



CLIMATE *Friendly* PARKS

Lake Mead National Recreation Area Action Plan

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LAKE MEAD NATIONAL RECREATION AREA BECOMES A CLIMATE FRIENDLY PARK

As a participant in the Climate Friendly Parks program, Lake Mead National Recreation Area belongs to a network of parks nationwide that are putting climate friendly behavior at the forefront of sustainability planning. By conducting an emissions inventory, setting an emission reduction goal, developing this Action Plan, and committing to educate park staff, visitors, and community members about climate change, Lake Mead National Recreation Area provides a model for climate friendly behavior within the park service.

Lake Mead National Recreation Area, as a member of the Pacific West Region, is involved in the first regional effort in the National Park Service to become carbon neutral. The Region has developed a vision of having its park operations be carbon neutral and of having all of its parks be a member of the Climate Friendly Parks Program by 2010.

This Action Plan identifies steps that Lake Mead National Recreation Area can undertake to reduce greenhouse gas emissions and mitigate its impact on climate change. The plan presents the Park's emissions reduction goals and associated reduction actions to achieve the Park's goals. The action plan contains strategies and items that were developed by working groups at the Mojave Desert and Mediterranean Coast Climate Friendly Parks Workshop.¹ While the plan provides a framework needed to meet the Park's emissions reduction, it is not intended to provide detailed instructions on how to implement each of the proposed measures.

This Action Plan will be the main driver for the Park's Environmental Management System's plan and establish emphasis areas that the Park needs to address such as energy and waste. In 2009 the Environmental Management System's focus was on the greenhouse gas emissions baseline inventory and hosting the Climate Friendly Parks Workshop. The Park has also developed a Sustainability Resource Manual that compliments this plan and identifies the Executive Orders and regulations pertaining to energy and water conservation, transportation, waste, and metering and also includes a checklist of sustainability items to be incorporated into building rehab projects. The Environmental Management System's plan, the Climate Friendly Park's Action Plan, and the Sustainability Resource Manual will work hand in hand to meet the requirements of the Executive Orders, the Washington Support Office of the National Park Service, and the Pacific West Region's goals and comply with the Climate Friendly Parks Program.

Lake Mead National Recreation Area aims to:

- Reduce Greenhouse Gas emissions from Park Operations by 20% below 2008 levels by the year 2016.
- Reduce Greenhouse Gas emissions from Total Park by 10% below 2008 levels by the year 2016.

To meet these goals, the Park will implement strategies proposed in this plan that relate to the Park's current and future emissions inventories. Specifically, the plan recommends three strategies:

Strategy 1: Identify and implement mitigation actions that the Park can independently take to reduce greenhouse gas emissions resulting from activities within and by the Park

Strategy 2: Increase climate change education and outreach efforts

Strategy 3: Monitor progress with respect to reducing emissions and identify areas for improvement.

¹ Original notes from these workshops, including detailed action items not presented in the final plan have been archived by Lake Mead National Recreation Area and are available upon request.

THE CHALLENGE OF CLIMATE CHANGE

Climate change presents significant risks and challenges to the National Park Service and specifically to Lake Mead National Recreation Area. Scientists cannot predict with certainty the general severity of climate change nor its impacts. Average global temperatures on the Earth's surface have increased about 1.1°F since the late 19th century, and the 10 warmest years of the 20th century all occurred in the last 15 years. The single leading cause of this warming is the buildup of greenhouse gases in the atmosphere—primarily carbon dioxide, methane, and nitrous oxide—which trap heat that otherwise would be released into space.

The continued addition of carbon dioxide and other greenhouse gases to the atmosphere will raise the Earth's average temperature more rapidly in the next century; a global average warming of 4-7°F by the year 2100 is considered likely.² Rising global temperatures will further raise sea levels and affect all aspects of the water cycle, including snow cover, mountain glaciers, spring runoff, water temperature, and aquatic life. Climate change is also expected to affect human health, crop production, animal and plant habitats, and many other features of our natural and managed environments.

At Lake Mead National Recreation Area, increasing temperatures, and changing precipitation patterns may alter park ecosystems, changing vegetation communities, habitats available for species, and the experience of park visitors. Climate models for the Mojave Desert predict less winter rains and snowpack, which leads to less water in the lake. Lower water levels on the lake will lead to issues with navigation and the location of launch ramps for boats. Models also predict more potential for flash floods and monsoonal type storms in the summer. Summer storms increase lightning strike capabilities for higher fire potential. Higher fire potential effects both air quality and also the potential to spread invasive (non-native) annual grasses. We may also see shifts in the range northward of some Sonoran desert plant and animal species.

A series of complex and interacting factors make absolute predictions of how species move, where they will go and which species are likely to be successful in the future difficult, however, the physical properties of ecosystems, such as adiabatic rates and geographic barriers, will not change but may exaggerate effects of climate change. While the effects of climate change may further the invasion by known weeds, locations with a close proximity to development are likely be invaded by new and novel weeds.

² IPCC 2007. Climate Change 2007: The Physical Science Basis. Intergovernmental Panel on Climate Change, Geneva, Switzerland. Available online at < <http://ipcc-wg1.ucar.edu/wg1/wg1-report.html>>

GREENHOUSE GAS EMISSION INVENTORY AT LAKE MEAD NATIONAL RECREATION AREA

Naturally occurring greenhouse gases include carbon dioxide, methane, and nitrous oxide, and water vapor. Human activities (e.g., fuel combustion and waste generation) lead to increased concentrations of these gases (except water vapor) in the atmosphere.

