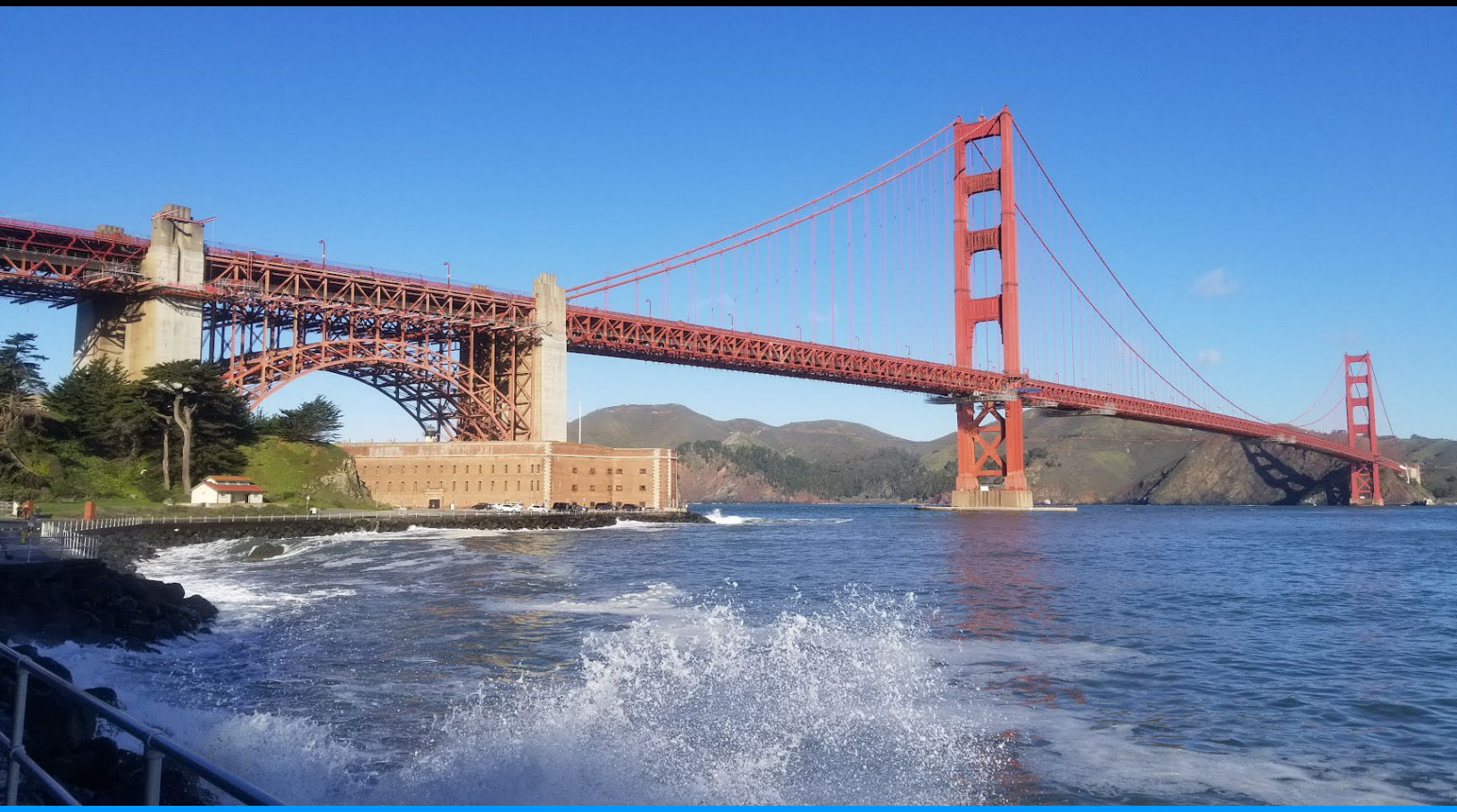

CLIMATE*Friendly* PARKS

Golden Gate National Recreation Area Climate Action Plan 2024

Golden Gate National Recreation Area Climate Action Plan 2024

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Prepared by
Golden Gate National Recreation Area
Planning and Environmental Programs
August 28, 2024

A message from the Superintendent

Climate change poses a threat to the core mission of the National Park Service: to preserve the nation's most important natural and cultural resources for the enjoyment of present and future generations.

At Golden Gate National Recreation Area (GGNRA), we are committed to responsibly managing our park in the face of a changing climate. This Plan outlines four strategies to support this commitment:

- **Reduce** our carbon footprint by phasing out fossil fuels
- **Educate** staff and visitors
- **Adapt** to the impacts of climate change
- **Inspire and Lead** in the community and the National Park Service

Predicted climate impacts under the status quo pose an existential threat to our park. Sea level rise threatens beaches, roads, and structures. Natural and cultural resources are vulnerable to more extreme weather events, from intensified storms and drought to heightened wildfire risk. Coastal sites also experience increased visitation driven by excessive heat inland.

The park is already experiencing impacts. Avoiding the worst of them requires a global response, which starts with reducing emissions from fossil fuels like coal, oil, and natural gas. This is changing how we operate our parks: from business-as-usual to a new model of sustainable operations. We have started reducing our reliance on fossil fuels and intend to phase them out, going all-in on powering our buildings and fleet with clean renewable electricity.

We have also begun to understand the adaptation challenges we face and develop appropriate short and long-term response strategies. Wise, timely decisions arising from these strategies will increase the chances of minimizing the effects of sea level rise, fire, extreme weather, and other climate impacts in the future.

We will communicate and promote our efforts to park visitors, surrounding communities, and other national parks, collaborating on shared initiatives to amplify our impact.

Our strategies for achieving these goals are outlined in this third version of our Climate Action Plan. We lay out Goals and Objectives in a range of sectors and commit to cutting our greenhouse gas emissions in half and achieving carbon-neutral park operations.

We have made great strides since our first Climate Action Plan (CAP) in 2008. But the urgency to address climate change is stronger than ever, and this updated CAP aims to strengthen our response as we manage the park for the benefit of this and future generations.

David Smith, General Superintendent, GGNRA

Golden Gate National Recreation Area Superintendent David Smith

Our Vision for a Climate Friendly National Park

Climate change presents an opportunity to create a new future: where our buildings and transportation are powered by renewable electricity, where nature is integrated throughout cities and landscapes, and where all people have dignity and opportunity.

In this vision, national parks become living examples of a sustainable coexistence between humanity and the natural world.

Parks and protected areas serve as reservoirs of biodiversity, showcasing thriving ecosystems.

Facilities and cultural resources are safeguarded, offering valuable lessons from the past to future generations.

Parks are welcoming havens, providing recreation and rejuvenation, fostering connections with nature, and encouraging social ties.

GGNRA's Climate Action Plan at a Glance

This Climate Action Plan lays out Golden Gate National Recreation Area's goals to take immediate, ambitious, and durable actions to address climate change. Our Strategies and Goals are outlined here, as well as the Key Moves that will have the biggest impact in each of the Strategy areas.

Strategy 1 - Reduce

Goals:

- Achieve carbon neutral park operations by 2025 through fossil fuel reductions and offsets
- Achieve net-zero energy use for park buildings
- Reduce transportation emissions from NPS vehicles, visitors, and employees
- Increase waste diversion through recycling and composting
- Reduce waste and emissions through sustainable purchasing
- Reduce water use to ensure climate resilient operations

Key moves:

- Reinstate the Alcatraz solar microgrid (short-term)
- Electrify park buildings and fleet (longer-term)

Strategy 2 – Educate

Goals:

- Foster a climate and sustainability focused workforce
- Promote climate change awareness and action for park visitors and the public

Key move:

- Develop a team focused on educating park staff about GOGA's climate change response

Strategy 3 – Adapt

Goals:

- The park understands and anticipates climate impacts based on comprehensive studies
- GOGA resources and ecosystems are proactively managed to be resilient and adaptive to a range of climate impacts

Key move:

- Develop an adaptation roadmap for the park's most vulnerable sites

Strategy 4 – Inspire and Lead

Goals:

- Inspire continued success by integrating climate change response into core park activities
- Play a leadership role within NPS in climate and sustainability programs

Key move:

- Elevate GOGA's climate change response by embedding in Strategic Plan as a priority

Building 1199 at Crissy Field is a LEED Platinum building occupied by GGNRA's Interpretation Staff. It features solar panels, wind turbines, rainwater catchment, daylighting, sustainable materials, and EV charging.

Introduction: Golden Gate National Recreation Area Responds to Climate Change

This plan lays out Golden Gate National Recreation Area (GGNRA)'s goals to take immediate, ambitious, and durable actions to address climate change. We hope to showcase how a national park can expand its use of clean, renewable energy to eliminate heat-trapping carbon emissions, as well as protect valuable park resources for future generations.

This is the second update since the original *Golden Gate National Recreation Area Climate Change Action Plan 2008*. The purpose of this plan is to outline the accomplishments of GGNRA in addressing climate change and set new goals for the park. The plan provides detailed guidance for GGNRA to become a carbon neutral park and to adapt to changes the park may experience due to a changing climate. We also define the highest priorities – or key moves – needed over the next 5 years to make significant progress on all our goals.

This plan was developed over the course of several years, as the urgency of climate change suggested that an updated plan was needed to jump-start ambitious action across the park (see Appendix D). The following strategies, goals, and objectives – as well as implementation details in the Annual Workplan – were developed through a series of conversations between Green Team members and subject matter experts across different disciplines. The park's Leadership Team was represented on the working group that established this plan, and leadership priorities are reflected in these actions.

Organization of the Climate Action Plan:

The plan is organized into four major Strategies, each with one or more Goals, Objectives, and Implementation Actions. The *Strategies, Goals and Objectives* are listed in this plan, while the detailed *Annual Workplan* will be a living document updated every year by the parks' Green Team.

Strategies – These are the broad overarching categories that all the goals and objectives fit under.

