

11 GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

11.1 INTRODUCTION

This chapter includes a discussion of existing greenhouse gas (GHG) emissions and climate change conditions, a summary of applicable regulations and policies, and an analysis of the potential for the Shoreline Plan to result in construction- and operation-related GHG emissions that contribute to climate change. This was the primary issue raised during scoping that pertains to GHG emissions and climate change.

The methods of analysis for addressing construction- and operation-related GHGs used in this chapter are consistent with the recommendations of the California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA).

11.2 REGULATORY SETTING

GHG emission standards and fuel efficiency standards have not been established for recreational watercraft by any federal or state agencies, or by TRPA. However, GHG emissions from other sources and responses to global climate change are regulated by a variety of federal, state, and local laws and policies. Key regulatory and conservation planning issues applicable to the Shoreline Plan are discussed below.

11.2.1 Federal

GREENHOUSE GAS EMISSIONS STANDARDS

In October 2012, EPA and the National Highway Traffic Safety Administration (NHTSA), on behalf of the Department of Transportation, issued final rules to further reduce GHG emissions and improve corporate average fuel economy (CAFE) standards for light-duty vehicles for model years 2017 and beyond (77 FR 62624). NHTSA CAFE standards have been enacted under the Energy Policy and Conservation Act since 1978. This national program requires automobile manufacturers to build a single light-duty national fleet that meets all requirements under both federal programs and the standards of California and other states. This program would increase fuel economy to the equivalent of 54.5 miles per gallon (mpg) limiting vehicle emissions to 163 grams of carbon dioxide (CO₂) per mile for the fleet of cars and light-duty trucks by model year 2025 (77 FR 62630).

In January 2017, EPA Administrator Gina McCarthy signed her determination to maintain the current GHG emissions standards for model year 2022-2025 vehicles. However, on March 15, 2017, the new EPA Administrator, Scott Pruitt, and Department of Transportation Secretary, Elaine Chao, announced that EPA intends to reconsider the final determination. EPA intends to make a new Final Determination regarding the appropriateness of the standards no later than April 1, 2018 (EPA 2017).

CLEAN POWER PLAN

The Clean Power Plan was unveiled by President Obama on August 3, 2015. The plan aims to reduce carbon dioxide emissions from electrical power generation by 32 percent within twenty-five years relative to 2005 levels. President Donald Trump signed an executive order on March 28, 2017 mandating the EPA to review the plan. EPA is proposing to repeal the Clean Power Plan based on a change to the legal interpretation of Section 111(d) of the CAA, upon which the Clean Power Plan was based. EPA is accepting public comments on the proposal until April 26, 2018 (EPA 2018).

11.2.2 Tahoe Regional Planning Agency

THRESHOLDS

TRPA does not have any environmental thresholds concerning GHGs (TRPA 2016).

GOALS AND POLICIES

TRPA's Regional Plan does not include any goals or policies addressing GHGs throughout the Tahoe Basin (TRPA 2012). However, TRPA's Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), which serves as the transportation element of the Regional Plan (TRPA 2012:3-1), includes a strategy to reduce GHGs generated by on-road vehicle travel in the California portion of the Tahoe Basin. The RTP/SCS is discussed in greater detail below.

REGIONAL TRANSPORTATION PLAN AND SUSTAINABLE COMMUNITIES STRATEGY

As the Lake Tahoe region's federally designated metropolitan planning organization, TRPA completed the latest update to its RTP in 2017 (TRPA 2017). The plan seeks to improve mobility and safety for the commuting public while at the same time delivering environmental improvements throughout the transportation network in the Tahoe Basin. Important directions of the plan are to reduce the overall environmental impact of transportation in the region, create walkable, vibrant communities, and provide real alternatives to driving. The plan met the challenge of California's Senate Bill (SB) 375 (2008, summarized below) and qualifies as an SCS by presenting an integrated land use and transportation strategy that will reduce vehicle miles traveled and make it possible for the California side of Lake Tahoe Region to reduce its GHG emission generated by passenger cars and light duty trucks from 2005 levels 8.8 percent by 2020 and 5 percent by 2035. A smaller GHG reduction is forecast for 2035 based on the projections of increased population growth in metropolitan areas surrounding Lake Tahoe and the related increases in visitation from those areas (TRPA 2017:ES-5).

CODE OF ORDINANCES

Subsection 13.5.3.E, Greenhouse Gas Reduction Strategy

Subsection 13.5.3.E requires that area plans to include a strategy to reduce GHGs from the construction and operation of buildings. The strategy must include elements in addition to those included to satisfy other TRPA or state requirements. Additional elements included in the strategy may include but are not limited to the following:

- ▲ a local green building incentive program to reduce the energy consumption of new or remodeled buildings;
- ▲ a low interest loan or rebate program for alternative energy projects or energy efficiency retrofits;
- ▲ modifications to the applicable building code or design standards to reduce energy consumption; or
- ▲ capital improvements to reduce energy consumption or incorporate alternative energy production into public facilities.