Greenhouse Gas Emissions

Greenhouse gas emissions result from the combustion of fossil fuels for transportation and energy (e.g., boilers, electricity generation), the decomposition of waste and other organic matter, and the volatilization or release of gases from various other sources (e.g., fertilizers and refrigerants).

Lake Mead National Recreation Area completed a greenhouse gas emissions inventory using the Climate Leadership in Parks Tool provided by the Climate Friendly Parks program. The Climate Leadership in Parks Tool uses data on the activities that occur within the Park that produce greenhouse gas emissions (i.e., emission sources) and methodologies established by the Intergovernmental Panel on Climate Change (IPCC) to estimate greenhouse gas emissions. Emission sources included in the greenhouse gas inventory include stationary and mobile fossil fuel combustion, electricity purchases, solid waste disposal, wastewater treatment, and refrigeration and air conditioning use. For the purposes of preparing an action plan, these sources are grouped into four sectors – Energy, Transportation, Waste, and Other. Lake Mead National Recreation Area completed emission estimates for these sources from its own facilities, vehicles, vessels, etc. (i.e., Park Operations) as well as from the activities of visitors and concessioners.

In 2008, greenhouse gas emissions within Lake Mead National Recreation Area totaled 73,637 metric tons of carbon dioxide equivalent (MTCO₂E). This includes emissions from park and concessioner operations and visitor activities, including vehicle use within the Park. For perspective, a typical single family home in the U.S. produces approximately 12 metric tons of carbon dioxide per year.³ Thus, the combined emissions from park and concessioner operations and visitor activities within the Park are roughly equivalent to the emissions from the energy use of 5,685 households each year.

As Figure 1 and Table 1 demonstrate, the largest emission sector was Transportation totaling 52,751 metric tons of carbon dioxide equivalent. The majority of the emissions result from visitor miles traveled within park boundaries. Figure 2 and Table 2 present only the park operations emission inventory results, which exclude emissions from visitors and concessioners. The total emissions for park operations are 7,246 metric tons of carbon dioxide equivalent with energy being the highest emitting sector with a total of 4,466 metric tons of carbon dioxide equivalent.

³ U.S. EPA, Greenhouse Gases Equivalencies Calculators – Calculations and References, Retrieved , Website: <http://www.epa.gov/RDEE/energy-resources/calculator.html>

FIGURE 1

Lake Mead National Recreation Area 2008 Total Greenhouse Gas Emissions by Sector

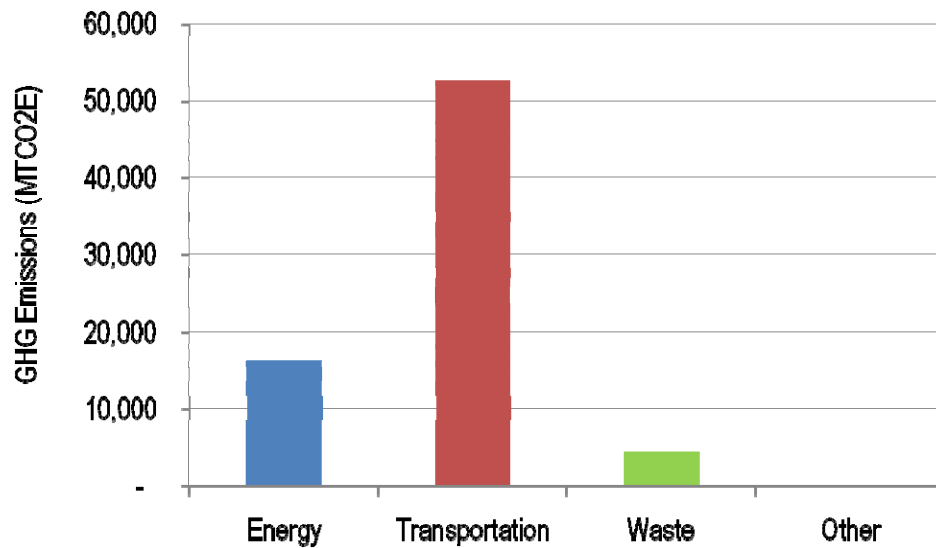


TABLE 1

Lake Mead National Recreation Area 2008 Total Greenhouse Gas Emissions by Sector and Source

	MTCO2E
Energy	16,265
Stationary Combustion	424
Purchased Electricity	15,842
Transportation	52,751
Mobile Combustion	52,751
Waste	4,537
Landfilled Waste	4,537
Wastewater	-
Other	83
Refrigeration and Air Conditioning	83
Other	-
Total	73,637

Note - Totals may not sum due to rounding

Not applicable data sources represented by "-"

