6828 (2015).

88. An increase in the frequency and persistence of unusual atmospheric pressure patterns also have contributed to the frequency of meteorological drought in California and the County. For instance, multi-year persistence of an atmospheric high-pressure ridge off the California coast that diverted atmospheric moisture away from California was a substantial contributor to the absence of precipitation during the 2012-2016 California drought.[73]

89. The co-occurrence of the precipitation/moisture deficits that constitute "drought" with extremely warm temperatures induced by anthropogenic global warming exacerbates the impacts of precipitation deficits by amplifying evapotranspiration and inducing increased groundwater withdrawal and surface water diversion, thereby magnifying the impacts of drought in Santa Cruz County.[74] Continued global warming is likely to cause a transition to a regime in which essentially every seasonal, annual, and multiannual precipitation deficit co-occurs with historically warm ambient temperatures.[75] Thus, future droughts in the County are expected to be more severe than historical droughts, with an attendant exacerbation of drought impacts.

ii. Extreme Precipitation

90. Evaporation increases with surface temperature, and warmer air can hold more moisture than cooler air. The increase in water vapor in the atmosphere, via increased evapotranspiration and increased capacity, increases the intensity of precipitation that falls from the atmosphere.

91. A consequence of higher water vapor concentrations in the atmosphere is the increased frequency of intense precipitation events.[76] Moreover, a larger proportion of precipitation will fall in a shorter amount of time as compared to the historical average.[77]

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[73] Noah S. Diffenbaugh, et al., Anthropogenic Warming Has Increased Drought Risk in California, Proceedings of the National Academy of Sciences, 3931-3936, 3931 (2015).
[74] Id.
[75] Id. at 3934.
[76] NASA Earth Observatory, The Water Cycle, (webpage), accessed Nov. 29, 2017, available at https://earthobservatory.nasa.gov/Features/Water/page1.php.
[77] Id.

Extreme precipitation episodes in California will become even more extreme as the climate changes.[78]

92. Extreme precipitation events (the upper 0.1% of daily rain events) have increased substantially over the past 100 years in the United States, by about 33%.[79] In California, the weather phenomena that drive extreme precipitation events are increasing in both frequency and magnitude.

93. Historically, the most dangerous storms in California have been warm and wet storms that strike in winter, producing intense rains over large areas, melting snowpack in the Sierra Nevada, and unleashing many of the State's largest floods.[80] These storms are delivered via atmospheric rivers – bands of warm, moist air containing water vapor evaporated in southerly latitudes that transport water from the tropics to the western U.S.[81] When atmospheric rivers hit the mountainous topography of California, Pacific moisture is forced out of the atmosphere as very intense precipitation, the magnitude of which can rival the intensity of landfalling hurricanes in the tropics.[82] Atmospheric river storms are the primary meteorological cause of extreme precipitation and flooding in California.[83] Projections indicate that major atmospheric river storms with attendant winter flooding will increase with warming of the climate.[84] Winters with exceptionally large numbers of atmospheric river storms will increase in the 21st Century.[85] Moreover, the amount of precipitation delivered by future atmospheric rivers will increase with

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[78] Michael Dettinger, Climate Change, Atmospheric Rivers, and Floods in California – A Multimodel Analysis of Storm Frequency and Magnitude Changes, Journal of the American Water Resources Association Vol. 47, No. 3, 515 (2011).
[79] Groisman, P. Y. A. *et al.* Trends in intense precipitation in the climate record J. Clim. 18, 1326–1350 (2005).
[80] Michael Dettinger, Climate Change, Atmospheric Rivers, and Floods in California – A Multimodel Analysis of Storm Frequency and Magnitude Changes, Journal of the American Water Resources Association Vol. 47, No. 3, 515 (2011).
[81] Id.
[82] Id.
[83] Id.
[84] Id. at 518.
[85] See id.

anthropogenic global warming.[86] Projections show that future atmospheric river storms may exceed the intensity of any atmospheric river storm previously observed.[87]

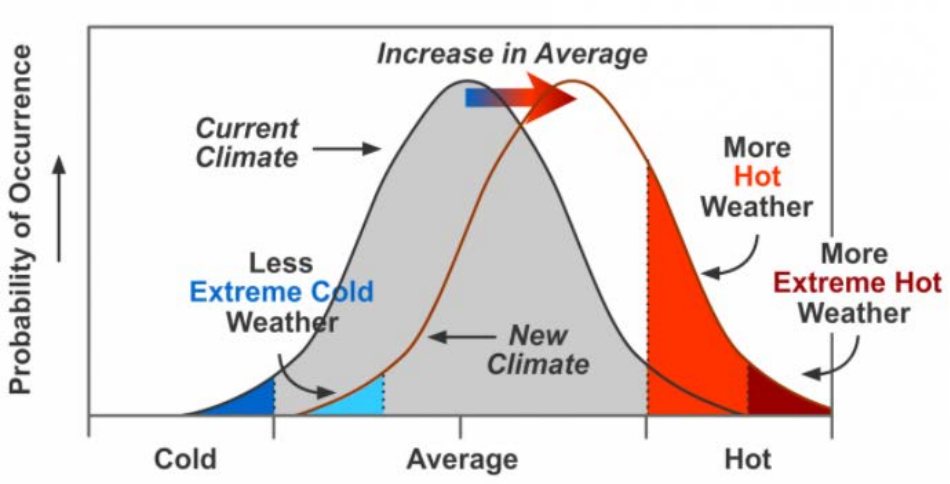
94. Heavy precipitation events (defined as rainfall equal to or greater than the historical 95th percentile) will increase in frequency by 3.1 events per year by the year 2100.[88]

95. Among other impacts, extreme precipitation events cause, contribute to, or exacerbate disruption of surface substrate, thereby leading to increased frequency and magnitude of landslides.

iii. Heat Waves

96. Heatwaves are prolonged periods with excessive ambient temperatures, often (but not necessarily) defined with reference to historical temperatures at a given locale.

97. As Earth's surface temperature warms, there is not only an overall increase in average temperature but also a frequency of extremely warm temperature, corresponding with a decrease in extremely cold temperature. The following graph illustrates the statistical shift in expected average and extreme temperatures due to climate change.[89]



[86] Id. at 520.
[87] Id. at 521
[88] Xiang Gao, et al., 21st Century Changes in U.S. Heavy Precipitation Frequency Based on Resolved Atmospheric Patterns, MIT Joint Program on the Science and Policy of Global Change: Report 302, 15 (2016).
[89] IPCC, Fourth Assessment Report: Climate Change 2007: Working Group I: The Physical Science Basis Box TS.5, Figure 1, *available at* https://www.ipcc.ch/publications_and_data/ar4/wg1/en/box-ts-5-figure-1.html.

98. Since as early as the 1950s, increases in the duration, intensity, and especially the frequency of heatwaves have been detected over many regions,[90] including the western United States.[91]

99. Record-breaking high temperatures are now outnumbering record lows by an average decadal ratio of 2:1 across the United States.[92] This represents an increase from approximately 1.09 high temperature records for every 1 low temperature record in the 1950s, and 1.36 high temperature records for every 1 low temperature record in the 1990s.[93]

100. The frequency of record high temperatures relative to record low temperatures will continue to increase with future anthropogenic global warming. For instance, under even a moderate rising emissions scenario, the ratio of record high maximum to record low minimum temperatures in the US will continue to increase, reaching ratios of about 20:1 by 2050, and roughly 50:1 by 2100.[94]

101. The annual average number of extreme heat days[95] has increased in Santa Cruz County relative to the historical baseline. [96]

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[90] S.E. Perkins-Kirkpatrick & P.B. Gibson, Changes in Regional Heatwave Characteristics as a Function of Increasing Global Temperature, Scientific Reports 7:12256 at 1 (2017).

[91] See Noah. S. Diffenbaugh & Moestasim Ashfaq, Intensification of Hot Extremes in the United States, Geophysical Research Letters Vol. 37, L15701 at 2 (2010).

[92] Gerald A. Meehl, et al., Relative Increase of Record High Maximum Temperatures Compared to Record Low Minimum Temperatures in the U.S. Geophysical Research Letters, L23701 at 3 (2009).

[93] See Climate Signals beta Record High Temps vs. Record Low Temps (webpage), accessed Dec. 5, 2017, available at http://www.climatesignals.org/data/record-high-temps-vs-record-low-temps.

[94] Gerald A. Meehl, et al., Relative Increase of Record High Maximum Temperatures Compared to Record Low Minimum Temperatures in the U.S. Geophysical Research Letters, L23701 at 3 (2009).

[95] Defined as days in April-October that meet or exceed the 98th percentile of historical maximum temperatures between April 1 and October 31 based on observed daily temperature data from 1961–1990.

[96] See California Energy Commission, Cal-Adapt: Exploring California's Climate Change Research, Number of Extreme Heat Days Tool, accessed Nov. 30, 2017, available at http://cal-adapt.org.

102. With future emissions, the annual average number of extreme heat days will continue to increase substantially in the County.[97]

iv. Wildfires

103. The climatic and meteorological trends toward longer, hotter, drier summers in Santa Cruz County are key indicia of increased fire occurrence, area burned, and fire behavior.[98] Climate drives moisture availability and weather conditions that increase fire risk.[99] Wet conditions during winter and spring promote fuel (vegetation) growth, while dry conditions prior to and during fire season increase the flammability of live and dead fuels that sustain wildfires.[100] Factors that limit and/or facilitate wildfires that are interrelated to moisture availability include fuel aridity,[101] fuel density, ambient meteorological conditions (temperature, relative humidity, wind, and precipitation), availability of ignition sources (lightning and anthropogenic sources), and fire suppression rates.[102]

104. In Northern California, including Santa Cruz County, there is a positive correlation between autumn-winter temperatures and the area burned in the subsequent fire season (i.e. higher temperature in a given autumn-winter correlates with larger areas burned in the following fire season), and a negative correlation between moisture availability and the area burned during the fire season (i.e. less moisture correlates to more area burned).[103] Thus, as temperatures increase,

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[97] Id.

[98] John T. Abatzoglou & Crystal A. Kolden, Relationships Between Climate and Macroscale Area Burned in the Western United States, International Journal of Wildland Fire at A (2013).

[99] A.L. Westerling & B.P. Bryant, Climate Change and Wildfire in California, Climatic Change, 87 (Suppl. 1) S231-S249, S233 (2007).

[100] Id.

[101] John T. Abatzoglou & A. Park Williams, Impact of Anthropogenic Climate Change on Wildfires Across Western US Forests, Proceedings of the National Academy of Sciences, Vol. 113, No. 42, E11770-11775, E11770 (2016) (citations omitted).

[102] O. Pechony & D.T. Shindell, Driving Forces of Global Wildfires Over the Past Millenium and the Forthcoming Century, Proceedings of the National Academy of Sciences, Vol. 107, No. 45, 19167-19170, 19167 (2010).

[103] John T. Abatzoglou & Crystal A. Kolden, Relationships Between Climate and Macroscale Area Burned in the Western United States, International Journal of Wildland Fire at F (2013).

and moisture availability decreases with anthropogenic global warming's effects on the hydrologic cycle, conditions have and will continue to become more conducive to wildfires in the County.

105. Fire activity, including the number of large fires, total area burned, and fire-season length, have all increased across the western United States in the last half century.[104] Man-made global warming has and will continue to exacerbate the areal extent and frequency of extreme fire risk in California, including Santa Cruz County.[105]

106. Anthropogenic climate change is responsible for increasing the number of days in which there is a high fire potential in the western United States, including Santa Cruz County, by a substantial number per year over the period 1979-2015.[106]

107. Anthropogenic forcing, in the form of greenhouse gas pollution attributable to the defendants' fossil fuel products, is responsible for nearly doubling the land surface area burned by wildfires in the western United States, which includes Santa Cruz County, over the period 1984-2015.[107] The net increase in burned area attributable to anthropogenic climate change in the Western United States during that timeframe is approximately 10.4 million acres.[108]

108. The annual average area burned by wildfires in Santa Cruz County has increased substantially from the period 1961-1990 to the period 2006-2017.[109]

109. The average area in Santa Cruz County annually burned by wildfires will continue to increase substantially at least through the 2099 relative to the historical baseline.[110]

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[104] John T. Abatzoglou & A. Park Williams, Impact of Anthropogenic Climate Change on Wildfires Across Western US Forests, Proceedings of the National Academy of Sciences, Vol. 113, No. 42, E11770-11775, E11770 (2016) (citations omitted).

[105] See Jin-Ho Yoon, et al., Extreme Fire Season in California: A Glimpse into the Future?, Bulletin of the American Meteorological Society,

[106] John T. Abatzoglou & A. Park Williams, Impact of Anthropogenic Climate Change on Wildfires Across Western US Forests, Proceedings of the National Academy of Sciences, Vol. 113, No. 42, E11770-11775, E11771 (2016).

[107] Id.

[108] Id.

[109] See California Energy Commission, Cal-Adapt: Exploring California's Climate Change Research, Wildfire Tool, accessed Nov. 30, 2017, available at http://cal-adapt.org.

[110] Id.

D. Attribution

110. "Carbon factors" analysis, devised by the International Panel on Climate Change (IPCC), the United Nations International Energy Agency, and the U.S. Environmental Protection Agency, quantifies the amount of CO_2 emissions attributable to a unit of raw fossil fuel extracted from the Earth.[111] Emissions factors for oil, coal, liquid natural gas, and natural gas are different for each material but are nevertheless known and quantifiable for each.[112] This analysis accounts for the use of Defendants' fossil fuel products, including non-combustion purposes that sequester CO_2 rather than emit it (e.g., production of asphalt).

111. Defendants' historical and current fossil fuel extraction and production records are publicly available in various fora. These include university and public library collections, company websites, company reports filed with the U.S. Securities and Exchange Commission, company histories, and other sources. The cumulative CO_2 and methane emissions attributable to Defendants' fossil fuel products were calculated by reference to such publicly available documents.

112. While it is possible to distinguish CO_2 derived from fossil fuels from other sources, it is not possible to determine the source of any particular individual molecule of CO_2 in the atmosphere attributable to anthropogenic sources because such greenhouse gas molecules do not bear markers that permit tracing them to their source, and because greenhouse gasses quickly diffuse and comingle in the atmosphere. However, cumulative carbon analysis allows an accurate calculation of net annual CO_2 and methane emissions attributable to each Defendant by quantifying the amount and type of fossil fuels products each Defendant extracted and placed into the stream of commerce, and multiplying those quantities by each fossil fuel product's carbon factor.

113. Defendants, through their extraction, promotion, marketing, and sale of their fossil fuel products, caused approximately 17.5% of global fossil fuel product-related CO_2 between 1965

[111] See Richard Heede, Tracing Anthropogenic Carbon Dioxide and Methane Emissions to Fossil Fuel and Cement Producers, 1854-2010, Climatic Change 122, 232-33 (2014), https://link.springer.com/article/10.1007/s10584-013-0986-y.

[112] See, e.g., id.

and 2015, with contributions currently continuing unabated. This constitutes a substantial portion of all such emissions in history, and the attendant historical, projected, and committed sea level rise and climatological changes associated therewith.

114. By quantifying CO_2 and methane pollution attributable to Defendants by and through their fossil fuel products, ambient air and ocean temperature, sea level, and hydrologic cycle responses to those emissions are also calculable, and can be attributed to Defendants on an individual and aggregate basis. Individually and collectively, Defendants' extraction, sale, and promotion of their fossil fuel products are responsible for substantial increases in ambient (surface) temperature, ocean temperature, sea level, droughts, extreme precipitation events, heat waves, wildfires, and other adverse impacts on Plaintiffs described herein.

115. Anthropogenic CO_2 emissions have caused a substantial portion of both observed and committed mean global sea level rise.[113]

116. Anthropogenic CO_2 emissions have caused and will continue to cause increased frequency and severity of droughts.[114]

117. Anthropogenic CO_2 emissions have caused and will continue to cause increases in daily precipitation extremes over land.[115]

118. Anthropogenic CO_2 emissions have caused and will continue to cause increased frequency and magnitude of maximum temperature extremes relative to the historical baseline. [116]

119. Anthropogenic CO_2 emissions have caused and will continue to cause increased frequency and magnitude of wildfires, resulting in additional acreage burned on an annual basis.[117]

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[113] Peter U. Clark et al., Consequences of Twenty-First-Century Policy for Multi-Millennial Climate and Sea-Level Change, Nature Climate Change Vol. 6, 365 (2016).

[114] See, e.g., A. Park Williams, et al., Contribution of Anthropogenic Warming to California Drought during 2012-2014 Geophysical Research Letters 42, 6819-6828 (2015).

[115] See, e.g., E.M. Fischer & R. Knutti, Anthropogenic Contribution to Global Occurrence of Heavy-Precipitation and High-Temperature Extremes, Nature Climate Change Vol. 5, 560 – 564 (2015).

[116] See, e.g., id.

[117] See, e.g., John T. Abatzoglou & A. Park Williams, Impact of Anthropogenic Climate Change on Wildfires Across Western US Forests, Proceedings of the National Academy of Sciences, Vol. 113, No. 42, E11770-11775, E11770 (2016)

120. Defendants, through their extraction, promotion, marketing, and sale of their fossil fuel products, caused a substantial portion of both those emissions and the attendant historical, projected, and committed sea level rise and other consequences of the resulting hydrologic cycle changes described herein, including increased droughts, extreme weather events, and wildfires.

121. As explained above, this analysis considers only the volume of raw material actually extracted from the Earth by these Defendants. Many of these Defendants actually are responsible for far greater volumes of emissions because they also refine, manufacture, produce, market, promote, and sell more fossil fuel derivatives than they extract themselves by purchasing fossil fuel products extracted by independent third parties.

122. In addition, considering the Defendants' lead role in promoting, marketing, and selling their fossil fuels products between 1965 and 2015; their efforts to conceal the hazards of those products from consumers; their promotion of their fossil fuel products despite knowing the dangers associate with those products; their dogged campaign against regulation of those products based on falsehoods, omissions, and deceptions; and their failure to pursue less hazardous alternatives available to them, Defendants, individually and together, have substantially and measurably contributed to the Plaintiffs' climate change-related injuries.

E. Defendants Went to Great Lengths to Understand the Hazards Associated with, and Knew or Should Have Known of the Dangers Associated with the Extraction, Promotion, and Sale of Their Fossil Fuel Products.

123. By 1965, concern about the risks of anthropogenic greenhouse gas emissions reached the highest level of the United States' scientific community. In that year, President Lyndon B. Johnson's Science Advisory Committee Panel on Environmental Pollution reported that by the year 2000, anthropogenic CO_2 emissions would "modify the heat balance of the atmosphere to such an extent that marked changes in climate . . . could occur."[118] President Johnson announced in a special message to Congress that "[t]his generation has altered the composition of the

[118] President's Science Advisory Committee, Restoring the Quality of Our Environment: Report of the Environmental Pollution Panel, page 9 (November 1965), https://hdl.handle.net/2027/uc1.b4315678.

atmosphere on a global scale through . . . a steady increase in carbon dioxide from the burning of fossil fuels."[119]

124. These statements from the Johnson Administration, at a minimum, put Defendants on notice of the potentially substantial dangers to people, communities, and the planet associated with unabated use of their fossil fuel products. Moreover, Defendants had amassed a considerable body of knowledge on the subject through their own independent efforts.

125. A 1963 Conservation Foundation report on a conference of scientists referenced in the 1966 World Book Encyclopedia, as well as in presidential panel reports and other sources around that time, described many specific consequences of rising greenhouse gas pollution in the atmosphere. It warned that a doubling of carbon dioxide "could be enough to bring about immense flooding of lower portions of the world's land surface, resulting from increased melting of glaciers." The publication also asserted that "a continuing rise in the amount of atmospheric carbon dioxide is likely to be accompanied by a significant warming of the surface of the earth which by melting the polar ice caps would raise sea level and by warming the oceans would change considerably the distributions of marine species including commercial fisheries." It warned of the potential inundation of "many densely settled coastal areas, including the cities of New York and London" and the possibility of "wiping out the world's present commercial fisheries." The report, in fact, noted that "the changes in marine life in the North Atlantic which accompanied the temperature change have been very noticeable".[120]

[119] President Lyndon B. Johnson, Special Message to Congress on Conservation and Restoration of Natural Beauty (February 8, 1965), http://acsc.lib.udel.edu/items/show/292.

[120] The Conservation Foundation, Implications of Rising Carbon Dioxide Content of the Atmosphere: A statement of trends and implications of carbon dioxide research reviewed at a conference of scientists, (March 1963), https://babel.hathitrust.org/cgi/pt?id=mdp.39015004619030;view=1up;seq=5.

126. In 1968, a Stanford Research Institute (SRI) report commissioned by the American Petroleum Institute ("API") and made available to all of its members, concluded, among other things:

> If the Earth's temperature increases significantly, a number of events might be expected to occur including the melting of the Antarctic ice cap, a rise in sea levels, warming of the oceans and an increase in photosynthesis. . . .
>
> It is clear that we are unsure as to what our long-lived pollutants are doing to our environment; however, there seems to be no doubt that the potential damage to our environment could be severe. . . . [T]he prospect for the future must be of serious concern.[121]

127. In 1969, Shell memorialized an on-going 18-month project to collect ocean data from oil platforms to develop and calibrate environmental forecasting theories related to predicting wave, wind, storm, sea level, and current changes and trends.[122] Several Defendants and/or their predecessors in interest participated in the project, including Esso Production Research Company (ExxonMobil), Mobil Research and Development Company (ExxonMobil), Pan American Petroleum Corporation (BP), Gulf Oil Corporation (Chevron), Texaco Inc. (Chevron), and the Chevron Oil Field Research Company.

128. In a 1970 report by H.R. Holland from the Engineering Division of Imperial Oil (Exxon), he stated: "Since pollution means disaster to the affected species, the only satisfactory course of action is to prevent it – to maintain the addition of foreign matter at such levels that it can be diluted, assimilated or destroyed by natural processes – to protect man's environment from man." He also noted that "a problem of such size, complexity and importance cannot be dealt with on a voluntary basis." CO_2 was listed as an air pollutant in the document.[123]

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[121] Elmer Robinson and R.C. Robbins, Sources, Abundance, and Fate of Gaseous Atmospheric Pollutants, Stanford Research Institute (February 1968), https://www.smokeandfumes.org/documents/document16.

[122] M.M. Patterson, An Ocean Data Gathering Program for the Gulf of Mexico, Society of Petroleum Engineers (1969), https://www.onepetro.org/conference-paper/SPE-2638-MS.

