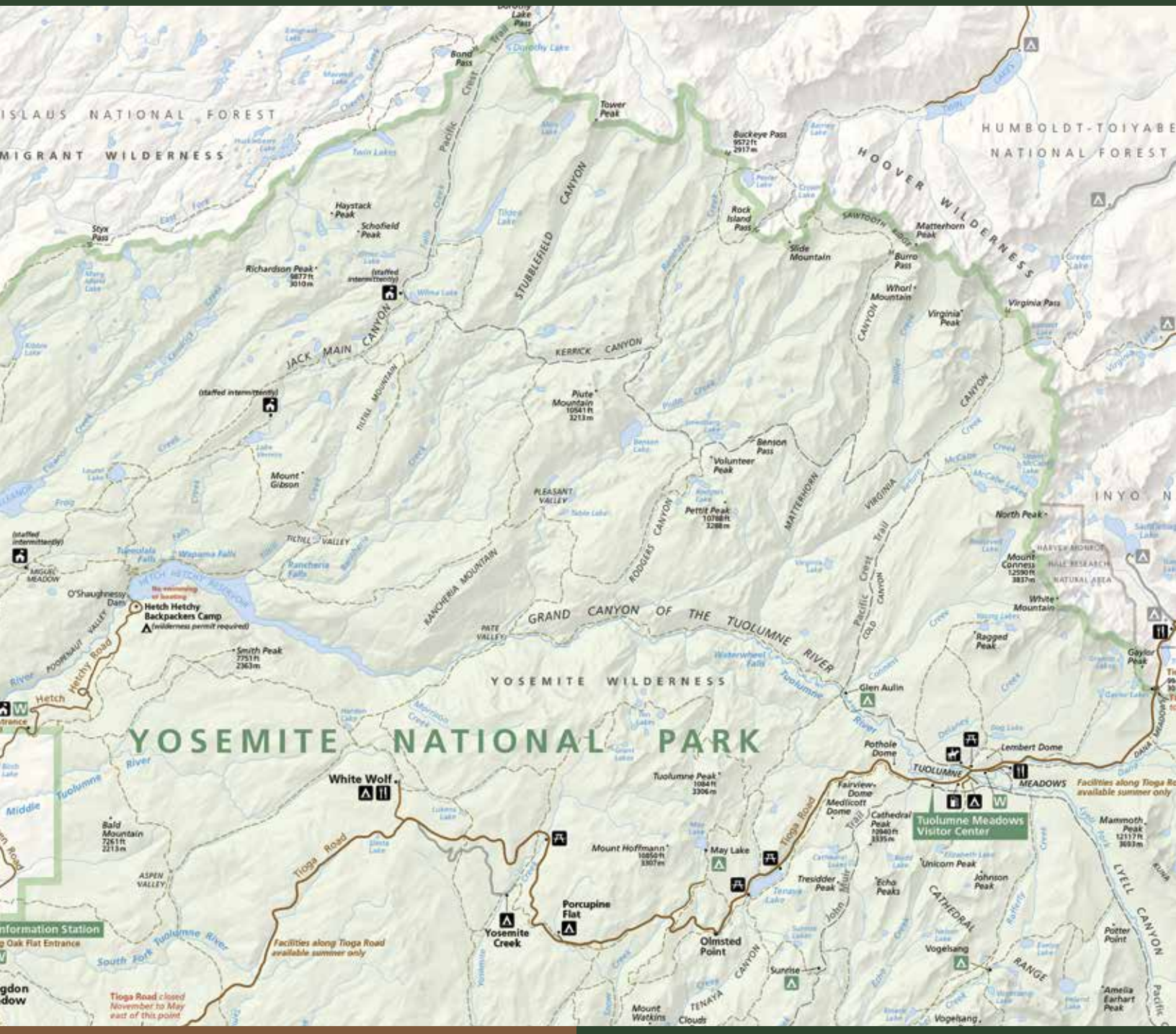
Resource Guide

Hetch Hetchy Regional Water System | Yosemite National Park

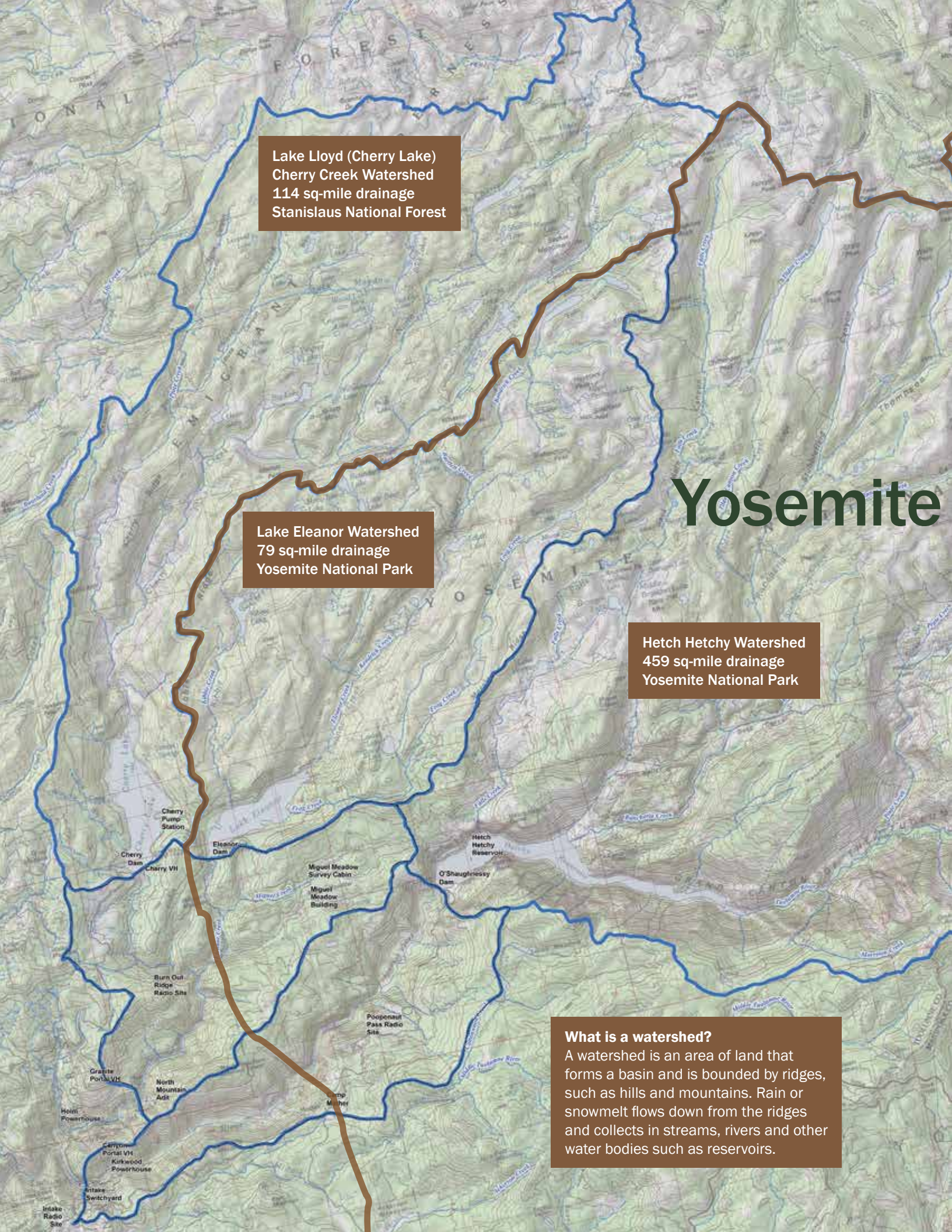
A partnership protecting the pristine lands of the Tuolumne River Watershed.



June 30, 1864: Yosemite Grant
October 1, 1890: Establishment of Yosemite National Park
April 18, 1906: Great Earthquake and Fire in San Francisco
December 9, 1913: Congressional Raker Act authorizes the Hetch Hetchy Project
Aug. 25, 1916: Establishment of the National Park Service

