IUCN Conservation Outlook Assessment 2017 **(archived)**
Finalised on 09 November 2017

Please note: this is an archived Conservation Outlook Assessment for Yosemite National Park. To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Yosemite National Park

SITE INFORMATION

Country:
United States of America (USA)
Inscribed in: 1984
Criteria:
(vii) (viii)

Site description:
Yosemite National Park lies in the heart of California. With its 'hanging' valleys, many waterfalls, cirque lakes, polished domes, moraines and U-shaped valleys, it provides an excellent overview of all kinds of granite relief fashioned by glaciation. At 600–4,000 m, a great variety of flora and fauna can also be found here. © UNESCO

SUMMARY

2017 Conservation Outlook

Good with some concerns

All in all, the conservation outlook for Yosemite is good with some concerns. The geological features of the site remain intact. Its scenic values also remain mainly preserved; however, increasing visitor use and development have the potential to impact the exceptional natural beauty of the site. The park has the ability to limit visitor use, but external pressure may make it difficult. Without such limits, degradation will occur. Non-native species will also increase over time, and active management will be necessary to stem the influx. But overall, the protection and management system under implementation is adequate and effective and is likely to essentially maintain the site's values and integrity over the medium-term. Air pollution and climate change remain the most vexing problems because the solution lies outside the park. Inside the park, conservation measures to reduce carbon footprint such as addition of solar panels and hybrid vehicles have been implemented.

Current state and trend of VALUES

Low Concern
Trend: Stable

The geological features of the site remain intact. Its scenic values also remain mainly preserved; however, increasing visitor use and development have the potential to impact the exceptional natural beauty of the site.

Overall THREATS

Low Threat

The current threats to the ecological integrity of the Yosemite World Heritage site related to over-development and unregulated day use are considered to be low. Although 94% of Yosemite is Congressionally designated wilderness, the remaining 6% has serious problems with over-development, especially in

Yosemite Valley. This creates a congested urban environment, which encroaches on the natural beauty of the valley and impacts natural ecosystems and disrupts wildlife habitats and corridors. There are no current limits on the number of people that can enter the park each day. With excessive visitor use, a valued resource, such as a sense of solitude, can diminish or even disappear. Other current threats such as air pollution and fire suppression are considered to be high. High levels of air pollutants are beginning to impact park resources and the visitor experience. Precluding the natural role of fire alters ecosystem function and leads to the inevitable fire that has catastrophic effects. Potential threats to the integrity of the Yosemite World Heritage site include climate change and invasive species. Fires may also increase as climates warm. Climate-induced decreases in snowpack and the concomitant increase in fire severity suggest that fires may become more frequent and more severe. The spread of invasive species is largely contained but management programs are directly affected by sustained funding.

Overall PROTECTION and MANAGEMENT

Mostly Effective

The protection and management system under implementation is largely adequate and effective and is likely to essentially maintain the site’s values and integrity over the medium-term. However, it may be insufficient to maintain the site’s values and integrity over the long-term.

FULL ASSESSMENT

Description of values

Values

World Heritage values

► **Unique and pronounced landform features and a unique example of the effects of glaciation on granitic domes**
Criterion:(viii)

Glacial action combined with the granitic bedrock has produced unique and pronounced landform features including distinctive polished dome structures, as well as hanging valleys, tarns, moraines and U-shaped valleys. Granitic landforms such as Half Dome and the vertical walls of El Capitan are classic distinctive reflections of geologic history. No other area portrays the effects of glaciation on underlying granitic domes as well as Yosemite does (Statement of Significance, 2006).

► **Exceptional natural beauty**
Criterion:(vii)

Yosemite has exceptional natural beauty, including 5 of the world's highest waterfalls, a combination of granite domes and walls, deeply incised valleys, three groves of giant sequoia, numerous alpine meadows, lakes, diversity of life zones and variety of species (Statement of Significance, 2006).