[123] H.R. Holland, Pollution is Everybody's Business, Imperial Oil (1970), https://www.desmogblog.com/sites/beta.desmogblog.com/files/DeSmogBlog-Imperial%20Oil%20Archive-Pollution-Everyone-Business-1970.pdf

129. In 1972, API members, including Defendants, received a status report on all environmental research projects funded by API. The report summarized the 1968 SRI report describing the impact of Defendants' fossil fuel products on the environment, including global warming and its many impacts. Industry participants who received this report include: American Standard of Indiana (BP), Asiatic (Shell), Ashland (Marathon), Atlantic Richfield (BP), British Petroleum (BP), Chevron Standard of California (Chevron), Cities Service (Citgo), Continental (ConocoPhillips), Dupont (former owner of Conoco), Esso Research (ExxonMobil), Ethyl (formerly affiliated with Esso, which was subsumed by ExxonMobil), Getty (ExxonMobil), Gulf (Chevron, among others), Humble Standard of New Jersey (ExxonMobil/Chevron/BP), Marathon, Mobil (ExxonMobil), Pan American (BP), Phillips (ConocoPhillips), Shell, Standard of Ohio (BP), Texaco (Chevron), Union (Chevron), Edison Electric Institute (representing electric utilities), Bituminous Coal Research (coal industry research group), Mid-Continent Oil & Gas Association (presently the U.S. Oil & Gas Association, a national trade association), Western Oil & Gas Association, National Petroleum Refiners Association (presently the American Fuel and Petrochemical Manufacturers Association, a national trade association), Champlin (Anadarko), Skelly (ExxonMobil), Colonial Pipeline (ownership has included BP, Citgo, ExxonMobil, ConocoPhillips, Chevron entities, among others) and Caltex (Chevron), among others.[124]

130. In a 1977 presentation and again in a 1978 briefing, Exxon scientists warned the Exxon Corporation Management Committee that CO_2 concentrations were building in the Earth's atmosphere at an increasing rate, that CO_2 emissions attributable to fossil fuels were retained in the atmosphere, and that CO_2 was contributing to global warming.[125] The report stated:

> There is general scientific agreement that the most likely manner in which mankind is influencing the global climate is through carbon dioxide release from the burning of fossil fuels . . . [and that] Man has a time window of five to ten years before the

[124] American Petroleum Institute, Environmental Research, A Status Report, Committee for Air and Water Conservation (January 1972), http://files.eric.ed.gov/fulltext/ED066339.pdf.

[125] Memo from J.F. Black to F.G. Turpin, The Greenhouse Effect, Exxon Research and Engineering Company (June 6, 1978), http://www.climatefiles.com/exxonmobil/1978-exxon-memo-on-greenhouse-effect-for-exxon-corporation-management-committee/.

> need for hard decisions regarding changes in energy strategies might become critical.[126]

One presentation slide read: "Current scientific opinion overwhelmingly favors attributing atmospheric carbon dioxide increase to fossil fuel combustion."[127] The report also warned that "a study of past climates suggests that if the earth does become warmer, more rainfall should result. But an increase as large as 2°C would probably also affect the distribution of the rainfall." Moreover, in summary, the report concluded that "doubling in CO_2 could increase average global temperature 1°C to 3°C by 2050 A.D. (10°C predicted at poles)."[128]

131. Thereafter, Exxon engaged in a research program to study the environmental fate of fossil fuel-derived greenhouse gases and their impacts, which included publication of peer-reviewed research by Exxon staff scientists and the conversion of a supertanker into a research vessel to study the greenhouse effect and the role of the oceans in absorbing anthropogenic CO_2. Much of this research was shared in a variety of fora, symposia, and shared papers through trade associations and directly with other Defendants.

132. Exxon scientists made the case internally for using company resources to build corporate knowledge about the impacts of the promotion, marketing, and consumption of Defendants' fossil fuel products. Exxon climate researcher Henry Shaw wrote in 1978: "The rationale for Exxon's involvement and commitment of funds and personnel is based on our need to assess the possible impact of the greenhouse effect on Exxon business. Exxon must develop a credible scientific team that can critically evaluate the information generated on the subject and be able to carry bad news, if any, to the corporation."[129] Moreover, Shaw emphasized the need to

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[126] Id.

[127] Id.

[128] Id.

[129] Henry Shaw, Memo to Edward David Jr. on the "Greenhouse Effect", Exxon Research and Engineering Company (December 7, 1978), http://insideclimatenews.org/sites/default/files/documents/Credible%20Scientific%20Team%201978%20Letter.pdf.

collaborate with universities and government to more completely understand what he called the "CO_2 problem."[130]

133. In 1979, API and its members, including Defendants, convened a Task Force to monitor and share cutting edge climate research among the oil industry. The group was initially called the CO_2 and Climate Task Force, but changed its name to the Climate and Energy Task Force in 1980 (hereinafter referred to as "API CO_2 Task Force"). Membership included senior scientists and engineers from nearly every major U.S. and multinational oil and gas company, including Exxon, Mobil (ExxonMobil), Amoco (BP), Phillips (ConocoPhillips), Texaco (Chevron), Shell, Sunoco, Sohio (BP) as well as Standard Oil of California (BP) and Gulf Oil (Chevron, among others). The Task Force was charged with assessing the implications of emerging science on the petroleum and gas industries and identifying where reductions in greenhouse gas emissions from Defendants' fossil fuel products could be made.[131]

134. In 1979, API sent its members a background memo related to the API CO_2 and Climate Task Force's efforts, stating that CO_2 concentrations were rising steadily in the atmosphere, and predicting when the first clear effects of climate change might be felt.[132]

135. Also in 1979, Exxon scientists advocated internally for additional fossil fuel industry-generated atmospheric research in light of the growing consensus that consumption of fossil fuel products was changing the Earth's climate:

> "We should determine how Exxon can best participate in all these [atmospheric science research] areas and influence possible legislation on environmental controls. It is important to begin to anticipate the strong intervention of

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[130] Id.

[131] American Petroleum Institute, AQ-9 Task Force Meeting Minutes (March 18, 1980), http://insideclimatenews.org/sites/default/files/documents/AQ-9%20Task%20Force%20Meeting%20%281980%29.pdf (AQ-9 refers to the "CO2 and Climate" Task Force).

[132] Neela Banerjee, Exxon's Oil Industry Peers Knew About Climate Dangers in the 1970s, Too, Inside Climate News (December 22, 2015), https://insideclimatenews.org/news/22122015/exxon-mobil-oil-industry-peers-knew-about-climate-change-dangers-1970s-american-petroleum-institute-api-shell-chevron-texaco.

> environmental groups and be prepared to respond with reliable and credible data. It behooves [Exxon] to start a very aggressive defensive program in the indicated areas of atmospheric science and climate because there is a good probability that legislation affecting our business will be passed. Clearly, it is in our interest for such legislation to be based on hard scientific data. The data obtained from research on the global damage from pollution, e.g., from coal combustion, will give us the needed focus for further research to avoid or control such pollutants."[133]

136. That same year, Exxon Research and Engineering reported that: "The most widely held theory [about increasing CO_2 concentration] is that the increase is due to fossil fuel combustion, increasing CO_2 concentration will cause a warming of the earth's surface, and the present trend of fossil fuel consumption will cause dramatic environmental effects before the year 2050."[134] According to the report, "ecological consequences of increased CO_2" to 500 ppm (1.7 times 1850 levels) could mean: "a global temperature increase of 3°F"; "the southwest states would be hotter, probably by more than 3°F, and drier"; "the southwest water shortage would become more acute"; "most of the glaciers in the North Cascades and Glacier National Park would be melted" and "there would be less of a winter snow pack in the Cascades, Sierras, and Rockies, necessitating a major increase in storage reservoirs"; "marine life would be markedly changed" and "maintaining runs of salmon and steelhead and other subarctic species in the Columbia River system would become increasingly difficult."[135] With a doubling of the 1860 CO_2 concentration, "ocean levels would rise four feet" and "the Arctic Ocean would be ice free for at least six months each year, causing major shifts in weather patterns in the northern hemisphere."[136]

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[133] Henry Shaw, Exxon Memo to H.N. Weinberg about "Research in Atmospheric Science", Exxon Inter-Office Correspondence (November 19, 1979), https://insideclimatenews.org/sites/default/files/documents/Probable%20Legislation%20Memo%20(1979).pdf.

[134] W.L. Ferrall, Exxon Memo to R.L. Hirsch about "Controlling Atmospheric CO_2", Exxon Research and Engineering Company (October 16, 1979), http://insideclimatenews.org/sites/default/files/documents/CO2%20and%20Fuel%20Use%20Projections.pdf.

[135] Id.

[136] Id.

137. Further, the report stated that unless fossil fuel use was constrained, there would be "noticeable temperature changes" associated with an increase in atmospheric CO_2 from about 280 parts per million before the Industrial Revolution to 400 parts per million by the year 2010.[137] Those projections proved remarkably accurate—atmospheric CO_2 concentrations surpassed 400 parts per million in May 2013, for the first time in millions of years.[138] In 2015, the annual average CO_2 concentration rose above 400 parts per million, and in 2016 the annual low surpassed 400 parts per million, meaning atmospheric CO_2 concentration remained above that threshold all year.[139]

138. In 1980, API's CO_2 Task Force members discussed the oil industry's responsibility to reduce CO_2 emissions by changing refining processes and developing fuels that emit less CO_2. The minutes from the Task Force's February 29, 1980, meeting included a summary of a presentation on "The CO_2 Problem" given by Dr. John Laurmann, which identified the "scientific consensus on the potential for large future climatic response to increased CO_2 levels" as a reason for API members to have concern with the "CO_2 problem" and informed attendees that there was "strong empirical evidence that rise [in CO_2 concentration was] caused by anthropogenic release of CO_2, mainly from fossil fuel combustion."[140] Moreover, Dr. Laurmann warned that the amount of CO_2 in the atmosphere could double by 2038, which he said would likely lead to a 2.5° C (4.5ºF) rise in global average temperatures with "major economic consequences." He then told the Task Force that models showed a 5°C (9ºF) rise by 2067, with "globally catastrophic effects."[141] A taskforce member and representative of Texaco (Chevron) leadership present at the meeting

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[137] Id.

[138] Nicola Jones, How the World Passed a Carbon Threshold and Why it Matters, Yale Environment 360 (Jan. 26, 2017), http://e360.yale.edu/features/how-the-world-passed-a-carbon-threshold-400ppm-and-why-it-matters.

[139] Id.

[140] American Petroleum Institute, AQ-9 Task Force Meeting Minutes (March 18, 1980), http://insideclimatenews.org/sites/default/files/documents/AQ-9%20Task%20Force%20Meeting%20%281980%29.pdf (AQ-9 refers to the "CO_2 and Climate" Task Force).

[141] Id.

posited that the API CO_2 Task Force should develop ground rules for energy release of fuels and the cleanup of fuels as they relate to CO_2 creation.

139. In 1980, the API CO_2 Task Force also discussed a potential area for investigation: alternative energy sources as a means of mitigating CO_2 emissions from Defendants' fossil fuel products. These efforts called for research and development to "Investigate the Market Penetration Requirements of Introducing a New Energy Source into World Wide Use." Such investigation was to include the technical implications of energy source changeover, research timing, and requirements.[142]

140. By 1980, Exxon's senior leadership had become intimately familiar with the greenhouse effect and the role of CO_2 in the atmosphere. In that year, Exxon Senior Vice President and Board member George Piercy questioned Exxon researchers on the minutiae of the ocean's role in absorbing atmospheric CO_2, including whether there was a net CO_2 flux out of the ocean into the atmosphere in certain zones where upwelling of cold water to the surface occurs, because Piercy evidently believed that the oceans could absorb and retain higher concentrations of CO_2 than the atmosphere.[143] This inquiry aligns with Exxon supertanker research into whether the ocean would act as a significant CO_2 sink that would sequester atmospheric CO_2 long enough to allow unabated emissions without triggering dire climatic consequences. As described below, Exxon eventually scrapped this research before it produced enough data from which to derive a conclusion.[144]

141. Also in 1980, Imperial Oil (ExxonMobil) reported to Esso and Exxon managers and environmental staff that increases in fossil fuel usage aggravates CO_2 in the atmosphere.

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[142] Id.

[143] Neela Banerjee, More Exxon Documents Show How Much It Knew About Climate 35 Years Ago, Inside Climate News (Dec. 1, 2015), https://insideclimatenews.org/news/01122015/documents-exxons-early-co2-position-senior-executives-engage-and-warming-forecast.

[144] Neela Banerjee et al., Exxon Believed Deep Dive Into Climate Research Would Protect Its Business, Inside Climate News (Sept. 17, 2015), https://insideclimatenews.org/news/16092015/exxon-believed-deep-dive-into-climate-research-would-protect-its-business.

Noting that the United Nations was encouraging research into the carbon cycle, Imperial reported that "[t]echnology exists to remove CO_2 from [fossil fuel power plant] stack gases but removal of only 50% of the CO_2 would double the cost of power generation." Imperial also reported that its coordination department had been internally evaluating its and Exxon's products to determine whether disclosure of a human health hazard was necessary. The report notes that Section (8e) of Toxic Substances Control Act, 55 U.S.C. §§ 1601 et seq., requires that anyone who discovers that a material or substance in commercial use is or may be a significant risk to human health must report such findings to the Environmental Protection Agency within 15 days. Although greenhouse gases are human health hazards (because they have serious consequences in terms of global food production, disease virulence, and sanitation infrastructure, among other impacts), neither Imperial, Exxon, nor any other Defendant has ever filed a disclosure with the U.S. Environmental Protection Agency pursuant to the Toxic Substances Control Act. Exxon scientist Roger Cohen warned his colleagues in a 1981 internal memorandum that "future developments in global data gathering and analysis, along with advances in climate modeling, may provide strong evidence for a delayed CO_2 effect of a truly substantial magnitude," and that under certain circumstances it would be "very likely that we will unambiguously recognize the threat by the year 2000."[145] Cohen had expressed concern that the memorandum mischaracterized potential effects of unabated CO_2 emissions from Defendants' fossil fuel products: ". . . it is distinctly possible that the . . . [Exxon Planning Division's] scenario will produce effects which will indeed be catastrophic (at least for a substantial fraction of the world's population)."[146]

142. In 1981, Exxon's Henry Shaw, the company's lead climate researcher at the time, prepared a summary of Exxon's current position on the greenhouse effect for Edward David Jr., president of Exxon Research and Engineering, stating in relevant part:

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[145] Roger W. Cohen, Exxon Memo to W. Glass about possible "catastrophic" effect of CO_2, Exxon Inter-Office Correspondence (Aug. 18, 1981), http://www.climatefiles.com/exxonmobil/1981-exxon-memo-on-possible-emission-consequences-of-fossil-fuel-consumption/.

[146] Id.

- "Atmospheric CO_2 will double in 100 years if fossil fuels grow at 1.4%/ a^2.
- 3ºC global average temperature rise and 10ºC at poles if CO_2 doubles.
    - Major shifts in rainfall/agriculture
    - Polar ice may melt"[147]

143. In 1982, another report prepared for API by scientists at the Lamont-Doherty Geological Observatory at Columbia University recognized that atmospheric CO_2 concentration had risen significantly compared to the beginning of the industrial revolution from about 290 parts per million to about 340 parts per million in 1981 and acknowledged that despite differences in climate modelers' predictions, all models indicated a temperature increase caused by anthropogenic CO_2 within a global mean range of 4º C (7.2° F). The report advised that there was scientific consensus that "a doubling of atmospheric CO_2 from [] pre-industrial revolution value would result in an average global temperature rise of (3.0 ± 1.5)°C [5.4 ± 2.7° F]." It went further, warning that "[s]uch a warming can have serious consequences for man's comfort and survival since patterns of aridity and rainfall can change, the height of the sea level can increase considerably and the world food supply can be affected."[148] Exxon's own modeling research confirmed this, and the company's results were later published in at least three peer-reviewed scientific papers.[149]

144. Also in 1982, Exxon's Environmental Affairs Manager distributed a primer on climate change to a "wide circulation [of] Exxon management . . . intended to familiarize Exxon

[147] Henry Shaw, Exxon Memo to E. E. David, Jr. about "CO_2Position Statement", Exxon Inter-Office Correspondence (May 15, 1981), https://insideclimatenews.org/sites/default/files/documents/Exxon%20Position%20on%20CO2%20%281981%29.pdf.

[148] American Petroleum Institute, Climate Models and CO_2 Warming: A Selective Review and Summary, Lamont-Doherty Geological Observatory (Columbia University) (March 1982), https://assets.documentcloud.org/documents/2805626/1982-API-Climate-Models-and-CO2-Warming-a.pdf.

[149] See Roger W. Cohen, Exxon Memo summarizing findings of research in climate modeling, Exxon Research and Engineering Company (September 2, 1982), https://insideclimatenews.org/sites/default/files/documents/%2522Consensus%2522%20on%20CO2%20Impacts%20(1982).pdf. (discussing research articles).

personnel with the subject."[150] The primer also was "restricted to Exxon personnel and not to be distributed externally."[151] The primer compiled science on climate change available at the time, and confirmed fossil fuel combustion as a primary anthropogenic contributor to global warming. The report estimated a CO_2 doubling around 2090 based on Exxon's long-range modeled outlook. The author warned that "uneven global distribution of increased rainfall and increased evaporation" were expected to occur, and that "disturbances in the existing global water distribution balance would have dramatic impact on soil moisture, and in turn, on agriculture."[152] Moreover, the melting of the Antarctic ice sheet could result in global sea level rise of five feet which would "cause flooding on much of the U.S. East Coast, including the State of Florida and Washington, D.C."[153] Indeed, it warned that "there are some potentially catastrophic events that must be considered," including sea level rise from melting polar ice sheets. It noted that some scientific groups were concerned "that once the effects are measurable, they might not be reversible."[154]

145. In a summary of Exxon's climate modeling research from 1982, Director of Exxon's Theoretical and Mathematical Sciences Laboratory Roger Cohen wrote that "the time required for doubling of atmospheric CO_2 depends on future world consumption of fossil fuels." Cohen concluded that Exxon's own results were "consistent with the published predictions of more complex climate models" and "in accord with the scientific consensus on the effect of increased atmospheric CO_2 on climate."[155]

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[150] M. B. Glaser, Exxon Memo to Management about "CO_2 'Greenhouse' Effect", Exxon Research and Engineering Company (November 12, 1982), http://insideclimatenews.org/sites/default/files/documents/1982%20Exxon%20Primer%20on%20CO2%20Greenhouse%20Effect.pdf.

[151] Id.

[152] Id.

[153] Id.

[154] Id.

[155] Roger W. Cohen, Exxon Memo summarizing findings of research in climate modeling, Exxon Research and Engineering Company (September 2, 1982),

146. At the fourth biennial Maurice Ewing Symposium at the Lamont-Doherty Geophysical Observatory in October 1982, attended by members of API, Exxon Research and Engineering Company president E.E. David delivered a speech titled: "Inventing the Future: Energy and the CO_2 'Greenhouse Effect.'"[156] His remarks included the following statement: "[F]ew people doubt that the world has entered an energy transition away from dependence upon fossil fuels and toward some mix of renewable resources that will not pose problems of CO_2 accumulation." He went on, discussing the human opportunity to address anthropogenic climate change before the point of no return:

> It is ironic that the biggest uncertainties about the CO_2 buildup are not in predicting what the climate will do, but in predicting what people will do. . . . [It] appears we still have time to generate the wealth and knowledge we will need to invent the transition to a stable energy system.

147. Throughout the early 1980s, at Exxon's direction, Exxon climate scientist Henry Shaw forecasted emissions of CO_2 from fossil fuel use. Those estimates were incorporated into Exxon's 21st century energy projections and were distributed among Exxon's various divisions. Shaw's conclusions included an expectation that atmospheric CO_2 concentrations would double in 2090 per the Exxon model, with an attendant 2.3–5.6º F average global temperature increase. Shaw compared his model results to those of the U.S. EPA, the National Academy of Sciences, and the Massachusetts Institute of Technology, indicating that the Exxon model predicted a longer delay than any of the other models, although its temperature increase prediction was in the mid-range of the four projections.[157]

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https://insideclimatenews.org/sites/default/files/documents/%2522Consensus%2522%20on%20CO2%20Impacts%20(1982).pdf.

[156] E. E. David, Jr., Inventing the Future: Energy and the CO_2 Greenhouse Effect: Remarks at the Fourth Annual Ewing Symposium, Tenafly, NJ (1982), http://sites.agu.org/publications/files/2015/09/ch1.pdf.

[157] Neela Banerjee, More Exxon Documents Show How Much It Knew About Climate 35 Years Ago, Inside Climate News (Dec. 1, 2015), https://insideclimatenews.org/news/01122015/documents-exxons-early-co2-position-senior-executives-engage-and-warming-forecast.

148. During the 1980s, many Defendants formed their own research units focused on climate modeling. The API, including the API CO_2 Task Force, provided a forum for Defendants to share their research efforts and corroborate their findings related to anthropogenic greenhouse gas emissions.[158]

149. During this time, Defendants' statements express an understanding of their obligation to consider and mitigate the externalities of unabated promotion, marketing, and sale of their fossil fuel products. For example, in 1988, Richard Tucker, the president of Mobil Oil, presented at the American Institute of Chemical Engineers National Meeting, the premier educational forum for chemical engineers, where he stated:

> [H]umanity, which has created the industrial system that has transformed civilities, is also responsible for the environment, which sometimes is at risk because of unintended consequences of industrialization. . . . Maintaining the health of this life-support system is emerging as one of the highest priorities. . . . [W]e must all be environmentalists.
>
> The environmental covenant requires action on many fronts…the low-atmosphere ozone problem, the upper-atmosphere ozone problem and the greenhouse effect, to name a few. . . . Our strategy must be to reduce pollution before it is ever generated – to prevent problems at the source.
>
> Prevention means engineering a new generation of fuels, lubricants and chemical products. . . . Prevention means designing catalysts and processes that minimize or eliminate the production of unwanted byproducts. . . . Prevention on a global scale may even require a dramatic reduction in our dependence on fossil fuels—and a shift towards solar, hydrogen, and safe nuclear power. It may be possible that—just possible—that the energy industry will transform itself so completely that observers will declare it a new industry. . . . Brute force, low-tech responses and money alone won't meet the challenges we face in the energy industry.[159]

[158] Neela Banerjee, Exxon's Oil Industry Peers Knew About Climate Dangers in the 1970s, Too, Inside Climate News (December 22, 2015), https://insideclimatenews.org/news/22122015/exxon-mobil-oil-industry-peers-knew-about-climate-change-dangers-1970s-american-petroleum-institute-api-shell-chevron-texaco.

[159] Richard E. Tucker, High Tech Frontiers in the Energy Industry: The Challenge Ahead, AIChE National Meeting (November 30, 1988), https://hdl.handle.net/2027/pur1.32754074119482?urlappend=%3Bseq=522.

150. In 1989, Esso Resources Canada (ExxonMobil) commissioned a report on the impacts of climate change on existing and proposed natural gas facilities in the Mackenzie River Valley and Delta, including extraction facilities on the Beaufort Sea and a pipeline crossing Canada's Northwest Territory.[160] It reported that "large zones of the Mackenzie Valley could be affected dramatically by climatic change" and that "the greatest concern in Norman Wells [oil town in North West Territories, Canada] should be the changes in permafrost that are likely to occur under conditions of climate warming." The report concluded that, in light of climate models showing a "general tendency towards warmer and wetter climate," operation of those facilities would be compromised by increased precipitation, increase in air temperature, changes in permafrost conditions, and significantly, sea level rise and erosion damage.[161] The authors recommended factoring these eventualities into future development planning and also warned that "a rise in sea level could cause increased flooding and erosion damage on Richards Island."