Goals – These provide the long-term direction for the park and are the outcomes the park intends to achieve. They are on a longer timeline (8-10 years).

Objectives – These can be shorter-term (3-5 years) and they define measurable strategies to achieve the overall goals.

Annual Actions – Each objective has multiple implementation actions that the park will undertake each year. The Annual Workplan is a living document that will be updated each year by the GOGA Green Team and the subject-matter experts working in the various sectors. The document will also include a responsible person or team, and a target year for completion.

Key Moves – These are the actions that, if implemented, will create the biggest impact in advancing each of the Strategy areas.

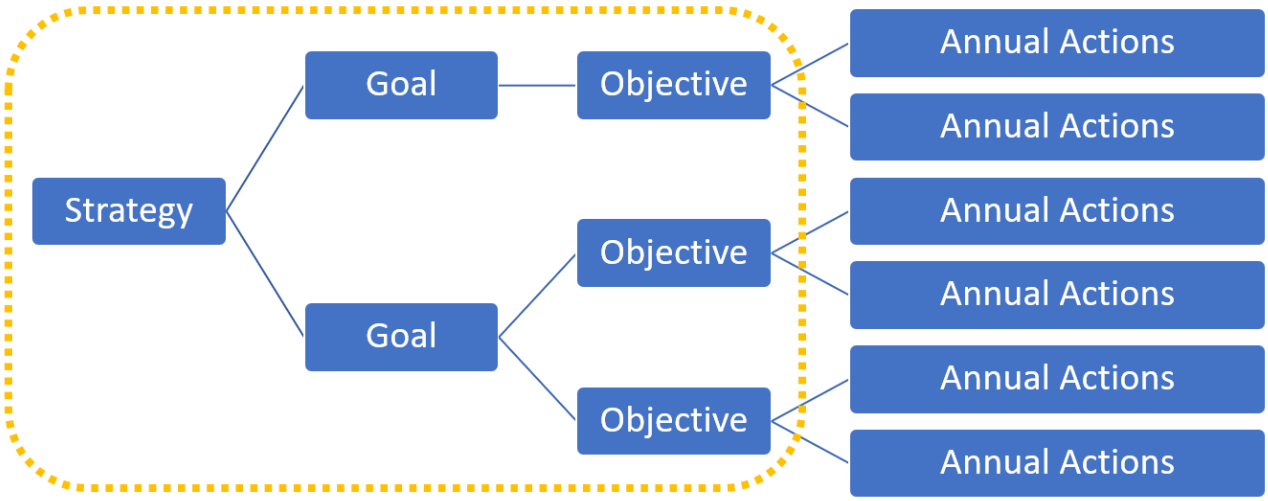

Figure 1: The hierarchy of Strategies, Goals, Objectives, and Annual Actions. The first three are described in this document. An Annual Workplan will be updated each year and include more detailed implementation actions.

Appendices A-D:

Four appendices go into more detail on the content of this CAP.

- **Appendix A** describes much of the progress made by the park in our sustainability and climate change initiatives since 2008.
- **Appendix B** depicts the new structure for our “Core” and “Extended” Green Teams.
- **Appendix C** provides much more detail on the contributors to the park’s carbon footprint, including from Park Operations, Visitor Transportation, and Employee Commute.
- **Appendix D** is a special addition provided by climate scientist Patrick Gonzalez on impacts to the park from climate change.

GOGA's Four Main Climate Response Strategies:

The following sections outline the Goals and Objectives for the four main strategies. Here, we summarize the content under each strategy and lay out one or more key moves necessary to make major progress on each.

Strategy 1 - Reduce

The first strategy includes GGNRA's goals for reducing fossil fuel emissions from park operations and visitation. Actions in this category focus on the sectors that contribute the most to our carbon footprint: Energy, Transportation, and Waste. These types of actions are often referred to as *climate mitigation* actions. Taken together, these actions contribute to GGNRA's goal of achieving carbon neutral park operations, starting in 2025. This will be accomplished by reducing the park's direct greenhouse gas emissions and purchasing carbon offsets for the remainder of emissions.

- **Two key moves** are required to make progress on this action: 1) in the short-term, repair and reinstate the Alcatraz solar microgrid system, and 2) longer-term, electrify the park's buildings and fleet. These two actions will contribute the most to reducing the park's carbon footprint.

Strategy 2 – Educate

The second strategy is to educate park staff, visitors, and the broader public about climate change and encourage everyone to reduce their own fossil fuel emissions. By amplifying our message beyond park boundaries, we can contribute to greater reductions than by just decreasing our own emissions.

- **A key move** under this strategy is to establish a new Education and Outreach group under the park's Green Team to focus on sharing the latest science on climate impacts and solutions. This will establish a climate-literate workforce and empower our public-facing staff to feel comfortable discussing climate change issues.

Strategy 3 – Adapt

The third strategy is to adapt to the impacts of climate change and bolster ecological and infrastructural resilience in the park. We will research the best available methods to support the park's natural and cultural resources and facilities to help them confront climate change impacts.

- **A key move** under this strategy is to develop an adaptation roadmap for the park's most vulnerable sites.

Strategy 4 - Inspire and Lead

The final strategy includes goals that integrate climate action into all park operations, and position GGNRA as a leader within the community and the broader National Park Service.

- **A key move** under this strategy is to embed climate actions into the park's upcoming Strategic Plan. This will ensure that park management prioritizes climate change response in overall decision-making.

Solar panels were installed on Alcatraz Island in 2012 as part of a hybrid microgrid. The system components include solar panels, battery storage, and backup diesel generators. When functioning, the system contributes significantly to reduced park emissions, but keeping the system operational has been challenging.

Strategy 1: Reduce

Reduce fossil fuel emissions and conserve energy and water, achieving carbon-neutral park operations by 2025

An overarching goal for this Climate Action Plan is to achieve carbon neutral park operations, in part by cutting our fossil fuel emissions in half. Carbon neutral operations can be achieved in the short-term through the purchase of carbon offset credits, as we continue to implement projects to reduce overall emissions from our operations.

GGNRA measures emissions from park operations each year (see Appendix C), and the three largest contributors are:

- **Energy** – on-site emissions from gas furnaces and appliances, and diesel and propane generators
- **Transportation** – on-site emissions from the park's fleet and heavy-duty equipment
- **Waste** – off-site emissions from municipal solid waste decomposition

We will prioritize reductions from these sources of emissions, since the park has the most control over them – from how we procure our energy and manage our buildings and fleet to how much waste we send to landfills.

We also plan to address emissions from visitor transportation.

Key move #1: Reinstate Alcatraz solar microgrid

- A repaired and optimized solar and battery system will eliminate much of the diesel used to power the island.

Key move #2: Electrify our buildings and fleet

- By using clean, renewable electricity and running our buildings and vehicles on that electricity, we can make a significant reduction in our carbon footprint.

These emissions are much higher than those of park operations (see Appendix C Figure 8), but also much more challenging to reduce. GGNRA last measured the carbon footprint from visitors in 2015, which showed that the share of total park emissions generated by visitor transport far exceeds the share generated by park operations. We have developed goals and objectives in this plan to address visitor transportation despite not having an updated measure of this contribution to the park's overall carbon footprint.

Lastly, we have incorporated water conservation in our Climate Action Plan for the first time, as an acknowledgement that water will always be a constrained resource and will only become more so in a changing climate.

GOGA's Goal for Carbon-Neutral Park Operations

Our goal of carbon-neutral park operations has two components, as illustrated in Figure 2:

- **50% reduction in annual emissions by 2032, totaling 683 metric tons of carbon dioxide equivalent ($MTCO_2E$).**

  Our baseline value of 1,365 $MTCO_2E$ was determined by averaging annual park emissions between 2015-2019. The baseline intentionally excludes data from 2020-2023, which were anomalous due to the lasting operational impacts of COVID-19. Our latest data from FY23 (1,616 $MTCO_2E$) is above the baseline, suggesting that we must decrease emissions by 12% each year between 2024 and 2032 to reach our goal of 683 $MTCO_2E$.

- **Purchase of carbon offset credits for the remainder of emissions, starting in 2025.**

  While reducing our actual emissions is the highest priority, we acknowledge that carbon-neutral park operations will not be possible at present without the purchase of carbon offsets. We intend to seek an outside source of funding to accomplish this and will ensure that any offsets purchased meet the highest standards for verification.

The 50% reduction goal by 2032 aligns with those put forth in the Federal Sustainability Plan and the NPS Green Parks Plan (2023). In this plan, we only include fossil fuel emissions from park operations (not visitors) as measured annually in our carbon-footprint analysis (see Appendix C).

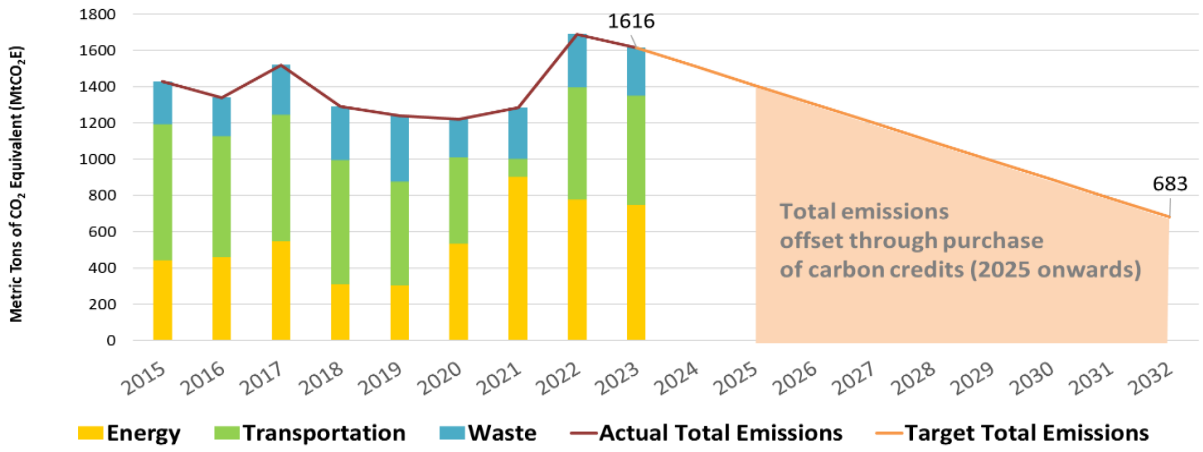

Figure 2: GGNRA's goal is to cut our emissions in half by 2032, at the same time achieving carbon-neutral park operations through the purchase of carbon offset credits.

