

**2008
Greenhouse Gas Emission Inventory for the
Gulf of Farallones National Marine Sanctuary**

Gulf of the Farallones National Marine Sanctuary (GFNMS) partnered with the National Park Service's (NPS) Golden Gate National Recreation Area (GGNRA) to complete a baseline inventory of 2008 greenhouse gas emissions resulting from facility use, operations, and transportation activities centered around the sanctuary's headquarters. The NPS Climate Friendly Parks Program provides a free tool for parks to inventory their greenhouse gas emissions. The [Climate Leadership In Parks \(CLIP\) Tool](#), available on the National Park Service website, has the ability to assess different units of the park, such as park operations, transportation, and waste.

Although designed for parks, GFNMS was able to use the CLIP Tool because its facilities and operations are very similar to that of a park. The CLIP Tool functions should be compatible with all sanctuary offices within the National Marine Sanctuary System.

Data were gathered from utility statements, internal records, and an employee transportation survey. The baseline Greenhouse Gas (GHG) inventory included totals for stationary combustion fuel (natural gas for heating), purchased electricity, mobile combustion mileage and fuel use (auto, public, and air transportation), wastewater treatment, and municipal solid waste and disposal.

For the purpose of this audit, emissions were measured only for internal staff at the headquarters facility on Crissy Field, and not for visitors to the sanctuary. Each input is described in greater detail below, with a per capita emission estimate provided at the end of this document.

General Information:

Unit Evaluated: Gulf of Farallones National Marine Sanctuary Crissy Field Headquarters, San Francisco, CA

Year Inventoried: 2008

Information provided by: Brian Johnson, Deputy Superintendent

Inventoried Operations: Stationary Combustion, Purchased Electricity, Mobile Combustion, Wastewater Treatment, Municipal Solid Waste and Disposal

Length of Season: 12 months

Length of Average Stay: 200 days (workdays)

Number of buildings: 1

Number of Full-Time Staff Equivalents: 23 (12-GFNMS, 7-FMSA, 4-IFR)

Stationary Combustion:

The stationary combustion (natural gas used for heat and hot water) numbers were derived from Pacific Gas & Electric statements. PG&E is our local utility provider.

Natural Gas: 3603 Therms of natural gas used in 2008

Conversion: 1Therm = 100 cubic feet.
Input: 360,300 cubic feet.

Purchased Electricity:

The stationary combustion numbers were derived from PG&E statements

Electricity: GFNMS paid \$7230 in 2008
The Presidio Trust utility rate is \$0.141 per kWh.
Input: 51,277 kWh.

Mobile Combustion/Ground & Sea Transportation:

A survey was conducted of all staff to determine the method in which they commuted to work. They could choose from car, carpool, bus, train, bicycle, or walk. All travel to and from the Crissy Field Headquarters office was counted, including use of two government vehicles. This estimate also accounts for the use of the R/V FULMAR, the sanctuary's research vessel, for 37 days each year.

Total staff: 23
Primary transportation: 15 auto, 4 auto/bus/bike, 3 bike, 1 bus
Government vehicles on-site: 2 (1-Van, 1-Hybrid; assumed average 22mpg per auto)
Input: Autos, fueled with gasoline – 169,690 miles
Input: Buses, fueled by diesel – 16,900 miles
Input: Boats – 4000 gallons of diesel

Mobile Combustion/Air Transportation

The transportation survey also asked all staff to estimate the total miles they flew on work related travel in the past year.

Total airplane miles: 98,400 miles.
Conversions: Greenhouse Gas Protocol Initiative calculation for long haul, economy class air travel = 0.1416 kg CO₂ per passenger mile; 1kg = 0.001 metric tons.
Input: 13.93 metric tons of CO₂ equivalent.

Wastewater Treatment:

Sewer charges are derived from water consumption. Because GFNMS is located in a Mediterranean climate, rain is seasonal and predictable. It typically rains from October to March, and is dry from April to September. For this estimate we assumed no irrigation was required in wet months. These numbers were derived from Presidio Trust sewer charges to the sanctuary (via GGNRA) during wet and dry months. This estimate focused on both potable water consumed by the buildings tenants, and that used for irrigation.

Based on the 2008 NPS Utility Billing Summary, GFNMS paid \$2976.83 for sewer in 2008. The Presidio Trust utility rate is \$9.37 per kgal. Conversion: 1 kgal = 1000 gal.
Total: 317,698 gallons.

Building-only: GFNMS paid \$636.67 in 2008 based on the sewage bills for wet months.
The Presidio Trust utility rate is \$9.37 per kgal.

Conversion: 1 kgal = 1000 gal.

Building-only Total: 67,948 gallons for 6 months, or 135,896 for 12 months.

Input: Building only - 135,896 gallons (43%)

Irrigation-only: 181,802 gallons (57%)

Solid Waste:

These numbers were derived from the on-site refuse collection bin.

GFNMS has one 2-cubic yard container for waste, picked up once a week. At pick up, the container is usually at 50% capacity.

Conversions: 1 cubic yard = 500 pounds; 1 pound = 0.0005 short tons.

Input: 13 short tons.

EMISSION RESULTS

After plugging in the above estimates, the NPS CLIP Tool derives the total Metric Tons Carbon Dioxide Equivalent (MTCO₂E) based on each input. For long-term tracking purposes, this number was converted into a per capita total.

The final numbers were used to generate graphs and charts below. More detailed results are available in the CLIP Tool, such as emissions of each greenhouse gas CO₂, CH₄, N₂O, and HFC. 2008 results will be used as the baseline for all future analyses.

Gross Emissions by Sector (MTCO₂E)

	Stationary Combustion	Purchased Electricity	Mobile Combustion	Wastewater Treatment	Solid Waste	Gross Emissions
Sanctuary Operations	20	18	164	1	0	203

Per Capita Emissions

203 metric tons / 23 staff = 8.826 MTCO₂E per staff person equivalent in 2008

Summary Results

The following tables provide summary results.