151. In 1991, Shell produced a film called "Climate of Concern." The film advises that while "no two [climate change projection] scenarios fully agree . . . [they] have each prompted the same serious warning. A warning endorsed by a uniquely broad consensus of scientists in their report to the UN at the end of 1990." The warning was an increasing frequency of abnormal weather, and of sea level rise of about one meter over the coming century. Shell specifically described the impacts of anthropogenic sea level rise on tropical islands, "barely afloat even now . . . [f]irst made uninhabitable and then obliterated beneath the waves. Wetland habitats destroyed by intruding salt. Coastal lowlands suffering pollution of precious groundwater." It warned of "greenhouse refugees," people who abandoned homelands inundated by the sea, or displaced because of catastrophic changes to the environment. The video concludes with a stark admonition:

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[160]Stephen Lonergan and Kathy Young, An Assessment of the Effects of Climate Warming on Energy Developments in the Mackenzie River Valley and Delta, Canadian Arctic, Energy Exploration & Exploitation, Vol. 7, Issue 5 (Oct. 1, 1989), http://journals.sagepub.com/doi/abs/10.1177/014459878900700508.

[161] Id.

"Global warming is not yet certain, but many think that the wait for final proof would be irresponsible. Action now is seen as the only safe insurance."[162]

152. In the mid-1990s, ExxonMobil, Shell and Imperial Oil (ExxonMobil) jointly undertook the Sable Offshore Energy Project in Nova Scotia. The project's own Environmental Impact Statement declared: "The impact of a global warming sea-level rise may be particularly significant in Nova Scotia. The long-term tide gauge records at a number of locations along the N.S. coast have shown sea level has been rising over the past century . . . . For the design of coastal and offshore structures, an estimated rise in water level, due to global warming, of 0.5 m [1.64 feet] may be assumed for the proposed project life (25 years)."[163]

153. Climate change research conducted by Defendants and their industry associations frequently acknowledged uncertainties in their climate modeling—those uncertainties, however, were merely with respect to the magnitude and timing of climate impacts resulting from fossil fuel consumption, not that significant changes would eventually occur. The Defendants' researchers and the researchers at their industry associations harbored little doubt that climate change was occurring and that fossil fuel products were, and are, the primary cause.

154. Despite the overwhelming information about the threats to people and the planet posed by continued unabated use of their fossil fuel products, Defendants failed to act as they reasonably should have to mitigate or avoid those dire adverse impacts. Defendants instead adopted the position, as described below, that the absence of meaningful regulations on the consumption of their fossil fuel products was the equivalent of a social license to continue the unfettered pursuit of profits from those products. This position was an abdication of Defendants' responsibility to consumers and the public, including Plaintiffs, to act on their unique knowledge

[162] Jelmer Mommers, Shell Made a Film About Climate Change in 1991 (Then Neglected To Heed Its Own Warning), de Correspondent (Feb. 27, 2017), https://thecorrespondent.com/6285/shell-made-a-film-about-climate-change-in-1991-then-neglected-to-heed-its-own-warning/692663565-875331f6.

[163] ExxonMobil, Sable Project, Development Plan, Volume 3 – Environmental Impact Statement http://soep.com/about-the-project/development-plan-application/.

of the reasonably foreseeable hazards of unabated production and consumption of their fossil fuel products.

F. Defendants Did Not Disclose Known Harms Associated with the Extraction, Promotion, and Consumption of Their Fossil Fuel Products, and Instead Affirmatively Acted to Obscure Those Harms and Engaged in a Concerted Campaign to Evade Regulation.

155. By 1988, Defendants had amassed a compelling body of knowledge about the role of anthropogenic greenhouse gases, and specifically those emitted from the normal use of Defendants' fossil fuel products, in causing global warming, sea level rise, disruptions to the hydrologic cycle, extreme precipitation and drought, heatwaves, wildfires, and associated consequences for human communities and the environment. On notice that their products were causing global climate change and dire effects on the planet, Defendants were faced with the decision of whether to take steps to limit the damages their fossil fuel products were causing and would continue to cause for virtually every one of Earth's inhabitants, including the People of the State of California, and the County of Santa Cruz and its citizens.

156. Defendants at any time before or thereafter could and reasonably should have taken any of a number of steps to mitigate the damages caused by their fossil fuel products, and their own comments reveal an awareness of what some of these steps may have been. Defendants should have made reasonable warnings to consumers, the public, and regulators of the dangers known to Defendants of the unabated consumption of their fossil fuel products, and they should have taken reasonable steps to limit the potential greenhouse gas emissions arising out of their fossil fuel products.

157. But several key events during the period 1988–1992 appear to have prompted Defendants to change their tactics from general research and internal discussion on climate change to a public campaign aimed at evading regulation of their fossil fuel products and/or emissions therefrom. These include:

a. In 1988, National Aeronautics and Space Administration (NASA) scientists confirmed that human activities were actually contributing to global

warming.[164] On June 23 of that year, NASA scientist James Hansen's presentation of this information to Congress engendered significant news coverage and publicity for the announcement, including coverage on the front page of the New York Times.

b. On July 28, 1988, Senator Robert Stafford and four bipartisan co-sponsors introduced S. 2666, "The Global Environmental Protection Act," to regulate CO_2 and other greenhouse gases. Four more bipartisan bills to significantly reduce CO_2 pollution were introduced over the following ten weeks, and in August, U.S. Presidential candidate George H.W. Bush pledged that his presidency would "combat the greenhouse effect with the White House effect."[165] Political will in the United States to reduce anthropogenic greenhouse gas emissions and mitigate the harms associated with Defendants' fossil fuel products was gaining momentum.

c. In December 1988, the United Nations formed the Intergovernmental Panel on Climate Change (IPCC), a scientific panel dedicated to providing the world's governments with an objective, scientific analysis of climate change and its environmental, political, and economic impacts.

d. In 1990, the IPCC published its First Assessment Report on anthropogenic climate change,[166] in which it concluded that (1) "there is a natural greenhouse effect which already keeps the Earth warmer than it would otherwise be," and (2) that

[164] See Peter C. Frumhoff et al., The Climate Responsibilities of Industrial Carbon Producers, Climatic Change, Vol. 132, 161 (2015).

[165] New York Times, The White House and the Greenhouse, May 9, 1998, http://www.nytimes.com/1989/05/09/opinion/the-white-house-and-the-greenhouse.html.

[166] See IPCC, Reports, http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml.

> emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases carbon dioxide, methane, chlorofluorocarbons (CFCs) and nitrous oxide. These increases will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface. The main greenhouse gas, water vapour, will increase in response to global warming and further enhance it.[167]

The IPCC reconfirmed these conclusions in a 1992 supplement to the First Assessment report.[168]

e. The United Nations began preparation for the 1992 Earth Summit in Rio de Janeiro, Brazil, a major, newsworthy gathering of 172 world governments, of which 116 sent their heads of state. The Summit resulted in the United Nations Framework Convention on Climate Change (UNFCCC), an international environmental treaty providing protocols for future negotiations aimed at "stabiliz[ing] greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[169]

158. These world events marked a shift in public discussion of climate change, and the initiation of international efforts to curb anthropogenic greenhouse emissions – developments that had stark implications for, and would have diminished the profitability of, Defendants' fossil fuel products.

159. But rather than collaborating with the international community by acting to forestall, or at least decrease, their fossil fuel products' contributions to global warming, sea level rise, disruptions to the hydrologic cycle, and associated consequences to Santa Cruz County and other communities, Defendants embarked on a decades-long campaign designed to maximize

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[167] IPCC, Climate Change: The IPCC Scientific Assessment, Policymakers Summary (1990), http://www.ipcc.ch/ipccreports/far/wg_I/ipcc_far_wg_I_spm.pdf.

[168] IPCC, 1992 IPCC Supplement to the First Assessment Report (1992), http://www.ipcc.ch/publications_and_data/publications_ipcc_90_92_assessments_far.shtml.

[169] United Nations, United Nations Framework Convention on Climate Change, Article 2 (1992), https://unfccc.int/resource/docs/convkp/conveng.pdf.

continued dependence on their products and undermine national and international efforts like the Kyoto Protocol to rein in greenhouse gas emissions.

160. Defendants' campaign, which focused on concealing, discrediting, and/or misrepresenting information that tended to support restricting consumption of (and thereby decreasing demand for) Defendants' fossil fuel products, took several forms. The campaign enabled Defendants to accelerate their business practice of exploiting fossil fuel reserves, and concurrently externalize the social and environmental costs of their fossil fuel products. These activities stood in direct contradiction to Defendants' own prior recognition that the science of anthropogenic climate change was clear and that the greatest uncertainties involved responsive human behavior, not scientific understanding of the issue.

161. Defendants took affirmative steps to conceal, from Plaintiffs and the general public, the foreseeable impacts of the use of their fossil fuel products on the Earth's climate and associated harms to people and communities. Defendants embarked on a concerted public relations campaign to cast doubt on the science connecting global climate change to fossil fuel products and greenhouse gas emissions, in order to influence public perception of the existence of anthropogenic global warming, sea level rise, disruptions to weather cycles, extreme precipitation and drought, and associated consequences. The effort included promoting their hazardous products through advertising campaigns and the initiation and funding of climate change denialist organizations, designed to influence consumers to continue using Defendants' fossil fuel products irrespective of those products' damage to communities and the environment.

162. For example, in 1988, Joseph Carlson, an Exxon public affairs manager, described the "Exxon Position," which included among others, two important messaging tenets: (1) "[e]mphasize the uncertainty in scientific conclusions regarding the potential enhanced Greenhouse Effect;" and (2) "[r]esist the overstatement and sensationalization [sic] of potential greenhouse effect which could lead to noneconomic development of non-fossil fuel resources."[170]

[170] Joseph M. Carlson, Exxon Memo on "The Greenhouse Effect" (August 3, 1988), https://assets.documentcloud.org/documents/3024180/1998-Exxon-Memo-on-the-Greenhouse-Effect.pdf.

163. In 1991, for example, the Information Council for the Environment ("ICE"), whose members included affiliates, predecessors and/or subsidiaries of Defendants, including Pittsburg and Midway Coal Mining (Chevron) and Island Creek Coal Company (Occidental), launched a national climate change science denial campaign with full-page newspaper ads, radio commercials, a public relations tour schedule, "mailers," and research tools to measure campaign success. Included among the campaign strategies was to "reposition global warming as theory (not fact)." Its target audience included older less-educated males who are "predisposed to favor the ICE agenda, and likely to be even more supportive of that agenda following exposure to new info."[171]

164. An implicit goal of ICE's advertising campaign was to change public opinion and avoid regulation. A memo from Richard Lawson, president of the National Coal Association asked members to contribute to the ICE campaign with the justification that "policymakers are prepared to act [on global warming]. Public opinion polls reveal that 60% of the American people already believe global warming is a serious environmental problem. Our industry cannot sit on the sidelines in this debate."[172]

165. The following images are examples of ICE-funded print advertisements challenging the validity of climate science and intended to obscure the scientific consensus on anthropogenic climate change and induce political inertia to address it.[173]

[171] Union of Concerned Scientists, Deception Dossier #5: Coal's "Information Council on the Environment" Sham, (1991), http://www.ucsusa.org/sites/default/files/attach/2015/07/Climate-Deception-Dossier-5_ICE.pdf.

[172] Naomi Oreskes, My Facts Are Better Than Your Facts: Spreading Good News about Global Warming (2010), in Peter Howlett et al., How Well Do Facts Travel?: The Dissemination of Reliable Knowledge, 136-166. Cambridge University Press. doi:10.1017/CBO9780511762154.008.8.

[173] Union of Concerned Scientists, Deception Dossier #5: Coal's "Information Council on the Environment" Sham, 47–49 (1991), http://www.ucsusa.org/sites/default/files/attach/2015/07/Climate-Deception-Dossier-5_ICE.pdf.

166. In 1996, Exxon released a publication called "Global Warming: Who's Right? Facts about a debate that's turned up more questions than answers." In the publication's preface, Exxon CEO Lee Raymond stated that "taking drastic action immediately is unnecessary since many scientists agree there's ample time to better understand the climate system." The subsequent article described the greenhouse effect as "unquestionably real and definitely a good thing," while ignoring the severe consequences that would result from the influence of the increased CO_2 concentration on the Earth's climate. Instead, it characterized the greenhouse effect as simply "what makes the earth's atmosphere livable." Directly contradicting their own internal reports and peer-reviewed science, the article ascribed the rise in temperature since the late 19th century to "natural fluctuations that occur over long periods of time" rather than to the anthropogenic emissions that Exxon and other scientists had confirmed were responsible. The article also falsely challenged the computer models that projected the future impacts of unabated fossil fuel product consumption, including those developed by Exxon's own employees, as having been "proved to be inaccurate." The article contradicted the numerous reports circulated among Exxon's staff, and by the API, by stating that "the indications are that a warmer world would be far more benign than many imagine . . . moderate warming would reduce mortality rates in the US, so a slightly warmer climate would be more healthful." Raymond concluded his preface by attacking advocates for limiting the use of his company's fossil fuel products as "drawing on bad science, faulty logic, or

unrealistic assumptions"—despite the important role that Exxon's own scientists had played in compiling those same scientific underpinnings.[174]

167. In a speech presented at the World Petroleum Congress in Beijing in 1997 at which many of the Defendants were present, Exxon CEO Lee Raymond reiterated these views. This time, he presented a false dichotomy between stable energy markets and abatement of the marketing, promotion, and sale of fossil fuel products known to Defendants to be hazardous. He stated:

> Some people who argue that we should drastically curtail our use of fossil fuels for environmental reasons…my belief [is] that such proposals are neither prudent nor practical. With no readily available economic alternatives on the horizon, fossil fuels will continue to supply most of the world's and this region's energy for the foreseeable future.
>
> Governments also need to provide a stable investment climate…They should avoid the temptation to intervene in energy markets in ways that give advantage to one competitor over another or one fuel over another.
>
> We also have to keep in mind that most of the greenhouse effects comes from natural sources . . . . Leaping to radically cut this tiny sliver of the greenhouse pie on the premise that it will affect climate defies common sense and lacks foundation in our current understanding of the climate system.
>
> Let's agree there's a lot we really don't know about how climate will change in the 21st century and beyond. . . . It is highly unlikely that the temperature in the middle of the next century will be significantly affected whether policies are enacted now or 20 years from now. It's bad public policy to impose very costly regulations and restrictions when their need has yet to be proven.[175]

168. Imperial Oil (ExxonMobil) CEO Robert Peterson falsely denied the established connection between Defendants' fossil fuel products and anthropogenic climate change in the Summer 1998 Imperial Oil Review, "A Cleaner Canada":

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[174] Exxon Corp., Global warming: who's right?, (1996), https://www.documentcloud.org/documents/2805542-Exxon-Global-Warming-Whos-Right.html.

[175] Lee R. Raymond, Energy – Key to growth and a better environment for Asia-Pacific nations, World Petroleum Congress (October 13, 1997), https://assets.documentcloud.org/documents/2840902/1997-Lee-Raymond-Speech-at-China-World-Petroleum.pdf.

> [T]his issue [referring to climate change] has absolutely nothing to do with pollution and air quality. Carbon dioxide is not a pollutant but an essential ingredient of life on this planet. . . . [T]he question of whether or not the trapping of 'greenhouse gases will result in the planet's getting warmer…has no connection whatsoever with our day-to-day weather.
>
> There is absolutely no agreement among climatologists on whether or not the planet is getting warmer, or, if it is, on whether the warming is the result of man-made factors or natural variations in the climate. . . . I feel very safe in saying that the view that burning fossil fuels will result in global climate change remains an unproved hypothesis.[176]

169. Mobil (ExxonMobil) paid for a series of "advertorials," advertisements located in the editorial section of the New York Times and meant to look like editorials rather than paid ads. These ads discussed various aspects of the public discussion of climate change and sought to undermine the justifications for tackling greenhouse gas emissions as unsettled science. The 1997 advertorial below[177] argued that economic analysis of emissions restrictions was faulty and inconclusive and therefore a justification for delaying action on climate change.

[176] Robert Peterson, A Cleaner Canada in Imperial Oil Review (Summer 1998), http://www.documentcloud.org/documents/2827818-1998-Imperial-Oil-Robert-Peterson-A-Cleaner-Canada.html.

[177] Mobil, When Facts Don't Square with the Theory, Throw Out the Facts (1997) New York Times, A31 (August 14, 1997), https://www.documentcloud.org/documents/705550-mob-nyt-1997-aug-14-whenfactsdontsquare.html.

like race,

But when we no longer allow those choices, both civility and common sense will have been diminished. □

who was dragged from his sister's car by police officers and shot in the face at point-blank range. The cops who have the power to do something about those officers, but choose not to. □

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When facts don't square with the theory, throw out the facts

That seems to characterize the administration's attitude on two of its own studies which show that international efforts to curb global warming could spark a big run-up in energy prices.

For months, the administration—playing its cards close to the vest—has promised to provide details of the emission reduction plan it will put on the table at the climate change meeting in Kyoto, Japan, later this year. It also promised to evaluate the economics of that policy and measure its impact. Those results are important because the proposals submitted by other countries thus far would be disruptive and costly to the U.S. economy.

Yet, when the results from its own economic models were finally generated, the administration started distancing itself from the findings and models that produced them. The administration's top economic advisor said that economic models can't provide a "definitive answer" on the impact of controlling emissions. The effort, she said, was "futile." At best, the models can only provide a "range of potential impacts."

Frankly, we're puzzled. The White House has promised to lay the economic facts before the public. Yet, the administration's top advisor said such an analysis won't be based on models and it will "preclude...detailed numbers." If you don't provide numbers and don't rely on models, what kind of rigorous economic examination can Congress and the public expect?

We're also puzzled by ambivalence over models. The administration downplays the utility of economic models to forecast cost impacts 10–15 years from now, yet its negotiators accept as gospel the 50–100-year predictions of global warming that have been generated by climate models—many of which have been criticized as seriously flawed.

The second study, conducted by Argonne National Laboratory under a contract with the Energy Department, examined what would happen if the U.S. had to commit to higher energy prices under the emission reduction plans that several nations had advanced last year. Such increases, the report concluded, would result in "significant reductions in output and employment" in six industries—aluminum, cement, chemical, paper and pulp, petroleum refining and steel.

Hit hardest, the study noted, would be the chemical industry, with estimates that up to 30 percent of U.S. chemical manufacturing capacity would move offshore to developing countries. Job losses could amount to some 200,000 in that industry, with another 100,000 in the steel sector. And despite the substantial loss of U.S. jobs and manufacturing capacity, the net emission reduction could be insignificant since developing countries will not be bound by the emission targets of a global warming treaty.

Downplaying Argonne's findings, the Energy Department noted that the study used outdated energy prices (mid-1996), didn't reflect the gains that would come from international emissions trading and failed to factor in the benefits of accelerated developments in energy efficiency and low-carbon technologies.

What it failed to mention is just what these new technologies are and when we can expect their benefits to kick in. As for emissions trading, many economists have theorized about the role they could play in reducing emissions, but few have grappled with the practicality of implementing and policing such a scheme.

We applaud the goals the U.S. wants to achieve in these upcoming negotiations—namely, that a final agreement must be "flexible, cost-effective, realistic, achievable and ultimately global in scope." But until we see the details of the administration's policy, we are concerned that plans are being developed in the absence of rigorous economic analysis. Too much is at stake to simply ignore facts that don't square with preconceived theories.

Mobil The energy to make a difference.

http://www.mobil.com

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170. In 1998, API, on behalf of Defendants, among other fossil fuel companies and organizations supported by fossil fuel corporate grants, developed a Global Climate Science Communications Plan that stated that unless "climate change becomes a non-issue . . . there may be no moment when we can declare victory for our efforts." Rather, API proclaimed that "[v]ictory will be achieved when . . . average citizens 'understand' (recognize) uncertainties in climate science; [and when] recognition of uncertainties becomes part of the 'conventional wisdom.'"[178] The multi-million-dollar, multi-year proposed budget included public outreach and the dissemination of educational materials to schools to "begin to erect a barrier against further efforts to impose Kyoto-like measures in the future"[179]—a blatant attempt to disrupt international efforts, pursuant to the UNFCCC, to negotiate a treaty that curbed greenhouse gas emissions.

171. Soon after, API distributed a memo to its members identifying public agreement on fossil fuel role in climate change as its highest priority issue.[180] The memorandum illuminates API's and Defendants' concern over the potential regulation of Defendants' fossil fuel products: "Climate is at the center of the industry's business interests. Policies limiting carbon emissions reduce petroleum product use. That is why it is API's highest priority issue and defined as 'strategic.'"[181] Further, the API memo stresses many of the strategies that Defendants individually and collectively utilized to combat the perception of their fossil fuel products as hazardous. These included:

a. Influencing the tenor of the climate change "debate" as a means to establish that greenhouse gas reduction policies like the Kyoto Protocol were not necessary to responsibly address climate change;

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[178] Joe Walker, E-mail to Global Climate Science Team, attaching the Draft Global Science Communications Plan (April 3, 1998), https://assets.documentcloud.org/documents/784572/api-global-climate-science-communications-plan.pdf.

[179] Id.

[180] Committee on Oversight and Government Reform, Allegations of Political Interference with Government Climate Change Science, page 51 (March 19, 2007), https://ia601904.us.archive.org/25/items/gov.gpo.fdsys.CHRG-110hhrg37415/CHRG-110hhrg37415.pdf.

[181] Id.

b. Maintaining strong working relationships between government regulators and communications-oriented organizations like the Global Climate Coalition, the Heartland Institute, and other groups carrying Defendants' message minimizing the hazards of the unabated use of their fossil fuel products and opposing regulation thereof;

c. Building the case for (and falsely dichotomizing) Defendants' positive contributions to a "long-term approach" (ostensibly for regulation of their products) as a reason for society to reject short term fossil fuel emissions regulations, and engaging in climate change science uncertainty research; and

d. Presenting Defendants' positions on climate change in domestic and international forums, including by preparing rebuttals to IPCC reports.

172. Additionally, Defendants mounted a campaign against regulation of their business practices in order to continue placing their fossil fuel products into the stream of commerce, despite their own knowledge and the growing national and international scientific consensus about the hazards of doing so. These efforts came despite Defendants' recent recognition that "risks to nearly every facet of life on Earth . . . could be avoided only if timely steps were taken to address climate change."[182]

173. The Global Climate Coalition (GCC), on behalf of Defendants and other fossil fuel companies, funded advertising campaigns and distributed material to generate public uncertainty around the climate debate, with the specific purpose of preventing U.S. adoption of the Kyoto Protocol, despite the leading role that the U.S. had played in the Protocol negotiations.[183] Despite an internal primer stating that various "contrarian theories" [i.e., climate change skepticism] do

[182] Neela Banerjee, Exxon's Oil Industry Peers Knew About Climate Dangers in the 1970s, Too, Inside Climate News (December 22, 2015), https://insideclimatenews.org/news/22122015/exxon-mobil-oil-industry-peers-knew-about-climate-change-dangers-1970s-american-petroleum-institute-api-shell-chevron-texaco.