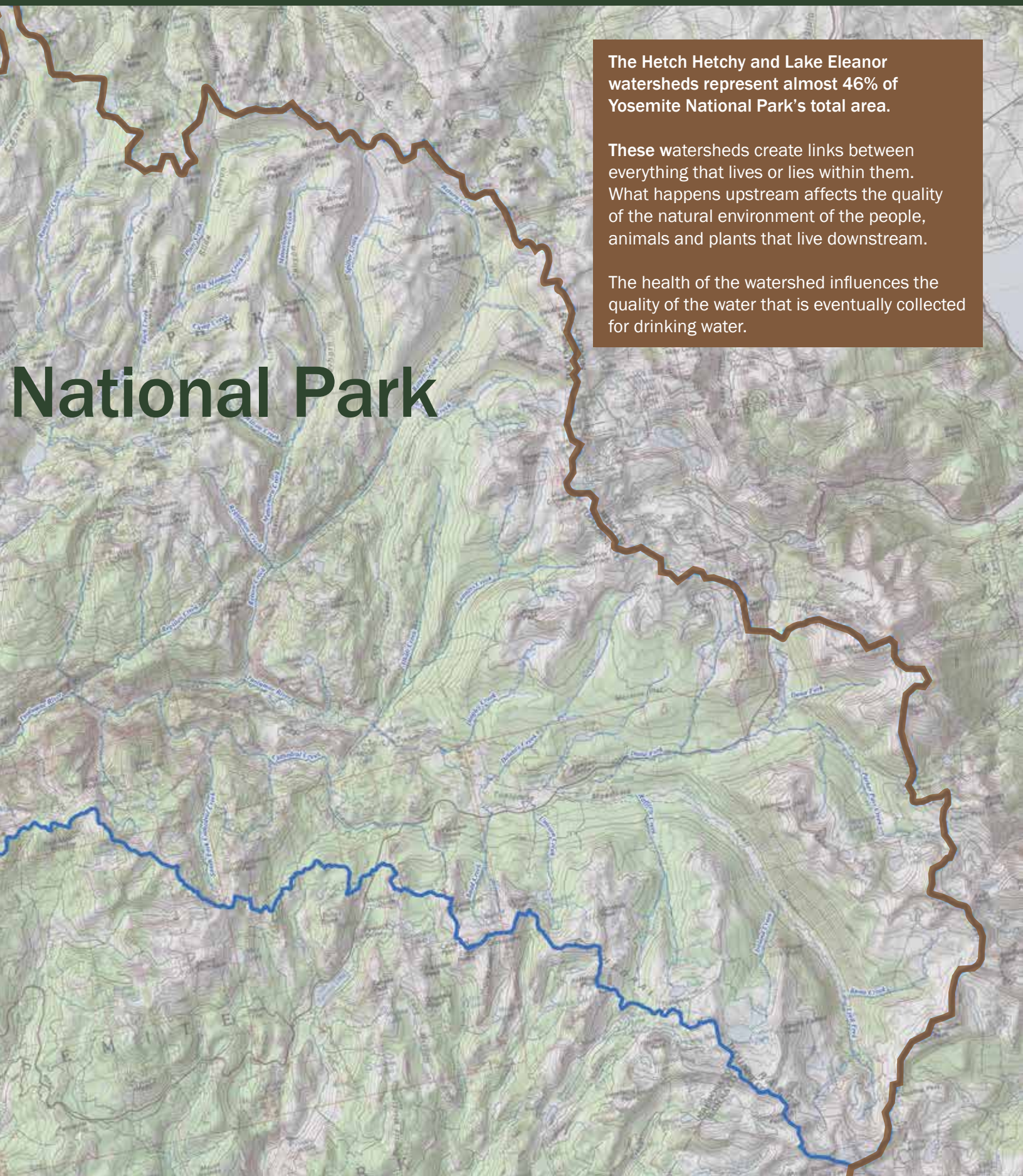
Since 1913, there has been a unique partnership surrounding the Tuolumne River watershed above the Hetch Hetchy Valley...

Hetch Hetchy
Regional Water System
Services of the San Francisco Public Utilities Commission


Lake Lloyd (Cherry Lake)
Cherry Creek Watershed
114 sq-mile drainage
Stanislaus National Forest
Lake Eleanor Watershed
79 sq-mile drainage
Yosemite National Park
Hetch Hetchy Watershed
459 sq-mile drainage
Yosemite National Park
Yosemite
What is a watershed?
A watershed is an area of land that forms a basin and is bounded by ridges, such as hills and mountains. Rain or snowmelt flows down from the ridges and collects in streams, rivers and other water bodies such as reservoirs.
Cherry Pump Station
Cherry Dam
Cherry VH
Eleanor Dam
Miguel Meadow Survey Cabin
Miguel Meadow Building
Hetch Hetchy Reservoir
O'Shaughnessy Dam
Burn Out Ridge Radio Site
Poopenaut Pass Radio Site
Granite Portal VH
North Mountain Adit
Holm Powerhouse
Canyon Portal VH
Kirkwood Powerhouse
Intake Switchyard
Intake Radio Site

The Watersheds

Tuolumne River to Hetch Hetchy
Eleanor Creek
Cherry Creek



The Hetch Hetchy and Lake Eleanor watersheds represent almost 46% of Yosemite National Park's total area.

These watersheds create links between everything that lives or lies within them. What happens upstream affects the quality of the natural environment of the people, animals and plants that live downstream.

The health of the watershed influences the quality of the water that is eventually collected for drinking water.

The Hetch Hetchy Regional Water System

The San Francisco Public Utilities Commission

A department of the City and County of San Francisco, the San Francisco Public Utilities Commission (SFPUC) operates the Hetch Hetchy Regional Water System.

The SFPUC employs over 2,300 staff, in facilities across seven northern California counties: San Francisco, San Mateo, Santa Clara, Alameda, Stanislaus, San Joaquin, and Tuolumne. The agency provides water, municipal power, and wastewater services for the City and County of San Francisco, along with regional water delivery to 26 wholesale customers.

Policy decisions are made by a 5-member Commission appointed by the Mayor of San Francisco. SFPUC funding is derived solely from the bills paid by retail and wholesale customers.

The Hetch Hetchy Regional Water System delivers potable (drinking) water to both our wholesale and retail customers. This reduces the need for individual wholesale customer agencies to have water treatment plants. Treatment responsibility lies solely with the SFPUC.