Strategy 1 Goals and Objectives

Carbon-Neutral Park Operations

Goal: Achieve Carbon Neutral Park Operations by reducing emissions and purchasing offsets

Our overarching goal under Reduce is to achieve carbon-neutral park operations. While many of the objectives under Energy, Transportation, and Waste will help accomplish this, the objectives here are intended to formalize the tracking and administration of this goal:

- Reduce carbon emissions 50% by 2032
- Purchase carbon offsets to achieve carbon neutral park operations beginning in 2025

Net-Zero Energy

Goal: Achieve net-zero energy buildings

Net-zero buildings are those that are energy efficient and produce enough renewable energy to meet the annual energy needs of the building. GOGA purchases renewable electricity for all park buildings, except at the Presidio. For the buildings already using renewable electricity, the final step is to convert fossil fuel appliances such as heaters and boilers to electric. Objectives to achieve net-zero energy include:

- Reduce building energy use intensity each year
- Utilize 100% clean energy by purchasing through a renewable energy provider or generating on-site
- Eliminate fossil fuel in buildings and shift to 100% electrical power by 2032

Transportation Management

Goal: Reduce the carbon footprint of NPS vehicles and equipment

GOGA's fleet consists of over 170 leased vehicles, plus additional heavy-duty vehicles such as tractors and street-sweepers. Electrifying the fleet and finding other ways to make the remaining fleet as efficient as possible will help the most with fossil fuel emissions reductions. Objectives include:

- Increase the average miles-per-gallon (MPG) of the park fleet each year by continually incorporating high-efficiency and zero-emission vehicles
- Install fleet EV chargers at all park sites by 2032
- Non-highway vehicles and equipment reduce fossil fuel use each year

Goal: Reduce the carbon footprint of park visitors

Visitor transportation to the park, whether driving personal vehicles or taking a shuttle or ferry, contribute a great deal to the park's overall carbon footprint. The objectives in this sector address the three modes of transportation that the park hopes to promote. The objectives include:

- Increase the percentage of visitors using public transportation to the park each year
- Increase visitor access to public EV charging by installing chargers at additional park sites
- Increase the percentage of visitors of biking and walking to the park

Goal: Reduce fossil fuel emissions from employees commuting

The emissions for employee commutes are also not included in that of Park Operations, but we measured these emissions in 2022 for three time periods (see Appendix C). We hope to re-do this measurement periodically and document reductions in the overall emissions. The objective under this goal is:

- Carbon footprint of employee commute is reduced by 50% by 2032, from 2019 baseline

Waste Diversion and Green Purchasing

Goal: Increase the waste diversion rate through recycling and composting

Waste that ends up in the landfill, especially with high organic content, generates methane which is a potent climate-warming gas. We will strive to divert as much waste as possible from landfills, both in our everyday operations (municipal waste) and from construction projects. The objectives include:

- Municipal diversion rate increases to 50% by 2025 and to 60% by 2030
- Construction diversion rate increases to 80% by 2025

Goal: Reduce waste and emissions through sustainable purchasing

The upstream and downstream impacts of our purchasing decisions contribute to climate change via the production, transport, and disposal of products and waste. We will focus on park operations that create the biggest impact on reducing waste and emissions. We will also prioritize actions to phase out single-use plastic products to the maximum extent practicable, consistent with DOI Secretarial Order 3407. This order aims to reduce the procurement, sale and distribution of single-use plastic products and packaging with a goal of phasing out all single-use plastic products on Department-managed lands by 2032.

The objectives include:

- Update Green Purchasing Policy to focus on products that generate waste and emissions
- Eliminate use of single use plastics by 2032 for both park and partner operations

Water Conservation:

Goal: Reduce outdoor water use to ensure climate resilient landscapes

California is a drought-prone state, and as the climate warms the availability of water will become even more unpredictable. With irrigation being our largest user of water, we will look for ways to consolidate or eliminate irrigation where possible. The objectives include:

- Irrigation efficiency is increased 50% by 2027
- Irrigations systems are improved each year through site-specific workplans
- Anticipate use of recycled water for irrigation

Goal: Reduce Indoor Water Use

Indoor water use, while a much smaller contributor to our overall usage, is still important to track and manage. For example, indoor water conservation is a category in the Climate Friendly Parks Scorecard (see “CAP Implementation” section for more info). The objectives include:

- Reduce indoor water consumption 20% by 2027

Golden Gate National Recreation Area staff provide interpretive and educational programs and outreach to park visitors, program participants, and to the broader public.

Strategy 2: Educate

Expand climate change education and outreach, modeling the park's sustainable actions to our staff and visitors

Climate change is a complex issue that the park can help communicate to the public. Combined with the park's emission reductions, the greatest impact that GGNRA can have on mitigating climate change is through public education. With more than 17 million visitors to the park annually, we have the opportunity to amplify our impact beyond park boundaries by encouraging people to reduce emissions in their own lives.

Climate communications to park staff, visitors, and community members will focus not only on the climate impacts that Golden Gate is expecting but also the actions they can take in their own lives to generate the greatest fossil fuel reductions.

Key move:

- Develop a Green Team outreach group focused on communicating to park staff about climate change and GOGA's response actions

By highlighting effective climate solutions in frequent and regular communications, the park can show that concern for the climate is normal, and we are part of a broader community that is taking action. In this way, we will break the "spiral of silence" that prevents many people from discussing climate impacts and solutions, and which researchers have identified as a key barrier to effective action. Our education and outreach efforts will empower people to talk more comfortably about climate change and expand our impact beyond just our park operations.

Strategy 2 Goals and Objectives

Park Staff:

Goal: Foster a climate and sustainability focused workforce

This goal encompasses several aspects of staff education. The first is educating all park staff on the park's climate priorities, and what actions they as staff can take to reduce fossil fuel emissions. The second is providing enough resources and training for the public-facing staff (Interpretation and Education staff, Communications staff, field staff in Facilities, Natural Resources, Visitor & Resource Protection, etc) to feel empowered to discuss climate change and solutions with visitors and the public. Objectives include:

- Develop content for park staff to increase climate change awareness and promote meaningful action

Visitors and Program Participants:

Goal: Promote climate change awareness and action for park visitors, program participants, and the public

The single largest impact we can have as a park is to engage our visitors and the overall public in discussions of climate change causes and effective solutions. By encouraging visitors to reduce fossil fuel emissions in their own lives, we can amplify our impact beyond park borders. Objectives include:

- Provide climate change interpretation and education for park visitors and program participants through new and existing channels
- Incorporate sustainable actions into visitor communications, encouraging them to take part

Park sites such as Stinson Beach are already seeing impacts from extreme weather events. As the planet warms, storms become warmer, wetter, and more damaging. Rising sea levels compound this effect.

Strategy 3: Adapt

Plan for and adapt to climate change

Climate change is causing increasing impacts to the park's coastline, creeks, and rivers which in turn affects recreation, resources, and infrastructure. Increases in storm frequency and flooding along with hotter and drier summers put a strain on park operations and resources. Studies show that more extreme climate conditions will continue to increase in the future at Golden Gate National Recreation Area (see Appendix D).

Key move:

- Develop an adaptation roadmap for the park's most vulnerable sites

Following guidance from the NPS publication *Planning for a Changing Climate*, the park is beginning to look at a range of future scenarios and adaptation strategies park-wide, particularly in our most vulnerable sites. The park evaluates climate vulnerability by assessing a site's exposure, sensitivity, and resilience, focusing on its ability to withstand, adapt to, and recover from impacts. The park will build internal capacity to engage in these adaptation planning processes, and also seek outside scientific and community expertise.

Strategy 3 Goals and Objectives

Goal: The park understands and anticipates climate impacts based on comprehensive studies

The park faces a range of climate impacts, and each site has a unique set of challenges. By looking across the park -- and beyond -- to understand these impacts and how they can be addressed, we hope to minimize the impacts to our resources. Objectives include:

- Conduct planning efforts across the park to address climate vulnerability and adaptation

- Enhance collaboration between park staff and other public agencies

Goal: GOGA resources and ecosystems are proactively managed to be resilient and adaptive to a range of climate impacts

While parkwide and site-specific planning is an important first step, the follow-up action must be to develop projects that make our facilities and resources more resilient to climate impacts. Objectives in this area include:

- Develop and implement site-specific projects that make park sites more adaptive
- Evaluate both planned and unanticipated projects using climate-smart guidance

GGNRA hopes to continue with initiatives that bring people together and provide inspiration, such as the Sustainability Summit series that has been paused since covid.

Strategy 4: Inspire and Lead

Inspire and motivate parkwide action on climate change

The final strategy aims to increase parkwide action on climate change by integrating climate initiatives into every aspect of park operations, positioning GGNRA as a leader in the community and within the National Park Service.

Key move:

- Elevate GOGA's climate change response by embedding it in the park's Strategic Plan

GGNRA has been an innovator in many areas, including partnerships and community engagement. Its urban location, surrounded by diverse communities and resources, fosters creative problem-solving

The park's climate change response has also benefited from the pioneering efforts of local communities in the San Francisco Bay Area, such as San Francisco's curbside composting initiative started in 2009 and Marin County's Community Choice Energy Program, launched in 2010. GGNRA has built on these initiatives to achieve numerous accomplishments.