Lake Tahoe Sustainability Action Plan

The Sustainability Action Plan (SAP), released in 2013, provides tools to assist local governments, agencies, businesses, residents, visitors, and community groups with prioritizing and adopting consistent sustainability actions throughout the Tahoe Region. The SAP represents an integrated approach to reducing GHG emissions and striving toward zero-impact in all aspects of sustainability. The SAP includes a GHG emissions inventory and reduction targets, and climate change and adaptation strategies vetted through the Lake Tahoe Sustainability Collaborative and the Tahoe Basin Partnership for Sustainable Communities. Within the

SAP, TRPA established a GHG reduction goal for the Tahoe Region of 5 percent and 49 percent below the 2005–2010 average baseline by 2020 and 2035, respectively. The SAP identifies actions that have the potential to reduce GHG emissions during construction and operation of land uses and protect against the effects of climate change. Identified actions include expanding the bicycle and pedestrian network, improving transit, supporting alternative fueled vehicles, increasing solid waste diversion, and urban forestry. None of the GHG reduction measures identified in the SAP pertain to boating activity. The recommended actions have not been officially adopted and thus are not currently required by TRPA or Tahoe Metropolitan Planning Organization (TMPO) (Lake Tahoe Sustainable Communities Program 2013).

11.2.3 California

EXECUTIVE ORDER S-3-05

Executive Order (EO) S-3-05, signed by Governor Arnold Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra Nevada snowpack, further exacerbate California’s air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the executive order established total GHG emission targets for the state. Specifically, statewide emissions are to be reduced to 2000 levels by 2010, 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

This executive order was the subject of a California Appellate Court decision, *Cleveland National Forest Foundation v. San Diego Association of Governments (SANDAG)* (November 24, 2014) 231 Cal.App.4th 1056, which was reviewed by the California Supreme Court in January 2017. The case addressed the adequacy of the GHG analysis in the Environmental Impact Report (EIR) SANDAG prepared for its 2011 Regional Transportation Plan. Although the court ruling concerned an EIR prepared pursuant to the California Environmental Quality Act, it may be relevant to the preparation of this EIS.

The Court decided a singular question in its decision, which was released on July 13, 2017. The Court ruled that SANDAG did not abuse its discretion by declining “to adopt the 2050 goal as a measure of significance because the Executive Order does not specify any plan or implementation measures to achieve its goal.” In addition to concluding that an EIR need not use this executive order’s goal for determining significance, the Court described several principles relevant to CEQA review of GHG impacts, including: (1) EIRs should “reasonably evaluate” the “long-range GHG emission impacts for the year 2050;” (2) the 2050 target is “grounded in sound science” in that it is “based on the scientifically supported level of emissions reduction needed to avoid significant disruption of the climate.” The Court also ruled that “an EIR’s designation of a particular adverse environmental effect as ‘significant’ does not excuse the EIR’s failure to reasonably describe the nature and magnitude of the adverse effect.” The Court also recognized that the 40 percent reduction in 1990 GHG levels by 2030 is “widely acknowledged” as a “necessary interim target to ensure that California meets its longer-range goal of reducing greenhouse gas emission 80 percent below 1990 levels by the year 2050.” SB 32 has since defined the 2030 goal in statute (discussed below).

ASSEMBLY BILL 32, THE CALIFORNIA GLOBAL WARMING SOLUTIONS ACT OF 2006

In September 2006, Governor Schwarzenegger signed the California Global Warming Solutions Act of 2006, Assembly Bill (AB) 32. AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. AB 32 also requires that (a) the statewide greenhouse gas emissions limit shall remain in effect unless otherwise amended or repealed. (b) It is the intent of the Legislature that the statewide greenhouse gas emissions limit continues in existence and be used to maintain and continue reductions in emissions of greenhouse gases beyond 2020. (c) The [California Air Resources Board] shall make recommendations to the Governor and the Legislature on how to continue reductions of greenhouse gas emissions beyond 2020.” [California Health and Safety Code, Division 25.5, Part 3, Section 38551]

EXECUTIVE ORDER B-30-15

On April 20, 2015 Governor Brown signed EO B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. The Governor's EO aligns California's GHG reduction targets with those of leading international governments such as the 28-nation European Union, which adopted the same target in October 2014. California is on track to meet or exceed the target of reducing GHG emissions to 1990 levels by 2020, as established in the California Global Warming Solutions Act of 2006 (AB 32 of 2008, discussed above). California's new emission reduction target of 40 percent below 1990 levels by 2030 sets the next interim step in the State's continuing efforts to pursue the long-term target expressed under Executive Order S-3-05 to reach the goal of reducing emissions 80 percent below 1990 levels by 2050. This is in line with the scientifically established levels needed in the U.S. to limit global warming below 2 degrees Celsius, the warming threshold at which major climate disruptions are projected, such as super droughts and rising sea levels.