FIGURE 2

Lake Mead National Recreation Area 2008 Park Operations Emissions by Sector

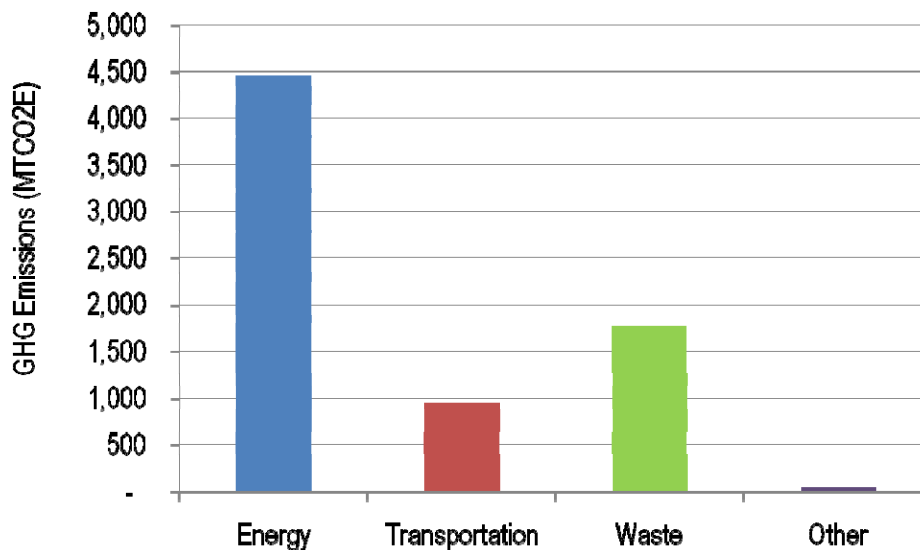


TABLE 2

Lake Mead National Recreation Area 2008 Park Operations Emissions by Sector

	MTCO2E
Energy	4,466
Stationary Combustion	51
Purchased Electricity	4,415
Transportation	953
Mobile Combustion	953
Waste	1,772
Landfilled Waste	1,772
Wastewater	-
Other	55
Refrigeration and Air Conditioning	55
Total	7,246

Note - Totals may not sum due to rounding

Not applicable data sources represented by "-"

Lake Mead National Recreation Area Responds to Climate Change

The following actions were developed during the Mojave Desert and Mediterranean Coast Climate Friendly Parks Workshop on December 1-2, 2009, in order to meet the Park's climate change mitigation goals.

STRATEGY 1: REDUCE GREENHOUSE GAS EMISSIONS RESULTING FROM ACTIVITIES WITHIN AND BY THE PARK

Lake Mead National Recreation Area has developed a set of actions that the Park is committed to taking in order to reduce emissions from activities within and by the Park. These strategies have been prioritized based on a qualitative assessment of a set of criteria including: emission reduction potential, cost-effectiveness, feasibility, co-benefits, regional impact, and ability to rapidly implement. Actions that Lake Mead National Recreation Area will take have been presented below in order from highest to lowest priority within each sub-category.

Energy Use Management

Emission Reduction Goal: Reduce park operations energy use emissions to 25 percent below 2008 levels by 2016.

Improving energy efficiency and implementing alternative energy sources reduces park-based fuel use, lowers greenhouse gas emissions, decreases electricity consumption, and offers monetary benefits for the Park. Emissions inventory results indicate that 62 percent of the Park's greenhouse gas emissions from park operations are from energy consumption. Consequently, Lake Mead National Recreation Area identified actions it will take to reduce energy-related emissions.

Progress to Date

Presented below are the Park's completed tasks.

- Replaced 75% of the Park's high intensity discharge lamps with energy efficient compact fluorescent bulbs.
- Installed solar and wind power at 13 repeater sites to provide them with power and developed backup battery power for three repeater sites.
 - Developed system for tracking remote repeater sites and radios back to Boulder City for adjustment, rather than by helicopter.
- Switched to THIN clients and encouraged the use of laptop computers.
- Installed photovoltaic panels at the new ATON building, WB maintenance facility, and two new entrance stations.
- Installed energy efficient water heaters upon replacement of existing heaters.
- Incorporated best practices regarding energy efficient building sitting into plans and designs for new buildings.
- Upgraded to energy efficient windows.
- Replaced old HVAC units with more efficient units.

Energy Use Management

Presented below are the actions the Park plans to pursue.

1 Promote energy efficiency and energy conservation in the Park through behavioral change

- Encourage energy conservation among staff through an education initiative that includes:
 - Managers working with first line supervisors to communicate to their staff energy saving practices.
 - Discussions of practices and improvement at management meetings. These will follow the safety program approach.
 - Develop and disseminate a list of energy saving practices so staff understands exactly what the practices are.
- Adjust thermostat settings to no more than 68 degrees in the winter and no less than 78 degrees in the summer.
- Develop and disseminate an energy saving best practices document and training for new staff.
- Establish building leads for larger buildings to manage energy use and communicate best management practices in building.
 - Ensure that building leads identify appliances and equipment that are higher users of power and implement conservation best management practices to high energy consuming devices when necessary.
- Install energy saving powerstrips that can shut off all equipment with one switch.
 - Ensure that all computers' power management settings are enabled to save energy when not in use.
- Review other possibilities for compressed and/or alternative work scheduling to reduce travel and building operation energy use.
- Compress work week of field crews and other staff to reduce number of trips into the field and into the office.

2 Upgrade lighting options

- Complete an assessment of lighting fixtures throughout the Park, which would include recommendations for replacement.
 - Review and update lighting inventory.
 - Develop better documentation of progress.
- Assess potential for solar lighting at exterior locations.
- Set up procurement criteria to allow for purchase of improved solar lighting currently not available on GSA schedule.
- Install motion sensors where feasible throughout the Park.
- Assess efficiency and pollution effects of outdoor lighting.