The System

The Hetch Hetchy Regional Water System plays a key regional role in water delivery in the state of California.

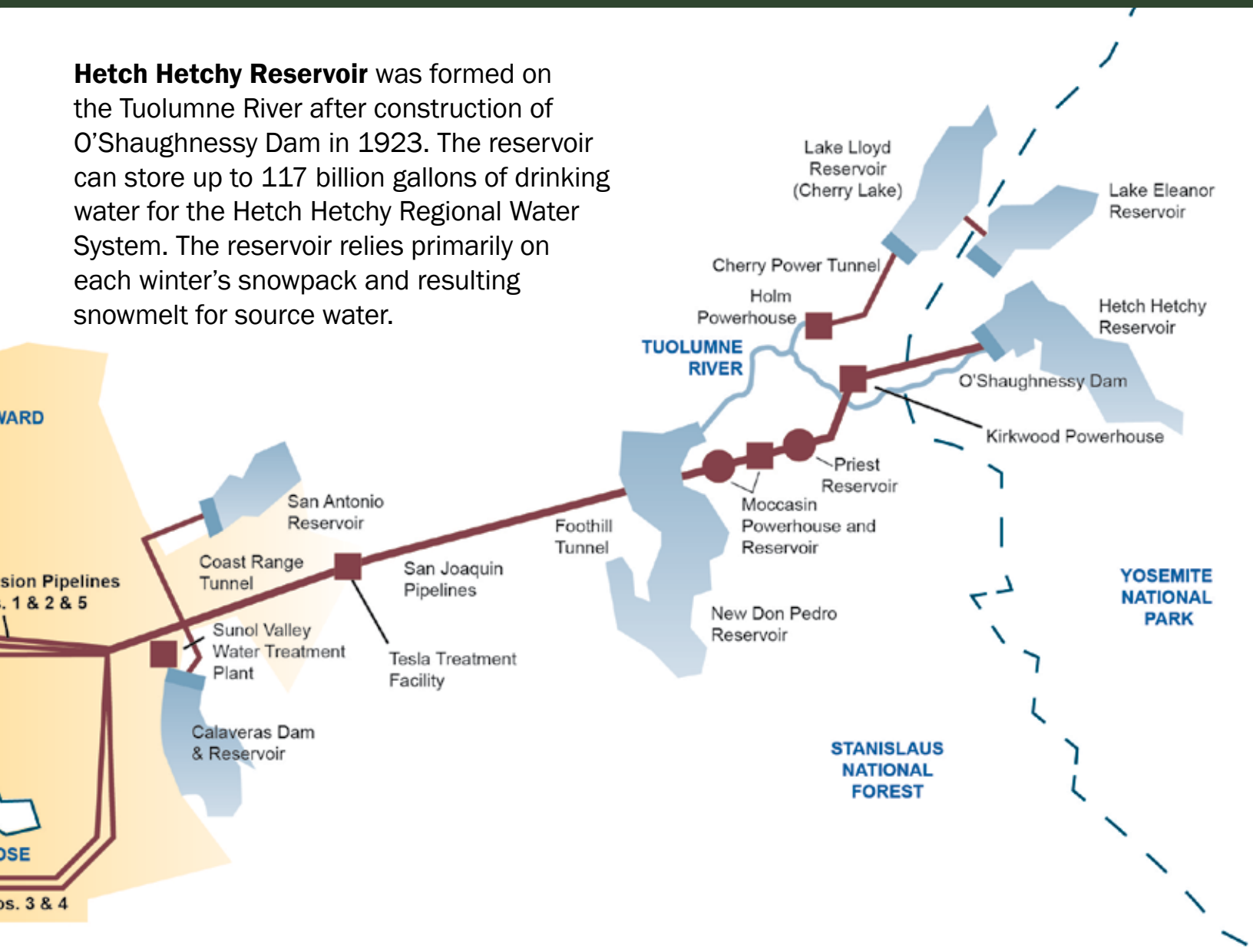
On a daily basis, this system reliably provides high-quality drinking water to 2.6 million residents and businesses across Southern Alameda, Northern Santa Clara, San Mateo, and San Francisco counties.

The system generates 1.6 billion kilowatt hours of greenhouse gas free, hydroelectric power annually for the City and County of San Francisco's municipal tenants and retail customers. A portion of this energy is also sold to the Modesto and Turlock Irrigation Districts, for use in their operations throughout their 662-square-mile service area.