SENATE BILL 32 AND ASSEMBLY BILL 197 OF 2016

In August 2016, Governor Brown signed SB 32 and AB 197, which serve to extend California's GHG reduction programs beyond 2020. SB 32 amended the Health and Safety Code to include Section 38566, which contains language to authorize CARB to achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030. SB 32 codified the targets established by EO B-30-15 for 2030, which set the next interim step in the State's continuing efforts to pursue the long-term target expressed in EOs S-3-05 and B-30-15 of 80 percent below 1990 emissions levels by 2050.

CLIMATE CHANGE SCOPING PLAN

In December 2008, CARB adopted its first version of its *Climate Change Scoping Plan*, which contained the main strategies California will implement to achieve the mandate of AB 32 (2006) to reduce statewide GHG emissions to 1990 levels by 2020. In May 2014, CARB released and subsequently adopted the *First Update to the Climate Change Scoping Plan* to identify the next steps in reaching the goals of AB 32 (2006) and evaluate the progress made between 2000 and 2012. After releasing multiple versions of proposed updates in 2017 CARB adopted the next version titled *California's 2017 Climate Change Scoping Plan* (2017 Scoping Plan) in December of that same year (CARB 2017a). The 2017 Scoping Plan indicates that California is on track to achieve the 2020 statewide GHG target mandated by AB 32 of 2006. It also lays out the framework for achieving the mandate of SB 32 of 2016 to reduce statewide GHG emissions to at least 40 percent below 1990 levels by the end of 2030 (CARB 2017a:9). The 2017 Scoping Plan identifies the GHG reductions needed by each emissions sector. The Scoping Plan does not include any information or guidance specific to motorized recreational watercraft or off-road recreational equipment.

The 2017 Scoping Plan also identifies how GHGs associated with proposed projects could be evaluated under CEQA (CARB 2017a:101-102). Specifically, it states that achieving "no net increase" in GHG emissions is an appropriate overall objective of projects evaluated under CEQA if conformity with an applicable local GHG reduction plan cannot be demonstrated. CARB recognizes that it may not be appropriate or feasible for every development project to mitigate its GHG emissions to zero and that an increase in GHG emissions due to a project may not necessarily imply a substantial contribution to the cumulatively significant environmental impact of climate change.

SENATE BILL 375 OF 2008

SB 375, signed by Governor Schwarzenegger in September 2008, aligns regional transportation planning efforts, regional GHG emission reduction targets, and land use and housing allocation. SB 375 requires metropolitan planning organizations (MPOs) to adopt an SCS or Alternative Planning Strategy, showing prescribed land use allocation in each MPO's Regional Transportation Plan. CARB, in consultation with the MPOs, provides each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in their respective regions for 2020 and 2035. As discussed above, TRPA serves as the MPO for the Tahoe Basin.

ADVANCED CLEAN CARS PROGRAM

In January 2012, CARB approved the Advanced Clean Cars program which combines the control of GHG emissions and criteria air pollutants, as well as requirements for greater numbers of zero-emission vehicles, into a single package of regulatory standards for vehicle model years 2017 through 2025. The new regulations strengthen the GHG standard for 2017 models and beyond. This will be achieved through existing technologies, the use of stronger and lighter materials, and more efficient drivetrains and engines. The program's zero-emission vehicle regulation requires battery, fuel cell, and/or plug-in hybrid electric vehicles to account for up to 15 percent of California's new vehicle sales by 2025. The program also includes a clean fuels outlet regulation designed to support the commercialization of zero-emission hydrogen fuel cell vehicles planned by vehicle manufacturers by 2015 by requiring increased numbers of hydrogen fueling stations throughout the state. The number of stations will grow as vehicle manufacturers sell more fuel cell vehicles. By 2025, when the rules will be fully implemented, the statewide fleet of new cars and light trucks will emit 34 percent fewer GHGs and 75 percent fewer smog-forming emissions than the statewide fleet in 2016 (CARB 2016).

LOW CARBON FUEL STANDARD

In January 2007, Executive Order S-01-07 established a Low Carbon Fuel Standard (LCFS). The Order calls for a statewide goal to be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020, and that a LCFS for transportation fuels be established for California. The LCFS applies to all refiners, blenders, producers, or importers ("Providers") of transportation fuels in California, including fuels used by off-road construction equipment, including boats (Wade, pers. comm. 2018). The LCFS is measured on a full fuels cycle basis and may be met through market-based methods by which providers exceeding the performance required by an LCFS receive credits that may be applied to future obligations or traded to Providers not meeting LCFS.