- Consider reducing lighting energy use by integrating daylighting into the plans and designs for new buildings.

3 Heating, ventilation, and air conditioning

- Upgrade air distribution systems at various locations throughout the Park such as the headquarters building.
- Install solar hot water heaters in new buildings.
- Replace old HVAC units with energy efficient editions.

4 Switch to more efficient electronics and devices

- Inventory current computers to establish their level of efficiency.
- Educate and train employees on how and why to purchase energy efficient appliances.
 - Ensure that procurement staff is trained to monitor purchases for energy efficiency and incorporate this metric into purchasing criteria.
- Ensure that all printers are able to print double-sided and that they are set to do so as their default.
 - Ensure that printers that are purchased in the future are able to print double-sided.
 - Reuse paper that has only been printed on one side.
 - Consolidate printers to reduce redundancy and unnecessary energy use.

5 Improve building structures and envelopes

- Include an assessment of park buildings' insulation in upcoming energy audit.
- Perform an assessment of windows throughout the Park.
- Incorporate best practices regarding energy efficient building siting into plans and designs for new buildings.

6 Utilize alternative energy sources

- Ensure that technology ideas that reduce energy use and impact on the environment are shared with other parks, agencies, and the concessioners.
- Research facilities/systems that can serve multiple areas and continue communication on expanded opportunities throughout Park.
- Consider tagging electric hot water heaters for upgrades to solar or propane hot water heaters.
 - Include in plans/design for new buildings.
- Incorporate plans to install photovoltaic panels on the Interagency Public Safety Communication Center, native plant nursery, and visitor center.
 - Explore opportunities to install photovoltaic panels at concessioner buildings.

7 Measure energy use throughout the Park

- Ensure that building leads put appliances on powerstrips and shut them off at night where applicable.
- Work with park staff to determine appliance needs.
- Incorporate energy-efficiency criteria into new contracts for park and concessioner construction.
- Conduct energy audit on all park buildings.
 - Include an assessment of and recommendations for improving HVAC systems, lighting, windows, and insulation.
 - Include concessioners in audit.
- Meter all buildings that are identified in the energy audit.
- Review and implement the DOI Sustainable Buildings Implementation Plan.

Transportation Management

Emission Reduction Goal: Reduce park operations transportation emissions to 10 percent below 2008 levels by 2016.

Reducing vehicle miles traveled, improving vehicle efficiency, and using alternative fuels can significantly reduce Lake Mead National Recreation Area's emissions. As the inventory results indicate, greenhouse gas emissions from transportation comprise 13 percent of park operations emissions.

Progress to Date

Presented below are the Park's completed tasks.

- Utilized four motorcycles by Ranger division instead of SUV's to patrol the backcountry.
- Utilized utility terrain vehicles (UTV) in backcountry instead of large SUVs to reduce wear and tear on vehicles and reduce SUV fuel use.
- Developed and implemented a vehicle replacement plan that evaluates alternate fuel vehicle options including: hybrid electric vehicles, electric vehicles, compressed natural gas (CNG), biodiesel, etc.
- Developed a tracking system for GSA and DOI vehicle utilization and fuel consumption.
- Assessed landscape design to ensure that minimal resources are used in upkeep.
- Used reclaimed materials for new roads and paving.

Transportation Management

Presented below are the actions the Park plans to pursue.

1 Transportation-related behavioral changes

- Reduce visitor vehicle idling.
 - Review commercial use authorization (CUA) to determine idling requirements and ensure that companies are adhering to requirements.
 - Implement policies and programs to minimize visitor idling throughout the Park where appropriate.
 - Recommend incorporating the policy regarding no idling during deliveries throughout the Park.
- Encourage green certification by bus operators.
- Implement real time launch ramp information (twitter, facebook, TIS) to allow visitors to choose launch area with the shortest wait to reduce visitor idling.
- Encourage visitors to utilize more efficient vehicles via fee program incentives.
- Encourage staff carpooling.
 - Place vehicle travel information on sharepoint site in order to allow employees to identify carpooling activities and opportunities for deliveries and material transportation needs. Include opportunities for employees to carpool to and from work.
 - Explore opportunities for expansion of a carpool run with staff that is similar to concessioner Cottonwood Cove Marina.
- Establish priority parking spaces for those staff that carpool to work.
- Investigate carbon offset program.
 - Explore options such as; visitors who purchase an offset receive free park entrance.
- Reduce staff idling.
 - Include in top 10 best practices for staff to reduce staff idling during cooler months.
 - Create dashboard idling guidelines and post in vehicles.
- Encourage participation in bike to work day.
 - Create incentives and investments for staff.
 - Examples of larger investments include developing showers for staff who bike to work, and providing bikes for local trips to Boulder City and developed areas.
 - Communicate Club Ride program to staff.
- Work with concessioners to provide slip rental and dry storage incentives to reduce boat hauling and visitor idling.