Key Aspects of Hetch Hetchy Reservoir, held behind O'Shaughnessy Dam:

- **Pristine -** Hetch Hetchy Reservoir collects and stores pristine snowmelt and precipitation from the protected lands of Yosemite National Park, much of which is federally designated Wilderness.
- **No Filtration -** Water collected and stored in Hetch Hetchy Reservoir's granite basin consistently meets and exceeds Federal and State standards for safe drinking water.
- **Reliable Water Delivery -** Hetch Hetchy Reservoir captures snowmelt and stores the water for water delivery throughout the year and across multiple years. Water in

Hetch Hetchy Reservoir was formed on the Tuolumne River after construction of O'Shaughnessy Dam in 1923. The reservoir can store up to 117 billion gallons of drinking water for the Hetch Hetchy Regional Water System. The reservoir relies primarily on each winter's snowpack and resulting snowmelt for source water.



storage is heavily relied upon during droughts when the natural hydrology is incapable of meeting water needs, even when rationing is in place.

- **Gravity-Driven -** The high elevation of Hetch Hetchy Reservoir and the engineering infrastructure of the Regional Water System move water from its source, across the state, and to its customers solely by gravity.
- **Renewable, Dependable Electricity -** The gravity-driven water from Hetch Hetchy Reservoir, along with the waters retained in Cherry Lake and Lake Eleanor, provides renewable, clean energy through hydroelectric generation.

Greenhouse Gas-Free System

The gravity-driven water and clean hydropower deliveries of the Hetch Hetchy system ensure that San Francisco and the SFPUC's regional customers receive water and power delivered by a greenhouse gas-free system. No additional energy is required to move this water across the state. Thus the system results in lower regional conventional energy purchasing.

Serving the Public

The Hetch Hetchy Water and Power system is a publicly owned system that ensures water and power delivery.

The Hetch Hetchy Water and Power system was built with ratepayer (payments from utility bills) funds, not State or Federal, and is maintained with local Bay Area financing.

Working Together to Protect Natural Lands

Yosemite National Park and the Hetch Hetchy Regional Water System are working together to protect the Hetch Hetchy watershed. Almost 46% of Yosemite's lands – from Mt. Lyell west through Tuolumne Meadows to Smith Peak – drain to the Tuolumne River.

Key Watershed Protection Messages: Yosemite is one of the birthplaces of water in California.

Watersheds are critical to serve our water needs. The natural ecosystem of this watershed – comprised of the soil, plants, and animals within it – gathers pristine water not only for Yosemite, but also for cities and communities, crops, animals, and river ecosystems downstream.

Watersheds connect natural spaces to agricultural and urban areas. Wherever you call home, the water that comes to your tap, shower, gym, favorite restaurant, or even fire hydrant, is collected somewhere. Do you know where your water comes from?

The watersheds of Yosemite are a sustaining resource not only for your national park, but also for the lands and people of California's Central Valley and the San Francisco Bay Area.

What you do makes a difference – here and throughout the State.

Maintaining healthy ecosystems will always be a challenge. Here's what you can do: Leave No Trace!

- **Protect fragile vegetation and soils.** Compressing soils and trampling vegetation negatively affects the movement and cleanliness of water.
- **Travel and camp on durable surfaces.** Sticking to established trails, campsites, rock, and gravel, minimizes your impact. Walk single file and keep groups small.
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- **Wash yourself or dishes 300 feet away from water sources.** Use biodegradable soap and scatter strained dishwater.
- **Use restroom facilities or bury human waste.** Deposit human waste in holes dug 6 to 8 inches deep at least 200 feet from water, camp and trails. Cover and disguise hole. Pack out toilet paper and hygiene products.

Science Collaboration:

The **Upper Tuolumne River Ecosystem Program (UTREP**) is a long-term, science-based effort to assess the effects of current Hetch Hetchy Regional Water System operations on the Upper Tuolumne River ecosystem and provide recommendations for river management that support broad ecosystem values while meeting water supply and power generation needs.

UTREP has a goal of conducting long-term, collaborative, science-based investigations designed to:

- Describe historical and present day upper Tuolumne River ecosystem conditions;
- Assess the relationship of historical and present day conditions to Hetch Hetchy Regional Water System operations; and
- Develop recommendations for improving ecosystem conditions on a long-term, adaptively managed basis.

The UTREP develops data, analyses, and recommendations for improving ecosystem conditions downstream of Hetch Hetchy facilities consistent with the SFPUC's Environmental Stewardship Policy. UTREP is a cooperative effort led by the SFPUC, in collaboration with Yosemite National Park, the US Fish and Wildlife Service, Stanislaus National Forest, consultants, researchers, and academics. Input is provided by the Upper Tuolumne River Stakeholder Group.

More information and updates on the project at **utrep.blogspot.com**

Federal and State Regulations Governing Cooperation


RAKER ACT
[H.R. 7207]

The Raker Act of 1913 (H. R. 7207)

The Raker Act (or Raker Bill as it was originally known) is an act passed by the United States Congress in 1913 that provided the rights of way to construct water and power facilities over federal land in Yosemite National Park and Stanislaus National Forest. Named after its chief sponsor John E. Raker, Congressman from Manteca, the bill granted the rights to build O'Shaughnessy Dam in the Hetch Hetchy Valley, and construct water-collection and power-generating facilities stretching from the Sierras to the San Francisco Bay Area.