In June 2007, CARB adopted the LCFS as a Discrete Early Action item under AB 32 pursuant to Health and Safety Code Section 38560.5, and, in April 2009, CARB approved the new rules and carbon intensity reference values with new regulatory requirements taking effect in January 2011. The standards require providers of transportation fuels to report on the mix of fuels they provide and demonstrate they meet the LCFS intensity standards annually. This is accomplished by ensuring that the number of "credits" earned by providing fuels with a lower carbon intensity than the established baseline (or obtained from another party) is equal to or greater than the "deficits" earned from selling higher intensity fuels.

After some disputes in the courts, CARB re-adopted the LCFS regulation in September 2015, and the LCFS went into effect on January 1, 2016.

SENATE BILL X1-2, THE CALIFORNIA RENEWABLE ENERGY RESOURCES ACT OF 2011

SB X1-2 of 2011 requires all California utilities to generate 33 percent of their electricity from renewables by 2020, referred to as California's Renewable Portfolio Standard (RPS). SB X1-2 sets a three-stage compliance period requiring all California utilities, including independently owned utilities, energy service providers, and community choice aggregators, to generate 20 percent of their electricity from renewables by December 31, 2013; 25 percent by December 31, 2016; and 33 percent by December 31, 2020. SB X1-2 also requires the renewable electricity standard to be met increasingly with renewable energy that is supplied to the California grid from sources within, or directly proximate to, California. SB X1-2 mandates that renewables from these sources make up at least 50 percent of the total renewable energy for the 2011-2013 compliance period, at least 65 percent for the 2014-2016 compliance period, and at least 75 percent for 2016 and beyond.

SENATE BILL 350

Approved by the Governor on October 7, 2015, SB 350 targets a 50 percent renewable mix in California electricity by December 31, 2030 and a cumulative doubling of statewide energy efficiency savings in electricity and natural gas end uses of retail customers by January 1, 2030 with annual targets established by the California Energy Commission. This bill is meant as an extension of the State's current 2020 RPS goal. SB 350's energy efficiency goals are applicable to both existing building stock and new construction but would have the most impact on existing building stock.

11.2.4 Nevada

The Nevada Climate Change Advisory Committee (NCCAC) was created through an Executive Order signed in April 2007. The Executive Order directed the committee to propose recommendations for reducing GHG emissions in Nevada. The committee's final report included 28 recommendations related to reducing GHG emissions from the energy, transportation, waste, agriculture, and other sectors. One of the committee's priority recommendations is to develop a State Climate Action Plan (NCCAC 2008:7-9). At this time, the Nevada Division of Environmental Protection (NDEP) has not adopted GHG reduction goals or climate change-related policies or regulations that would pertain to the Shoreline Plan.

11.3 AFFECTED ENVIRONMENT

GHG emissions have the potential to adversely affect the environment because they contribute, on a cumulative basis, to global climate change. This section provides background on global climate change sources of GHG emissions.

11.3.1 Scientific Basis of Greenhouse Gas Emissions and Climate Change

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space. A portion of the radiation is absorbed by the earth's surface and a smaller portion of this radiation is reflected toward space. This absorbed radiation is then emitted from the earth as low-frequency infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. The earth has a much lower temperature than the sun; therefore, the earth emits lower frequency radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate on earth.

Prominent GHGs contributing to the greenhouse effect are CO₂, methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Human-caused emissions of these GHGs more than natural ambient concentrations are found to be responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is "extremely likely" that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic forcing (IPCC 2014).

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern. Whereas most pollutants with localized air quality effects have relatively short atmospheric lifetimes (about one day), GHGs have long atmospheric lifetimes (one to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Although the lifetime of any GHG molecule is dependent on multiple variables and cannot be determined with any certainty, it is understood that more CO₂ is emitted into the

atmosphere than is sequestered by ocean uptake, vegetation, and other forms of sequestration. Of the total annual human-caused CO₂ emissions, approximately 55 percent is estimated to be sequestered through ocean and land uptake every year, averaged over the last 50 years, whereas the remaining 45 percent of human-caused CO₂ emissions remains stored in the atmosphere (IPCC 2013:467).

The quantity of GHGs in the atmosphere that ultimately result in climate change is not precisely known but is enormous; no single project alone would measurably contribute to an incremental change in the global average temperature, or to global, local, or micro climates. GHG impacts relative to global climate change are inherently cumulative.