- Create a program similar to Forever Resorts launch and retrieval service that further encourages customers to leave boats on site and not drive inefficient vehicles to park.
- Explore opportunities to market slip and dry storage rental as climate friendly.
- Work with concessioners to designate front two rows at marinas for fuel efficient vehicles.
- Reduce meeting travel.
 - Expand teleconferencing capabilities to more locations to include remote areas. Establish systems at warehouse and water safety center.
 - Provide additional training for staff to utilize existing teleconferencing systems.
 - Consider using free services (i.e. Skype) when allowable by DOI IT policy.

2 Reduce visitor vehicle fuel consumption

- Replace two-stroke engines in park fleet.
 - Investigate language in Lake Management Plan and check on flexibility in language for meeting the engine standard versus prescribing how to meet standard.
- Encourage concessioners to expand shuttle service to launch ramps and marinas from campgrounds and parking lots.
 - Install call boxes to make it easy.
- Use River Mountain Loop trail as model for expanding other similar opportunities parallel to roadways.
 - Look at opportunities to cherry stem trail to marinas.
- Expand discussions with Regional Transportation Commission regarding summer demonstration of Citizens Area Transit buses into park for locals and the river mountain loop trail.
 - Explore the possibility of casino and hotel shuttles making stops at the Park.
- Look into providing incentives for green certified buses.
 - List commercial operators that meet criteria under an "Earth Friendly Visit" listing on website.
- Develop messaging for concessioners to provide to customers regarding reduction in carbon footprint for longer lengths of stay and less annual trips and promote carbon neutral trips.
- Recommend that mitigation working group at the Washington Support Office in D.C. investigate fee incentives for energy and fuel efficient vehicles.
- Improve tracking of visitor transit data to understand travel patterns better.
 - Explore opportunities to collect data on visitor transportation patterns, vehicle occupancy, and ridership.

3 Reduce NPS vehicle and equipment fuel consumption

- Promote efficient driving throughout the Park.
- Assess vehicle utilization and fuel consumption and implement recommendations from fleet study.
 - Right-size or upgrade vessel fleet.
- Benchmark existing fleet-wide mile per gallon average and raise the average through vehicle replacement.
- Identify lead in Ranger Division to make a game plan for replacing, using, and repairing vessels.
 - Train park staff on the proper care and maintenance of vessels.
- Replace two-stroke engines in park fleet.
 - Investigate language in Lake Management Plan and check on flexibility in language for meeting the engine standard versus prescribing how to meet standard.
- Explore the expansion of the use of Utility Terrain Vehicles (UTV) into other areas of park.

4 Replace vehicles and equipment

- Work with concessioners to right-size vehicle fleet.
 - Explore options to partner with local (Boulder City) companies looking to start biodiesel operation between the Park and concessioners.

5 Vehicle maintenance

- Develop and maintain a fleet maintenance schedule.
 - Consider standardizing vessels so that parts can be kept on hand for repairs and maintenance.
 - Develop plan for vessel maintenance.

6 Transportation Infrastructure

- Improve parking lot designs to incorporate local vegetation.
 - Replace exotics with native vegetation.
 - Increase opportunities to utilize landscaping and green materials to reduce energy needs and costs.
 - When replacing vegetation consider desert climate factors and competing issues of water versus lack of vegetation.

Waste Management

Emission Reduction Goal: Reduce park operations waste emissions to 25 percent below 2008 levels by 2016.

The connection between waste and greenhouse gas emissions may not be obvious. However, waste management—in the form of source and solid waste reduction—can dramatically reduce greenhouse gas emissions. Landfills are the largest human-generated source of CH₄ emissions in the United States. Reducing the amount of waste sent to landfills reduces CH₄ emissions caused by decomposition as well as the greenhouse gases emitted from the transportation of waste. The less the Park and its visitors consume in terms of products and packaging, the less energy is used and fewer greenhouse gases are emitted.

Lake Mead National Recreation Area's park operation activities emitted 1,772 metric tons of carbon dioxide equivalent from waste management in 2008. Diverting or reducing the Park's waste stream through increased recycling efforts and waste management will reduce the amount of waste sent to landfills and resulting emissions.

Progress to Date

Presented below are the Park's completed tasks.

- Engaged local high schools to raise awareness about and support for the anti-litter campaign.
- Delivered fish entrails from fish cleaners to Boulder City Disposal for compost.
- Composted green and brown materials at native plant nursery.
- Instituted a "Boat it in, Bag it out" program.
- Participated and lead the "Don't Trash Nevada" interagency initiative that is ongoing (anti-litter team).
- Grew native plant materials for use in the Park at the native plant nursery.
- Obtained local and regional vendors for purchases and construction contracts when possible.
- Implemented the use of recycled products at concessioner Forever Resorts locations.
- Implemented a pilot program with Boulder Disposal for a variety of recyclables.
- Increased the recycled content of purchased materials.
- Installed one liter urinals and 1.25 gallon flush toilets in rehabilitation projects.
- Shared equipment, furniture and supplies across divisions and across agencies.
- Revised the Superintendent's compendium to address the elimination of glass and styrofoam in the Park.
- Upgraded the entire water and wastewater infrastructure in park.

Waste Management

Presented below are the actions the Park plans to pursue.