[183] Id.

not "offer convincing arguments against the conventional model of greenhouse gas emission-induced climate change," GCC excluded this section from the public version of the backgrounder and instead funded efforts to promote some of those same contrarian theories over subsequent years.[184]

174. A key strategy in Defendants' efforts to discredit scientific consensus on climate change and the IPCC was to bankroll scientists who, although accredited, held fringe opinions that were even more questionable given the sources of their research funding. These scientists obtained part or all of their research budget from Defendants directly or through Defendant-funded organizations like API,[185] but they frequently failed to disclose their fossil fuel industry underwriters.[186]

175. Creating a false sense of disagreement in the scientific community (despite the consensus that its own scientists, experts, and managers had previously acknowledged) has had an evident impact on public opinion. A 2007 Yale University-Gallup poll found that while 71% of Americans personally believed global warming was happening, only 48% believed that there was a consensus among the scientific community, and 40% believed there was a lot of disagreement among scientists over whether global warming was occurring.[187]

176. 2007 was the same year the IPCC published its Fourth Assessment Report, in which it concluded that "there is *very high confidence* that the net effect of human activities since 1750

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[184] Gregory J. Dana, Memo to AIAM Technical Committee Re: Global Climate Coalition (GCC) – Primer on Climate Change Science – Final Draft, Association of International Automobile Manufacturers (January 18, 1996), http://www.webcitation.org/6FyqHawb9.

[185] Willie Soon and Sallie Baliunas, Proxy Climatic and Environmental Changes of the Past 1000 Years, Climate Research 23, 88-110 (January 31, 2003), http://www.int-res.com/articles/cr2003/23/c023p089.pdf.

[186] Newsdesk, Smithsonian Statement: Dr. Wei-Hock (Willie) Soon, Smithsonian (February 26, 2015), http://newsdesk.si.edu/releases/smithsonian-statement-dr-wei-hock-willie-soon.

[187] American Opinions on Global Warming: A Yale/Gallup/Clearvision Poll, Yale Program on Climate Change Communication (July 31, 2007), http://climatecommunication.yale.edu/publications/american-opinions-on-global-warming/.

has been one of warming."[188] The IPCC defined "very high confidence" as at least a 9 out of 10 chance.[189]

177. Defendants borrowed pages out of the playbook of prior denialist campaigns. A "Global Climate Science Team" ("GCST") was created that mirrored a front group created by the tobacco industry, known as The Advancement of Sound Science Coalition, whose purpose was to sow uncertainty about the fact that cigarette smoke is carcinogenic. The GCST's membership included Steve Milloy (a key player on the tobacco industry's front group), Exxon's senior environmental lobbyist; an API public relations representative; and representatives from Chevron and Southern Company that drafted API's 1998 Communications Plan. There were no scientists on the "Global Climate Science Team." GCST developed a strategy to spend millions of dollars manufacturing climate change uncertainty. Between 2000 and 2004, Exxon donated $110,000 to Milloy's efforts and another organization, the Free Enterprise Education Institute and $50,000 to the Free Enterprise Action Institute, both registered to Milloy's home address.[190]

178. Defendants by and through their trade association memberships, worked directly, and often in a deliberately obscured manner, to evade regulation of the emissions resulting from use of their fossil fuel products.

179. Defendants have funded dozens of think tanks, front groups, and dark money foundations pushing climate change denial. These include the Competitive Enterprise Institute, the Heartland Institute, Frontiers for Freedom, Committee for a Constructive Tomorrow, and Heritage Foundation. From 1998 to 2014 ExxonMobil spent almost $31 million funding numerous organizations misrepresenting the scientific consensus that Defendants' fossil fuel products were

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[188] IPCC, Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (2007), https://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf (emphasis in original).

[189] Id.

[190] Seth Shulman et al. Smoke, Mirrors & Hot Air: How ExxonMobil Uses Big Tobacco's Tactics to Manufacture Uncertainty on Climate Science, Union of Concerned Scientists, 19 (January 2007), http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/exxon_report.pdf.

causing climate change, sea level rise, disruptions to the hydrologic cycle, extreme precipitation and drought, and associated consequences to Santa Cruz County, among other communities.[191] Several Defendants have been linked to other groups that undermine the scientific basis linking Defendants' fossil fuel products to climate change and sea level rise, including the Frontiers of Freedom Institute and the George C. Marshall Institute.

180. Exxon acknowledged its own previous success in sowing uncertainty and slowing mitigation through funding of climate denial groups. In its 2007 Corporate Citizenship Report, Exxon declared: "In 2008, we will discontinue contributions to several public policy research groups whose position on climate change could divert attention from the important discussion on how the world will secure the energy required for economic growth in an environmentally responsible manner."[192] Despite this pronouncement, Exxon remained financially associated with several such groups after the report's publication.

181. Defendants could have contributed to the global effort to mitigate the impacts of greenhouse gas emissions by, for example delineating practical technical strategies, policy goals, and regulatory structures that would have allowed them to continue their business ventures while reducing greenhouse gas emissions and supporting a transition to a lower carbon future. Instead, Defendants undertook a momentous effort to evade international and national regulation of greenhouse gas emissions to enable them to continue unabated fossil fuel production.

182. As a result of Defendants' tortious, false and misleading conduct, reasonable consumers of Defendants' fossil fuel products and policy-makers, have been deliberately and unnecessarily deceived about: the role of fossil fuel products in causing global warming, sea level rise, disruptions to the hydrologic cycle, and increased extreme precipitation, heatwaves, wildfires, and drought; the acceleration of global warming since the mid-20th century and the continuation thereof; and about the fact that the continued increase in fossil fuel product consumption that creates severe environmental threats and significant economic costs for communities, including

[191] ExxonSecrets.org, ExxonMobil Climate Denial Funding 1998–2014, http://exxonsecrets.org/html/index.php.

[192] ExxonMobil, 2007 Corporate Citizenship Report (December 31, 2007).

Santa Cruz County. Reasonable consumers and policy makers have also been deceived about the depth and breadth of the state of the scientific evidence on anthropogenic climate change, and in particular, about the strength of the scientific consensus demonstrating the role of fossil fuels in causing both climate change and a wide range of potentially destructive impacts, including sea level rise, disruptions to the hydrologic cycle, extreme precipitation, heatwaves, wildfires, drought, and associated consequences.

G. In Contrast to Their Public Statements, Defendants' Internal Actions Demonstrate their Awareness of and Intent to Profit from the Unabated Use of Fossil Fuel Products.

183. In contrast to their public-facing efforts challenging the validity of the scientific consensus about anthropogenic climate change, Defendants' acts and omissions evidence their internal acknowledgement of the reality of climate change and its likely consequences. These actions include, but are not limited to, making multi-billion-dollar infrastructure investments for their own operations that acknowledge the reality of coming anthropogenic climate-related change. These investments included (among others), raising offshore oil platforms to protect against sea level rise; reinforcing offshore oil platforms to withstand increased wave strength and storm severity; and developing and patenting designs for equipment intended to extract crude oil and/or natural gas in areas previously unreachable because of the presence of polar ice sheets.[193]

184. For example, in 1973 Exxon obtained a patent for a cargo ship capable of breaking through sea ice[194] and for an oil tanker[195] designed specifically for use in previously unreachable areas of the Arctic.

[193] Amy Lieberman and Suzanne Rust, Big Oil Braced for Global Warming While It Fought Regulations , L.A. Times (December 31, 2015) http://graphics.latimes.com/oil-operations/.

[194]Patents, Icebreaking cargo vessel, Exxon Research Engineering Co. (April 17, 1973) https://www.google.com/patents/US3727571.

[195] Patents, Tanker vessel, Exxon Research Engineering Co. (July 17, 1973) https://www.google.com/patents/US3745960.

185. In 1974, Chevron obtained a patent for a mobile arctic drilling platform designed to withstand significant interference from lateral ice masses,[196] allowing for drilling in areas with increased ice floe movement due to elevated temperature.

186. That same year, Texaco (Chevron) worked toward obtaining a patent for a method and apparatus for reducing ice forces on a marine structure prone to being frozen in ice through natural weather conditions,[197] allowing for drilling in previously unreachable Arctic areas that would become seasonally accessible.

187. Shell obtained a patent similar to Texaco's (Chevron) in 1984.[198]

188. In 1989, Norske Shell, Royal Dutch Shell's Norwegian subsidiary, altered designs for a natural gas platform planned for construction in the North Sea to account for anticipated sea level rise. Those design changes were ultimately carried out by Shell's contractors, adding substantial costs to the project.[199]

a. The Troll field, off the Norwegian coast in the North Sea, was proven to contain large natural oil and gas deposits in 1979, shortly after Norske Shell was approved by Norwegian oil and gas regulators to operate a portion of the field.

b. In 1986, the Norwegian parliament granted Norske Shell authority to complete the first development phase of the Troll field gas deposits, and Norske Shell began designing the "Troll A" gas platform, with the intent to begin operation of the platform in approximately 1995. Based on the very

[196] Patents, Arctic offshore platform, Chevron Res (August 27, 1974) https://www.google.com/patents/US3831385.

[197] Patents, Mobile, arctic drilling and production platform, Texaco Inc. (February 26, 1974) https://www.google.com/patents/US3793840.

[198] Patents, Arctic offshore platform, Shell Oil Company (January 24, 1984) https://www.google.com/patents/US4427320.

[199] Greenhouse Effect: Shell Anticipates A Sea Change, N.Y. Times (December 20, 1989) http://www.nytimes.com/1989/12/20/business/greenhouse-effect-shell-anticipates-a-sea-change.html.

large size of the gas deposits in the Troll field, the Troll A platform was projected to operate for approximately 70 years.

c. The platform was originally designed to stand approximately 100 feet above sea level—the amount necessary to stay above waves in a once-in-a-century strength storm.

d. In 1989, Shell engineers revised their plans to increase the above-water height of the platform by 3–6 feet, specifically to account for higher anticipated average sea levels and increased storm intensity due to global warming over the platform's 70-year operational life.[200]

e. Shell projected that the additional 3–6 feet of above-water construction would increase the cost of the Troll A platform by as much as $40 million.

H. Defendants' Actions Prevented the Development of Alternatives That Would Have Eased the Transition to a Less Fossil Fuel Dependent Economy.

189. The harms and benefits of Defendants' conduct can be balanced in part by weighing the social benefit of extracting and burning a unit of fossil fuels against the costs that a unit of fuel imposes on society, known as the "social cost of carbon" or "SCC."

190. Because climatic responses to atmospheric temperature increases are non-linear, and because greenhouse gas pollution accumulates in the atmosphere, some of which does not dissipate for potentially thousands of years (namely CO_2), there is broad agreement that SCC increases as emissions rise, and as the climate warms. Relatedly, as atmospheric CO_2 levels and surface temperature increase, the costs of remediating any individual environmental injury—for example infrastructure to mitigate sea level rise, and changes to agricultural processes—also increases. In short, each additional ton of CO_2 emitted into the atmosphere will have a greater net social cost as emissions increase, and each additional ton of CO_2 will have a greater net social cost as global warming accelerates.

191. A critical corollary of the non-linear relationship between atmospheric CO_2

[200] Id.; Amy Lieberman and Suzanne Rust, Big Oil braced for global warming while it fought regulations, L.A. Times (December 31, 2015), http://graphics.latimes.com/oil-operations/.

concentrations and SCC is that delayed efforts to curb those emissions have increased environmental harms and will increased the magnitude and cost to remediate harms that have already occurred or are locked in by previous emissions. Therefore, Defendants' campaign to obscure the science of climate change and to expand the extraction and use of fossil fuels greatly increased and continues to increase the harms and rate of harms suffered by the County and the People.

192. The consequences of delayed action on climate change, exacerbated by Defendants' actions, already have drastically increased the cost of mitigating further harm. Had concerted action begun even as late as 2005, an annual 3.5% reduction in CO_2 emissions to lower atmospheric CO_2 to 350 ppm by the year 2100 would have restored earth's energy balance[201] and halted future global warming, although such efforts would not forestall committed sea level rise already locked in.[202] If efforts do not begin until 2020, however, a 15% annual reduction will be required to restore the Earth's energy balance by the end of the century.[203] Earlier steps to reduce emissions would have led to smaller—and less disruptive—measures needed to mitigate the impacts of fossil fuel production.

193. The costs of inaction and the opportunities to confront anthropogenic climate change and sea level rise caused by normal consumption of their fossil fuel products, were not lost on Defendants. In a 1997 speech by John Browne, Group Executive for BP America, at Stanford University, Browne described Defendants' and the entire fossil fuel industry's responsibility and

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[201] "Climate equilibrium" is the balance between Earth's absorption of solar energy and its own energy radiation. Earth is currently out of equilibrium due to the influence of anthropogenic greenhouse gases, which prevent radiation of energy into space. Earth therefore warms and move back toward energy balance. Reduction of global CO_2 concentrations to 350 ppm is necessary to re-achieve energy balance, if the aim is to stabilize climate without further global warming. *See* James Hansen et al., Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature, 8 PLOS ONE 1, 4-5 (December 3, 2013), http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081648.

[202] James Hansen et al., Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature, 8 PLOS ONE 1, 10 (December 3, 2013), http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081648.

[203] Id.

opportunities to reduce use of fossil fuel products, reduce global CO_2 emissions, and mitigate the harms associated with the use and consumption of such products:

> A new age demands a fresh perspective of the nature of society and responsibility.
>
> We need to go beyond analysis and to take action. It is a moment for change and for a rethinking of corporate responsibility. . . .
>
> [T]here is now an effective consensus among the world's leading scientists and serious and well informed people outside the scientific community that there is a discernible human influence on the climate, and a link between the concentration of carbon dioxide and the increase in temperature.
>
> The prediction of the IPCC is that over the next century temperatures might rise by a further 1 to 3.5 degrees centigrade [1.8º – 6.3º F], and that sea levels might rise by between 15 and 95 centimetres [5.9 and 37.4 inches]. Some of that impact is probably unavoidable, because it results from current emissions. . . .
>
> [I]t would be unwise and potentially dangerous to ignore the mounting concern.
>
> The time to consider the policy dimensions of climate change is not when the link between greenhouse gases and climate change is conclusively proven . . . but when the possibility cannot be discounted and is taken seriously by the society of which we are part. . . .
>
> We [the fossil fuel industry] have a responsibility to act, and I hope that through our actions we can contribute to the much wider process which is desirable and necessary.
>
> BP accepts that responsibility and we're therefore taking some specific steps.
>
> To control our own emissions.
>
> To fund continuing scientific research.
>
> To take initiatives for joint implementation.
>
> To develop alternative fuels for the long term.
>
> And to contribute to the public policy debate in search of the wider global answers to the problem."[204]

194. Despite Defendants' knowledge of the foreseeable, measurable harms associated

[204] John Browne, BP Climate Change Speech to Stanford, Climate Files (May 19, 1997), http://www.climatefiles.com/bp/bp-climate-change-speech-to-stanford/.

with the unabated consumption and use of their fossil fuel products, and despite the existence and Defendants' knowledge of technologies and practices that could have helped to reduce the foreseeable dangers associated with their fossil fuel products, Defendants continued to market and promote heavy fossil fuel use, dramatically increasing the cost of abatement. At all relevant times, Defendants were deeply familiar with opportunities to reduce the use of their fossil fuel products, reduce global CO_2 emissions associated therewith, and mitigate the harms associated with the use and consumption of such products. Examples of that recognition include, but are not limited to the following:

a. In 1963, Esso (Exxon) obtained multiple patents on technologies for fuel cells, including on the design of a fuel cell and necessary electrodes,[205] and on a process for increasing the oxidation of a fuel, specifically methanol, to produce electricity in a fuel cell.[206]

b. In 1970, Esso (ExxonMobil) obtained a patent for a "low-polluting engine and drive system" that used an interburner and air compressor to reduce pollutant emissions, including CO_2 emissions, from gasoline combustion engines (the system also increased the efficiency of the fossil fuel products used in such engines, thereby lowering the amount of fossil fuel product necessary to operate engines equipped with this technology).[207]

195. Defendants could have made major inroads to mitigate Plaintiffs' injuries through technology by developing and employing technologies to capture and sequester greenhouse gases emissions associated with conventional use of their fossil fuel products. Defendants had

[205] Patents, Fuel cell and fuel cell electrodes, Exxon Research Engineering Co. (December 31, 1963) https://www.google.com/patents/US3116169.

[206] Patents, Direct production of electrical energy from liquid fuels, Exxon Research Engineering Co. (December 3, 1963) https://www.google.com/patents/US3113049.

[207] Patents, Low-polluting engine and drive system, Exxon Research Engineering Co. (May 16, 1970) https://www.google.com/patents/US3513929.

knowledge dating at least back to the 1960s, and indeed, internally researched and perfected many such technologies. For instance:

a. The first patent for enhanced oil recovery technology, a process by which CO_2 is captured and reinjected into oil deposits, was granted to an ARCO (BP) subsidiary in 1952.[208] This technology could have been further developed as a carbon capture and sequestration technique;

b. Phillips Petroleum Company (ConocoPhillips) obtained a patent in 1966 for a "Method for recovering a purified component from a gas" outlining a process to remove carbon from natural gas and gasoline streams;[209] and

c. In 1973, Shell was granted a patent for a process to remove acidic gases, including CO_2, from gaseous mixtures.

196. Despite this knowledge, Defendants' later forays into the alternative energy sector were largely pretenses. For instance, in 2001, Chevron developed and shared a sophisticated information management system to gather greenhouse gas emissions data from its explorations and production to help regulate and set reduction goals.[210] Beyond this technological breakthrough, Chevron touted "profitable renewable energy" as part of its business plan for several years and launched a 2010 advertising campaign promoting the company's move towards renewable energy. Despite all this, Chevron rolled back its renewable and alternative energy projects in 2014.[211]

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[208] James P. Meyer, Summary of Carbon Dioxide Enhanced Oil Recovery (CO_2EOR) Injection Well Technology, American Petroleum Institute, page 1, http://www.api.org/~/media/Files/EHS/climate-change/Summary-carbon-dioxide-enhanced-oil-recovery-well-tech.pdf.

[209] Patents, Method for recovering a purified component from a gas, Phillips Petroleum Co (January 11, 1966) https://www.google.com/patents/US3228874.

[210] Chevron, Chevron Press Release – Chevron Introduces New System to Manage Energy Use (September 25, 2001).

[211] Benjamin Elgin, Chevron Dims the Lights on Green Power, Bloomberg (May 29, 2014) https://www.bloomberg.com/news/articles/2014-05-29/chevron-dims-the-lights-on-renewable-energy-projects.

197. Similarly, ConocoPhillips' 2012 Sustainable Development report declared developing renewable energy a priority in keeping with their position on sustainable development and climate change.[212] Their 10-K filing from the same year told a different story: "As an independent E&P company, we are solely focused on our core business of exploring for, developing and producing crude oil and natural gas globally."[213]

198. Likewise, while Shell orchestrated an entire public relations campaign around energy transitions towards net zero emissions, a fine-print disclaimer in its 2016 net-zero pathways report reads: "We have no immediate plans to move to a net-zero emissions portfolio over our investment horizon of 10–20 years."[214]

199. BP, appearing to abide by the representations Lord Browne made in his 1997 speech described above, engaged in a rebranding campaign to convey an air of environmental stewardship and renewable energy to its consumers. This included renouncing its membership in the GCC in 2007, changing its name from "British Petroleum" to "BP" while adopting the slogan "Beyond Petroleum," and adopting a conspicuously green corporate logo. However, BP's self-touted "alternative energy" investments during this turnaround included investments in natural gas, a fossil fuel, and in 2007 the company reinvested in Canadian tar sands, a particularly high-carbon source of oil.[215] The company ultimately abandoned its wind and solar assets in 2011 and 2013, respectively, and even the "Beyond Petroleum" moniker in 2013.[216]

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[212] ConocoPhillips, Sustainable Development (2013) http://www.conocophillips.com/sustainable-development/Documents/2013.11.7%201200%20Our%20Approach%20Section%20Final.pdf.

[213] ConocoPhillips Form 10-K, U.S. Securities and Exchange Commission Webpage (December 31, 2012) https://www.sec.gov/Archives/edgar/data/1163165/000119312513065426/d452384d10k.htm.

[214] Energy Transitions Towards Net Zero Emissions (NZE), Shell (2016).

[215] Fred Pearce, Greenwash: BP and the Myth of a World 'Beyond Petroleum,' The Guardian, (November 20, 2008) https://www.theguardian.com/environment/2008/nov/20/fossilfuels-energy.

[216] Javier E. David, 'Beyond Petroleum' No More? BP Goes Back to Basics, CNBC (April 20, 2013) http://www.cnbc.com/id/100647034.

200. After posting a $10 billion quarterly profit, Exxon in 2005 stated that "We're an oil and gas company. In times past, when we tried to get into other businesses, we didn't do it well. We'd rather re-invest in what we know."[217]

201. Even if Defendants did not adopt technological or energy source alternatives that would have reduced use of fossil fuel products, reduced global greenhouse gas pollution, and/or mitigated the harms associated with the use and consumption of such products, Defendants could have taken other practical, cost-effective steps to reduce the use of their fossil fuel products, reduce global greenhouse gas pollution associated therewith, and mitigate the harms associated with the use and consumption of such products. These alternatives could have included, among other measures:

a. Accepting scientific evidence on the validity of anthropogenic climate change and the damages it will cause people and communities, including Plaintiffs, and the environment. Mere acceptance of that information would have altered the debate from *whether* to combat climate change and sea level rise to *how* to combat it; and avoided much of the public confusion that has ensued over nearly 30 years, since at least 1988;

b. Forthrightly communicating with Defendants' shareholders, banks, insurers, the public, regulators and Plaintiffs about the global warming and sea level rise hazards of Defendants' fossil fuel products that were known to Defendants, would have enabled those groups to make material, informed decisions about whether and how to address climate change and sea level rise vis-à-vis Defendants' products;

c. Refraining from affirmative efforts, whether directly, through coalitions, or through front groups, to distort public debate, and to cause many consumers

[217] James R. Healy, Alternate Energy Not in Cards at ExxonMobil (October 28, 2005) https://usatoday30.usatoday.com/money/industries/energy/2005-10-27-oil-invest-usat_x.htm.

and business and political leaders to think the relevant science was far less certain that it actually was;

d. Sharing their internal scientific research with the public, and with other scientists and business leaders, so as to increase public understanding of the scientific underpinnings of climate change and its relation to Defendants' fossil fuel products;

e. Supporting and encouraging policies to avoid dangerous climate change, and demonstrating corporate leadership in addressing the challenges of transitioning to a low-carbon economy;

f. Prioritizing alternative sources of energy through sustained investment and research on renewable energy sources to replace dependence on Defendants' inherently hazardous fossil fuel products;

g. Adopting their shareholders' concerns about Defendants' need to protect their businesses from the inevitable consequences of profiting from their fossil fuel products. Over the period of 1990-2015, Defendants' shareholders proposed hundreds of resolutions to change Defendants' policies and business practices regarding climate change. These included increasing renewable energy investment, cutting emissions, and performing carbon risk assessments, among others.