The City of San Francisco wanted to break the monopoly of its sole private water provider – Spring Valley Water Company -- and to provide a high-quality, reliable source of water for a region booming since the Gold Rush. After much of San Francisco burned due to lack of water in the wake of the 1906 earthquake, there was a renewed effort to find reliable water supplies that were not in the control of Spring Valley Water.

The City had received permission from Secretary of the Interior John Garfield to use federal land for the purposes of developing a water system in 1908. However, permission could have been revoked at any time and was subject to the whims of each succeeding administration. The only way to avoid this was an act of Congress. Former San Francisco City Attorney Franklin Lane became Secretary of the Interior under President Wilson and urged the City to seek congressional approval to avoid the appearance of a conflict of interest on his part. Hence, City leaders began the effort to pass what came to be known as The Raker Act.

The Raker Act obligates the NPS to implement the water quality provisions of the Act:

Sec. 9. (a) ...the following sanitary regulations shall be made effective within the watershed above and around said reservoir sites...:

First. No human excrement, garbage, or other refuse shall be placed in the waters of any reservoir or stream or within three hundred feet thereof.

Second. All sewage from permanent camps and hotels within the watershed shall be filtered by natural percolation through porous earth or otherwise adequately purified or destroyed.

Third. No person shall bathe, wash clothes or cooking utensils, or water stock in, or in any way pollute, the water within the limits of the Hetch Hetchy Reservoir or any reservoir constructed by the said grantee under the provisions of this grant, or in the streams leading thereto, within one mile of said reservoir; or, with reference to the Hetch Hetchy Reservoir, in the waters from the reservoir or waters entering the river between it and the "Early intake" of the aqueduct, pending the completion of the aqueduct between "Early intake" and the Hetch Hetchy Dam site.

Fourth. The cost of the inspection necessary to secure compliance with the sanitary regulations made a part of these conditions, which inspection shall be under the direction of the Secretary of the Interior, shall be defrayed by the said grantee.

Fifth. If at any time the sanitary regulations provided for herein shall be deemed by said grantee insufficient to protect the purity of the water supply, then the said grantee shall install a filtration plant or provide other means to guard the purity of the water. No other sanitary rules or restrictions shall be demanded by or granted to the said grantee as to the use of the watershed by campers, tourists, or the occupants of hotels and cottages.

The Raker Act also requires the SFPUC to provide Yosemite National Park an annual payment of $30,000.

Filtration avoidance:
The SFPUC was granted filtration avoidance for the Hetch Hetchy water supply by the Environmental Protection Agency on October 29, 1993. This is covered under Title 40 Code of Federal Regulations (CFR), Part 141, Subpart H, Section 141.71. The SFPUC is permitted under Title 22 of the California Code of Regulations (CCR): System No. 3810001, Permit Number 02-04-04P-3810001. California regulations pertaining to filtration avoidance are listed in Title 22 Sections 64652.5.

The SFPUC and the NPS have a written Memorandum of Agreement outlining watershed protection and infrastructure security measures. These additional protection measures constitute, in combination with the Raker Act water quality provisions, a watershed control program that meets the filtration avoidance requirements of 40CFR §141.71 and 22CCR § 64652.5 for the Hetch Hetchy watershed. The watershed control program ensures that the high quality of the Hetch Hetchy source water is maintained.

Designated Critical Infrastructure: The State of California and the US Department of Homeland Security have designated Hetch Hetchy Regional Water System facilities within Yosemite National Park as critical infrastructure.

Water Treatment, Regulation, Watersheds

Water Treatment

Standard water treatment includes filtration to remove particulate in the water and then disinfection to kill microorganisms that carry illness.

All drinking water receives treatment.

The Hetch Hetchy source receives ultraviolet light (UV) and chlorine disinfection at the Tesla UV Treatment Facility. *It is important to note that Hetch Hetchy Reservoir is one of only 5 large municipal water sources in the United States that retain a filtration waiver from the US EPA. Due to the high quality and watershed protections in place, water from Hetch Hetchy Reservoir does not require filtration.*

Water collected from the local Bay Area watersheds of the Hetch Hetchy system receives both filtration and disinfection:

- Calaveras and San Antonio reservoirs
  Treated at Sunol Valley Water Treatment Plant
- Pilarcitos, Crystal Springs, and San Andreas reservoirs
  Treated at Harry Tracy Water Treatment Plant

Public Water Agency Regulation

The **United States Environmental Protection Agency** sets standards that, when combined with protecting ground water and surface water, are critical to ensuring safe drinking water. These efforts are focused on protecting public health through implementing the Safe Drinking Water Act.