In this Climate Action Plan, we aim to generate momentum for even greater achievements, inspiring further action toward our ambitious carbon reduction goals. This strategy ensures that CAP implementation remains a top priority and that climate actions are fully integrated into park operations.

Strategy 4 Goals and Objectives

Goal: Inspire continued success by integrating climate change response into core park activities

We want to ensure that climate actions are embedded into everyday park operations and programs, and that there is accountability for the commitments made in this plan. Objectives include:

- Develop annual milestones to maintain momentum on CAP implementation actions
- Embed sustainability and climate change response into existing park processes

Goal: Play a Leadership Role within NPS in Climate and Sustainability Programs

We also have an opportunity to share best practices and lessons-learned with our park partners, concessioners, neighboring communities, tribes, and other National Parks. Our objectives to accomplish this include:

- Achieve Platinum certification in Climate Friendly Parks Program in first national evaluation
- Collaborate with other NPS units, Park Partners, and local agencies, and tribal partners on climate change response

High tides and flooding wash over the entrance road to Fort Point National Historical Site.

CAP Implementation and Next Steps

By taking the actions established above, Golden Gate National Recreation Area plans to achieve carbon neutral park operations and be a leader in addressing climate change within the National Park Service. Achieving this goal will require an ongoing commitment by the park, which may include subsequent emission inventories, additional mitigation actions, and re-evaluation of goals and objectives.

Several new measures are outlined in this section that are intended to deepen and strengthen the park's commitment to implementing this CAP. These include:

- Reconfiguring the park's Green Team to focus exclusively on CAP implementation
- Committing to updating and implementing an Annual Workplan
- Engaging with the Climate Friendly Parks Program and striving for Platinum Certification
- Including climate change response in the park's updated Strategic Plan
- Prioritizing funding for projects and staff to implement these actions
- Regular communication with park Leadership Team on updates, priorities, and challenges

Reorganization of the Park's Green Team:

GOGA has had a Green Team in place since 2003, which was initially formed to develop and implement an Environmental Management System. Over the years, the Green Team pivoted to focus more on Climate Action Plan implementation, and with this current CAP will undergo a reorganization to focus exclusively on implementing this CAP.

The new structure will consist of a "Core Green Team" and an "Extended Green Team" (see Appendix B). The overall change is that there will be stronger representation from the park's

Leadership Team on the Core Green Team, along with Subject Matter Expert Leads who will support the Sustainability Coordinator in implementing the CAP priorities.

Organization of the Annual Implementation Workplan:

A new component of this updated Climate Action Plan is a standalone Annual Implementation Workplan (or Annual Workplan) that will be updated each year by the Core and Extended Green Teams. The framework for the workplan will be the Strategies, Goals, and Objectives outlined in this plan, with the addition of specific Annual Actions, Responsible Party, and Year to be accomplished (see sample in Table 1 below).

The annual workplan will be updated at the beginning of each Fiscal Year (Oct. 1-Sept. 30) by the Subject Matter Expert (SME) teams in collaboration with the Sustainability Coordinator and SME Leads. The new Workplan will be reviewed and approved by the Leadership Team within the first quarter of the fiscal year.

As the year progresses, the SME Leads and Sustainability Coordinator will track progress on the workplan actions through various means such as topical meetings, written updates, etc.

An Annual Report will be developed by the Program Manager and presented to Leadership Team at the end of the fiscal year to document progress on the workplan.

Table 1: Sample from CAP Annual Implementation Workplan, Visitor Transportation Goal.

Goal	Objective	#	Annual Actions	Responsibility	Year
Reduce the carbon footprint of park visitors	Increase the number of visitors using clean public transportation to the park each year	1	Initiate planning for Muir Woods shuttle transition to concession	Transportation Planner	Year 1
		2	Fully implement fast charging for Alcatraz ferries, allowing all visits to the island under battery power	Business Management liaison	Year 1
		3	Develop approach for including public transportation in visitor count system	Transportation Planner	Year 2

Climate Friendly Parks Certification:

GGNRA has been a Climate Friendly Park (CFP) since 2008 with the completion of our first Climate Action Plan. Initially a one-time certification, the Climate Friendly Parks Program has now established sustainability performance measures, including greenhouse gas emissions, energy use intensity, water use, solid waste management, community outreach and visitor interface, internal green team and leadership engagement, and resilience.

A new rating system is designed to incentivize continual park sustainability improvements, and parks can be assigned a CFP rating based on the categories below. Parks are expected to annually report on their sustainability data across the six performance measures. The Sustainable Operations and Maintenance Branch (SOMB) at the NPS Washington Office will measure and score the parks on these measures and compare the CFP parks against each other by their scores to result in commensurate levels of recognition.

Based on parks' scores, SOMB will assign the following ratings:

- **Inactive Status:** Scores reflective of disengagement from the program
- **Certified:** meets basic requirements of program participation (parks with lowest 59% of scores)
- **Silver:** (score is in 60%-79% range)
- **Gold:** (score is in 80-94% range)
- **Platinum:** represents top achievers in the program (top 5% of parks)

As part of GGNRA's goal to be a leader in the National Park Service in responding to climate change, we are committed to achieving a Platinum certification in the first cycle of national Climate Friendly Parks evaluation. Many of the Goals, Objectives, and Actions that we are committing to are in service of achieving this certification.

Connection to GOGA's Strategic Plan:

The update of this Climate Action Plan coincides with the park's update of its 5-year Strategic Plan. The new Strategic Plan lists climate change response as one of three "Emphasis Areas", and states that "Keystone goals from the park's climate action plan are leveraged to reduce the park's contribution to climate change."

As each of these plans is finalized and move towards implementation, the Green Team will work with the Strategic Plan implementation team to ensure that the goals in each plan continue to align.

GOGA Leadership Team Support of GOGA's Climate Actions:

The measures outlined above are intended to increase the engagement between the Green Team and park Leadership Team, leading to increased support and prioritization of these proposed climate actions. The GOGA Leadership Team (LT) meets weekly, and consists of the General Superintendent, Deputy Superintendent, and all the Division Chiefs.

The inclusion of several LT members on the Core Green Team will enhance the communication between park leadership and the Subject Matter Experts, leading to more alignment on shared priorities on CAP implementation.

Some examples of these LT-level topics include:

- **Prioritize funding** for CAP implementation projects and the additional staff needed to implement them
- **Seek additional funding** and advocate for existing fund sources to incorporate climate actions in project prioritization
- **Support existing staff time** to work on CAP projects
- **Support improved tracking of energy, transportation, and waste data** to facilitate decisions based on the greatest GHG emission reductions
- **Encourage all park staff** to engage in education and outreach efforts related to the park's climate change response

Conclusion

Golden Gate National Recreation Area's updated Climate Action Plan outlines a comprehensive and ambitious approach to addressing climate change. By focusing on reducing emissions, educating the public, adapting to climate impacts, and leading by example, the park aims to achieve carbon neutrality and enhance resilience.

Through collaborative efforts and detailed planning, GGNRA is committed to making significant progress over the next decade. This plan not only sets a clear path for sustainable park operations but also serves as a model for other national parks and communities striving to combat climate change.

Appendix A: Progress Since 2008 Action Plan

Golden Gate's original Climate Action Plan was written in 2008, with a second edition completed in 2016. Since that time GGNRA has made progress in many areas. Highlights of the park's actions include:

Reducing Emissions:

- Joined Marin Clean Energy's Deep Green program in 2011 and CleanPowerSF's SuperGreen program in 2016, providing renewable electricity to all our park buildings
- Added solar photovoltaics on the park headquarters building and on Alcatraz Island
- Developed a workplan and started implementing building electrification projects
- Installed electric vehicle chargers for both NPS fleet vehicles and visitors in multiple park locations
- Expanded the Muir Woods Shuttle to decrease vehicle traffic to Muir Woods
- Improved solid waste diversion through increased composting in both Marin and San Francisco Counties
- Expanded public areas recycling collection with Conservation Corps North Bay
- Measured the carbon footprint of employee commute, documenting savings from hybrid telework

The effects of these efforts can be seen in Figure 3, which depict the trends in our carbon footprint over time. This graph shows that the park achieved carbon-neutral park operations for one year: in 2019, the park purchased carbon offset credits to offset the total emissions for 2018's park operations. Appendix C includes more information about the carbon footprint changes over time.

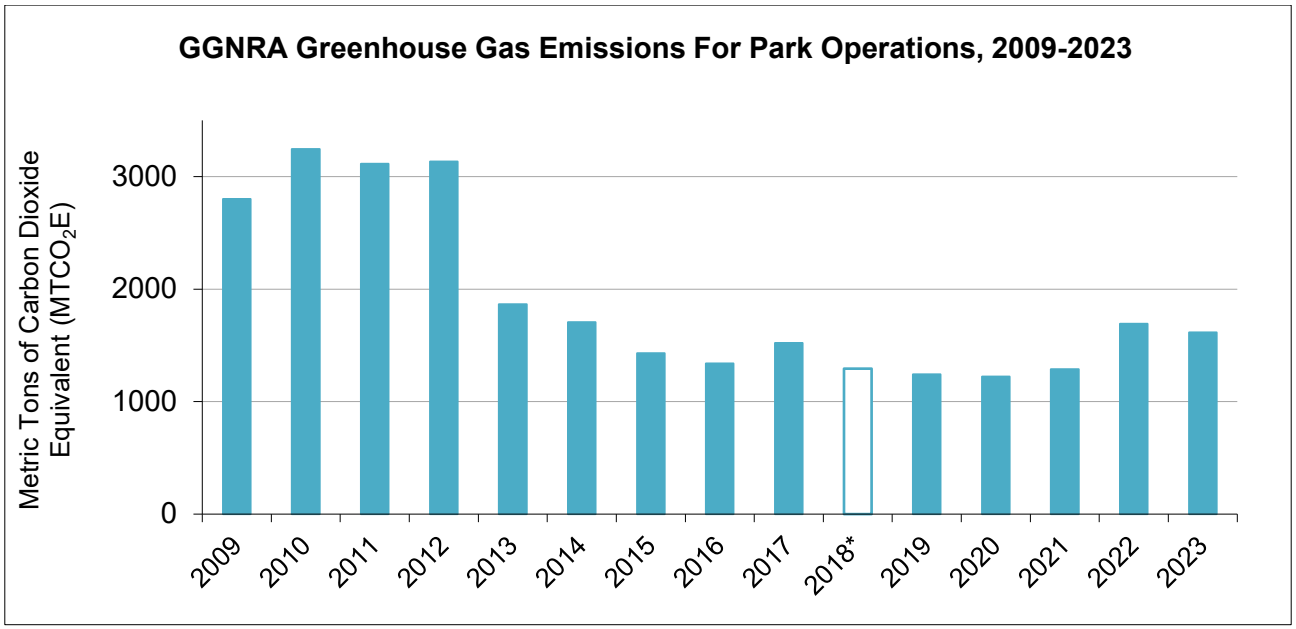

Figure 3: Emission trends from 2009 – 2023. The 2018 emissions depict the purchase of carbon offsets to achieve carbon-neutral park operations for that year.