202. Despite their knowledge of the foreseeable harms associated with the consumption of Defendants' fossil fuel products, and despite the existence and fossil fuel industry knowledge of opportunities that would have reduced the foreseeable dangers associated with those products, Defendants wrongfully and falsely promoted, campaigned against regulation of, and concealed the hazards of use of their fossil fuel products.

I. Defendants Caused Plaintiffs' Injuries.

203. Defendants individually and collectively extracted a substantial percentage of all raw fossil fuels extracted globally since 1965. Defendants individually and collectively refined, promoted, marketed, and sold a substantial percentage of all fossil fuels ultimately used and

combusted. And Defendants played a leadership role in campaigns to deny the link between their products and the adverse effects of fossil fuel emissions, avoid regulation, and lessen the carbon footprint affecting the world climate system.

204. CO_2 emissions attributable to fossil fuels that Defendants extracted from the Earth and injected into the market are responsible for a substantial percentage of greenhouse gas pollution since 1965.

205. Defendants' individual and collective conduct, including, but not limited to, their extraction, refining, and/or formulation of fossil fuel products; their introduction of fossil fuel products into the stream of commerce; their wrongful promotion of their fossil fuel products and concealment of known hazards associated with use of those products; and their failure to pursue less hazardous alternatives available to them; is a substantial factor in causing the increase in global mean temperature, and consequent increase in global mean sea surface height and disruptions to the hydrologic cycle, including, but not limited to, more frequent and extreme droughts, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes, since 1965.

206. Defendants have actually and proximately caused sea levels to rise, increased the destructive impacts of storm surges, increased coastal erosion, exacerbated the onshore impact of regular tidal ebb and flow, caused saltwater intrusion, disrupted the hydrologic cycle, caused increased frequency and severity of drought, caused increased frequency and severity of extreme precipitation events, caused increased frequency and severity of heat waves, caused increased frequency and severity of wildfires, and caused consequent social and economic injuries associated with the aforementioned physical and environmental impacts, among other impacts, resulting in inundation, destruction, and/or other interference with Plaintiffs' property and citizenry.

207. Plaintiffs have already incurred, and will foreseeably continue to incur, injuries, and damages because of sea level rise and disruptions to the hydrologic cycle including increased frequency and severity of drought, increased frequency and severity of extreme precipitation events, increased frequency and severity of heat waves, increased frequency and severity of

wildfires, and consequent social and economic injuries associated with those physical and environmental changes, all of which have been caused and/or exacerbated by Defendants' conduct.

208. But for Defendants' conduct, Plaintiffs would have suffered no or far less injuries and damages than they have endured, and foreseeably will endure, due to anthropogenic sea level rise, disruption of the hydrologic cycle, and associated consequences of those physical and environmental changes.

i. Sea Level Rise-Related Conditions and Injuries

209. Santa Cruz County has experienced significant sea level rise over the last half century attributable to Defendants' conduct.[218] Santa Cruz County will experience additional, significant, and dangerous sea level rise through at least the year 2150,[219] and the increases will continue and accelerate. Additionally, Santa Cruz County will experience greater committed sea level rise due to the "locked in" greenhouse gases already emitted.[220] The County will suffer greater overall sea level rise than the global average.[221]

210. In addition to weather and climate changes already observed, the County is at an increased risk of suffering extreme injuries in the future. For example, there is a 98% chance that the County experiences a devastating three-foot flood before the year 2050, and a 22% chance that

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[218] See NOAA, Mean Sea Level Trend at Tide Station 9413450 (Monterey, CA), https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=9413450 (accessed Nov. 3, 2017).

[219] Gary Griggs, et al., Rising Seas in California: An Update on Sea-Level Rise Science, California Ocean Science Trust, p. 26, Table 1(b) (April 2017), http://www.opc.ca.gov/webmaster/ftp/pdf/docs/rising-seas-in-california-an-update-on-sea-level-rise-science.pdf (describing sea level rise at the Golden Gate, approximately 80 miles from Santa Cruz County)

[220] Peter U. Clark, et al., Consequences of Twenty-First-Century Policy for Multi-Millennial Climate and Sea-Level Change, Nature Climate Change Vol. 6, 363-65 (2016).

[221] Global sea level rise is projected to be 82.7 cm (32.6 inches) above 2000 levels by 2100. See National Research Council, Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past Present and Future (2012) at page 107 at Table 5.2; page 117 at Table 5.3. The San Francisco Bay Area sea level rise is projected to be 91.9 cm (36.2 inches) over 2000 by 2100. Id.

such a flood occurs before 2030.[222] Average sea level rise along the County's shores will increase substantially over the course of the next several decades. For instance, sea level in the County will eventually increase in the County by over five feet by the year 2100 if emissions continue largely unabated,[223] causing multiple, predictable impacts, and exacerbating the impacts of extreme events.

211. With 0.3 feet of sea level rise, anticipated by 2030, the County will endure extensive coastal flooding. Over 850 buildings in unincorporated Santa Cruz County are at risk from that level of sea level rise. More than half of these are private residences, flooding of which can and will displace County citizens. 105,000 linear feet of roadway and highway are in the pathway of flooding and erosion damage, as well as 120,000 feet of storm and sewer infrastructure. Two emergency services buildings in the County are identified as at risk from 0.3 feet of sea level rise. 1,300 acres of parks and more than half of the coastal access points in the County are at risk, as are half of the coastal wetlands in the County, and 2% of its dune ecosystems, which protect upland activities from flooding and inundation.[224] The County estimates that the economic value of assets at-risk with 0.3 feet of sea level rise is approximately $742 million.[225]

212. With 2.4 feet of sea level rise, the County will endure greater flooding, erosion, and other injuries. Moreover, that level of sea level rise – projected by 2060 – will be coupled with the failure of coastal armoring and water control structures that are already in place. With that level of sea level rise, an additional 800 buildings in unincorporated areas of the County are under flood, inundation, or erosion risk. 35,000 additional feet of roadway and 55,000 feet of wastewater and storm drain pipes will be in the path of sea level rise hazards.[226] The County estimates that the

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[222] Climate Central, Surging Seas Risk Finder: Santa Cruz County, https://riskfinder.climatecentral.org/county/santa-cruz-county.ca.us?comparisonType=postal-code&forecastType=NOAA2017_int_p50&level=3&unit=ft (accessed Nov. 3, 2017).

[223] Central Coast Wetlands Group, Santa Cruz County Coastal Climate Change Vulnerability Report, p. 28, Table 2 (2017).

[224] Id. at 38-39.

[225] Id. at 60 Table 7.

[226] Id. at 39.

economic value of assets at risk with 2.4 feet of sea level rise is approximately $1.52 billion.[227]

213. With 5.2 feet of sea level rise, the County will suffer even greater injuries. At that level, more than 1,800 residential properties within the unincorporated County will be impacted by sea level rise hazards, as are 170,000 feet of roadway and 210,000 feet of water and sewer pipes.[228] The County estimates that the economic value of assets at risk with 5.2 feet of sea level rise is approximately $2.15 billion.[229]

214. Specific infrastructure in the County at risk of injury or destruction from anticipated increases in mean sea level includes all of, but is not limited to, the following:

a. Highway 1 north of the City of Santa Cruz will suffer from coastal erosion. Three sections of the highway are predicted to be vulnerable by 2030, four sections by 2060, and eleven separate locations are within erosion hazard areas by 2100. Key infrastructure within hazard areas includes bridges over Scott and Waddell creeks. Almost 3.5 miles of coastal armoring will be necessary to protect the current north county highway alignment through 2100.[230]

b. Roads along East Cliff Drive will experience monthly tidal flooding by 2030. Some sections of road, especially those crossing creek and lagoon mouths between 7th Avenue and Capitola, are already vulnerable to coastal flooding. Portions of West Beach Street will be vulnerable to tidal flooding by 2060 and much of the road and parking area within the Pajaro Dunes development will be flooded monthly by 2100. Approximately 1.8 miles of the rail line and 3.5 miles of County roads in the Pajaro Valley area are vulnerable to coastal flooding by 2060.

[227] Id. at 60 Table 7.
[228] Id. at 39.
[229] Id. at 60 Table 7.
[230] Id. at 45.

c. Many coastal access points adjacent to Moran Lake and within the low-lying sections of Rio Del Mar will suffer coastal flooding as early as 2030. By 2060, beach areas between Pleasure Point and Capitola will be submerged during high tides. By 2100 most of Seacliff, Aptos and Manresa beaches will be flooded during high tides if coastal bluffs are not allowed to erode inland.

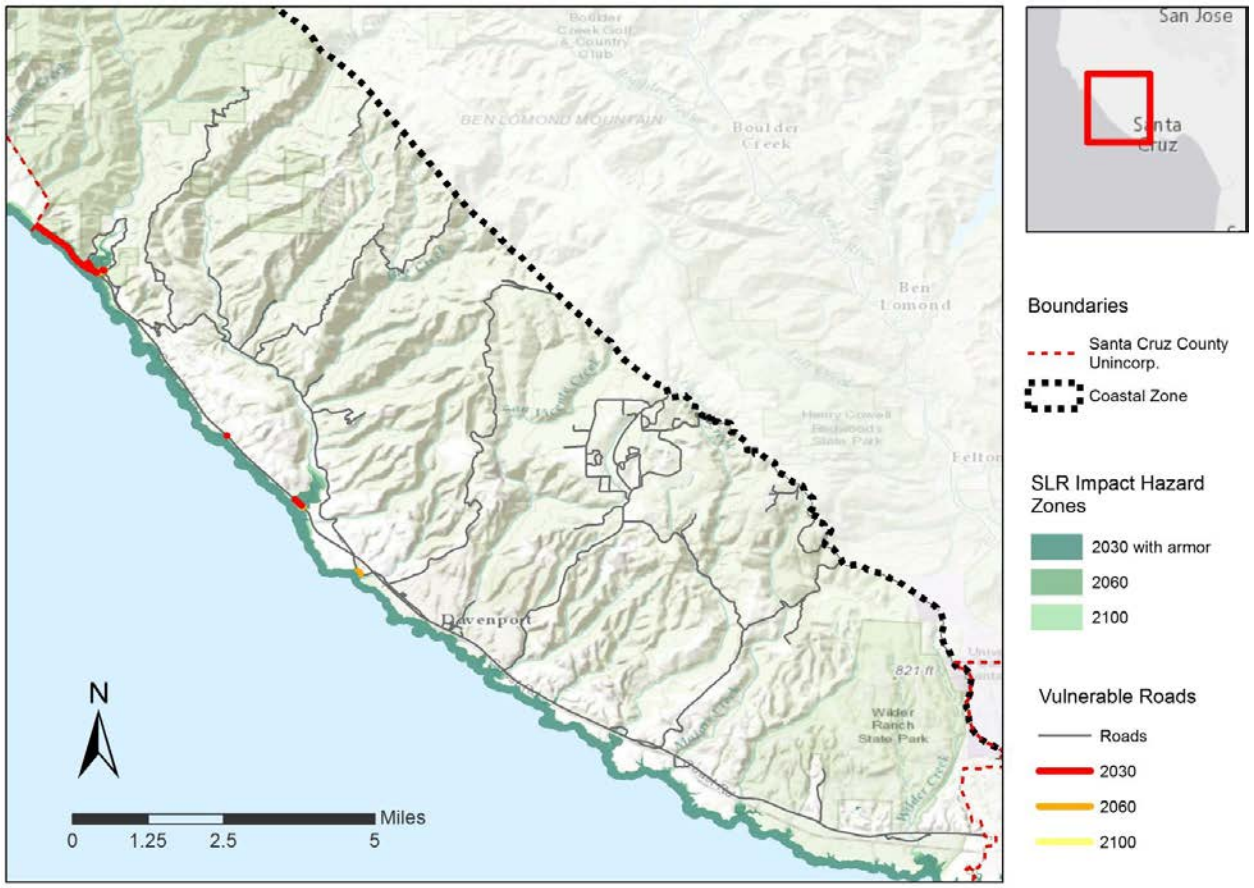
d. 2.5 miles of coastal armoring located between 7th Avenue and Capitola will need to be replaced to protect the adjacent 180 homes. Without replacing 2.9 miles of coastal armoring from Seacliff to Manresa Beach, 442 residential properties would be vulnerable to coastal erosion by 2060. The costs of rebuilding these seawalls are expected to be high and the feasibility of maintaining these structures as sea levels rise is uncertain.

e. Santa Cruz County Sanitation District pump stations and associated sanitary sewer infrastructure are situated in locations vulnerable to storm surges. Several of these facilities will be increasingly impacted by flooding as sea level rises and storms increase. As many as 427 sewer structures, 109,774 feet of sewer conduit, 13,466 feet of water main, and one wastewater treatment plant will suffer damage as a result of anticipated sea level rise and its associated consequences.[231]

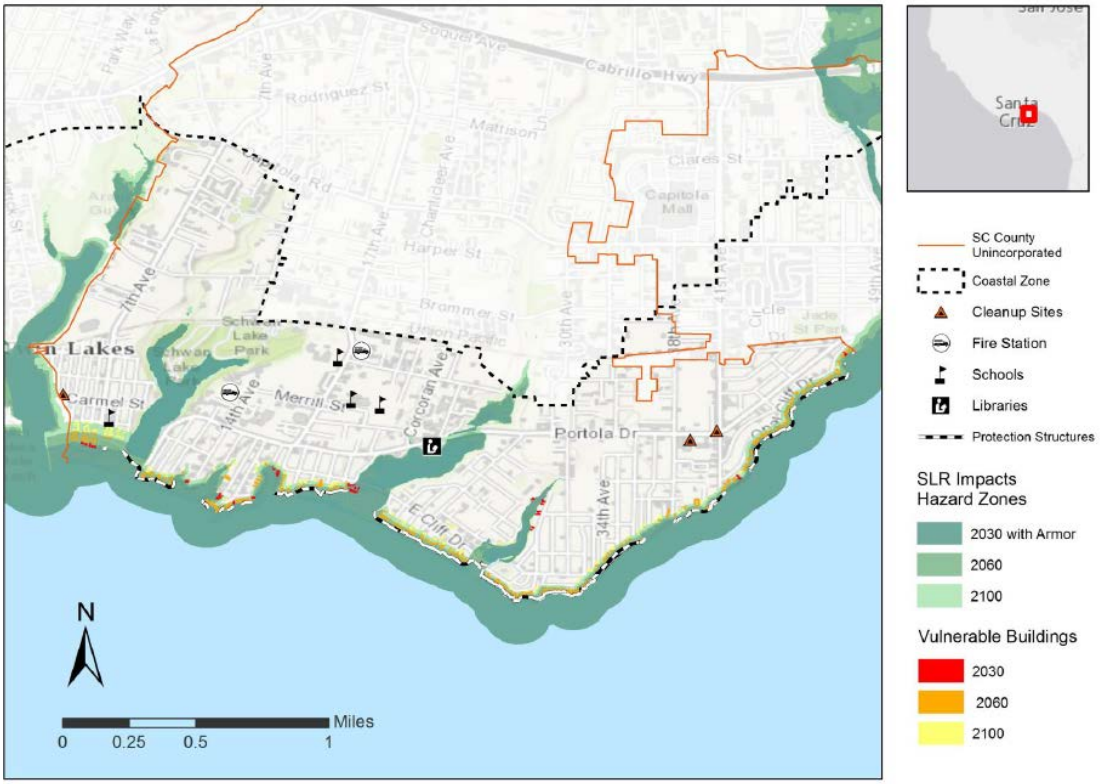
[231] Id. at Appendix A Table A4.

215. The following figures depict the areas of the County that will experience anticipated levels of sea level rise. As they demonstrate, virtually all the County's shoreline will experience some form of sea level rise-related impact by 2030, even with only 0.3 feet of sea level rise.

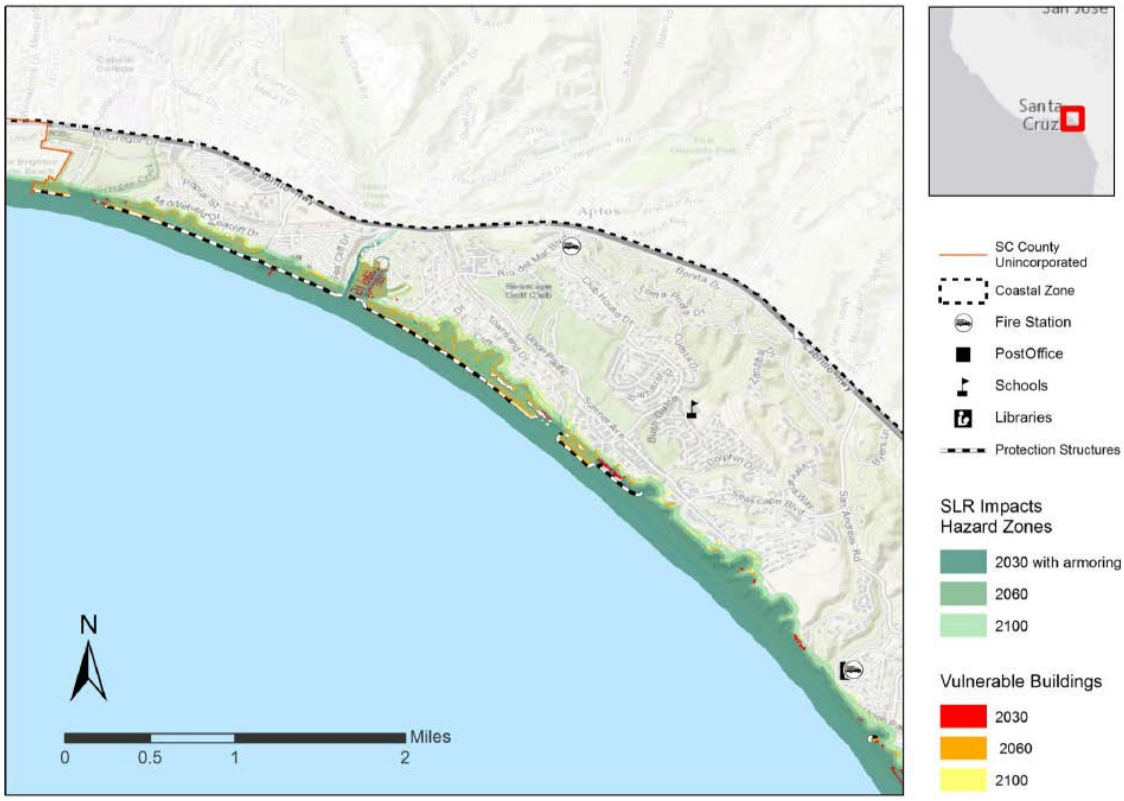
SANTA CRUZ COUNTY COASTAL HAZARD ANALYSIS
SECTION 1: COMBINED SEA LEVEL RISE IMPACTS



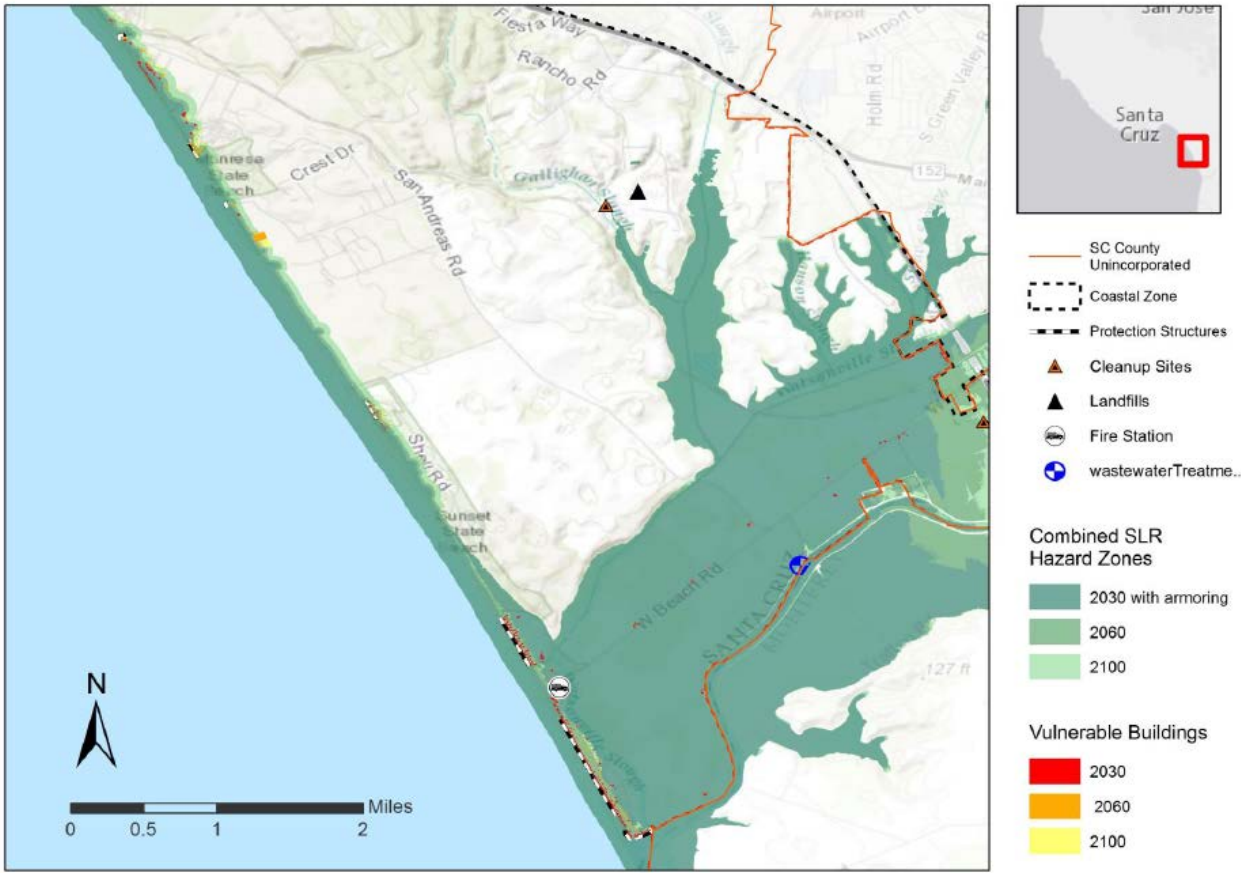
Map B5. Section 2: Combined Coastal Climate Change Hazard Zones