1 Decrease waste through behavior change

- Develop message for refillable water bottles and incorporate Climate Friendly Parks logo.
 - Develop messaging discouraging visitors from bringing disposable plastic bottles and encouraging visitors to bring in or purchase refillable bottles.
 - Create filling stations throughout park.
- Work with concessioners to implement programs that decrease the use of disposable plastic containers including: selling less expensive refillable water bottles to encourage increased use of refillable water bottles; developing and/or selling large refillable water coolers with messaging for vessel use.
- Investigate expanding "Boat it in, Bag it out" program to include separating trash from recyclables.
- Develop comprehensive educational program to relay the Park's waste policies to staff including: appropriate recycling practices.
- Assign a specific staff member to manage proper waste disposal during special events.
- Begin to work with the city of Las Vegas to involve them in "Don't Trash Nevada" campaign.
- Work with the city of Las Vegas on more "Adopt a . . ." programs.
- Implement volunteer litter collection efforts throughout the Park, partnering with concessioners, and Southern Nevada federal lands.

2 Establish new plans and policies that promote waste reduction.

- Work with concessioners to standardize recycling collection throughout developed areas and develop better "branding" for the collection facilities and bags.
 - Research using the same contractor as concessioners and organizing the effort to collaborate with the larger Southern Nevada effort, and communicate to Environmental Management Team.
 - Utilize houseboats as floating visitor centers to convey the "Leave No Trace" message to a targeted audience.
- Incorporate Waste reduction into Green Office Practices.
 - Engage building leads to monitor recycling and follow up with communication to staff.
 - Determine opportunities to incentivize sustainable behavior (i.e. take advantage of money available from recycling and utilize for park programs).
- Expand "OZ" program (operation zero - patio boat that is capable of taking 10 volunteers out on lake to focus on litter reduction) to include volunteer boat operators to allow for more flexibility and capacity in scheduling
- Focus volunteer efforts more strategically on problem areas for trash removal and recycling.

- Discuss potential expansion opportunities for recycling materials in the boneyards with concessioners.
 - Consider segregating boneyards to organize materials and encourage recycling and reuse of materials, and proper disposal of non-recyclable waste.
- Purchase pre-cut materials for specific needs to ensure minimization of waste.
- Establish an exchange process within the Park so different departments can source surplus materials internally.
 - End-of-life materials can be made available for reuse at other units and for other applications.
 - Materials that can be repurposed should be catalogued and stored or exchanged, e.g. brick and wood waste.
 - Old equipment that cannot be repurposed can be donated or recycled per guidelines from the disposal of excess property document.
 - Consider implementing program where materials can be shared between concessioners.
- Update the Integrated Solid Waste Alternative Program and identify current waste streams.
 - Work on the challenges of capturing information from all access points of the Park, and managing solid waste differently for land versus water use.
- Enforce and monitor the Superintendent's compendium relative to glass and styrofoam elimination in park.
- Track and report landfill data and integrate into the Environmental Management System's goals.

3 Implement recycling and composting practices

- Determine feasibility and organization of recyclable program managed by disposal companies.
- Continually increase the amount of waste material that can be recycled and/or reused.
 - Recycle cardboard, aluminum, scrap metal, glass, white paper, and no. 1 PET and 2 HDPE plastics.
 - Add mixed paper, tin, other plastics (including film), and pallets.
 - Find reuse opportunity or donate unwanted items in accordance with property disposal guidelines. Look into cooperative waste disposal or recycling to increase volume and reduce costs/traffic.
- Start a comprehensive recycling outreach campaign aimed at park visitors.
 - Include waste prevention and recycling messages in park talks.
 - Provide recycling messages in brochures, trail guides, maps, and posters.
 - Use recycling messaging at waysides, campground display boards, and kiosks.
- Recycle or donate old computers and electronics in accordance with property disposal guidelines.
- Practice environmentally responsible deconstruction.
- Install easy-to-use recycling containers throughout park facilities.

- Purchase containers with recycled content. Place trash and recycling containers next to each other.
- Evaluate signage; use graphics.
- Ensure that asphalt pavement is recycled for road projects.
- Ensure that used florescent bulbs are sent to recycling service center.
- Institute alkaline, lithium battery recycling locations in every office building.

4 Reduce waste through green procurement

- Identify the top 10 annual purchase items and provide alternative green purchasing information to the Park.
- Continue to purchase locally produced materials when possible and beneficial.
- Use post-consumer recycled paper in all park publications.
 - Use 100% post-consumer (PC) content, processed chlorine-free (PCF) copy paper. Consider alternative fibers (i.e., non-wood) and water-based or vegetable-based ink. Target paper reduction.
- Provide training for credit card holders regarding green procurement procedures and refresher courses for employees with purchase cards.
 - Ensure that supervisors are screening employee purchases for green procurement and that trainings include guidance on best practices for types and locations of purchases.
- Develop a schedule for replacing existing equipment to enhance reuse and recycling (e.g., copiers that can make two-sided copies).
- Use carpet with high recycled content for any building projects.
- Conduct an inventory and review of all cleaning supplies.
 - Eliminate use of hazardous chemicals from cleaning supplies.
 - Substitute products containing hazardous or toxic chemicals with non-toxic products.
- Identify locations where printers can be shared by more employees but ensure that the appropriate type of equipment is purchased to manage the load.
 - Explore use of copiers that have printing capability for areas with smaller printing loads.

5 Reduce and reuse wastewater

- Consider expanding the installation of low flow urinals and toilets to all facilities.
- Install metered low flow faucets.
 - Consider expanding program to all faucets.
- Conserve water used to maintain the grounds.