Educating Staff and Visitors:

- Conducted a series of trainings for staff, volunteers, and visitors related to GGNRA's climate change efforts
- Conducted multiple outreach and collaboration events, such as the bi-annual Sustainability Summit, online newsletters, web content, and an Earth Month Staff Challenge
- Added outdoor exhibits and provided increased interpretive programming related to climate change

Adapting to Climate Change:

- Participated in multiple planning efforts related to climate change adaptation, such as at Stinson Beach, Ocean Beach, and Crissy Field
- Conducted parkwide evaluations on vulnerability of natural resources

Inspiring and Leading:

- Encouraged partners and concessioners to achieve sustainability goals: e.g. Alcatraz City Cruises developing electric ferry; Muir Woods Trading Company green products

For more information and resources see:

- GGNRA's Sustainability and Climate Change Webpages
- Sustainability Newsletters featuring stories about many of these projects

Appendix B: Reorganization of the park's Green Team

GOGA has had a Green Team in place since 2003, which was initially formed to develop and implement an Environmental Management System. Over the years, the Green Team pivoted to focus more on Climate Action Plan implementation, and with this current CAP will undergo a reorganization to focus exclusively on implementing this CAP.

The new structure will consist of a "Core Green Team" and an "Extended Green Team" (see Figure 4 below).

- **Core Green Team** will consist of the park's Sustainability Coordinator (Program Manager), representatives from the park's Leadership Team, and Subject Matter Leads from various goal sectors. This team will meet every two months, and focus on strategy, policy, and overall implementation guidance.

- **Extended Green Team** will consist of subject-matter experts (SMEs) across the goal sectors who are responsible for the actions in the Annual Implementation Workplan. These SME teams will meet a few times per year and focus on developing and implementing the annual workplan. For some sectors, a Subject Matter Lead will assist the Program Manager in organizing these SME meetings; for other sectors the PM will organize the meetings.

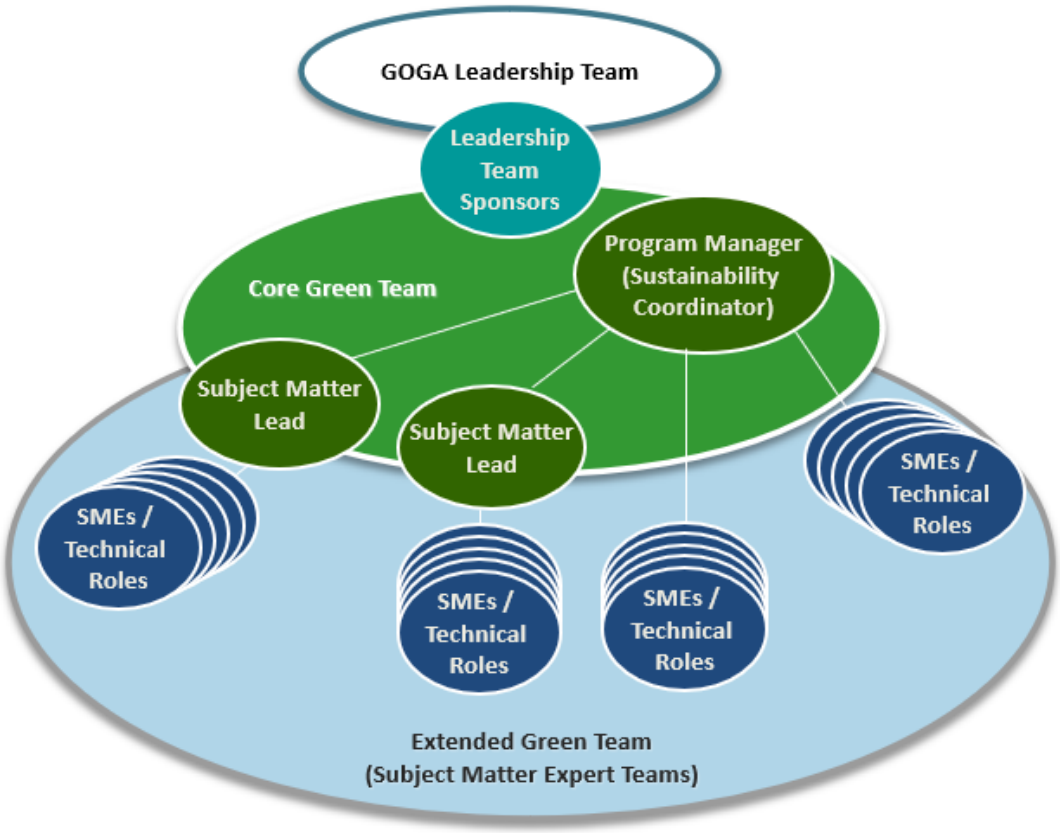

Figure 4: Proposed structure for reorganized "Core Green Team" and "Extended Green Team".

Appendix C: Contributors to Greenhouse Gas Emissions at GGNRA

To enact Strategy 1 of the Climate Action Plan -- reducing GHG emissions resulting from activities within and by the park -- it is necessary to perform GHG emissions audits annually.

Golden Gate National Recreation Area has GHG emissions from three contributors:

1) Emissions from park operations
2) Emissions from concessioner and Park Partner operations (non-profits that utilize park buildings)
3) Visitor emissions from travel to the park (in personal vehicles, ferries, and public transportation)

The only emissions that are measured annually are those from park operations. Park Partner and concessioner operations are very difficult to quantify (for example they receive separate utility bills) and are therefore excluded from the following evaluation.

GOGA has only measured the carbon footprint from Visitors twice, in 2008 and 2016. The data for this measurement is difficult to collect and not very reliable, but contributes a great deal to the park's overall carbon footprint. A later section in this appendix describes the visitor carbon footprint further.

A note about terminology related to emissions: throughout this plan, we have used the terms "*fossil fuel emissions*", *"heat-trapping gasses*", "*carbon emissions*", "*greenhouse gas emissions*", and "*metric tons of carbon dioxide emissions*" interchangeably. In reality they have slightly different meanings depending on the context:

- The term "*fossil fuel emissions*" -- especially when followed by a description such as "like coal, oil, and gas" -- is a more familiar term to many people and can be used in non-technical communications.
- The term "*metric tons of carbon dioxide emissions (MTCO$_2$E)"* is slightly more accurate because it standardizes emissions such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) based on their global warming potential, allowing for a combined measurement that reflects their overall impact on climate change. This term can be used in more technical communications when high accuracy is important.

In this appendix, we use Greenhouse Gas Emissions (GHGs) and MTCO$_2$E frequently, in line with the data generated for the Climate Friendly Parks Program via the CLIP Tool.

The CLIP Tool

The GHG emissions inventory was completed using the Climate Leadership in Parks (CLIP) tool. The CLIP tool was developed under the Climate Friendly Parks initiative between NPS and the Environmental Protection Agency (EPA), with the purpose of enabling park personnel to complete GHG inventories and then use the tool to track future progress. The CLIP tool converts emissions of various GHGs into a common "metric tons of carbon dioxide equivalent" (MTCO$_2$E) unit, which provides a basis for comparison between gases and simplifies reduction tracking.

Naturally occurring GHGs include CO_2, CH_4, N_2O, and water vapor. Human activities (e.g., fuel combustion, waste generation) lead to increased concentrations of these gases (except water vapor) in the atmosphere.

FY23 Greenhouse Gas Emissions for Park Operations

The most recent data we have is from Fiscal Year (FY) 2023. The emissions from park operations come from three sectors: Energy, Transportation, and Waste. The sources of these emissions are described in Table 1, along with the type of data used to input into the CLIP Tool.

Table 2: Emission sources included in GOGA's CLIP Tool analysis.

Sector	Emission Source	Park Operations Generating Emissions
Energy	Purchased Electricity	Non-renewable electricity use (on the Presidio)
Energy	Stationary Combustion - Diesel	Diesel used in Alcatraz generators
Energy	Stationary Combustion - Natural Gas	NPS-occupied buildings using gas for heating and appliances
Energy	Stationary Combustion - Propane	NPS-occupied buildings using propane for heating and appliances
Transportation	Mobile Combustion – NPS Fleet	Gas used for cars, trucks, SUVs, minivans; Diesel in trucks, SUVs, minivans, heavy duty trucks
Transportation	Mobile Combustion – NPS Non-Road Equipment	Gas or diesel used by heavy-duty fleet; fuel is stored at park sites
Waste	Municipal Solid Waste To Landfill	Tons of waste sent to landfill (includes both NPS operations and visitor waste)
Waste	Wastewater Treated	Gallons of wastewater parkwide; often using potable water as a proxy

In 2023, Golden Gate National Recreation Area's GHG emissions totaled **1,616** metric tons of carbon dioxide equivalent ($MTCO_2E$). The emissions break out as follows:

Table 3: FY23 Emissions results by sector and gas (park operations only).