The **Safe Drinking Water Act (SDWA)** is the main federal law that ensures the quality of Americans' drinking water. Under SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (SDWA does not regulate private wells which serve fewer than 25 individuals.)

In California, the **State Water Resources Control Board (SWRCB), Division of Drinking Water** regulates public water systems.

Watershed Sanitary Surveys

Our annual **Hetch Hetchy Watershed Sanitary Survey** evaluates the sanitary conditions, water quality, potential contamination sources, and the results of watershed management activities with partner agencies including the National Park Service and US Forest Service. Sanitary surveys are required by the SWRCB in order to maintain a filtration waiver. The SWRCB regulates the SFPUC and determines if watershed protections are satisfactory for filtration avoidance.

The SFPUC also conducts sanitary surveys every five years to detect and track sanitary concerns for the local Bay Area watersheds and the approved source of water in the Upcountry Non Hetch Hetchy Sources (Cherry Lake, Lake Eleanor, and Early Intake Watersheds). The sanitary surveys identify potential water contamination from various natural and human activities. Water from these watersheds requires filtration.

Watershed and Environmental Improvement Program

The SFPUC has a **Watershed and Environmental Improvement Program** to proactively manage, protect and restore environmental resources affected by our system operations. The Program spans the Peninsula, Alameda, and Tuolumne Watersheds, as well as areas in San Francisco.

The Program's objectives are:

- Manage watershed activities and resources to protect source water quality and protect/restore terrestrial and aquatic species and their habitats
- Protect/restore watershed lands
- Enhance public awareness of watershed resources, their protection, and restoration efforts
- Include key stakeholders in the Program
- Maintain up-to-date watershed assessments and management plans
- Develop monitoring and feedback mechanisms to measure progress

System History and Facts

Timeline

1858 Spring Valley Water Company established

1864 Yosemite Grant

1890 Yosemite National Park established

1892 Sierra Club founded in San Francisco

1899 US Geological Survey recommends Hetch Hetchy for San Francisco water supply

1906 Great San Francisco Earthquake and Fire

1913 Raker Act allows for construction of the Hetch Hetchy Water and Power Project

1916 National Park Service established

1918 Eleanor Dam completed
Early Intake Powerhouse begins operation

1923 O'Shaughnessy Dam completed

1925 Moccasin Powerhouse completed

1930 Spring Valley Water Company purchased by City of San Francisco; assets still in use today

1934 First Hetch Hetchy water arrives at Crystal Springs Reservoir

1938 O'Shaughnessy Dam raised 85 feet

1955 Cherry Valley Dam completed

1960 Cherry Powerhouse completed (Holm Powerhouse)

1967 Kirkwood Powerhouse begins operation

1969 New Moccasin Powerhouse completed

Lower Cherry Aqueduct
Supplied water to Early Intake Powerhouse for construction of O'Shaughnessy Dam
Allows access to backup drinking water supply from Lake Eleanor and Cherry Lake.

Hetch Hetchy Reservoir
(within Yosemite National Park)
Capacity: 117 billion gallons
Use: Drinking water, hydroelectric generation
Fed from the 459 sq. mile Upper Tuolumne River watershed

Lake Eleanor Reservoir
(within Yosemite National Park)
Capacity: 9 billion gallons
Use: Downstream hydroelectric generation, recreation
Fed from the 79 sq. mile Eleanor Creek watershed

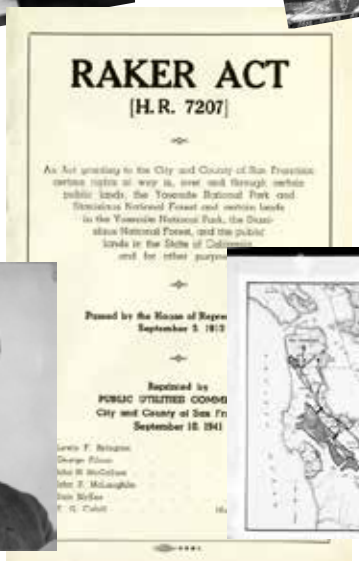
Cherry Lake Reservoir
(within Stanislaus National Forest)
Capacity: 88 billion gallons
Use: Downstream hydroelectric generation, recreation
Fed from the 117 sq. mile Cherry Creek watershed

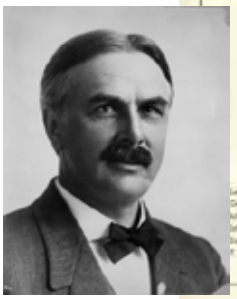
Annual Funding

Each year in addition to an annual $30,000 payment, the SFPUC provides funding to support NPS core tasks, as well as special projects and emergency conditions, related to source water protection, environmental stewardship, and security:

- NPS Watershed Patrols and Enforcement of Regulations
- NPS Visitor Education - On site and off site visitor education and information programs are conducted so that national park visitors to the Hetch Hetchy watershed understand regulations and practice limited impact wilderness use techniques in order to prevent degradation of drinking water quality.
- NPS Facilities - Facilities within the Hetch Hetchy watershed, including trails, are constructed, operated and maintained to mitigate and/or prevent water contamination.
- Sources of Contamination - Collaborative efforts between the NPS and the SFPUC to identify potential sources of drinking water contamination and actions to eliminate or mitigate the sources.