Other important biodiversity values

► **Rich terrestrial and aquatic biota**

The variety of flora is reflected in the existence of six distinct vegetation

zones which are governed by altitudinal variation. Notable are three groves of the giant sequoia tree and extensive alpine meadows. There are 1,200 species of flowering plant along with various other ferns, bryophytes and lichens. There is one endemic and eight threatened or endangered species of plant. The park has 67 mammalian species, of which 32 are rodents, 221 species of bird, 18 reptile, 10 amphibian and 11 fish, of which 6 are endemic. Two bird species (bald eagle; peregrine falcon) were but are no longer listed as threatened or endangered. A few non-native species have been accidentally introduced such as beaver and white-tailed ptarmigan. Bighorn sheep were declared extinct in Yosemite in 1914 but were reintroduced in 1986 (Statement of Significance, 2006).

Assessment information

Threats

Current Threats

Low Threat

Current threats to the integrity of the Yosemite World Heritage site include over-development, unregulated day use, air pollution, and fire suppression. Although 94% of Yosemite is Congressionally designated wilderness, the remaining 6% has serious problems with over-development, especially in Yosemite Valley. This creates a congested urban environment, which encroaches on the natural beauty of the valley and impacts natural ecosystems and disrupts wildlife habitats and corridors. There are no current limits on the number of people that can enter the park each day. With excessive visitor use, a valued resource, such as a sense of solitude, can diminish or even disappear. High levels of air pollutants are beginning to impact park resources and the visitor experience. Precluding the natural role of fire alters ecosystem function and leads to the inevitable fire that has catastrophic effects.

▶ **Air Pollution**

High Threat

Inside site, widespread(15-50%)
Outside site

Ozone levels are a high threat to the site (Kohut 2007). Yosemite has 8-hour ozone concentrations that are consistently at or above the standard of 75 ppb. The ozone W126 index values at 28 ppm-hours during 2007. NPS (2009) suggests that ozone levels warrants significant concern. Yosemite also experiences haze levels well above estimated natural conditions and has a significant degrading trend in ammonium concentrations. Over 60% of the ponderosa and Jeffrey pine trees in the park show evidence of injury by ozone (Durisco 1987). These levels of air pollutants are beginning to impact park resources and the visitor experience.

► Housing/ Urban Areas, Commercial/ Industrial Areas, Tourism/ Recreation Areas

Low Threat
Inside site, localised(<5%)

Although 94% of Yosemite is Congressionally designated wilderness, the remaining 6% has serious problems with over-development, especially in Yosemite Valley. There, over a thousand buildings are crowded into one end of the 1,428 ha valley (NPS 2012). There are, for example, 1,504 campsites in 18 camp grounds, 210 picnic sites in 24 picnic areas, 3 visitor centers, 6 museums and major exhibits, 2 amphitheaters, 8 Ranger stations, 6 entrance stations (NPS 2012). This creates a congested urban environment, which encroaches on the natural beauty of the valley and impacts natural ecosystems and disrupts wildlife habitats and corridors.

► Tourism/ visitors/ recreation

Low Threat
Inside site, localised(<5%)

Overnight use is limited by the number of lodging units, designated campsites, and wilderness permits. There are no current limits on the number of people that can enter the park each day. There were 4,098,648 total visits in 2011 (NPS 2012). Out of the 4 million annual visits to the park, approximately 3 million are day visitors (Blotkamp et al. 2010). Private automobiles were used by 69% of all users, while 30% used rental automobiles. This number of vehicles results in serious gridlock during many

summer weekend days. With excessive visitor use, a valued resource, such as a sense of solitude, can diminish or even disappear.

▶ Fire/ Fire Suppression

Low Threat
Inside site, scattered(5-15%)

Although lightning fires are permitted to burn under prescribed conditions in over 84% of the park, many lightning ignitions are suppressed due to concerns about smoke, preparedness levels, and fire fighter resource availability. For example, in 2012, 8 lightning fires were ignited, but only 1 was allowed to run its course, eventually burning only 700 ha. Managed prescribed fires are not able to make up the difference, and fuels continue to build up. Precluding the natural role of fire alters ecosystem function and leads to the inevitable fire that has catastrophic effects (Miller et al. 2012, van Wagtendonk and Lutz 2007).