Gas	Stationary Combustion	Purchased Electricity	Mobile Combustion	Waste	Wastewater Treatment
CO_2	722	33	590	0	NA
CH_4	2	0	1	243	0
N_2O	2	0	13	0	21
HFC	NA	NA	NA	NA	NA
Total Emissions ($MTCO_2E$)	**726**	**33**	**603**	**243**	**21**

This data can be further broken out to determine the largest sources of emissions in the park:

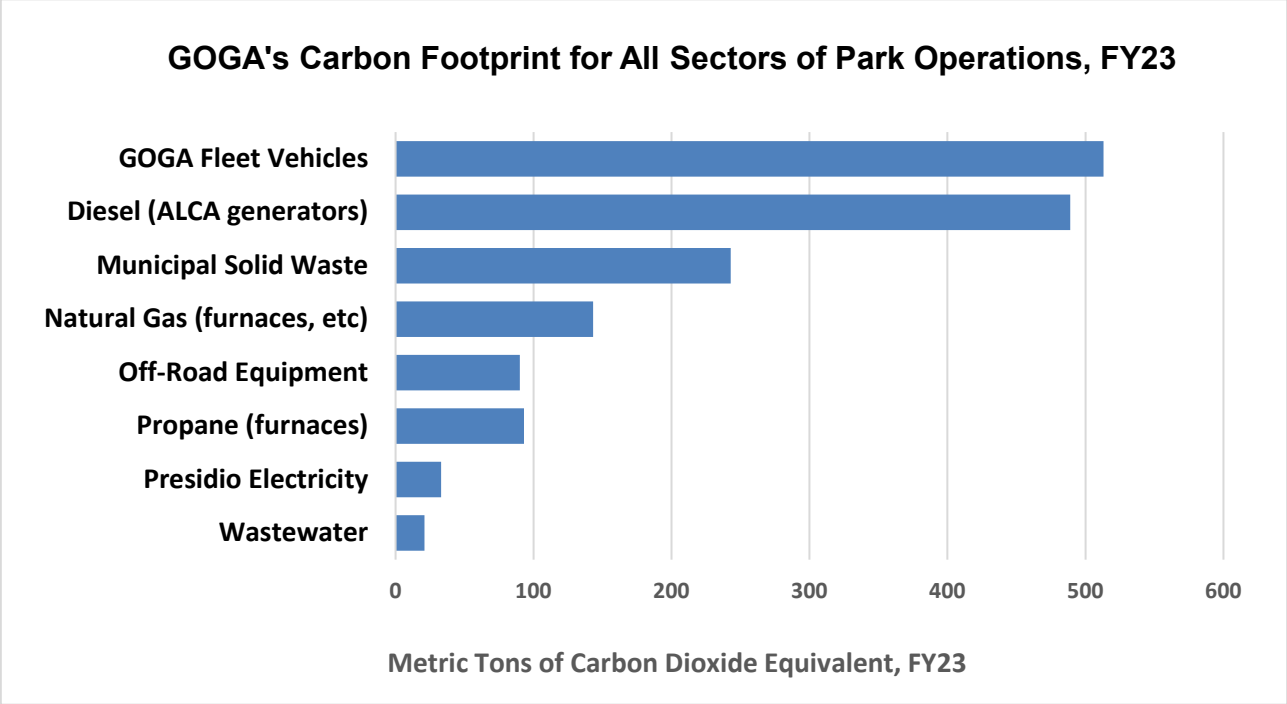

Figure 5: The largest contributor to the park's carbon footprint is the park fleet, followed by diesel used in the Alcatraz generators.

Emission Trends Over Time – FY 2009-2023

GOGA has been measuring our carbon footprint since 2008 (more reliably since 2009). Figure 6 presents emissions from Park Operations from 2009-2023 broken out by sector.

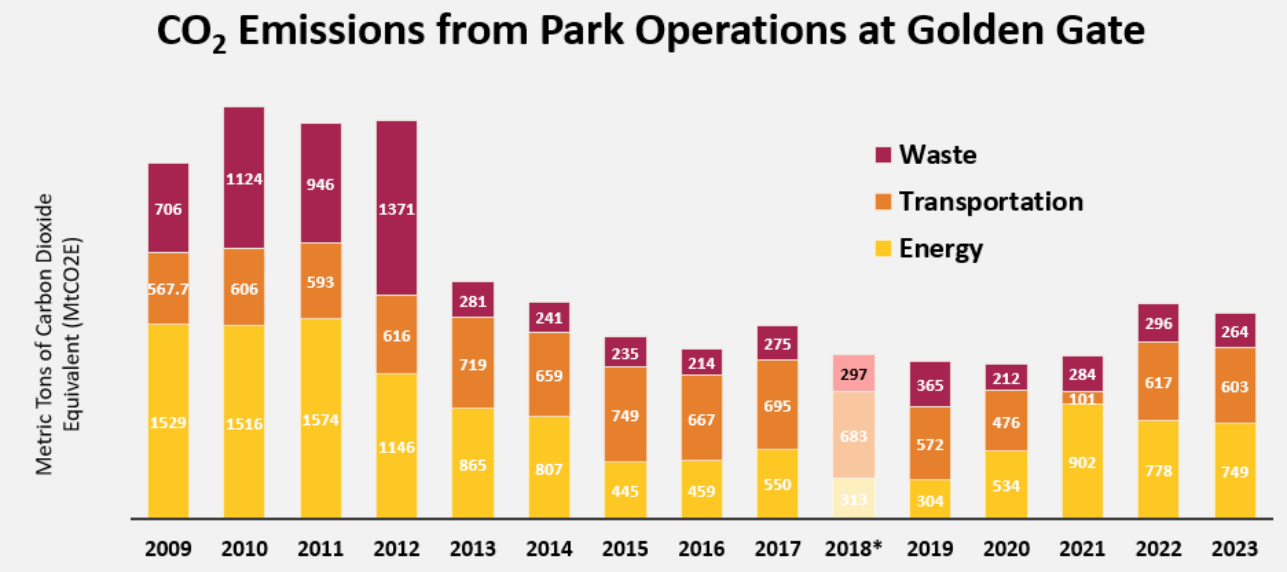

Figure 6: GGNRA's emissions have trended downward over time, with gains and losses in the sectors of energy, transportation, and waste.

Some notes on trends in the Energy data:

- In 2012 the park joined MCE Clean Energy and began purchasing 100% renewable electricity in our Marin County buildings.
- Also in 2012, the Alcatraz microgrid project went online, powering the island with a combination of solar energy and diesel.
- In 2015, the park joined CleanPowerSF and began purchasing 100% renewable electricity in our San Francisco buildings.
- Between 2017 - 2019, the Presidio Trust purchased Renewable Energy Certificates (RECs) to offset the electricity used by NPS at the Presidio. The purchase of RECs ended with the financial distress of COVID-19.
- Similarly, the park's concessionaire Alcatraz City Cruises purchased carbon offsets between 2016-2019 that included offsets for the diesel used in the Alcatraz generators. This support also ended with COVID-19.
- Fluctuations in the remaining Energy sector between 2015-2022 are due to changes in propane and natural gas usage for heating buildings.

Notes on trends in the Transportation data:

- The large drop in emissions between 2020 and 2021 are due to the dramatic decrease in the fuel use of both the light duty and heavy duty park fleets, as work around the park was curtailed by COVID-19.

Notes on trends in the Waste data:

- The drop in the Waste data between 2012-2013 is attributed to a change of assumptions about how waste is treated at local landfills. Currently, we can document that the landfills use landfill gas capture, which lowers the overall emissions from the landfill.
- Prior to 2013 we were not able to confirm this practice was occurring.

Carbon Footprint of Employee Commute – 2019, 2020, 2022

In 2022, members of the Green Team conducted a survey of all GOGA staff determining their commute patterns during three time periods:

- **2019** (pre-covid)
- **2020** (peak work-from-home)
- **2022** (as more employees had hybrid schedules)

Figure 7 depicts the employee commute data stacked on top of the overall footprint from park operations. Employee commute is not considered a “park operation”, but this graphic portrays the overall message that employee commute contributes a significant amount to our overall carbon footprint.

While we don’t plan to measure this annually, we can repeat this survey and calculation periodically to determine whether the carbon footprint is decreasing overall, through a combination of robust telework, cleaner vehicles, and improved public transportation.

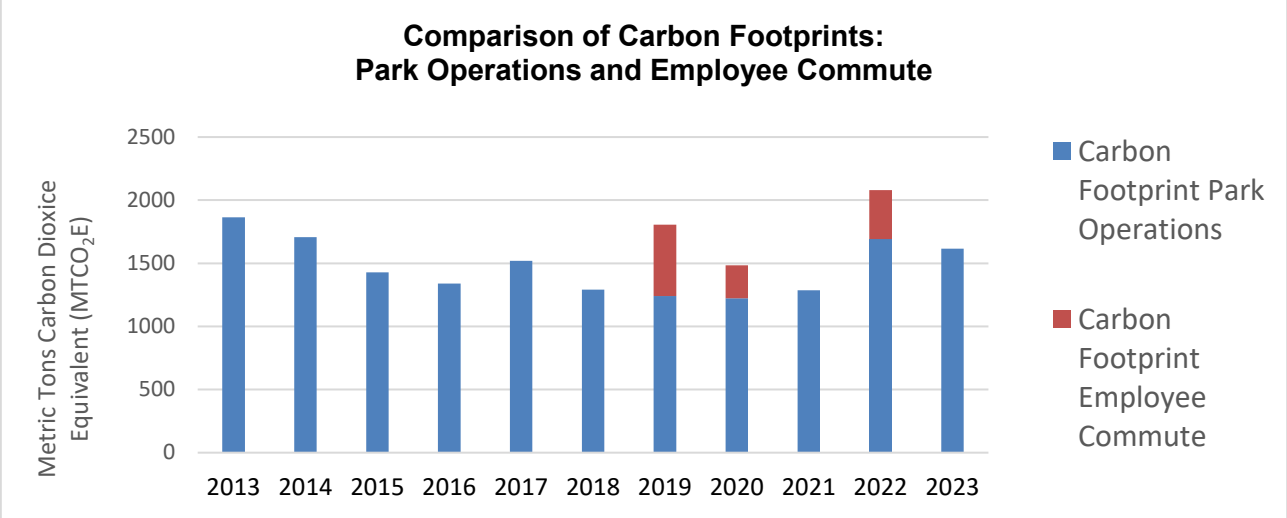

Figure 7: Emissions from Employee Commute stacked atop that of Park Operations for three time periods.