Annual Funding continues on next page





Annual Funding continued

SFPUC to YNP annual funding supports numerous administrative and resource management functions, some of which include:

- Program management at Yosemite National Park to achieve MOA coordination, implementation and administration support
- Hetch Hetchy Entrance Station operations
- Trails Maintenance
- Buildings & Grounds Maintenance
- Utilities, such as wastewater treatment and testing within the watershed
- Interpretation
- Wilderness Operations & Wilderness Education
- Visitor and Resource Protection
- Wilderness Restoration
- Hydrological Monitoring

- Support NPS Tuolumne Wild and Scenic River planning and the Upper Tuolumne River Ecosystem Project
- Security of dam, facilities and surrounding area
- Special projects, such as: toilets at Glen Aulin, modifications to the Tuolumne Meadows Corral, Fire Protection Planning
- Scientific research

Annual Funding Provided to Yosemite National Park (includes $30,000 annual fee)

2010-11: $4,831,871
2011-12: $5,455,925
2012-13: $5,581,877
2013-14: $6,016,018
2014-15: $5,913,584
2015-16: $6,012,271
2016-17: $6,115,699
2017-18: $6,110,806

So What?

Here are some questions to think about for discussion and programs:

Why does this combined history matter?

How do we use this history to provoke thought and build connections for visitors to these lands?

Where does our water come from?

Where does it go?

What is the need for clean water?

What are the impacts of the Raker Act and construction of this system?

- The Raker Act planted the seeds for the modern environmental movement. The passage of the Raker Act was the first time the use of public wilderness and the nature of conservation were debated on a national level. John Muir, environmentalist and founder of the Sierra Club, was the most well-known opponent of the bill. Muir reasoned that nature is a cathedral and should be left untouched. On the other side, some conservationists like Gifford Pinchot, former Chief of the National Forest Service, believed federal land should be used for the greatest benefit of the largest amount of people.
- Created a high quality water supply for the City of San Francisco and the Bay Area
- Prevented Colorado River Dam, Dinosaur Monument
- Reduced levels of recreational infrastructure in the Hetch Hetchy Valley

What if we keep the Dam? Remove it?

Is 'the highest and best use of water' for domestic purposes?

In rendering his decision, Secretary Garfield reiterated that the water supply of San Francisco was inadequate and unsatisfactory. He believed that domestic purposes, especially in terms of a municipal water supply, constituted the highest use to which water and storage basins could be put. The next best use of water and water resources, he stated in his decision, was for irrigation. Despite the beauty of Hetch Hetchy Valley, Garfield believed it to be less of a wonder than Yosemite Valley. Furthermore he stated that the valley would not be destroyed by this use, only its character changed. Instead of an "unusable" meadow floor, the valley would contain a beautiful lake. This partial loss of scenery in the park would result in many advantages to the public: a pure water supply to San Francisco and other Bay areas, water for irrigable land in the Tuolumne and San Joaquin valleys, a cheap and bountiful supply of electric energy, a public highway built by the city reaching into that section of the park, and a patrol for the Hetch Hetchy area, furnished by the city, which, in protecting the water supply, would also guard against forest fires.

(Historic Resource Study VOLUME 1 OF 3 YNP; 70. Decision of the Secretary of the Interior, James Rudolph Garfield, re Application for Lake Eleanor and Hetch Hetchy Valley Reservoir Sites, 11 May 1908, in "Notes and Correspondence," Sierra Club Bulletin 6, no. 5 (June 1908): 321-27.)

Will Climate Change impact this watershed and water supply?

- California
- Yosemite National Park
- Water systems

What is the Future?

How can the combined use of this watershed highlight a focus on Recreating Smartly, Sustainably, with Utmost Respect for the Natural Surroundings?

What of the National Parks Dual Mandate: Protection vs. Enjoyment of?

What specific actions for the Reservoir:

- No body contact

What specific actions for Tuolumne Meadows?

- Leave no Trace
- Recreate responsibly within the watershed.
- Environmental awareness of your actions and how recreation might impact ecosystem

Items that impact clean water and habitat

- Direct contact: swimming, wading, walking in water course, human waste disposal
- Boating
- Dirt, soap, detergent
- Pathogens
- Garbage
- Sewage
  - Wastewater facilities
  - Stock facilities
  - Facilities and trail maintenance

Items that impact ecosystems

What does this mean for you?

For more information about the Hetch Hetchy Regional Water System: info@sfwater.org (415) 554-3289

Key Messages

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