11.3.2 Greenhouse Gas Emission Sources

GHG emissions are attributable in large part to human activities associated with the transportation, industrial/manufacturing, utility, residential, commercial, and agricultural emissions sectors (CARB 2014a). In both California and Nevada, the transportation sector and electricity generation sectors are the largest emitters of GHGs (CARB 2017c; NDEP 2017:9). Emissions of CO₂ are byproducts of fossil fuel combustion. CH₄, a highly potent GHG, primarily results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) and is largely associated with agricultural practices and landfills. NO₂ is also largely attributable to agricultural practices and soil management. CO₂ sinks, or reservoirs, include vegetation and the ocean, which absorb CO₂ through sequestration and dissolution (CO₂ dissolving into the water), respectively, two of the most common processes for removing CO₂ from the atmosphere.

11.3.3 Effects of Climate Change on the Environment

The IPCC was established in 1988 by the World Meteorological Organization and the United Nations Environment Programmed to provide the world with a scientific view on climate change and its potential effects. According to the IPCC global average temperature is expected to increase relative to the 1986–2005 period by 0.3 to 4.8 degrees Celsius (°C) (0.5 to 8.6 degrees Fahrenheit [°F]) by the end of the 21st century (2081–2100), depending on future GHG emission scenarios (IPCC 2014:SPM-8).

Other environmental resources could be indirectly affected by the accumulation of GHG emissions and resulting rise in global average temperature. In the recent years, California has been marked by extreme weather and its effects. According to CNRA's draft report, *Safeguarding California Plan: 2017 Update* (CNRA 2017), California experienced the driest four-year statewide precipitation on record from 2012 through 2015; the warmest years on average in 2014, 2015, and 2016; and the smallest and second smallest Sierra snowpack on record in 2015 and 2014 (CNRA 2017). In contrast, the northern Sierra Nevada range experienced its wettest year on record in 2016 (CNRA 2017). The changes in precipitation exacerbate wildfires throughout California with increasing frequency, size, and devastation. As temperatures increase, the increase in precipitation falling as rain rather than snow also could lead to increased potential for floods because water that would normally be held in the snowpack of the Sierra Nevada and Cascade mountains until spring would flow into the Central Valley concurrently with winter rainstorm events. This scenario would place more pressure on California's levee/flood control system (CNRA 2017). Furthermore, in the extreme scenario involving the rapid loss of the Antarctic ice sheet, sea level along California's coastline could rise to 10 feet by 2100, which is approximately 30 to 40 times faster than sea level rise experienced over the last century (CNRA 2017).

Changes in temperature, precipitation patterns, extreme weather events, and sea-level rise have the potential to effect and decrease the efficiency of thermal power plants and substations, decrease the capacity of transmission lines, disrupt electrical demand, and threaten energy infrastructure with the increased risk of flooding (CNRA 2017).

Sea level rise, storm surge, and coastal erosion are imminent threats to highways, roads, bridge supports, airports, transit systems and rail lines near sea level and seaports. Shifting precipitation patterns, increased temperatures, wildfires, and increased frequency in extreme weather events also threaten transportation systems across California and Nevada. Temperature extremes and increased precipitation can increase the risk of road and railroad track failure, decreased transportation safety, and increased maintenance costs (CNRA 2017).

Water availability and changing temperatures, which affects prevalence of pests, disease, and species, directly impact crop development and livestock production. Other environmental concerns include decline in water quality, groundwater security, and soil health (CNRA 2017). Vulnerabilities of water resources also include risks to degradation of watersheds, alteration of ecosystems and loss of habitat, impacts to coastal areas, and ocean acidification (CNRA 2017). The ocean absorbs approximately a third of the CO₂ released into the atmosphere every year from industrial and agricultural activities, changing the chemistry of the ocean by decreasing the pH of seawater. This ocean acidification is harmful to marine organisms especially calcifying species such as oysters, clams, sea urchins, and corals (CNRA 2017).

Cal-Adapt is a planning tool developed by the California Energy Commission (CEC) to evaluate climate change impacts consistent with emissions scenarios identified in the IPCC Fifth Assessment Report (IPCC 2014). The IPCC Fifth Assessment Report uses future emissions projections known as Representative Concentration Pathways (RCP) to estimate scenarios in which varying (higher or lower) levels of GHGs would be emitted in the future. Emissions scenarios used in the Cal-Adapt tool are based on the RCP 4.5 and RCP 8.5 scenarios. The RCP 4.5 scenario assumes global GHG emissions peak around 2040 and then decline between 2040 and 2100. The RCP 8.5 scenario assumes global GHG emissions continue to rise through 2050 with global annual emissions peaking around 2100. According to Cal-Adapt, annual mean temperatures in the City of South Lake Tahoe would increase 4.9 °F by 2050 and 6.7 °F by 2099 under the RCP 4.5 scenario and an increase 6.1 °F by 2050 and 9.8 °F by 2099 under the RCP 8.5 scenario. (Cal-Adapt 2017a).