Potential Threats

Low Threat

Potential threats to the integrity of the Yosemite World Heritage site include climate change and invasive species. A resurvey of sites first established in the 1920s indicates that climate induced changes to small mammal populations might be occurring. Formerly low-elevation species expanded their ranges and high-elevation species contracted theirs, leading to changed community composition at mid- and high elevations. Fires may also increase as climates warm. Climate-induced decreases in snowpack and the concomitant increase in fire severity suggest that fires may become more frequent and more severe.

▶ Habitat Shifting/ Alteration, Temperature extremes

High Threat
Inside site, extent of threat not known
Outside site

A resurvey of sites first established in the 1920s indicates that climate induced changes to small mammal populations might be occurring. Formerly low-elevation species expanded their ranges and high-elevation species contracted theirs, leading to changed community composition at mid- and high elevations. Elevational replacement among congeners changed because

species' responses were idiosyncratic. Though some high-elevation species are threatened, protection of elevation gradients allows other species to respond via migration (Moritz et al. 2008). Fires may also increase as climates warm. Climate-induced decreases in snowpack and the concomitant increase in fire severity suggest that existing assumptions may be understated – fires may become more frequent and more severe (Lutz et al. 2009). Some changes identified as consistent with, but not formally attributable to climate change include: higher-elevation tree shift, Dolanc et al. (2013), large tree decline, McIntyre et al. (2015), upslope fire shift, Schwartz et al. (2015), earlier spring Monahan et al. (2016), Gonzalez et al. (2010b), Drexler et al. (2015) among other changes.

► Invasive Non-Native/ Alien Species

Low Threat
Inside site, throughout(>50%)

Currently there are only 177 non-native plant species in the park, of which 5 are considered invasive (NPS 2012). Efforts are being taken to mitigate those 5 species, but it is estimated that 10 new non-native plants species occur in the park each year. Efforts are also underway to eliminate the bull frog from park waters, but this effort is not sufficiently reducing frog populations. The wild turkey appears to be spreading into the park, and no efforts are currently underway to stop its spread. There are 9 species of non-native fish in 1,939 km of streams in 2 major river systems and in 245 lakes (NPS 2012). Invasive species management has been successful under current funding levels. With some funding cuts being considered, the program may have difficulties in the future.

Protection and management

Assessing Protection and Management

► Relationships with local people

Some Concern

Although key stakeholders have been identified, they are not directly involved in site management. Consultations with local Native-Americans

occur on an as-needed basis, but are not considered collaborative. Local communities are primarily concerned about sustaining and increasing visitation to the park because their economies have grown dependent on park visitors. This leads to some conflicts with minimizing the impacts of high visitation rates.

► Legal framework

Mostly Effective

The site is governed by federal statutes that established the Yosemite National Park, the Yosemite Wilderness, the Tuolumne Wild and Scenic River, and Merced Wild and Scenic River. Other general federal acts cover establishment of the National Park Service, air quality, water quality, environmental policy, wild and scenic rivers, wilderness, endangered and threatened species, historic preservation, and archaeological resources protection. These statutes are generally effective in maintain the outstanding universal values of the site, although enforcement of some requirements of these acts is lacking. Specifically, the requirement of the Wild and Scenic Act to establish carrying capacities has yet to be implemented. In addition, the requirement of the California Wilderness Act to manage Potential Wilderness Additions containing the 5 High Sierra Camps as for as practicable as Wilderness is not being met.

► Enforcement

Highly Effective

The park has substantial law enforcement capability parkwide to provide resource and visitor protection. The park has a Visitor Use and Impacts Monitoring Program to detect and target problems impacting the Outstandingly Remarkable Values of the Tuolumne and Merced Wild and Scenic Rivers.

► Integration into regional and national planning systems

Mostly Effective

The park participates in service wide planning for national parks, but is much less active in regional and local planning. The only federal interagency planning at the local level deals with fire management and housing. Regional

planning for transportation is in effect, however.

▶ Management system

Mostly Effective

The management system in place is generally adequate to maintain its outstanding universal values. However, it is beyond the capability of the park to influence off-site air pollution sources.

▶ Management effectiveness

Mostly Effective

The park has a General Management plan approved in 1980 that needs to be updated. Comprehensive river management plans are being written for the Tuolumne and Merced rivers. A wilderness steward ship is just beginning to be written. Many action plans are in place, but many more need to be written.