- Improve and upgrade outdated irrigation systems to drip and automatic irrigation systems.
- Change non-native plant material to native plant material.
- Consider use of gray water.
- Collect water from pavement and roof surfaces and reuse in irrigation.
- Construct storm water basins to collect and meter out storm water.
 - Install french drain system to store and transport rainwater into irrigated areas.
- Monitor, manage and reduce point source wastewater.

6 Other

- Track and record waste diversion rates.
 - Provide concessioners with guidance and forms regarding tracking of waste for consistent reporting.

STRATEGY 2: INCREASE CLIMATE CHANGE EDUCATION AND OUTREACH

Climate change is a complex and easily misunderstood issue. Lake Mead National Recreation Area can play an integral role in communicating about climate change to a vast audience. A better understanding of the challenges and benefits of reducing greenhouse gas emissions can motivate staff, visitors, and community members to incorporate climate friendly actions into their own lives. Lake Mead National Recreation Area recognizes that the greatest potential impact the Park can have on mitigating climate change is through public education. Thus, the Park sees public education as an end goal of any climate initiative. From increasing the efficiency of public transportation to developing a green purchasing program, the actions Lake Mead National Recreation Area takes to address climate change serve as opportunities for increasing the public's awareness of climate change.

Progress to Date

Presented below are the Park's completed tasks.

- Posted messages about actions listed in the Lake Management Plan throughout the community.
- Conducted project based learning and service learning projects to engage the surrounding communities in addressing climate change.
 - Worked with local community schools on litter and education programs specific to the region.
 - Developed curriculum for the Forever Earth Program
- Worked with the Colorado River park steering committee to develop broader message focusing more attention on public messaging regarding water issues along Colorado River and collectively distribute message.
- Participated in the Global Climate Change workgroup.
- Worked with Mojave Network parks to establish a template for education and interpretation programming that integrates climate change.

Park Staff

Presented below are the actions that the Park plans to pursue.

Incorporate climate change into park staff training, events, and performance plans

Developing a climate change education program for park staff is vital to increasing awareness about climate change among park visitors and fostering a sense of collective responsibility among staff to help reduce park emissions. By incorporating climate change education into staff development programs, Lake Mead National Recreation Area will enable its staff to demonstrate their commitment through leading by example, and providing visitors with the tools and resources they need to reduce greenhouse gas emissions in the Park and in their own communities. Potential actions include:

- Review climate change messaging currently used and further incorporate climate friendly initiatives.
- Provide specific direction to park education staff regarding internal climate change messages.
- Create a park Climate Change Statement that establishes and promotes the Park's position on and approach to addressing climate change.

- Devise new educational strategies to continually reduce greenhouse gas emissions, distribute resources and tools to staff, and acknowledge success of current strategies, award Climate Leaders throughout the staff.
 - Use internal information technology to encourage staff to achieve more greenhouse gas emissions reductions and advise them on new ways to reduce greenhouse gas emissions.
 - Create personal incentives for staff to reduce greenhouse gas emissions in park and at home.
 - Create visual reminders for park employees regarding climate change and how employees can help reduce emissions.
- Have Lake Mead's Environmental Management Team keep the park staff informed about the science of climate change and the impacts regionally and nationally.
- Hold periodic, informal talks on interesting topics related to climate change: e.g. energy technology, green design, sequestration, for park staff and the community.
- Include climate change materials in employee orientation packets to inform employees of the issue and the climate change impacts that are occurring at our National Parks.
 - Tailor seasonal staff handbook to include Climate Friendly Parks information. Also include climate friendly parks language in kiosks and other materials.
- Incorporate climate friendly initiatives and tips into park newspaper.
- Publish internal announcements of climate friendly initiatives (i.e. InsideNPS, sharepoint, listserves, network groups) with ongoing announcements of status updates and completion of initiatives.
- Develop talking points for park and concessioner staff to have broad understanding of climate change messages.
 - Facilitate a dialogue between concessioners and climate experts at the fall concession meeting with a climate change panel.

Visitor Outreach

Presented below are the actions that the Park plans to pursue.

Understanding climate change and its consequences is essential to initiating individual behavioral change. Lake Mead National Recreation Area realizes that it has a unique opportunity to educate the public in a setting free from many of the distractions of daily life. By using existing materials, developing park-specific materials, highlighting what the Park is currently doing about climate change, and encouraging visitors to reduce emissions, Lake Mead National Recreation Area can play an important role in educating the public about climate change.

Lake Mead National Recreation Area staff recognize the many different audiences that visit the Park, including recreational and non-recreational park visitors, "virtual visitors" who visit the Park online, school-aged visitors, local and out of town visitors, local tribes, and external audiences. Reaching these various audiences with climate change information and engaging them in the Park's efforts requires appropriately focused messaging. The Park has developed a number of actions to reach these various audiences effectively. These actions include:

- Utilize park's Facebook page and Twitter account to educate public on climate friendly initiatives and include links to applicable documents for further information.