Based on Cal-Adapt's Annual Averages Precipitation tool, historical annual mean precipitation in the project region, identified as the Tahoe-Sierra Integrated Regional Water Management Region, is 41.7" per year. Under the RCP 4.5 scenario, annual mean precipitation is projected to increase by 3.6" to 45.3" by 2050 and decrease slightly to 45.5" by the end of the century. Under the RCP 8.5 scenario, annual mean precipitation is projected increase by 4.9" to 46.6" by 2050 and increase to 51.3" by the end of the century (Cal-Adapt 2017b).

11.4 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

11.4.1 Methods and Assumptions

GHG emissions associated with increased on-road vehicle travel were estimated using vehicle miles traveled (VMT) determined by the traffic analysis in Chapter 13, "Roadway Transportation and Circulation", and the EMFAC2014 web database (CARB 2015). The estimate of GHG emissions from VMT are based on estimates of annual VMT, which differs from the peak-day VMT estimates in Chapter 13. The estimate of GHGs associated with the construction of new shorezone facilities are also addressed qualitatively.

The potential change in long-term operational emissions generated by boating activity in the Tahoe Region under the Shoreline Plan alternatives is addressed qualitatively. CARB has not developed an estimate of GHG emissions from motorized watercraft in the Tahoe Region as it has for criteria pollutants and precursors. In addition, the statewide GHG inventories prepared for California and Nevada by CARB and the Nevada Division of Environmental Protection do not include any values specific to motorized boats or watercraft (CARB 2017c, NDEP 2017).

Furthermore, no GHG emission standards or fuel efficiency standards have been established for recreational watercraft by EPA, CARB, Nevada, or any other agency. Therefore, this analysis assesses the potential for a long-term net increase in GHG emissions at buildout (2040) of the Shoreline Plan alternatives based on the projected increase in boating activity and, the extent to which it can be known whether the future boat fleet will more GHG efficient than the existing boat fleet, and the potential for a longer boating season.

11.4.2 Significance Criteria

While TRPA considers GHG emissions and climate change within its EISs, TRPA has not adopted specific significance criteria for analyzing GHG emissions generated by a proposed project or endorsed a methodology for analyzing impacts related to GHG emissions or global climate change. An impact would be considered significant if it would:

- ▲ Result in a net increase in GHG emissions.

11.4.3 Environmental Effects of the Project Alternatives

Impact 11-1: Greenhouse gas emissions

Implementation of the Shoreline Plan would result in GHG emissions associated with the construction and demolition of boating facilities and on-road motor vehicle trips to and from new boating facilities. Under Alternatives 1, 2, and 3, implementation of the Shoreline Plan would also result in an increase in GHG-emitting boating activity. It is not feasible to know whether the fleet of motorized boats on Lake Tahoe will become more GHG efficient and, if it does, whether the improvement in GHG efficiency would be enough to offset the GHGs associated with construction activity, the increase in on-road motor vehicle travel, and the projected increase in boating activity. Therefore, this impact would be **potentially significant**.

The development and implementation of a GHG Reduction Policy, as required by Mitigation Measure 11-1, would reduce GHG emissions, but the extent of this reduction depends on participation rates, available funding, and available technology. Given the uncertainty about the magnitude of the increase in GHG emissions under the Shoreline Plan and the uncertain effect of these mitigation measures, the Shoreline Plan alternatives could have a considerable contribution to the cumulative impact of GHG emissions and climate change and this impact would be **significant and unavoidable** for all alternatives.

The increase in long-term operational GHG emissions associated with each Shoreline Plan alternative would primarily be a function of the increase in recreational boating activity that would occur, and, to a lesser degree, any new on-road vehicle trips associated with boating activity. None of the Shoreline Plan alternatives would result in new area sources or stationary sources of GHGs such as those typically associated with the development of new residential or commercial buildings (e.g., natural gas-fired boilers, operation of landscape maintenance equipment).

Table 11-1 shows the projected increase in annual boating activity under each Shoreline Plan Alternative.

Table 11-1 Estimated Boating Activity Under Each Alternative

	Annual Boating Activity ¹	
	boat-hr/year	% change
Baseline Conditions	489,155	–
Baseline + Alternative 1	566,814	+16%
Baseline + Alternative 2	742,260	+52%
Baseline + Alternative 3	507,368	+4%
Baseline + Alternative 4	489,155	0%

Notes: boat-hr/day = boating-hours per day; VMT/day = vehicle miles travelled per day
¹ Boating activity levels are provided in Table 2-3. Percent change calculations are added.
² The increases in VMT by on-road vehicles is provided in the traffic used to support the impact analysis in Section 12, "Roadway Transportation and Circulation."
Source: Values from Project Description, Table 2-3; % change based on calculations. For detailed calculations see Appendix C.