▶ Implementation of Committee decisions and recommendations

Data Deficient

Not applicable

▶ Boundaries

Mostly Effective

The boundary encompasses two nearly complete watersheds. However, there is one stream that enters the park from a developed rural area, and portions of the upper watershed of the South Fork of the Merced are on Forest Service lands that are actively managed for timber harvest. In addition, important habitat for migrating species such as mule deer lie outside the boundaries of the park where the deer are subject to hunting. Winter habitat for great gray owls occurs outside the western boundary, and winter habitat for Sierra Nevada bighorn sheep is outside of the eastern boundary. Private lands within the park and immediately on the boundaries of the park are vulnerable to development.

▶ Sustainable finance

Mostly Effective

The budget for the park in 2017 is 27 million USD, which enables a work

force of 1,200 employees in summer and 800 in winter (https://www.nps.gov/yose/learn/management/statistics.htm). The number of Yosemite hospitality employees in 2017 1,700 in summer and 800 in winter (https://www.nps.gov.yose/learn/management/statistics.htm). Because of the extreme pressure placed on this workforce by the high visitation, this budget is not adequate to maintain the integrity and the values of the site. Additional funding is available through a friends association, and this funding goes toward projects that mitigate impacts. The budget is expected to decrease over the next few years.

► Staff training and development

Mostly Effective

Training and staff development is mostly effective.

► Sustainable use

Some Concern

Although good strides are being made to reduce water consumption and solid waste, conserve energy, and use sustainable products, most targets are set to be met in future years. Steps have been taken to install solar collectors, a biodiesel fuel station and an increase in the addition of hybrid vehicles to the park's fleet. The park has initiated a Zero Landfill Project to increase recycling parkwide.

► Education and interpretation programs

Mostly Effective

Education and interpretive programs are mostly effective.

► Tourism and visitation management

Some Concern

Too much promotion of the park continues to fuel the ever-increasing visitation levels. Revenues from tourism support an in-park shuttle system and a construction program to upgrade visitor facilities.

► Monitoring

Mostly Effective

A comprehensive monitoring program is in place, but results have yet to be evaluated and actions based on those results have not been implemented.

▶ Research

Mostly Effective

A formal research program does not exist, but ad hoc research needs are identified and funded through cooperative agreements with academic institutes and federal research centers.

Overall assessment of protection and management

Mostly Effective

The protection and management system under implementation is largely adequate and effective and is likely to essentially maintain the site's values and integrity over the medium-term. However, it may be insufficient to maintain the site's values and integrity over the long-term.

▶ Assessment of the effectiveness of protection and management in addressing threats outside the site

Some Concern

Although the US NPS maintains a cadre of air quality specialists that works closely with the air regulatory agencies, the Park is unable to influence off-site air pollution sources. Air quality continues to be a major resource concern.

▶ Best practice examples

Solar collectors at the El Portal Administrative site produce 305 of the Yosemite maintenance facility electrical needs. Zero Landfill Project should greatly reduce the need for landfill facilities.

State and trend of values

Assessing the current state and trend of values

World Heritage values

▶ Unique and pronounced landform features and a unique example of the effects of glaciation on granitic domes

Good
Trend:Stable

Glacial action combined with the granitic bedrock has produced unique and pronounced landform features including distinctive polished dome structures, as well as hanging valleys, tarns, moraines and U-shaped valleys. Granitic landforms such as Half Dome and the vertical walls of El Capitan are classic distinctive reflections of geologic history. No other area portrays the effects of glaciation on underlying granitic domes as well as Yosemite does. Other than some minor quarrying, the geologic features for which the site was designated remain intact.

▶ Exceptional natural beauty

Low Concern
Trend:Stable

Yosemite has exceptional natural beauty, including some of the world's highest waterfalls, a combination of granite domes and walls, deeply incised valleys, three groves of giant sequoia, numerous alpine meadows, lakes, diversity of life zones and species. Some buildings intrude on the scenic beauty, and crowding and traffic congestion can mar the experience of many visitors. Regional haze from outside the park can obscure vistas as well.

Summary of the Values

▶ Assessment of the current state and trend of World Heritage values

Low Concern

Trend: Stable

The geological features of the site remain intact. Its scenic values also remain mainly preserved; however, increasing visitor use and development

have the potential to impact the exceptional natural beauty of the site.