- Communicate to a wider audience the elimination of styrofoam, glass, and inefficient two-stroke engines at Lake Mead.
- Educate visitors about climate change.
 - Incorporate messaging about how to have a climate friendly visit into the website.
 - Develop interpretation of lake level changes taking into consideration all factors (i.e. system allocation, climate change, etc.). Work on messaging specifically regarding lowering lake levels in relationship to climate change.
- Expand message mediums to include print, electronic, radio broadcasts and podcasts.
 - Develop a public announcement that the Park is becoming a climate friendly park and include the top five to ten emission mitigation initiatives.
 - Create demonstration projects and exhibits to convey park sustainability message to visitors
- Create and/or distribute previously produced information on climate change and its effects on national parks in general and on Lake Mead in particular.
- Incorporate climate friendly information into Interpreter programs and talks.
 - Integrate climate friendly parks program with school programs using educational kits, wayside exhibits, posters, etc.
 - Look for opportunities to educate with resources like the Climate Change Wildlife and Wildlands Toolkit.
- Develop messages specific to the local population and Lake Mead visitors.
 - Cater messages to reach audience and provide tools and specific deliverables for different audiences.
- Develop a “Do Your Part!” program for online visitors and your Climate Friendly visit to Lake Mead.
- Develop and distribute “Do Your Part!” materials including business cards, posters, stickers, bumper stickers, post cards, etc.
- Develop a “Do Your Part!” exhibit or kiosk in visitor’s center.
- Create and utilize products that talk about the success of the Climate Friendly Parks program in terms of resource and economic savings where appropriate.
- Obtain better understanding of our audience to better refine climate change messaging.
- Work with the Colorado River park steering committee to develop broader message focusing more attention on public information regarding water issues along Colorado River and collectively distribute message.
- Develop bilingual products as appropriate.

Local Community Outreach

Presented below are the actions that the Park plans to pursue.

The gateway communities, agencies, vendors, and volunteers surrounding Lake Mead National Recreation Area can play a significant role in supporting the Park's climate change mitigation goals. As such, when appropriate, park staff will assist local communities with incorporating climate change messages into community events and find partners to promote climate change education at those events, and engage with surrounding agencies to coordinate effective outreach and education efforts.

Potential actions include:

- Look at ways of working with other Southern Nevada land management agencies to take advantage of funding currently available to develop enhanced climate change messaging.
 - Work with the Bureau of Reclamation regarding messages related to lowering lake levels.
 - Create opportunities for workshops on climate friendly activities.
- Work on an interagency basis to incorporate the "Leave No Trace" and "Don't Trash Nevada" messaging into all educational programming.
 - Ensure that messaging initiatives cover all public lands in Southern Nevada.
- Work with the concessioners to understand ongoing efforts and develop consistent messaging.
- Attend community events as speakers and participants (park staff and concessioners) to further communicate climate friendly messages.
- Communicate with local communities, park visitors, and local media about actions they can take to reduce greenhouse gas emissions.
- Plan a community event for Earth Day with partners focusing on "Do Your Part!" messages.
- Host climate change education workshops.
- Disseminate information about climate friendly actions the Park is taking at conferences and regional workshops.

STRATEGY 3: EVALUATE PROGRESS AND IDENTIFY AREAS FOR IMPROVEMENT

By taking the actions established in strategies 1 and 2 above, Lake Mead National Recreation Area plans to reduce its emissions to the specified goals. Achieving these goals will require an ongoing commitment by the Park, which may include subsequent emission inventories, additional mitigation actions, and reevaluation of goals. As part of this strategy, Lake Mead National Recreation Area will:

- Monitor progress with respect to reducing emissions. This will include subsequent emission inventories to evaluate progress toward goals stated in this action plan.
- Periodically review and update this plan.
- The Park will track climate friendly actions through the Environmental Management System.

CONCLUSION

Lake Mead National Recreation Area has a unique opportunity to serve as a model for over 7,600,000 recreational visitors annually.⁴ This report summarizes the operational actions the Park commits to undertake to address climate change. Specifically, the Park realizes its ability to educate the public and serve as a valuable model for citizens. By addressing greenhouse gas emissions within the Park and sharing its successes with visitors, Lake Mead National Recreation Area will help mitigate climate change far beyond the Park's boundaries.

The National Park Service faces a future full of challenges and uncertainty due to the possible effects of climate change. However, by addressing climate change impacts and reducing emissions, Lake Mead National Recreation Area will reduce its contribution to the problem while setting an example for its visitors. The strategies presented in this Action Plan present an aggressive first step towards moving Lake Mead National Recreation Area to the forefront of Climate Friendly Parks.

⁴ Lake Mead National Recreation Area: Park Statistics. Available online at: <http://www.nature.nps.gov/stats/viewReport.cfm>

APPENDIX A: LIST OF WORK GROUP PARTICIPANTS

Lake Mead National Recreation Area

William Dickinson	Superintendent
Nancy Bernard	Volunteer Program Manager
Barbara Eschels	Contracting Officer
Heidie Grigg	Concessions Specialist
Jennifer Haley	Chief of Visitor Services
Mary Hinson	Chief of Ranger Activities
Kris Kirby	Chief of Commercial Services
Bryan Moore	Park Biologist
Andy Munoz	Public Affairs Officer
Lizette Richardson	Chief of Maintenance and Engineering
Amanda Rowland	SNAP Interpretation Ranger
Shannon Swann	Public Health Officer
Kent Turner	Chief of Resource Management
Bill Tynan	Director of Communications and Physical Security
Lila Walker	Chief of Business Operations

Concession Representatives

Forever Resorts
Las Vegas Boat Harbor