Table 11-2 shows the increase in VMT and GHG emissions generated by on-road vehicle activity associated with each of the alternatives.

Table 11-2 Annual Increase in VMT and GHG Emissions from On-Road Motor Vehicle Travel by Alternative

Alternative	VMT/year	MT CO ₂ /year
Alternative 1	–	4.4
Alternative 2	+373,841	19.7
Alternative 3	+1,662,124	3.6
Alternative 4	+299,771	0.0

Notes: MT CO₂/year = metric tons of carbon dioxide per year
Source: Modeling by Ascent Environmental using the EMFAC 2014 web database (CARB 2014b). For detailed calculations see Appendix C.

The potential for the change in boating activity and associated on-road vehicle travel to result in a net increase in GHG emissions is discussed for each alternative below.

Alternative 1: Proposed Shoreline Plan

Alternative 1 would authorize new dredging in specific circumstances, an additional 10 public piers, 128 private multiple-use piers, and two new boat ramps. Construction of these facilities would involve the use of GHG-emitting off-road construction equipment, GHG-emitting trucks delivering materials and equipment to construction sites, and GHG-emitting commute trips by construction workers. Construction of each facility would result in a one-time increase in GHG emissions.

As shown in Table 11-2, the on-road motor vehicle activity associated with the increase in boating would generate approximately 4.4 MT CO_{2e}/year at buildout under Alternative 1. Thus, there would be an increase in GHGs generated by on-road motor vehicle activity.

As shown in Table 11-1, boating activity at buildout (2040) under Alternative 1 is projected to increase approximately 16 percent from existing conditions. It is not feasible to know whether the fleet of boats operating at buildout would be more GHG-efficient than the existing boat fleet because there are no established GHG emission standards for motorized recreational watercraft. Even if some improvement to the GHG efficiency of the future boat fleet is achieved it is not feasible to know whether the magnitude of this improvement would be sufficient to offset the increase in boating activity, the associated on-road mobile-source GHG emissions, and construction-related emissions. Therefore, implementation of Alternative 1 has the potential to result in a substantial contribution to GHG emissions. This impact would be **potentially significant**.

Alternative 2: Maintain Existing TRPA Shorezone Regulations (No Project)

Alternative 2 would authorize additional public and private piers, buoys, public and private marina slips, public boat ramps, new and expanded marinas, and private boat lifts. As described in Chapter 2, "Project Description," the number of new moorings would be limited by the number of eligible parcels that could place moorings consistent with location standards including the prohibition on structures within prime fish habitat. A maximum of two buoys and one boat lift would be allowed for each littoral parcel. Based on an assessment of the most recent prime fish habitat mapping and pier eligibility criteria, it is estimated that up to 4,871 new buoys, 1,897 new slips, and 168 new boat lifts could be developed under the No Project Alternative, for a total of 6,396 new moorings.

As shown in Table 11-2, the on-road motor vehicle activity associated with the increase in boating would generate approximately 19.7 MT CO₂e/year at buildout under Alternative 2. Thus, there would be an increase in GHGs generated by on-road motor vehicle activity.

As shown in Table 11-1, boating activity at buildout (2040) under Alternative 2 is projected to increase approximately 52 percent from existing conditions. As with Alternative 1, it is not feasible to know whether the fleet of boats operating at buildout would be more GHG efficient than the existing boat fleet because there are no established GHG emission standards for motorized recreational watercraft. Even if some improvement to the GHG efficiency of the future boat fleet is achieved it is not feasible to know whether the magnitude of this improvement would be sufficient to offset the increase in boating activity, the associated on-road mobile-source GHG emissions, and construction-related emissions. Therefore, implementation of Alternative 2 has the potential to result in a substantial contribution to GHG emissions. This impact would be **potentially significant**.

Alternative 3: Limit New Development

Alternative 3 would authorize new dredging in specific circumstances, an additional 5 public piers, 86 private multiple-use piers, and one new boat ramp and, like Alternative 1, construction of these facilities would result in a one-time increase in GHG emissions.

As shown in Table 11-2, the on-road motor vehicle activity associated with the increase in boating would generate approximately 3.6 MT CO₂e/year at buildout under Alternative 1. Thus, there would be an increase in GHGs generated by on-road motor vehicle activity.

As shown in Table 11-1, boating activity at buildout (2040) under Alternative 3 is projected to increase approximately 4 percent from existing conditions. As with Alternative 1, it is not feasible to know whether the fleet of boats operating at buildout would be more GHG efficient than the existing boat fleet because there are no established GHG emission standards for motorized recreational watercraft. Even if some improvement to the GHG efficiency of the future boat fleet is achieved it is not feasible to know whether the magnitude of this improvement would be sufficient to offset the increase in boating activity, the associated on-road mobile-source GHG emissions, and construction-related emissions. Therefore, implementation of Alternative 3 has the potential to result in a substantial contribution to GHG emissions. This impact would be **potentially significant**.