► **Assessment of the current state and trend of other important biodiversity values**

Low Concern

Trend: Data Deficient

The terrestrial and aquatic biota is largely intact, but extinctions and endangerment have occurred. Non-native invasive plant and animal species pose a potential threat. Climate change has the potential for greatly altering native biota in both the near term and long term. Ongoing monitoring continues to document the status and trends of important biological values but data are currently insufficient to link biological change to changes in environmental data.

Additional information

Benefits

Understanding Benefits

► **Water provision (importance for water quantity and quality)**

The 302881 ha Park, of which 94% is federally designated wilderness, includes two relatively pristine watersheds. These watersheds make a significant contribution to the water supplies of the san Francisco Bay area and the cities and irrigation districts of the California’s central Valley. Unfortunately, the park is marred by two unnecessary reservoirs that could just as easily meet the water needs if built outside the park.

Severe drought over the last 4 years has severely reduced water quantity. There is concern that global warming will exacerbate drought conditions affecting all species in the future.

►

History and tradition, Wilderness and iconic features, Sacred natural sites or landscapes

Yosemite has been home to Native Americans for millennia. It encompasses their sacred sites and landscapes and continues to be part of their spiritual heritage. In addition, the park is an outstanding area for contemplative reflection, one of the most important values of a protected area. Yosemite Valley and the Wilderness that surrounds it are among the world's most evocative scenery.

► **Outdoor recreation and tourism**

As the over 4 million visitors per year can attest, Yosemite is an extremely important for recreation and tourism. It is a major destination for travellers from California, the US, and the world. And contributes substantially to the local and regional economy, especially of the gateway communities.

► **Importance for research**

The relatively pristine ecosystems of Yosemite represent an outstanding opportunity to advance society's understanding of ecological processes and functions. The opportunity to study the ecological role of fire in an area where lightning ignitions to burn under prescribed conditions is unequalled in the world. The great exposures of geological formations and land forms make Yosemite a destination for geologist to better understand earth forming processes.

The ad hoc nature of Yosemite's inhouse science capability limits the park's ability to target needed research over time and effectively build its understanding of Yosemite's natural systems.

► **Carbon sequestration, Water provision (importance for water quantity and quality)**

The vast expanses and ranges of elevations in the park make it ideal for climate change mitigation and impact amelioration. The fire program has been successful shifting biomass from smaller tress to larger trees, thereby contributing to carbon sequestration. The large pristine watersheds in the park contribute to filtration, groundwater renewal, and maintenance of

natural flows.

There is a concern that climate change could cause large tree decline limiting carbon sequestration, altering biological diversity and exacerbating the spread of invasive species Gonzalez et al. (2010b) Bradley et al. (2009).

► **Tourism-related income, Provision of jobs**

2014 Cumulative benefits to local communities were estimated at $535 million USD, supporting 6261 jobs.

Summary of benefits

The Yosemite World heritage site provides many benefits for local, regional, national, and international communities. These values include nature conservation values, spiritual values, recreational values, and values related to naturally functioning ecosystems. Its international acclaim as the icon of nature conservation is uncontested. In 2014 cumulative economic benefits to local communities were estimated at 535 million USD, supporting 6261 jobs. (https://www.nature.nps.gov/socialscience/economics.cfm)

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects
1	Yosemite National Park		The purpose of the Invasive Plant Program is to protect Yosemite National Park’s natural and cultural resources from displacement by non-native invasive plants. Yosemite’s large size, just over 302,881 ha (748,436 acres), can make surveying for and treating invasive plants logistically difficult. This is especially true in remote wilderness. The threat from invasive species is growing and new invasive plant species and populations are found and treated each year. Limited operational resources for invasive plant control make it critical that treatments are efficient and effective and guided by a strategically sound plan. This is a long term program.