Carbon Footprint of Park Visitors

The last time we measure the carbon footprint of park visitors was with FY2015 data. The visitor mobile combustion emissions were based on a variety of estimates and assumptions. The park keeps track of the number of vehicles that come to certain locations within the park every day. The number of vehicles visiting each location was multiplied by the estimated miles traveled to each location. It was estimated that park visitors in total traveled 88,507,196 miles while visiting the park. This included visitors riding the shuttle to and from Muir Woods.

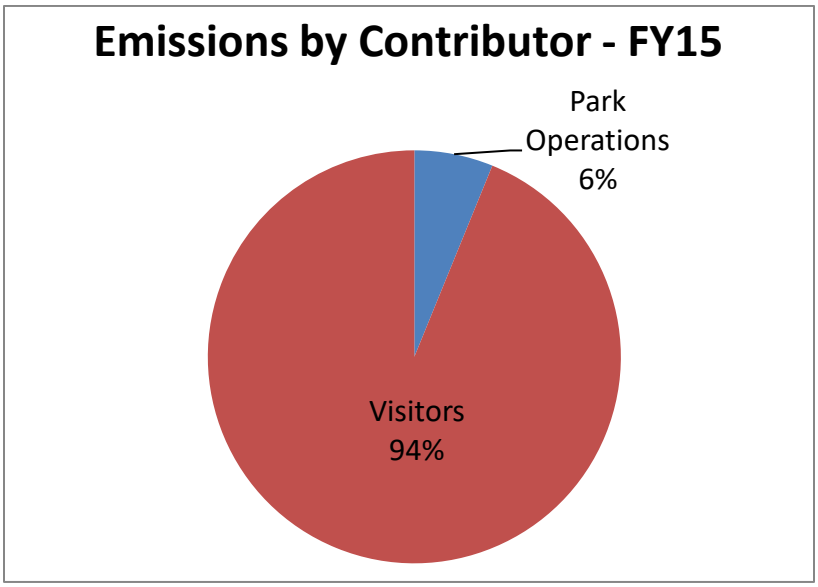

Figure 8: Emissions from Park Visitors compared to that of Park Operations for FY2015.

Another aspect of visitor mobile combustion emissions is the diesel used by the Alcatraz ferries. Alcatraz Cruises determined that they used 109,545 gallons of diesel for the ferries. However, this number was not included in the CLIP tool since in 2015 Alcatraz Cruises offset the emissions by purchasing RECs and Carbon Offsets.

In 2015, the park received approximately 15 million visitors per year, and that number has increased to 17 million as of 2023. This accounts for a majority of the park's emissions – totaling 94 percent of emissions.

Case Study – Muir Woods Reservation System and Shuttle:

While we don't plan to repeat the visitor carbon footprint calculation as part of this CAP update, we did conduct an analysis to document the effectiveness of launching a reservation system at Muir Woods to discourage single-occupancy vehicles. The reservation system launched in 2018, and we were able to document a drop of visitors in private vehicles and an increase in the use of the Muir Woods Shuttle after the reservation system went into effect. This resulted in an overall decrease in the carbon dioxide emissions from visitor travel to the site.

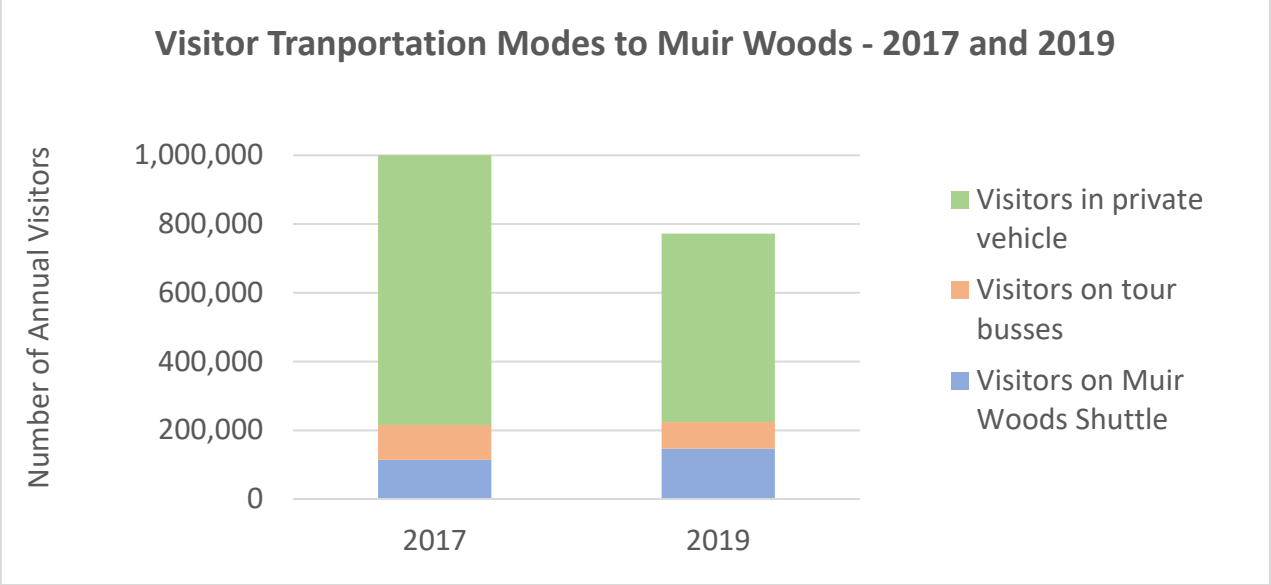

Figure 9: A case study at Muir Woods shows the impact of the reservation system and improved shuttle in decreasing emissions from visitors.

Appendix D: Causes, Impacts, and Solutions for Climate Change at GGNRA

The following section was prepared by:

Patrick Gonzalez

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Climate change in Golden Gate National Recreation Area, May 23, 2024

Human Cause of Climate Change

Cars, power plants, deforestation, and other human activities currently pump twice as much carbon dioxide into the atmosphere as forests, soils, and oceans can naturally absorb (IPCC 2023, Friedlingstein et al. 2023). This imbalance of human emissions and natural removal has increased carbon dioxide in the atmosphere to its highest level in two million years (IPCC 2021). Other human activities have also increased emissions of methane (from oil and gas drilling and refining), nitrous oxide (from fertilizers), and other polluting gases. This pollution has exacerbated the greenhouse effect. The greenhouse effect is a phenomenon that naturally keeps Earth at a habitable temperature but pollution from human activities has trapped an unnatural amount of heat near the surface of the planet.

Increased greenhouse gases have heated global temperatures to their highest level in more than 120 000 years (IPCC 2021). Scientific measurements and analyses show that human sources of greenhouse gases have caused more than 99% of the measured heating of climate change, far outweighing any natural causes (IPCC 2023). Climate change has increased global average surface temperature 1.2ºC (2.2ºF.) from the pre-industrial period (1850-1900) to recent years (2014-2023) (Morice et al. 2021, IPCC 2023, University of East Anglia 2024).

Observed Impacts

Scientific detection and attribution analyses have identified physical and ecological changes caused by human-caused climate change more than other factors. Climate change has increased average annual temperature at Golden Gate National Recreation Area 1.7ºC (3ºF.) from 1901 to 2022 (Gonzalez et al. 2018, Harris et al. 2020). Climate change reduced average spring snowpack up to 20% from 1950 to 2016 in the Sierra Nevada (Pierce et al. 2008, Mote et al. 2018), the source of drinking water for the San Francisco Bay Area. Climate change has also caused a drought across the southwestern U.S., including California, since 2000 that is the most severe since the 1500s (Williams et al. 2020, 2022).

While periodic natural wildfire is essential for forest health in many ecosystems, including in Golden Gate National Recreation Area, climate change has doubled the area burned by wildfire over natural levels across the western U.S., from 1984 to 2015 (Abatzoglou and Williams 2016) and

tripled the average area burned by wildfire in summer across northern and central California from 1996 to 2021 (Turco et al. 2023). The tidal gauge for San Francisco, located in Golden Gate National Recreation Area, shows that climate change has raised sea level 34 cm (13 in.) from 1853 to 2023, from meltwater of glaciers running from land into the oceans and the expansion of seawater when it warms (IPCC 2021, NOAA 2024). Climate change also doubled tree mortality across the western U.S. from 1955 to 2007 (van Mantgem et al. 2009) and caused the local disappearance of up to 15% of bumble bee species in northern California from 1901 to 1914 (Soroye et al. 2020).