Alternative 4: Expand Public Access and Reduce Existing Development

Alternative 4 would authorize an additional 15 public piers and would allow for the relocation and reconstruction of some private piers and boat ramps, if the relocation resulted in a 2:1 reduction in the number of structures. Construction of new piers and removal of existing piers would result in a one-time increase in GHG emissions. As shown in Tables 11-1 and 11-2, there would be no increase in GHG-emitting boating activity and on-road vehicle travel. As with Alternative 1, it is not feasible to know whether the fleet of boats operating at buildout would be more GHG efficient than the existing boat fleet because there are no established GHG emission standards for motorized recreational watercraft. Even if some improvement to the GHG efficiency of the future boat fleet is achieved it is not possible to know whether the magnitude of this improvement would be sufficient to offset construction-related emissions. Therefore, implementation of Alternative 4 has the potential to result in a substantial contribution to GHG emissions. This impact would be **potentially significant**.

Mitigation Measures

Mitigation Measure 11-1: Develop and implement a GHG reduction policy

This mitigation measure would be required for Alternatives 1, 2, 3, and 4.

Within 12 months of adoption of the Shoreline Plan, TRPA will coordinate the implementation of a GHG Emission Reduction Policy through TRPA-approved plans, project permitting, or projects/programs developed in coordination with local or other governments addressing Best Construction Practices and ongoing operational efficiencies. Until that time, TRPA will continue its existing practice to require measures developed on a project-by-project basis. The policy will require implementation of measures for the reduction of GHG emissions generated by demolition and construction activity in the shorezone and in associated upland areas, by on-road motor vehicles trips directly associated with the operation of boating facilities, and by ongoing operation of recreational watercraft. Where local ordinances already require GHG emission reductions consistent with the policy, no further action is necessary. Where local government ordinances do not adequately address GHG reduction practices, those practices will be implemented through local government and/or TRPA permitting activities or implementation program. Such measures may include, but are not limited to, the following:

Minimize Construction-Related GHG Emissions

- ▲ All diesel-powered construction equipment shall have engines that comply with Tier 4 emission standards or better.
- ▲ Require all construction contractors to use renewable diesel (RD) fuel for all diesel-powered construction equipment (off-road land- and water-based). Any RD product that is considered for use by the construction contractors shall comply with California's Low Carbon Fuel Standards and be certified by the California Air Resources Board Executive Officer. RD fuel must also meet the following criteria:
 - Be hydrogenation-derived (reaction with hydrogen at high temperatures) from 100 percent biomass material (i.e., nonpetroleum sources), such as animal fats and vegetables;
 - Contain no fatty acids or functionalized fatty acid esters; and
 - Have a chemical structure that is identical to petroleum-based diesel which ensures RD will be compatible with all existing diesel engines; it must comply with American Society for Testing and Materials (ASTM) D975 requirements for diesel fuels.
- ▲ Use electric powered equipment instead of fossil fuel-based generators.
- ▲ Purchase mitigation credits from the Climate Action Reserve's GHG Mitigation Credit Program to offset construction-generated GHG emissions.

Minimize GHG Emissions Associated with On-Road Vehicle to Watercraft Facilities

- ▲ Provide charging stations for electric vehicles and bike lockers at parking lots that serve public piers and marinas.

Minimize GHG Emissions Generated by Recreational Watercraft

- ▲ Require or incentivize businesses that rent motorized watercraft to convert their rental fleet to watercraft with electric engines.
- ▲ Require or incentivize charging stations at marinas and public piers for electric-motor watercraft.
- ▲ Require or incentivize the installation of charging stations for electric-motor watercraft at private piers, boat houses, and boat lifts.
- ▲ Require solar panels on all marina buildings.

This measure will apply to new construction occurring under the Shoreline Plan. TRPA will also initiate a funding program to apply these measures to existing facilities within the Tahoe Basin.

Significance after Mitigation

Under all alternatives, the Shoreline Plan may increase overall GHG emissions. Implementation of Mitigation Measure 11-1 would reduce some of the anticipated future GHG emissions at buildout. Some of these measures would also be consistent with those identified in the Sustainability Action Plan (Lake Tahoe Sustainable Communities Program 2013). However, the effectiveness of these measures would depend on participation rates, available funding, and available technology. Given the uncertainty about the magnitude of the increase in GHG emissions from projects accommodated by the Shoreline Plan and the uncertain effect of these mitigation measures, it is possible that the Shoreline Plan could have a considerable contribution to the cumulative impact of GHG emissions and climate change and this impact would be **significant and unavoidable** for all alternatives.

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