Map B9. Section 3: Combined Coastal Climate Change Hazard Zones



Map B13. Section 4: Combined Coastal Climate Change Hazard Zones



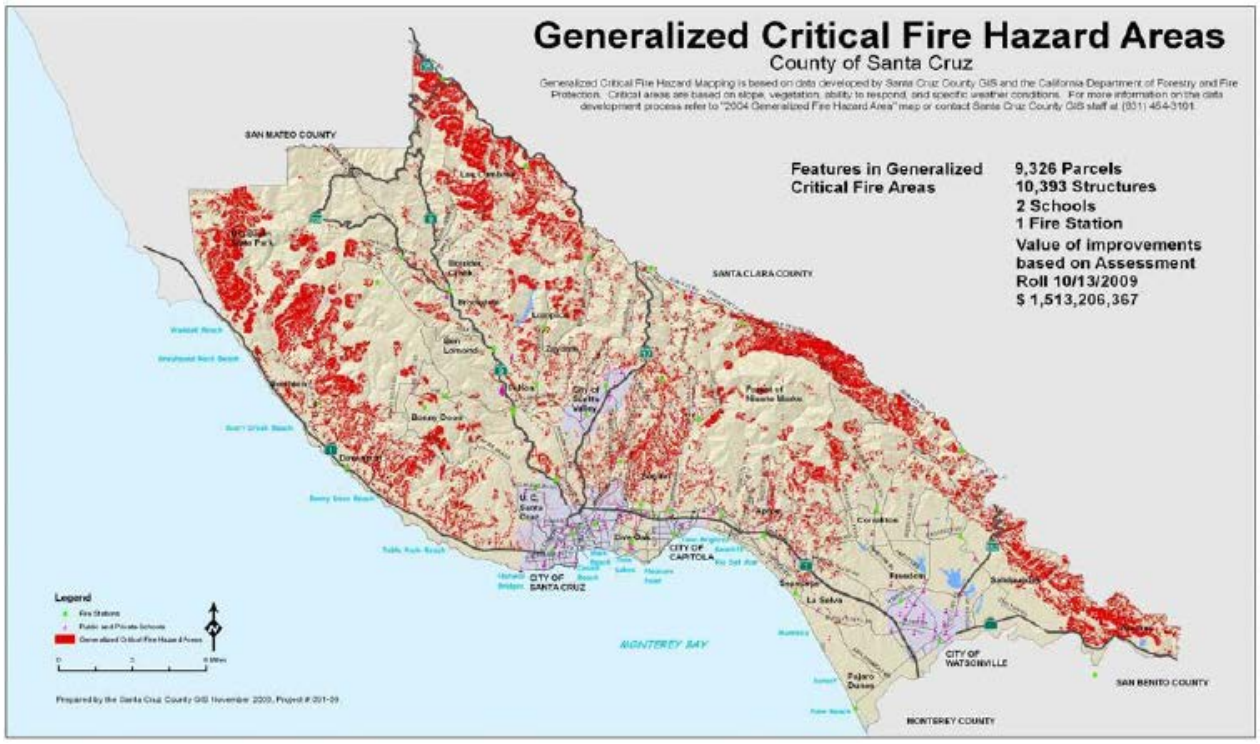
216. Particularly concerning to the County is the impact of sea level rise on its public beaches, which are the focal point of the tourism industry in the County. Rising sea level threatens the beaches with increased erosion, severe storms and flooding that will damage infrastructure, access, and tourist attractions. Several key roads and bridges are at low elevation and close to the coast where they are vulnerable to flooding, storm waves, and erosion. Tourism generates hundreds of millions of dollars in direct travel expenditures in the County annually, and millions in revenue for local government. The County will lose material portions of this revenue source because of the continued erosion and inundation of its beaches and other injuries to tourist attractions.

ii. Wildfire-Related Conditions & Injuries

217. Santa Cruz ranks 14th among California Counties for fire risk.[232] This owes to the County's steep and remote inland mountains, covered with dense vegetation ranging from chaparral to eucalyptus to conifer forest, and the typical cold and damp weather pattern in the Count that is interspersed with extremely hot, dry, and windy conditions.

218. The map below describes portions of the County that are designated Critical Fire Hazard Areas.[233]

FIGURE 16. CRITICAL FIRE HAZARD AREAS WITHIN COUNTY OF SANTA CRUZ



219. Since 1948, the County has experienced 16 major wildfires that burned more than 150 acres. Of those, seven occurred since 2002,[234] demonstrating that the frequency of major fires in Santa Cruz County has accelerated since the onset of anthropogenic global warming. The major wildfires that have burned in the County since 2008 include, but are not limited to:

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[232] County of Santa Cruz, Local Hazard Mitigation Plan: 2015-2020, 62 (2015).

[233] Id. at 59.

[234] Id. at 60.

a. The Summit Fire in May 2008 that burned 4,270 acres in an area straddling Santa Cruz and Santa Clara Counties, destroyed 35 residences and 64 outbuildings, and caused sixteen injuries.[235]

b. The Martin Fire in June 2008 that burned 520 acres, destroyed three residences and eight outbuildings, seven miles north of Santa Cruz at Bonny Doon and Martin Road near Hwy 9 in Santa Cruz County.[236]

c. The Trabing Fire in June 2008 that burned 630 acres, destroyed ten residences and ten outbuildings, in Larkin Valley north of Watsonville near Highway 1 in Santa Cruz County.[237]

d. The Lockheed Fire in August 2009 that burned 7,817 acres in the Bonny Doon and Swanton areas of Santa Cruz County, destroying thirteen outbuildings. 2.[238]

e. The Loma Fire in October 2009 that burned 485 acres in the area of Maymens Flat - Highland Road, Eureka Canyon and Ormsby in Santa Cruz County.[239]

f. The Bear Fire in October 2017 that burned 391 acres in the vicinity of Bear Canyon Road and Deer Creek Road in Boulder Creek, Santa Cruz County. six structures were destroyed in this fire.[240]

220. The County contracts with the California Department of Forestry and Fire Protection ("CalFire") to provide fire suppression services for unincorporated portions of the

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[235] Cal. Dept. of Forestry and Fire Protection, Incident Information for Santa Cruz County, http://cdfdata.fire.ca.gov/incidents/incidents_cur_search_results?search=santa%20cruz%20county (accessed Nov. 3, 2017).

[236] Id.

[237] Id.

[238] Id.

[239] Id.

[240] Id.

County that are not included in autonomous fire protection districts.[241] The County bears costs related to fire suppression in its jurisdiction.

221. Due to the increase in temperature and decrease in moisture availability in Santa Cruz County, the frequency and intensity of wildfires is increasing. Coincident with that increase, the destructive force of and costs to suppress wildfires are also increasing.

222. The County estimates that over a billion dollars of improvements are located in Critical Fire Hazard Areas of the County. Assets within the County that are at risk of wildfire include thousands of residences, several schools including the University of California, Santa Cruz, several youth camps, numerous commercial facilities, five local public water systems with extensive infrastructure, three state highways, and three major power transmission Rights of Way. Wildfire injury to any of these assets will cause secondary and tertiary injuries to the County in the form of response costs, displacement of residents, landslides, and others.

iii. Extreme Precipitation & Landslide-Related Conditions & Injuries

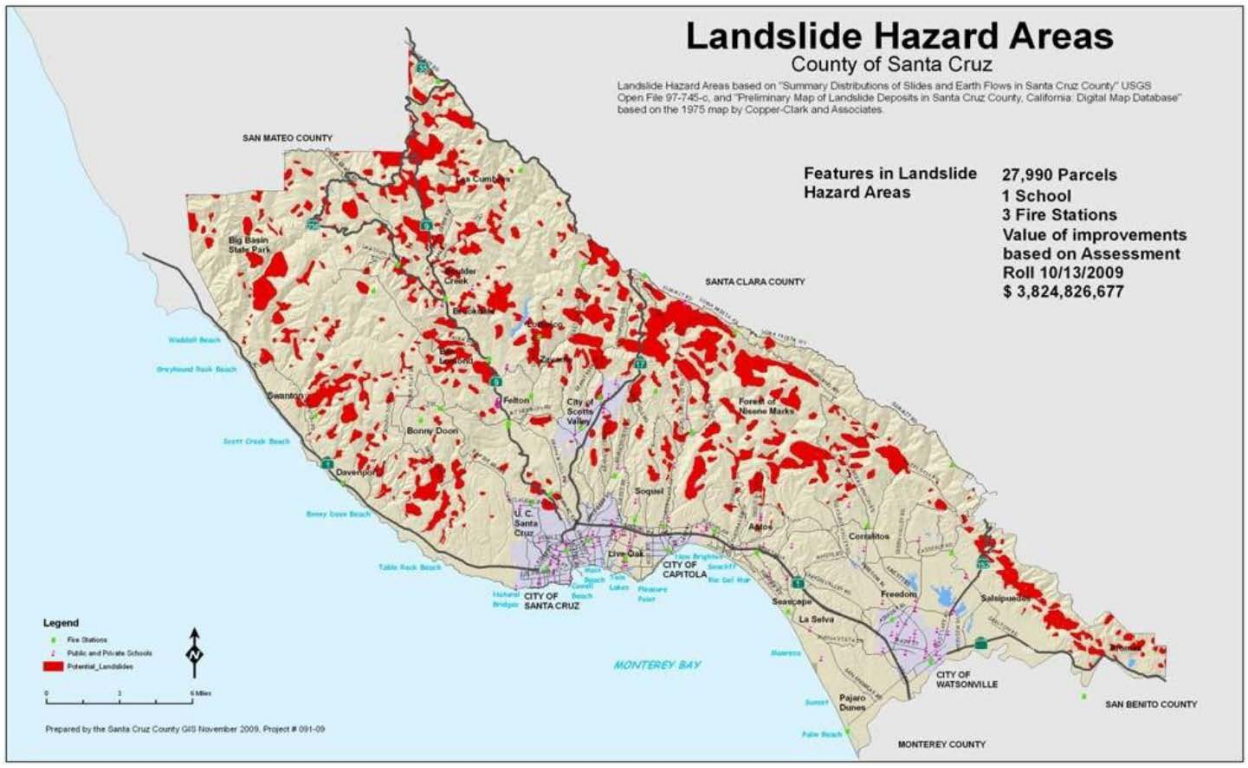
223. The topography in Santa Cruz County is conducive to destructive landslides, and such activity is centered primarily along the steeper slopes in the hills and mountains, along stream corridors, and along coastal bluffs and inlets. The County anticipates that as extreme precipitation events increase, so too will the occurrence of landslides. Runoff that seeps into loose substrate can cause it to dislodge, at which point gravity will carry material downslope. Additionally, in areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides[242] due to the loss of root structures that maintain soil cohesion. Landslides may cause loss of life, property damage, and destruction of infrastructure, among other impacts. For instance, severe storms have caused landslides in the Santa Cruz mountains that killed at least ten people in one instance, and severe storms have damaged major thoroughfares such as Highway 9, Branciforte Road, and Amensti Road.[243] Because utilities in the County generally follow roadways, damage to roads will

[241] County of Santa Cruz, Local Hazard Mitigation Plan: 2015-2020, p. 58 (2015).

[242] Id. at 137.

[243] Id. at 140.

often disrupt sewers, water systems, gas and electricity, and cable and telephone utilities that service the County and its residents.[244] The County incurs significant costs in responding to road closures associated with landslides, including, but not limited to, the costs of personnel, engineering, and construction/demolition. The County also expends significant sums on planning for landslides, including by constructing prevention and mitigation infrastructure to limit damages. The County estimates that multiple billions of dollars in property is subject to landslide risk that increases with anthropogenic climate change.[245] The map below illustrates the significant portion of the County that is at an increasing risk of injury due to landslides associated with the consequences of anthropogenic global warming.[246]



224. Foreseeably, the increased incidence of landslides has resulted in increased litigation defense costs to the County. County residents have brought, *inter alia,* inverse condemnation claims against the County where those residents are unable to access their property

[244] Id. at 141.
[245] Id. at 139 Figure 28.
[246] Id.

due to landslide-induced road closures. Unless the County undertakes expensive projects to mitigate the effects of anthropogenic global warming, specifically increased risk and occurrence of landslides, it will continue to be exposed to these litigation-related expenses.

225. Additionally, increasingly extreme precipitation events in the County will contribute to relatively diminished groundwater storage in groundwater basins in the County (due to the shorter time in which runoff is present on the surface), which will reduce groundwater storage and dry season stream baseflows, which will have adverse impacts on water supply.[247]

226. Extreme precipitation events, and consequent extreme surface runoff, injure wastewater collection and treatment infrastructure. Stormwater infiltration inflow that enters wastewater collection systems in the County increases the total amount of water that the systems treat, causing increased costs of operating, maintaining, and powering wastewater treatment facilities, and increasing the wear and tear on treatment and conveyance infrastructure.

227. Increasingly extreme precipitation events have caused and will continue to cause increased inland flooding and associated damage, included interference with or destruction of roads and county infrastructure. Intense storms in the recent past have destroyed or rendered impassable approximately 230 roads in the County, for which the County has incurred hundreds of millions of dollars in expenses in planning, permitting, and actual repair. The County will continue to suffer similar injuries and on-going expenses in the coming years.

iv. Drought-Related Conditions & Injuries

228. Nearly all of the public water supply systems in Santa Cruz County are already impacted by climate-related shifts to a hotter, dryer meteorological regime in the County and an increased climatic water deficit. These water suppliers and County residents and businesses are suffering from either reduction in surface water supply due to increasingly frequent and intense drought, or from groundwater overdraft due to increased reliance on that source in the face of diminished surface water supply. With continued global warming and attendant climatic and meteorological shifts, the County and its residents will continue to be negatively impacted in

[247] Id. at 101.

several ways, including, but not limited to, being forced to adapt water sources and water use habits, and incur attendant costs.

229. Almost all of the groundwater basins in the County are in a condition of overdraft.[248] This is due to increased reliance on groundwater as surface water availability decreases due to drought, and reduced groundwater recharge due to the same decrease in surface water availability. Current average groundwater pumping levels in the County cannot be sustained on a long-term basis.[249]

230. The County projects that that water demand will outstrip supply during drought years moving forward. As soon as 2020, the County projects that a single drought year will result in a deficit of tens of millions of gallons.[250] Water supply deficits will be exacerbated by increasing frequency and severity of droughts, and the increasing likelihood of multi-year drought conditions.

231. Because groundwater extraction rates in the County's groundwater basins exceed sustainable pumping rates, groundwater levels have dropped significantly, resulting in saltwater intrusion and rendering some coastal groundwater wells unsuitable for use.[251] With the rise in sea level and current groundwater overdraft conditions, saltwater intrusion will be exacerbated. Consequences of saltwater intrusion in the County include, but are not limited to, County agricultural operations fallowing fields in the County. This diminishes the productivity of the County's agricultural economy, thereby diminishing tax revenue to the County, among other injuries.

v. Public Health Conditions & Injuries

232. The County has and will continue to incur expenses in planning and preparing for, and treating, the public health impacts associated with anthropogenic global warming. In Santa Cruz County, the predicted public health effects of anthropogenic climate change include, but are

[248] County of Santa Cruz, Local Hazard Mitigation Plan: 2015-2020, p. 95 (2015).
[249] Id.
[250] Id. at 98-99.
[251] Id. at 159.

not limited to, impacts associated with extreme weather, extreme heat, drought, vector borne illnesses, and sea level rise.

233. Extreme weather-induced public health impacts in the County will increase risk of fatal and nonfatal injuries from drowning, being struck by objects, fire, explosions, electrocution, or exposure to toxic materials, among others. A widespread weather-related natural disaster may destroy or ruin housing, schools and businesses and cause temporary or permanent displacement. Individuals and families may experience post-traumatic stress, depression, and increased risk of suicide.[252]

234. Extreme heat-induced public health impacts in the County will result in increased risk of heat-related illnesses (mild heat stress to fatal heat stroke) and the exacerbation of pre-existing conditions in the medically fragile, chronically ill, and vulnerable. Increased heat also intensifies the photochemical reactions that produce smog and ground level ozone and fine particulates (PM2.5), which contribute to and exacerbate respiratory disease in children and adults. Increased heat and carbon dioxide enhance the growth of plants that produce pollen, which are associated with allergies. Increased temperatures add to the heat load of buildings in urban areas and exacerbate existing urban heat islands adding to the risk of high ambient temperatures.[253]

235. Increased frequency and intensity of wildfires will increase fire-related injuries and increase respiratory and cardiovascular risks from smoke, ash, and fine particles.[254]

236. Increased frequency and intensity of drought will create human health impacts by reducing water availability to fight wildfires. Drought will also increase risk of exposure to health hazards including wildfires, dust storms, extreme heat events, flash flooding, degraded water quality, and reduced water quantity. Dust storms associated with drought conditions have been associated with increased incidents of Valley fever, a fungal pathogen.[255]

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[252] N. Maizlish, et al., Climate Change and Health Profile Report: Santa Cruz County Office of Health Equity, California Department of Public Health, p. 12 (2017).
[253] Id. at 13.
[254] Id.
[255] Id.

237. Disease-related public health impacts in the County may include, but are not limited to, increased incidence of emerging diseases with migration of animal and insect disease vectors; physical and mental health impacts associated with severe weather events, such as flooding, when they cause population dislocation and infrastructure loss; exacerbation of existing respiratory disease, cardiovascular disease, and stroke as a result of heatwaves and increased average temperature; respiratory distress; and exacerbation of existing disease.[256]

238. Sea level rise will increase risk of public health impacts including, but are not limited to, salt water intrusion into coastal aquifers reducing quality and quantity of water supply; loss of recreational venues and hazards to infrastructure and public safety due to coastal erosion; and; and indoor air quality problems from mold resulting from water intrusion.[257]

239. Public health impacts are likely to be disproportionately borne by communities made vulnerable by geographic, racial, or income disparities.[258]

240. As a direct and proximate result of the acts and omissions of the Defendants' alleged herein, Plaintiffs have incurred substantial expenses related to planning for and predicting future climate change-related injuries to its real property, improvements thereon, civil infrastructure, and citizens, to preemptively mitigate and/or prevent such injuries. This includes, but is not limited to, performing a coastal climate change vulnerability assessment finalized in 2017 at significant expense to the County, which found that billions of dollars in assets located in the County are at risk with expected increases in mean sea levels adjacent to the County. Plaintiffs have also expended substantial sums in planning for increasing frequency and severity of drought, increasing frequency and severity of extreme precipitation events, increasing the frequency and severity of heatwaves, increasing frequency and severity of wildfires, and increasing magnitude of the associated consequences of those physical and environmental changes.

241. As a direct and proximate result of Defendants' acts and omissions alleged herein, Plaintiffs have incurred sea level rise- and hydrologic cycle change-related injuries and damages.

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[256] Id.

[257] Id.

[258] Id.

These include, but are not limited to, infrastructural repair and reinforcement of roads, beach and access; installation of coastal armoring infrastructure (sea walls and rip rap), much of which will need to be repaired, replaced, or supplemented after 2030; erosion of ocean-adjacent public land; flooding and/or inundation of property; increased emergency response costs including to wildfires; costs of addressing public health consequences of elevated temperatures; displacement of residents within the County; decreases in County revenue; and others.

242. Defendants' conduct as described herein is therefore an actual, substantial, and proximate cause of Plaintiffs' injuries that result from sea level rise, changes to the hydrologic cycle, increasing frequency and severity of drought, increasing frequency and severity of extreme precipitation events, increasing frequency and severity of heatwaves, increasing frequency and severity of wildfires, and the associated consequences of those physical and environmental changes.

VI. CAUSES OF ACTION

FIRST CAUSE OF ACTION

(Public Nuisance on Behalf of the People of the State of California)

(Against All Defendants)

243. The People incorporate by reference each and every allegation contained above, as though set forth herein in full.

244. Defendants, and each of them, by their affirmative acts and omissions, have created, contributed to, and assisted in creating, conditions in Santa Cruz County, and permitted those conditions to persist, which constitute a nuisance by, *inter alia*, increasing local sea level, and associated flooding, inundation, erosion, and other impacts within the County; increasing the frequency and magnitude of drought in the County; increasing the frequency and magnitude of extreme heat days in the County; increasing the frequency and magnitude of extreme precipitation events in the County; and increasing the frequency and magnitude of wildfires in the County.

245. Defendants specifically created, contributed to, and/or assisted, and/or were a substantial contributing factor in the creation of the public nuisance, by, *inter alia*:

a. extracting raw fossil fuel products, including crude oil, coal, and natural gas from the Earth, and placing those fossil fuel products into the stream of commerce;

b. affirmatively and knowingly promoting the sale and use of fossil fuel products which Defendants knew to be hazardous and knew would cause or exacerbate global warming and related consequences, including, but not limited to, sea level rise, drought, extreme precipitation events, extreme heatwaves, and wildfires;

c. affirmatively and knowingly concealing the hazards that Defendants knew would result from the normal use of their fossil fuel products by misrepresenting and casting doubt on the integrity of scientific information related to climate change;

d. disseminating and funding the dissemination of information intended to mislead customers, consumers, and regulators regarding known and foreseeable risk of climate change and its consequences, which follow from the normal, intended use and foreseeable misuse of Defendants' fossil fuel products;

e. affirmatively and knowingly campaigning against the regulation of their fossil fuel products, despite knowing the hazards associated with the normal use of those products, in order to continue profiting from use of those products by externalizing those known costs onto people, the environment, and communities, including the People; and failing to warn the public about the hazards associated with the use of fossil fuel products.

246. The condition created by Defendants substantially and negatively affects the interests of the public at large. In particular, higher sea level, more frequent and extreme droughts, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes: (1) are harmful and dangerous to human health; (2) are indecent and

offensive to the senses of the ordinary person; (3) obstruct and threaten to obstruct the free use of the People's property so as to interfere with the comfortable enjoyment of life and property; and (4) obstruct and threaten to obstruct the free passage and use of navigable lakes, rivers, bays, streams, canals, basins, public parks, squares, streets, and/or highways within Santa Cruz County.

247. The People of the State of California have a common right to be free from the increased severity of these hazards due to climate change, higher sea level, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes.

248. The seriousness of rising sea levels, higher sea level, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes, is extremely grave and outweighs the social utility of Defendants' conduct because, *inter alia*,

a. interference with the public's rights due to sea level rise, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes as described above, is expected to become so regular and severe that it will cause material deprivation of and/or interference with the use and enjoyment of public and private property in the County;

b. the ultimate nature of the harm is the destruction of real and personal property, rather than mere annoyance;

c. the interference borne is the loss of property and infrastructure within Santa Cruz County, which will actually be borne by Plaintiff's citizens as loss of use of public property and infrastructure and diversion of tax dollars away from other public services to the mitigation of and/or adaptation to climate change impacts;

d. Plaintiff's coastal property, which serves myriad uses including industrial, residential, infrastructural, commercial, and ecological, is not suitable for regular inundation, flooding, landslides, wildfires and/or other physical or environmental consequences of anthropogenic global warming;

e. the social benefit of the purpose of placing fossil fuels into the stream of commerce is outweighed by the availability of other sources of energy that could have been placed into the stream of commerce that would not have caused anthropogenic global warming and its physical and environmental consequences as described herein; Defendants, and each of them, knew of the external costs of placing their fossil fuel products into the stream of commerce, and rather than striving to mitigate those externalities, Defendants instead acted affirmatively to obscure them from public consciousness;

f. the cost to society of each ton of greenhouse gases emitted into the atmosphere increases as total global emissions increase, so that unchecked extraction and consumption of fossil fuel products is more harmful and costly than moderated extraction and consumption; and

g. it was practical for Defendants, and each of them, in light of their extensive knowledge of the hazards of placing fossil fuel products into the stream of commerce and extensive scientific engineering expertise, to develop better technologies and to pursue and adopt known, practical, and available technologies, energy sources, and business practices that would have mitigated greenhouse gas pollution and eased the transition to a lower carbon economy.