Projected Risks

If the world does not cut greenhouse gas emissions to zero by 2050, climate change could heat global temperature 3–4ºC (5.4–7.2ºF.) above pre-industrial levels by 2100 (IPCC 2023, UNEP 2023). Under this very high emissions scenario, average annual temperature at Golden Gate National Recreation Area could increase 3.7 ± 0.8ºC (6.7 ± 1.4ºF.) by 2100 (Gonzalez et al. 2018). Cutting greenhouse gas pollution through energy conservation and efficiency, renewable energy, public transit, and other sustainable practices could limit the heating in the park to current levels (Gonzalez et al. 2018). Continued climate change at 4ºC above pre-industrial could raise sea level 60–100 cm (2–3 ft.) (IPCC 2023), triple the area burned by wildfire in California (Westerling 2018), exacerbate invasive alien plants, such as ice plant and slender oat in the San Francisco Bay Area (Early et al. 2016), and threaten extinction of 3% to 39% of the plant and animal species on Earth, more than the number of species driven extinct through habitat destruction by people in the past 12,000 years (IPCC 2022a). Cutting carbon pollution would reduce all of these risks (IPCC 2023).

Carbon Solutions

This *Golden Gate National Recreation Area Climate Action Plan* details specific actions that the park is taking to cut greenhouse gas pollution from park operations. Park actions contribute to the U.S. and international goal to limit the heating of the Earth to 1.5–2ºC above pre-industrial levels, to which all 194 independent nations of the world committed under the Paris Agreement of the U.N. Framework Convention on Climate Change. This policy originated in the scientific findings of the Intergovernmental Panel on Climate Change, which found that limiting temperature below that threshold is necessary to avert the most drastic consequences of climate change (IPCC 2023).

Park sustainability actions target the burning of coal, oil, methane gas, and other fossil fuels that cause climate change. In the U.S., transportation generates more carbon pollution than any other sector (US EPA 2024). If U.S. cars and light trucks were a separate country, they would be the 7th biggest carbon polluter in the world – more than the emissions from all sources in Canada and France combined (Friedlingstein et al. 2023, US EPA 2024). Park transportation that uses less or no gasoline contributes to this goal.

Fossil fuel-fired electricity plants generated one-third of global carbon emissions in 2022 (Friedlingstein et al. 2023, IEA 2023). Renewable energy, including solar, wind, hydroelectric, biomass, and geothermal, generates as little as 1% of the greenhouse gas emissions of fossil fuels per unit of electricity, over the entire life cycle, including mining, construction, operation, maintenance, and waste (IPCC 2011). Park reduction of fossil fuel-generated electricity and replacement with renewable energy is an essential solution to halt climate change. Moreover, solar, wind, and other renewable energy now cost less per unit of electricity generation capacity than fossil fuel systems and nuclear energy (Lazard 2023). Renewable electricity capacity quadrupled globally from 2000 to 2022, with the increases displacing the equivalent of 6500 coal-fired plants (IRENA 2023).

Energy conservation actions, such as turning off unused lights, computers, and other electronics, save energy at no cost, instantly saving money. Energy efficiency improvements, such as replacing

old lights with LED lights, incur costs but less than the cost of electricity generation (Lazard 2023, Murphy and Frick 2023). In the building sector, electricity conservation and efficiency improvements produce more savings than costs (IPCC 2022b). Globally, energy conservation and efficiency improvements can potentially reduce greenhouse gas emissions from electricity generation 73% by 2050 (IPCC 2022b).

Recent results show that energy conservation, energy efficiency, renewable energy, and public transit solutions are working. California cut greenhouse gas emissions 17% From 2000 to 2021, even as population increased 16% and economic production increased 68% (California ARB 2023). Essentially, the state achieved this progress by increasing efficiency, reducing emissions per person 29% and emissions per dollar of economic product 51%.

The redwood trees in Muir Woods National Monument and vegetation in Golden Gate National Recreation Area naturally remove carbon dioxide from the air and store it as wood. So, by conserving natural ecosystems, the parks are also preventing carbon emissions that cause climate change.

Figure 10. Temperature increase

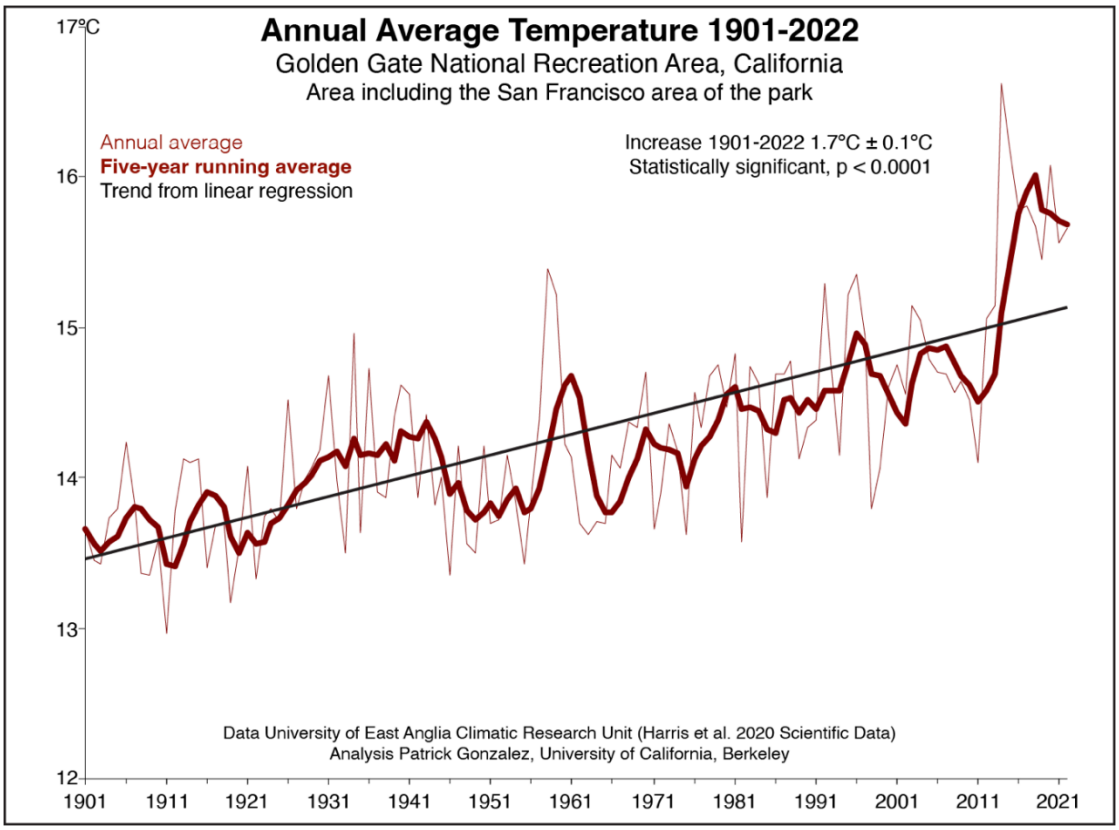
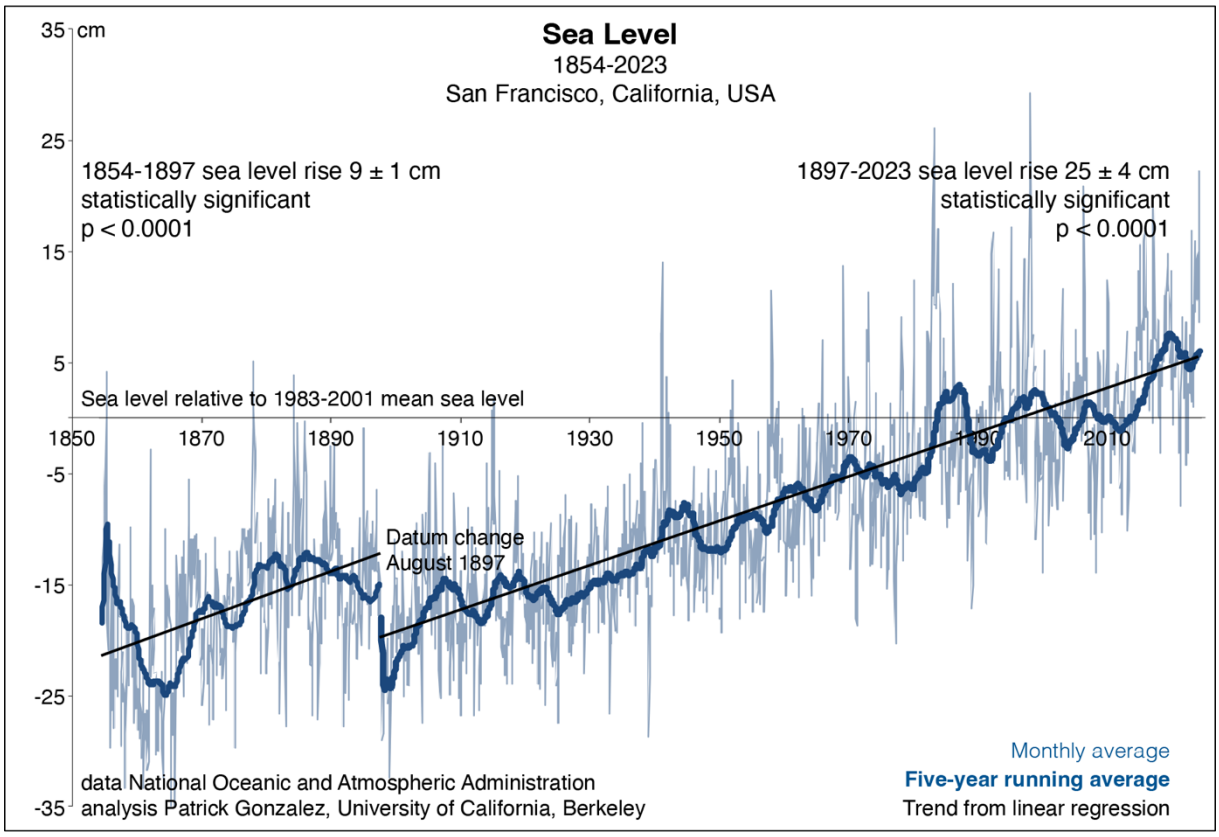


Figure 11. Sea level rise



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