№	Organization/ individuals	Project duration	Brief description of Active Projects
2	Yosemite National Park		The Fire Management Program reduces risk to park wildland urban interface communities within six to eight years, and to restore park ecosystems within 15 to 20 years. Some of the work which will be done to reduce the risk of unwanted wildland fire in and adjacent to wildland urban interface communities will involve mechanical methods. The primary methods to reduce wildland fire risk and to restore park ecosystems, however, will be prescribed and wildland fire. This program implements the Park’s Fire Management Plan
3	Sierra Nevada Network		The Sierra Nevada Network Inventory and Monitoring Program is one of 32 National Park Service Inventory & Monitoring networks across the country established to facilitate collaboration, information sharing, and economies of scale in natural resource monitoring. The Sierra Nevada Network comprises Yosemite, Sequoia, and Kings Canyon national parks and Devils Postpile National Monument. Network personnel work closely with each park's natural resources program to develop and implement long-term monitoring and provide sound scientific information to park managers
4	Yosemite National Park		Air Quality Monitoring Program in Yosemite National Park, in cooperation with state and other federal agencies, monitors the damage caused by air pollution with a comprehensive, science-based air resources program. This program targets major air pollutants and impacts potentially affecting Yosemite's visitors and ecology.
5	Yosemite National Park		The High Elevation Aquatic Ecosystem Recovery and Stewardship Plan will guide the next 15 years of NPS management actions to protect and restore the park's high elevation aquatic ecosystems. Management actions will be designed to protect these ecosystems from future threats and will restore the diversity and distribution of species to increase the resiliency of these ecosystems.
6	Yosemite National Park		Meadow restoration has taken place in numerous locations throughout Yosemite Valley. Since the early 1990s efforts have been made to remove multiple trails, replace asphalt trails with boardwalks in seasonally flooded areas, eliminate old drainage ditches, and remove old road beds. The actions improved the crucial hydrologic function of the wet meadows. Additionally, park resource managers and volunteers have removed numerous invasive plants, most notably Himalayan blackberry, allowing for resurgence of native plants. The Stoneman Meadow asphalt removal project and the Stoneman Meadow boardwalk building project encompass a total restoration area of 10.5 ha (26 acres). The Cook's Meadow project restored 17 ha (42 acres). A large restoration of the Mariposa sequoia grove has recently been initiated.

№	Organization/ individuals	Project duration	Brief description of Active Projects
7	Yosemite National Park	From: 2011 To: 2017	The Merced River Plan was recently signed (March 2017) and provides overarching guidance for river protection within the Merced Wild and Scenic River corridor inside Yosemite National Park and the El Portal Administrative Site. The National Park Service is committed to a collaborative, interdisciplinary planning approach, rooted in public comment. The planning process is leveraging the best available science and technology to create an implementable comprehensive management plan.
8	Mariposa Grove Restoration		The purpose of this project is to restore the grove's dynamic ecology and increase its resilience. Once the project is completed, visitors to the Mariposa Grove will notice a consolidated parking area and information station at South Entrance, many of the roads within the grove converted into hiking trails, over a half-mile of new accessible trails and boardwalks providing universal access for all visitors to the grove, flush toilets replacing vault toilets in the grove, and the removal from the grove of commercial activities such as the gift shop and tram tours.
9	Meadow Carbon Sequestration	From: 2017	This most recent ecological conservation project includes a study of meadow carbon sequestration in the Tuolomne Meadow.

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years
1	Investigate potential invasive species establishment	Additional information is need on the potential for invasive species to become established in the park.	From: 2018
2	Effects of climate change on native species and ability to adapt to change	Additional studies need to be conducted on the effects of climate change and the potential for Yosemite to absorb that change.	From: 2018
3	Long term impact of fire suppression on forested ecosystem	The long term effects of not being able to restore fire to its natural ecosystem role need to be determined.	From: 2018

№	Site need title	Brief description of potential site needs	Support needed for following years
4	Long term effects of air pollution on nitrogen sequestration	Trend information is needed ozone injury, nitrogen deposition, and the role the ecosystem plays in nitrogen sequestration and dynamics.	From: 2018
5	Determine day use limits and develop guidance	Day use limits need to be established for all areas of the park including a means for implementing the limits.	From: 2018
6	Analyze long-term ecological data to incorporate into conservation and management implementation	Data being collected on vital signs needs to be analysed to determine if changes reflect natural ecological variability or are the result of other causes.	From: 2018

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