249. This public nuisance affects and/or interferes with the rights of an entire community and/or the rights of a considerable number of persons in the State of California to health, safety, peace, comfort, and convenience.

250. As a direct and proximate result of Defendants' conduct, as set forth above, the common rights enjoyed by the People of the State of California and by the general public in the County of Santa Cruz have been unreasonably interfered with because Defendants knew or should have known that their conduct would create a continuing problem with long-lasting significant negative effects on the rights of the public.

251. Defendants' actions are a direct and legal cause of the public nuisance.

252. The People of the State of California, acting through the County of Santa Cruz, have a clearly ascertainable right to have the public nuisance created by Defendants abated.[259]

253. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

254. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff the People of the State of California's injuries as alleged herein.

255. Wherefore, the People of the State of California pray for relief as set forth below.

SECOND CAUSE OF ACTION

(Public Nuisance on Behalf of Santa Cruz County)

(Against All Defendants)

256. Plaintiff Santa Cruz County incorporates by reference each and every allegation contained above, as though set forth herein in full.

257. Defendants, and each of them, by their affirmative acts and omissions, have created, contributed to, and/or assisted in creating, conditions in Santa Cruz County, and permitted those conditions to persist, which constitute a nuisance by, *inter alia*, increasing local sea level, and associated flooding, inundation, erosion, and other impacts within the County; increasing the frequency and magnitude of drought conditions in the County; increasing the frequency and

[259] The People do not seek abatement with respect to any federal lands.

magnitude of extreme heat days in the County; increasing the frequency and magnitude of extreme precipitation events in the County; and increasing the frequency and magnitude of wildfires in the County, all of which have resulted in, and will continue to result in, injury to the Plaintiff.

258. The conditions created by Defendants substantially and negatively affect the interests of the public at large. Climate change impacts, including but not limited to, higher sea level, more frequent and extreme droughts, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes: (1) are harmful and dangerous to human health; (2) are indecent and offensive to the senses of the ordinary person; (3) obstruct and threaten to obstruct the free use of property within the County so as to interfere with the comfortable enjoyment of life and property; and (4) obstruct and threaten to obstruct the free passage and use of navigable lakes, rivers, bays, streams, canals, basins, public parks, squares, streets, and/or highways within Santa Cruz County.

259. Climate change impacts associated with sea level rise, more frequent and extreme droughts, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes, will impact a substantial numbers of residents and citizens living, owning property, operating businesses, and relying on the public infrastructure in Santa Cruz County; therefore, the conditions created by Defendants affect substantial numbers of people in Plaintiff's communities at the same time.

260. The seriousness of anthropogenic global warming impacts including *inter alia* rising sea levels, more frequent and extreme droughts, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes, is extremely grave, and outweighs the social utility of Defendants' conduct. The seriousness of the harm to Plaintiff Santa Cruz County outweighs the benefit of Defendants' and each of their conduct, because

a. these interferences with Plaintiff's property is expected to become so regular and severe as to be a permanent;

b. the nature of the harm is the destruction of Plaintiff's property, rather than mere annoyance;

c. the interference borne is the loss of property and infrastructure within Santa Cruz County, which will actually be borne by Plaintiff's citizens as loss of use of public property and infrastructure and diversion of tax dollars away from other public services to the mitigation of and/or adaptation to climate change impacts;

d. Plaintiff's public and private property, which serves myriad uses including residential, infrastructural, commercial, and ecological, is not suitable for regular inundation, wildfire, erosion, landslides, and other climate change impacts;

e. the burden on Plaintiff to mitigate and prevent the interference with its property is significant and severe, as costs associated with addressing sea level rise, more frequent and extreme droughts, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes caused by Defendants, are projected to be enormously expensive over the next several decades;

f. the social benefit of the purpose of placing fossil fuels into the stream of commerce, if any, is outweighed by the availability of other sources of energy that could have been placed into the stream of commerce that would not have caused sea level rise, more frequent and extreme droughts, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes; Defendants, and each of them, knew of the external costs of placing their fossil fuel products into the stream of commerce, and rather than striving to mitigate

those externalities, instead acted affirmatively to obscure them from public consciousness;

g. the social cost of each ton of CO_2 emitted into the atmosphere increases as total global emissions increase, so that unchecked extraction and consumption of fossil fuel products is more harmful and costly than moderated extraction and consumption; and

h. it was practical for Defendants, and each of them, in light of their extensive knowledge of the hazards of placing fossil fuel products into the stream of commerce and extensive scientific engineering expertise, to develop better technologies and to pursue and adopt known, practical, and available technologies, energy sources, and business practices that would have mitigated the greenhouse gas pollution caused by their fossil fuel products and eased the transition to a lower carbon economy.

261. In addition to the harms suffered by the public at large, Plaintiff has suffered special injuries different in kind. Among other harms,

a. Plaintiff has been forced to spend or set aside significant funds to assess, plan for, and enact policy and infrastructure changes needed to mitigate rising sea levels on Plaintiff's publicly owned infrastructure, beaches, and other public coastal property, and needed to mitigate the impacts of more frequent and extreme droughts, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes, on property within Plaintiff's jurisdiction;

b. Plaintiff has had to plan for and provide additional public health, emergency, and other public services in response to more frequent and more intense flooding and storm surges, more frequent and extreme droughts, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated

consequences of those physical and environmental changes, on both properties owned by Plaintiff, and properties owned, leased, and utilized by residents, citizens, and visitors to Plaintiff's communities.

262. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

263. As a direct and proximate result of Defendants' conduct, as set forth above, the County of Santa Cruz has been unreasonably interfered with because Defendants knew or should have known that their conduct would create a continuing problem with long-lasting significant negative effects on the rights of the public.

264. Defendants' actions are a direct and legal cause of the public nuisance described herein.

265. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff Santa Cruz County's injuries and damages as alleged herein.

266. Wherefore, Plaintiff prays for relief as set forth below.

THIRD CAUSE OF ACTION

(Strict Liability—Failure to Warn on behalf of Santa Cruz County)

(Against All Defendants)

267. Plaintiff Santa Cruz County incorporates by reference each and every allegation contained above, as though set forth herein in full.

268. Defendants, and each of them, extracted raw fossil fuel products, including crude oil, coal, and natural gas from the Earth, and placed those fossil fuel products into the stream of commerce.

269. Defendants, and each of them, extracted, refined, formulated, designed, packaged, distributed, tested, constructed, fabricated, analyzed, recommended, merchandised, advertised,

promoted, and/or sold fossil fuel products, which were intended by Defendants, and each of them, to be combusted for energy, refined into petrochemicals, and refined and/or incorporated into petrochemical products including fuels and plastics.

270. Defendants, and each of them, heavily marketed, promoted, and advertised fossil fuel products and their derivatives, which were sold or used by their respective affiliates and subsidiaries. Defendants received direct financial benefit from their affiliates' and subsidiaries' sales of fossil fuel products. Defendants' roles as promoters and marketers were integral to their respective businesses and a necessary factor in bringing fossil fuel products and their derivatives to the consumer market, such that Defendants had control over, and a substantial ability to influence, the manufacturing and distribution processes of their affiliates and subsidiaries.

271. Throughout the times at issue, Defendants individually and collectively knew or should have known, in light of the scientific knowledge generally accepted at the time, that fossil fuel products, whether used as intended or misused in a foreseeable manner, release greenhouse gases into the atmosphere that inevitably cause *inter alia* global warming, sea level rise, more frequent and extreme droughts, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes.

272. Throughout the times at issue and continuing today, fossil fuel products presented and still present a substantial risk of injury to Plaintiff through the climate effects described herein, whether used as intended or misused in a reasonably foreseeable manner.

273. Throughout the times at issue, the ordinary consumer would not recognize that the use or foreseeable misuse of fossil fuel products causes global and localized changes in climate, including those effects described herein.

274. Throughout the times at issue, Defendants individually and in concert widely disseminated marketing materials, refuted the scientific knowledge generally accepted at the time, advanced pseudo-scientific theories of their own, and developed public relations campaigns and materials that prevented reasonable consumers from recognizing the risk that fossil fuel products would cause grave climate changes, including those described herein.

275. Defendants, and each of them, failed to adequately warn customers, consumers, and regulators of known and foreseeable risk of climate change and the consequences that inevitably follow from the normal, intended use and foreseeable misuse of Defendants' fossil fuel products.

276. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

277. As a direct and proximate result of the defects previously described, fossil fuel products caused Plaintiff Santa Cruz County to sustain the injuries and damages set forth in this Complaint, including damage to publicly owned infrastructure and real property, and the creation and maintenance of nuisances that interfere with the rights of the County, its residents, and of the People.

278. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff Santa Cruz County's injuries as alleged herein.

279. Wherefore, Plaintiff prays for relief as set forth below.

FOURTH CAUSE OF ACTION

(Strict Liability—Design Defect on behalf of Santa Cruz County)

(Against All Defendants)

280. Plaintiff Santa Cruz County incorporates by reference each and every allegation contained above, as though set forth herein in full.

281. Defendants, and each of them, extracted raw fossil fuel products, including crude oil, coal, and natural gas from the Earth and placed those fossil fuel products into the stream of commerce.

282. Defendants, and each of them, extracted, refined, formulated, designed, packaged, distributed, tested, constructed, fabricated, analyzed, recommended, merchandised, advertised, promoted, and/or sold fossil fuel products, which were intended by Defendants, and each of them,

to be burned for energy, refined into petrochemicals, and refined and/or incorporated into petrochemical products including but not limited to fuels and plastics.

283. Defendants, and each of them, heavily marketed, promoted, and advertised fossil fuel products and their derivatives, which were sold or used by their respective affiliates and subsidiaries. Defendants' received direct financial benefit from their affiliates' and subsidiaries' sales of fossil fuel products. Defendants' roles as promoters and marketers were integral to their respective businesses and a necessary factor in bringing fossil fuel products and their derivatives to the consumer market, such that Defendants had control over, and a substantial ability to influence, the manufacturing and distribution processes of their affiliates and subsidiaries.

284. Throughout the time at issue, fossil fuel products have not performed as safely as an ordinary consumer would expect them to because greenhouse gas emissions from their use cause numerous global and local changes to Earth's climate. In particular, ordinary consumers did not expect that:

a. fossil fuel products are the primary cause of global warming since the dawn of the industrial revolution, and by far the primary cause of global warming acceleration in the 20th and 21st centuries;

b. fossil fuel products are the primary would cause acceleration of sea level rise since the beginning of the 20th century;

c. normal use and/or foreseeable misuse of fossil fuel products would cause more frequent and extreme drought;

d. normal use and/or foreseeable misuse of fossil fuel products would cause more frequent and extreme precipitation events;

e. normal use and/or foreseeable misuse of fossil fuel products would cause more frequent and extreme heat waves;

f. normal use and/or foreseeable misuse of fossil fuel products would cause more frequent and extreme wildfires;

g. normal use and/or foreseeable misuse of fossil fuel products would cause other injurious changes to the environment as alleged herein;

h. by increasing sea level rise, more frequent and extreme droughts, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme heat waves, and the associated consequences of those physical and environmental changes, fossil fuel products cause damage to publicly and privately owned infrastructure and buildings, including homes;

i. the social cost of each ton of CO_2 emitted into the atmosphere increases as total global emissions increase, so that unchecked extraction and consumption of fossil fuel products is more harmful and costly than moderated extraction and consumption; and

j. for these reasons and others, the unmitigated use of fossil fuel products present significant threats to the environment and human health and welfare.

285. Throughout the times at issue, Defendants individually and in concert widely disseminated marketing materials, refuted the scientific knowledge generally accepted at the time, advanced pseudo-scientific theories of their own, and developed public relations materials, among other public messaging efforts, that prevented reasonable consumers from forming an expectation that fossil fuel products would cause grave climate changes, including those described herein.

286. Additionally, and in the alternative, Defendants' fossil fuel products are defective because the risks they pose to consumers and to the public, including and especially to Plaintiff, outweigh their benefits, because:

a. the gravity of the potential harms caused by fossil fuel products is extreme; global warming and its attendant consequences are guaranteed to occur following the use or foreseeable misuse of fossil fuel products because such use inherently releases greenhouse gases into the atmosphere; and global warming would continue to occur for decades even if all greenhouse gas emissions ceased;

b. the social benefit of the purpose of placing fossil fuels into the stream of commerce is overshadowed by the availability of other sources of energy that could have been placed into the stream of commerce that would not have caused global warming, its associated consequences including those described herein, and accordingly Plaintiff's injuries; Defendants, and each of them, knew of the external costs of placing their fossil fuel products into the stream of commerce, and rather than striving to mitigate those externalities, instead acted affirmatively to obscure them from public consciousness;

c. Defendants' campaign of disinformation regarding global warming and the climatic effects of fossil fuel products prevented customers, consumers, regulators, and the general public from taking steps to mitigate the inevitable consequences of fossil fuel consumption, and incorporating those consequences into either short-term decisions or long-term planning;

d. the cost to society of each ton of CO_2 emitted into the atmosphere increases as total global emissions increase so that unchecked extraction and consumption of fossil fuel products is more harmful and costly than moderated extraction and consumption; and

e. it was practical for Defendants, and each of them, in light of their extensive knowledge of the hazards of placing fossil fuel products into the stream of commerce, to pursue and adopt known, practical, and available technologies, energy sources, and business practices that would have mitigated their greenhouse gas pollution and eased the transition to a lower carbon economy, reduced global CO_2 emissions, and mitigated the harms associated with the use and consumption of such products.

287. Defendants' individual and aggregate fossil fuel products were used in a manner for which they were intended to be used, or misused in a manner foreseeable to Defendants and

each of them, by individual and corporate consumers, the result of which was the addition of CO_2 emissions to the global atmosphere with attendant global and local consequences.

288. As a direct and proximate result of the defects in fossil fuel products described herein, Plaintiff sustained the injuries and damages set forth in this Complaint, including, but not limited to, damage to publicly and privately owned infrastructure and real property.

289. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

290. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff Santa Cruz County's injuries and damage as alleged herein.

291. Wherefore, Plaintiff prays for relief as set forth below.

FIFTH CAUSE OF ACTION

(Private Nuisance on behalf of Santa Cruz County)

(Against All Defendants)

292. Plaintiff Santa Cruz County incorporates by reference each and every allegation contained above, as though set forth herein in full.

293. Plaintiff owns and manages extensive property within Santa Cruz County borders that has been injured and will be injured by rising sea levels, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes.

294. Defendants, and each of them, by their acts and omission, have created conditions on Plaintiff's property, and permitted those conditions to persist, which constitute a nuisance by increasing sea level, increasing the frequency and severity of drought, increasing the frequency and severity of extreme precipitation events, increasing the frequency and severity of heatwaves,

increasing the frequency and severity of wildfires, and increasing the magnitude of the associated consequences of those physical and environmental changes.

295. The conditions created by Defendants substantially and negatively affect Plaintiff's interest in its own real property. In particular, higher sea level, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes:

a. are harmful and dangerous to human health;

b. are indecent and offensive to the senses of the ordinary person;

c. threaten to obstruct the free use of Plaintiff's property and property owned by Plaintiff's residents and citizens, so as to interfere with the comfortable enjoyment of life and property; and

d. threaten to obstruct the free passage and use of navigable lakes, rivers, bays, streams, canals, basins, public parks, squares, streets, and/or highways within Plaintiff's communities.

296. The conditions described herein created by Defendants' conduct substantially interfere with Plaintiff's use and quiet enjoyment of its properties.

297. Plaintiff has not consented to Defendants' creation of the conditions that have led to sea level rise, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes.

298. The ordinary person, and the ordinary city or county in Plaintiff's position, would be reasonably annoyed and disturbed by Defendants' conduct and the conditions created thereby, because, *inter alia*, those conditions infringe on Plaintiff's ability to provide public space to residents and visitors, and have forced Plaintiff to plan for and provide additional emergency and other public services in response to more frequent and more intense flooding, storm surges, drought, and wildfires on properties owned by Plaintiff.

299. The seriousness of rising sea levels, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes, is extremely grave, and outweighs the social utility of Defendants' conduct. The seriousness of the harms to Plaintiff outweighs the benefit of Defendants' and each of their conduct, because:

a. the interference with Plaintiff's property is expected to become so regular and severe as to be a permanent;

b. the nature of the harm is the destruction of Plaintiff's public and private real and personal property, rather than mere annoyance;

c. the interference borne is the loss of property and infrastructure within Santa Cruz County, which will actually be borne by Plaintiff's citizens as loss of use of public property and infrastructure and diversion of tax dollars away from other public services to the mitigation of and/or adaptation to climate change impacts;

d. Plaintiff's public and private property, which serves myriad uses including industrial, residential, infrastructural, commercial, and ecological, is not suitable for regular inundation, wildfire, erosion, landslides, or other global warming impacts including those described herein;

e. the burden on Plaintiff to mitigate and prevent the interference with its property is significant and severe, as costs associated with addressing sea level rise, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes caused by Defendants are projected to be enormously expensive over the next several decades;

f. the social benefit of the purpose of placing fossil fuels into the stream of commerce is overshadowed by the availability of other sources of energy

that could have been placed into the stream of commerce that would not have caused sea level rise, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes; Defendants, and each of them, knew of the external costs of placing their fossil fuel products into the stream of commerce, and rather than striving to mitigate those externalities, Defendants acted affirmatively to obscure those costs from public consciousness;

g. the social cost each ton of CO_2 emitted into the atmosphere increases as total global emissions increase, so that unchecked extraction and consumption of fossil fuel products is more harmful and costly than moderated extraction and consumption;

h. Defendants' campaign of disinformation regarding global warming and the climatic effects of fossil fuel products prevented customers, consumers, regulators, and the general public from staking steps to mitigate the inevitable consequences of fossil fuel consumption, and incorporating those consequences into either short-term decisions or long-term planning; and

i. it was practical for Defendants, and each of them, in light of their extensive knowledge of the hazards of placing fossil fuel products into the stream of commerce, to pursue and adopt known, practical, and available technologies, energy sources, and business practices that would have mitigated their greenhouse gas pollution and eased the transition to a lower carbon economy, reduced global CO_2 emissions, and mitigated the harms associated with the use and consumption of such products.

300. Defendants' conduct was a direct and proximate cause of Plaintiff's injuries, and a substantial factor in the harms suffered by Plaintiff as described in this Complaint.

301. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others.

Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct

302. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff Santa Cruz County's injuries and damage as alleged herein.

303. Wherefore, Plaintiff prays for relief as set forth below.

SIXTH CAUSE OF ACTION

(Negligence on Behalf of Santa Cruz County)

(Against All Defendants)

304. Plaintiff Santa Cruz County incorporates by reference each and every allegation contained above, as though set forth herein in full.

305. Defendants knew or should have known of the climate effects inherently caused by the normal use and operation of their fossil fuel products, including the likelihood and likely severity of global and local sea level rise, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes, including Plaintiff's injuries and damages as described herein.

306. Defendants, collectively and individually, had a duty to use due care in developing, designing, testing, inspecting, and distributing their fossil fuel products. That duty obligated Defendants collectively and individually to, *inter alia*, prevent defective products from entering the stream of commerce, and prevent reasonably foreseeable harm that could have resulted from the ordinary use or reasonably foreseeable misuse of Defendants' products.

307. Defendants, and each of them, breached their duty of due care by, *inter alia*:

a. allowing fossil fuel products to enter the stream of commerce, despite knowing them to be defective due to their inevitable propensity to cause sea level rise, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more

frequent and extreme wildfires, and the associated consequences of those physical and environmental changes;

b. failing to act on the information and warnings they received from their own internal research staff, as well as from the international scientific community, that the unabated extraction, promotion, and sale of their fossil fuel products would result in material dangers to the public, including Santa Cruz County;

c. failing to take actions including, but not limited to, pursuing and adopting known, practical, and available technologies, energy sources, and business practices that would have mitigated caused by Defendants' fossil fuel products and eased the transition to a lower carbon economy; shifting to non-fossil fuel products, and researching and/or offering technologies to mitigate CO_2 emissions in conjunction with sale and distribution of their fossil fuel products; and pursuing other available alternatives that would have prevented or mitigated the injuries to Plaintiff caused by sea level rise, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes, that Defendants, and each of them, knew or should have foreseen would inevitably result from use of Defendants' fossil fuel products;

d. engaging in a campaign of disinformation regarding global warming and the climatic effects of fossil fuel products that prevented customers, consumers, regulators, and the general public from staking steps to mitigate the inevitable consequences of fossil fuel consumption, and incorporating those consequences into either short-term decisions or long-term planning.

308. Defendants individual and collective acts and omissions were actual, substantial causes of sea level rise, disruptions to weather cycles, extreme precipitation and drought, increased

frequency and magnitude of wildfires, and associated consequences, including Plaintiff's injuries and damages set forth herein, as sea levels would not have risen to the levels that caused Plaintiff's injuries, and prevailing climatic and meteorological regimes would not have been disrupted to a magnitude that caused Plaintiff's injuries, but for Defendants introduction of their fossil fuel products into the stream of commerce.

309. Defendants individual and collective acts and omissions were proximate causes of sea level rise, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes, including Plaintiff's injuries and damages set forth herein. No other act, omission, or natural phenomenon intervened in the chain of causation between Defendants' conduct and Plaintiff's injuries and damages, or superseded Defendants' breach of their duties' substantiality in causing Plaintiff's injuries and damages.

310. As a direct and proximate result of Defendants' and each of their acts and omissions, Plaintiff sustained injuries and damages as set forth herein.

311. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff Santa Cruz County's injuries and damage as alleged herein.

312. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

313. Wherefore, Plaintiff prays for relief as set forth below.

SEVENTH CAUSE OF ACTION

(Negligence - Failure to Warn on Behalf of Santa Cruz County)

(Against All Defendants)

314. Plaintiff Santa Cruz County incorporates by reference each and every allegation contained above, as though set forth herein in full.

315. Defendants knew or should have known, based on information passed to them from their internal research divisions and affiliates and/or from the international scientific community, of the climate effects inherently caused by the normal use and operation of their fossil fuel products, including the likelihood and likely severity of global warming, global and local sea level rise, more frequent and extreme drought, more frequent and extreme precipitation events, more frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes, including Plaintiff's injuries and damages described herein.

316. Defendants knew or should have known, based on information passed to them from their internal research divisions and affiliates and/or from the international scientific community, that the climate effects described herein rendered their fossil fuel products dangerous, or likely to be dangerous, when used as intended or misused in a reasonably foreseeable manner.

317. Throughout the times at issue, Defendants failed to adequately warn any consumers or any other party of the climate effects that inevitably flow from the use or foreseeable misuse of their fossil fuel products.

318. Throughout the times at issue, Defendants individually and in concert widely disseminated marketing materials, refuted the scientific knowledge generally accepted at the time, advanced pseudo-scientific theories of their own, and developed public relations materials that prevented reasonable consumers from recognizing the risk that fossil fuel products would cause grave climate changes, undermining and rendering ineffective any warnings that Defendants may have also disseminated.

319. Given the grave dangers presented by the climate effects that inevitably flow from the normal use or foreseeable misuse of fossil fuel products, a reasonable extractor, manufacturer,

formulator, seller, or other participant responsible for introducing fossil fuel products into the stream of commerce, would have warned of those known, inevitable climate effects.

320. Defendants' conduct was a direct and proximate cause of Plaintiff's injuries and a substantial factor in the harms suffered by Plaintiff as alleged herein.

321. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff Santa Cruz County's injuries and damage as alleged herein.

322. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

323. Wherefore, Plaintiff prays for relief as set forth below.

EIGHTH CAUSE OF ACTION

(Trespass on Behalf of Santa Cruz County)

(Against All Defendants)

324. Plaintiff Santa Cruz County incorporates by reference each and every allegation contained above, as though set forth herein in full.

325. Plaintiff Santa Cruz County owns, leases, occupies, and/or controls real property within Plaintiff's county boundaries and within communities located within the County.

326. Defendants, and each of them, have intentionally, recklessly, or negligently caused flood waters, wildfires, extreme precipitation, landslides, saltwater, and other materials, to enter Plaintiff Santa Cruz County's property, by extracting, refining, formulating, designing, packaging, distributing, testing, constructing, fabricating, analyzing, recommending, merchandising, advertising, promoting, marketing, and/or selling fossil fuel products, knowing those products in their normal operation and use or foreseeable misuse would cause global and local sea levels to rise, more frequent and extreme drought, more frequent and extreme precipitation events, more

frequent and extreme heat waves, and more frequent and extreme wildfires, and the associated consequences of those physical and environmental changes.

327. Plaintiff Santa Cruz County did not give permission for Defendants, or any of them, to cause flood waters, wildfires, extreme precipitation, landslides, saltwater, and other materials to enter its property as a result of the use of Defendants' fossil fuel products.

328. Plaintiff Santa Cruz County has been and continues to be actually injured and continues to suffer damages as a result of Defendants and each of their having caused flood waters, wildfires, extreme precipitation, landslides, saltwater, and other materials, to enter its property, by *inter alia* permanently submerging real property owned by Plaintiff, causing flooding which have invaded and threatens to invade real property owned by Plaintiff and rendered it unusable, causing storm surges which have invaded and threatened to invade real Property owned by Plaintiff, burning Plaintiff's land, contaminating Plaintiff's aquifers with sea water, causing landslides to enter Plaintiff's property, and in so doing, rendering Plaintiff's land unusable.

329. Defendants' and each Defendant's introduction of their fossil fuel products into the stream of commerce was a substantial factor in causing the injuries and damages to Plaintiff's public and private real property as alleged herein.

330. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff Santa Cruz County's injuries and damages as alleged herein.

331. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

332. Wherefore, Plaintiff prays for relief as set forth below.

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VII. PRAYER FOR RELIEF

1. Compensatory damages in an amount according to proof;

2. Equitable relief, including abatement of the nuisances complained of herein;

3. Reasonable attorneys' fees pursuant to California Code of Civil Procedure 1021.5 or otherwise;

4. Punitive damages;

5. Disgorgement of profits;

6. Costs of suit; and

7. For such and other relief as the court may deem proper.

Dated: December 20, 2017

OFFICE OF THE COUNTY COUNSEL
COUNTY OF SANTA CRUZ

By: _____
DANA M. McRAE, County Counsel
JORDAN SHEINBAUM, Deputy County Counsel

SHER EDLING LLP

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KATIE H. JONES

Attorneys for The County of Santa Cruz, individually and on behalf of the People of the State of California

VIII. JURY DEMAND

Plaintiff Santa Cruz County demands a jury trial on all issues so triable.

Dated: December 20, 2017

OFFICE OF THE COUNTY COUNSEL
COUNTY OF SANTA CRUZ

By: _____

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EXHIBIT A

Truth or CO_2nsequences

MAJOR FOSSIL FUEL COMPANIES have known the truth for nearly 50 years: their oil, gas, and coal products create greenhouse gas pollution that warms the planet and changes our climate. They've known for decades that the consequences could be catastrophic and that only a narrow window of time existed to take action before the damage might not be reversible. They have nevertheless engaged in a coordinated, multi-front effort to conceal and contradict their own knowledge of these threats, discredit the growing body of publicly available scientific evidence, and persistently create doubt in the minds of customers, consumers, regulators, the media, journalists, teachers, and the general public about the reality and consequences of climate change.

This timeline highlights information, alleged in lawsuits against fossil fuel companies, that comes from key industry documents and other sources. It illustrates what the industry knew, when they knew it, and what they didn't do to prevent the impacts that are now imposing real costs on people and communities around the country. While the early warnings from the industry's own scientists and experts often acknowledged the uncertainties in their projections, those uncertainties were typically about the timing and magnitude of the climate change impacts – not about whether those impacts would occur or whether the industry's oil, gas, and coal were the primary cause. On those latter points, as these documents show, they were quite certain.

DATE	DOCUMENT	TEXT
NOV. 5, 1965	"RESTORING THE QUALITY OF OUR ENVIRONMENT," REPORT OF THE ENVIRONMENTAL POLLUTION PANEL, PRESIDENT'S SCIENCE ADVISORY COMMITTEE	**President Lyndon Johnson's Science Advisory Committee finds that** "*[P]ollutants have altered on a global scale the carbon dioxide content of the air*" and "*[M]an is unwittingly conducting a vast geophysical experiment*" by burning fossil fuels that are injecting CO2 into the atmosphere. The committee concludes that by the year 2000, we could see *"measurable and perhaps marked changes in climate, and will almost certainly cause significant changes in the temperature and other properties of the stratosphere."*
FEB. 1968	"SOURCES, ABUNDANCE, AND FATE OF GASEOUS ATMOSPHERIC POLLUTANTS," REPORT PREPARED BY STANFORD RESEARCH INSTITUTE SCIENTISTS ELMER ROBINSON AND R.C. ROBBINS FOR THE AMERICAN PETROLEUM INSTITUTE (API)	**The American Petroleum Institute commissions a report finding that:** • *"[A]lthough there are other possible sources for the additional CO2 now being observed in the atmosphere, none seems to fit the presently observed situation as well as the fossil fuel emanation theory."* • *"Significant temperature changes are almost certain to occur by the year 2000, and these could bring about climatic changes."* • *"There seems to be no doubt that the potential damage to our environment could be severe."* • *"What is lacking, however, is an application of these CO2 data to air pollution technology and work toward systems in which CO2 emissions would be brought under control."*
JUNE 6, 1978	PRESENTATION SHARED WITH EXXON MANAGEMENT COMMITTEE FROM EXXON RESEARCH AND ENGINEERING SCIENCE ADVISOR, JAMES BLACK	**Exxon Science Advisor James Black tells the company's Management Committee that** "*[T]here is general scientific agreement that the most likely manner in which mankind is influencing the global climate is through carbon dioxide release from the burning of fossil fuels*" and that "*[M]an has a time window of five to ten years before the need for hard decisions regarding changes in energy strategy might become critical."*
SEPT. 17, 1978	CONGRESS PASSES NATIONAL CLIMATE POLICY ACT	**Congress passes the National Climate Policy Act to help** "*the Nation and the world to understand and respond to natural and man-induced climate processes and their implications."*

Truth or CO_2nsequences

DATE	DOCUMENT	TEXT
DEC. 7, 1978	CO2 RESEARCH PROPOSAL FROM EXXON RESEARCH AND ENGINEERING'S ENVIRONMENTAL AREA MANAGER, HENRY SHAW	**Exxon scientist Henry Shaw proposes that the company initiate a comprehensive research program** "*to assess the possible impact of the greenhouse effect on Exxon business.*" He argues that the company needs "*a credible scientific team that can critically evaluate the information generated on the subject and be able to carry bad news, if any, to the corporation.*"
OCT. 16, 1979	"CONTROLLING THE CO2 CONCENTRATION IN THE ATMOSPHERE," STUDY BY EXXON EMPLOYEE STEVE KNISELY	**An Exxon internal study finds that:** • *"The present trend of fossil fuel consumption will cause dramatic environmental effects before the year 2050."* • *"[R]ecognizing the uncertainty, there is a possibility that an atmospheric CO2 buildup will cause adverse environmental effects in enough areas of the world to consider limiting the future use of fossil fuels as major energy sources."* • *"The potential problem is great and urgent."*
FEB. 29, 1980	MEETING MINUTES FROM THE AMERICAN PETROLEUM INSTITUTE'S (API'S) CO2 AND CLIMATE TASK FORCE: PRESENTATION BY DR. J. LAURMAN	**Dr. J. Laurman tells API's Climate Task Force that** "*there is a scientific consensus on the potential for large future climatic response to increased CO2 levels*" and that "*remedial actions will take a long time to become effective.*"
AUG. 6, 1980	"REVIEW OF ENVIRONMENTAL PROTECTION ACTIVITIES FOR 1978-1979," IMPERIAL OIL REPORT	**An internal "Review of Environmental Protection Activities for 1978-1979" by Imperial Oil, which was distributed widely to Exxon/Esso Corporate Managers, finds that** "*[T]echnology exists to remove CO2 from stack gases but removal of only 50% of the CO2 would double the cost of power generation.*"
AUG. 18, 1981	MEMO FROM ROGER COHEN, DIRECTOR OF EXXON'S THEORETICAL AND MATHEMATICAL SCIENCE LABORATORY, TO SCIENTIST WERNER GLASS	**Exxon Strategic Planning Manager Roger Cohen comments on an internal assessment of CO2 emissions and the greenhouse effect that is prepared at the request of Senior VP and Director Morey O'Loughlin:** • *"[I]t is very likely that we will unambiguously recognize the threat by the year 2000 because of advances in climate modeling and the beginning of real experimental confirmation of the CO2 effect."* • *"Whereas I can agree with the statement that our best guess is that observable effects in the year 2030 will be 'well short of catastrophic', it is distinctly possible that the [Planning Division's] scenario will later produce effects that will indeed be catastrophic (at least for a substantial fraction of the earth's population)."*
APRIL 1, 1982	"CO2 'GREENHOUSE' EFFECT," INTERNALLY DISTRIBUTED SUMMARY BY EXXON MANAGER M.B. GLASER OF A TECHNICAL REVIEW PREPARED BY EXXON RESEARCH AND ENGINEERING COMPANY'S COORDINATION AND PLANNING DIVISION	**An internal Exxon "CO2 'Greenhouse Effect' Summary" finds that** "*[T]here is concern among some scientific groups that once the effects are measurable, they might not be reversible and little could be done to correct the situation in the short term*" and that "*[M]itigation of the 'greenhouse effect' could require major reductions in fossil fuel combustion.*"

Truth or CO_2nsequences

DATE	DOCUMENT	TEXT
SEPT. 2, 1982	MEMO FROM ROGER COHEN, DIRECTOR OF EXXON'S THEORETICAL AND MATHEMATICAL SCIENCE LABORATORY, TO EXXON MANAGEMENT INCLUDING PRESIDENT OF EXXON CORPORATION'S RESEARCH AND ENGINEERING, E. E. DAVID JR.	**The Director of Exxon's Theoretical and Mathematical Sciences Laboratory, Roger Cohen, summarizes the findings of their research in climate modeling:** • *"[O]ver the past several years a clear scientific consensus has emerged regarding the expected climatic effects of increased atmospheric CO2."* • *"It is generally believed that the first unambiguous CO2-induced temperature increase will not be observable until around the year 2000."* • *"[T]he results of our research are in accord with the scientific consensus on the effect of increased atmospheric CO2 on climate."*
OCT. 1982	"INVENTING THE FUTURE: ENERGY AND THE CO2 'GREENHOUSE' EFFECT," E. E. DAVID JR. REMARKS AT THE FOURTH ANNUAL EWING SYMPOSIUM, TENAFLY, NJ	**In a speech, E. E. David Jr., President of Exxon Research and Engineering Company, states:** *"It is ironic that the biggest uncertainties about the CO2 buildup are not in predicting what the climate will do, but in predicting what people will do. . .[It] appears we still have time to generate the wealth and knowledge we will need to invent the transition to a stable energy system."*
SUMMER 1988	PUBLIC AWARENESS OF THE GREENHOUSE EFFECT AND EFFORTS TO COMBAT IT RAMP UP	**The summer of 1988 sees a flurry of activity around climate change policy:** • Dr. James Hansen, Director of NASA's Goddard Institute for Space Studies, tells Congress that the Institute's greenhouse effect research shows *"the global warming is now large enough that we can ascribe with a high degree of confidence a cause and effect relationship with the greenhouse effect."* • At least four bipartisan bills are introduced in Congress, three championed by Republicans, to regulate greenhouse gas emissions.
AUG. 3, 1988	"THE GREENHOUSE EFFECT," DRAFT WRITTEN BY JOSEPH M. CARLSON, AN EXXON PUBLIC AFFAIRS MANAGER	Despite declaring the Greenhouse Effect *"one of the most significant environmental issues for the 1990s,"* Carlson writes that Exxon's position should be to *"emphasize the uncertainty in scientific conclusions regarding the potential enhanced Greenhouse Effect."*
AUG. 31, 1988	VICE PRESIDENT GEORGE H.W. BUSH CAMPAIGN SPEECH IN MICHIGAN	**Vice President George H.W. Bush, in a speech while running for President, says** *"[T]hose who think we are powerless to do anything about the greenhouse effect forget about the 'White House effect'; as President, I intend to do something about it."*
DEC. 6, 1988	THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC) IS FORMED	The IPCC is formed in December 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) to provide policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.
DEC. 20, 1989	"GREENHOUSE EFFECT: SHELL ANTICIPATES A SEA CHANGE," ARTICLE IN THE NEW YORK TIMES	**A New York Times article reports:** *"In what is considered the first major project that takes account of the changes the greenhouse effect is expected to bring, [Shell] engineers are designing a huge platform that anticipates rising water in the North Sea by raising the platform from the standard 30 meters - the height now thought necessary to stay above the waves that come in a once-a-century storm - to 31 or 32 meters."*

Truth or CO_2nsequences

DATE	DOCUMENT	TEXT
1991	"CLIMATE OF CONCERN," DOCUMENTARY PRODUCED AND DISTRIBUTED BY SHELL	**Shell releases a 30-minute educational video** warning of climate change's negative consequences ranging from sea level rise and wetland destruction to "*greenhouse refugees*." It concludes: "*Global warming is not yet certain, but many think that the wait for final proof would be irresponsible. Action now is seen as the only safe insurance.*"
MAY 1991	INFORMATION COUNCIL FOR THE ENVIRONMENT (ICE) PR CAMPAIGN	The Information Council for the Environment (ICE), formed by the coal industry, launches a national climate change science denial campaign with data collection, full-page newspaper ads, radio commercials, a PR tour, and mailers.
DEC. 1995	"PREDICTING FUTURE CLIMATE CHANGE: A PRIMER," GLOBAL CLIMATE COALITION'S (GCC) INTERNAL PRIMER DRAFT, PREPARED BY GCC'S SCIENCE TECHNICAL ADVISORY COMMITTEE V. THEIR PUBLICLY DISTRIBUTED BACKGROUNDER, "SCIENCE AND GLOBAL CLIMATE CHANGE: WHAT DO WE KNOW? WHAT ARE THE UNCERTAINTIES?"	**The Global Climate Coalition (GCC), a fossil fuel industry group, drafts an internal primer analyzing "*contrarian theories*" and concluding that they do not** "*offer convincing arguments against the conventional model of greenhouse gas emission-induced climate change.*" However, a publicly distributed version excluded this section while focusing on scientific disagreement and uncertainty by citing some of those same contrarian scientists.
FALL 1996	"GLOBAL WARMING: WHO'S RIGHT? FACTS ABOUT A DEBATE THAT'S TURNED UP MORE QUESTIONS THAN ANSWERS," PUBLICATION FROM EXXON CORPORATION	**An eight-page Exxon publication** questions the negative impact the greenhouse effect might have and plays up the uncertainty. The introductory statement by Lee Raymond, Exxon's chairman and CEO, claims that *"[S]cientific evidence remains inconclusive as to whether human activities affect global climate."*
APRIL 3, 1998	"GLOBAL SCIENCE COMMUNICATIONS ACTION PLAN," DRAFT BY THE AMERICAN PETROLEUM INSTITUTE (API)	**The American Petroleum Institute develops a multi-million dollar communications and outreach plan to ensure that** "*climate change becomes a non-issue.*" It maintains that "*[V]ictory will be achieved when…uncertainties in climate science [become] part of the 'conventional wisdom.'*"
DEC. 11, 2000	LETTER FROM LLOYD KEIGWIN, SENIOR SCIENTIST AT THE WOODS HOLE OCEANOGRAPHIC INSTITUTION, TO PETER ALTMAN, NATIONAL CAMPAIGN COORDINATOR FOR EXXONMOBIL	**A senior scientist at Woods Hole Oceanographic Institution, Lloyd Keigwin, sends a letter to Exxon's Peter Altman, summarizing their email and phone conversations regarding Exxon's misleading use of Keigwin's study results**. "*The sad thing is that a company with the resources of ExxonMobil is exploiting the data for political purposes when they could actually get much better press by supporting research into the role of the ocean in climate change.*"
JUNE 20, 2001	"YOUR MEETING WITH MEMBERS OF THE GLOBAL CLIMATE COALITION," US DEPARTMENT OF STATE MEMO AND TALKING POINTS	**Talking points for State Department Undersecretary Paula Dobriansky's meeting with the Global Climate Coalition at API's headquarters:** "*POTUS rejected Kyoto, in part, based on input from you.*"

Truth or CO_2nsequences

DATE	DOCUMENT	TEXT
SEPT. 26, 2002	LETTER FROM MICHAEL MACCRACKEN, RETIRING SENIOR SCIENTIST FROM THE OFFICE OF THE US GLOBAL CHANGE RESEARCH PROGRAM, TO EXXON CEO LEE RAYMOND: "RE: WITH REGARD TO THE EXXONMOBIL FACSIMILE ON FEBRUARY 6, 2001 FROM DR. AG RANDOL TO MR. JOHN HOWARD OF THE COUNCIL ON ENVIRONMENTAL QUALITY"	**Michael MacCracken, the former director of the National Assessment Coordination Office of the US Global Change Research Program, writes to Exxon CEO Lee Raymond in response to ExxonMobil's criticism of a US climate change assessment:** *"In my earlier experience, arguing for study of adaptation had been a position of industry, but now when this was attempted, ExxonMobil argued this was premature. Roughly, this is equivalent to turning your back on the future and putting your head in the sand—with this position, it is no wonder ExxonMobil is the target of environmental and shareholder critics...Certainly, there are uncertainties, but decisions are made under uncertainty all the time--that is what executives are well paid to do. In this case, ExxonMobil is on the wrong side of the international scientific community, the wrong side of the findings of all the world's leading academies of science, and the wrong side of virtually all of the world's countries as expressed, without dissent, in the IPCC reports...To call ExxonMobil's position out of the mainstream is thus a gross understatement. There can be all kinds of perspectives about what one might or might not do to start to limit the extent of the change, but to be in opposition to the key scientific findings is rather appalling for such an established and scientific organization."*
OCT. 21, 2002	MARKUPS BY PHILIP COONEY, CHIEF OF STAFF FOR THE WHITE HOUSE COUNCIL ON ENVIRONMENTAL QUALITY, ON A DRAFT STRATEGIC PLAN FOR THE CLIMATE CHANGE SCIENCE PROGRAM	Philip Cooney, Chief of Staff for the White House Council of Environmental Quality and a former lawyer and lobbyist for the American Petroleum Institute with no scientific credentials, edits a Draft Strategic Plan for the US Climate Change Science Program to introduce uncertainty about global warming and its impacts. In 2005, Cooney resigns after being accused of doctoring scientific reports and is hired by Exxon. A Union of Concerned Scientists report published samples of Cooney's edits (p.56).
JUNE 11, 2009	"THE PROPORTIONALITY OF GLOBAL WARMING TO CUMULATIVE CARBON EMISSIONS," PUBLICATION BY DAMON MATTHEWS PUBLISHED IN NATURE	**Damon Matthews publishes seminal research in the peer-reviewed Nature journal** showing a linear relationship between greenhouse gas emissions and increasing global temperatures.
AUG. 12, 2009	EMAIL FROM API CEO JACK GERARD TO API'S MEMBERSHIP REGARDING A SERIES OF "ENERGY CITIZEN" RALLIES IN 20 STATES DURING THE END OF THE CONGRESSIONAL RECESS	**The American Petroleum Institute's CEO, Jack Gerard, emails API's membership promising** *"up front resources"* **and encouraging turnout for "Energy Citizen" rallies in about 20 states. Gerard says they are** *"collaborating closely with the allied oil and natural gas associations"* in order to *"aim a loud message at those states' U.S. Senators to avoid the mistakes embodied in the House climate bill."*
NOV. 22, 2013	"TRACING ANTHROPOGENIC CARBON DIOXIDE AND METHANE EMISSIONS TO FOSSIL FUEL AND CEMENT PRODUCERS, 1854-2010," PUBLICATION BY RICK HEEDE PUBLISHED IN CLIMATIC CHANGE	**Rick Heede, co-founder and director of the Climate Accountability Institute, authors a peer-reviewed study** revealing that 90 producers of oil, natural gas, coal, and cement – the "carbon majors" – are responsible for 63 percent of cumulative industrial CO2 and methane emissions worldwide between 1751 and 2010. Just 28 companies are responsible for 25 percent of all emissions since 1965.

Truth or CO_2nsequences

DATE	DOCUMENT	TEXT
NOV. 11, 2014	"WSPA PRIORITY ISSUES," PRESENTATION BY WESTERN STATES PETROLEUM ASSOCIATION PRESIDENT CATHERINE REHEIS-BOYD	**The Western States Petroleum Association, a top lobbying and trade association for the oil industry, describes in a presentation the** *"campaigns and coalitions [it has] activated that have contributed to WSPA's advocacy goals and continue to respond to aggressive anti-oil initiatives in the West,"* including investment *"in several coalitions that are best suited to drive consumer and grassroots messages to regulators and policymakers."*