HISTORY OF WEATHER OBSERVATIONS
The Presidio of San Francisco, California
1847—1892

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Many thanks.

CONTENTS

ILLUSTRATIONS

Figures

Tables

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INTRODUCTION

The Spanish founded the Presidio of San Francisco in 1776. Mexican forces replaced the Spanish occupation in 1821. In 1845, Lt. John C. Frémont, U.S. Army, led an exploration party of sixty-two men into the Sacramento Valley and made weather observations twice each day he was there. The U. S. Army established the Presidio of San Francisco as an Army Post in September 1847. The ruins of the old Spanish fort were repaired and used. It was in that setting that the Surgeons assigned there began making climate observations— a month after the first U.S. occupation, a year before the territory was transferred to the U.S. from Mexico, and three years before California became a state.

During the Civil War, interest in the Presidio and its strategic location was renewed and the number of troops there increased. By the end of that war, the Presidio was a major western post. Throughout the changes at the Post, climate observations continued to be recorded.

The Surgeon General's Climate Network

The U.S. Army Surgeon General had established the first formal network of climate observers in the United States in 1818. Note that the purpose was to determine the characteristics of climate. Use of observations for weather forecasts would not occur for many years later. The motivation for the new network was to determine if there was a cause and effect relationship between climate and the health of the soldiers. The Surgeon General said that the purpose of the network was to ascertain if "in a series of years there be any material change in the climate of a given district of the country; and if so, how far it depends on cultivation of the soil, density of population, etc."

The Army was a logical choice for this role because it could direct action and had the authority to assure compliance. It could assure that the data were collected into a single standardized format so that geographical differences would be assessed. The Army had posts in the most remote areas of the frontier. That was very important to the government because it would be possible to know what the climate was like before large numbers of people began migrating westward.

The Observers

The medical doctors in the Army were trained scientists, schooled in the importance of careful observations and reasoned analysis, and were a logical choice to become the weather observers. They would be capable of finding the connections between climate and disease, if they existed.

The Climate Record. The importance of the climate observations was evidenced by the early publication of the data. Those climate observations had been taken continually since 1820. The observations for 1820 and 1821 were published at the end of each of those years. The first Army Meteorological Register included data from the years 1822 through 1825 and was issued by Surgeon General Lovell in 1826. The second register had data from 1826 through 1830 and was published in 1840. The third was from 1831 through 1842 and was published in 1851. The scientific data collected by the Post Surgeons were published in the "Army Meteorological Register" in 1855.

The Instrumentation. According to Gillette, the Army furnished improved instruments to the different posts in 1842 and Surgeons Mower and Steinecke and Assistant Surgeon Cuyler, were instructed to prepare a series of rules for taking meteorological observations. The result was that the volume was printed for the period from 1842 through 1854. It contained the observations taken using the prescribed directions. It contained temperature, direction and force of winds, sky conditions, and rain and snow measurements. It was a real climatology with tables and graphs reflecting the general climate of the United States.

The Location. The location of the earliest of the Army's climate network in the California area was at the Presidio of San Francisco. This study of the history of the Presidio's climate observations is one way to preserve that history and to help us understand California's climate from its frontier beginnings to modern days.

Goal of the Study

The goal of this study is to document the primary weather observational history of the Presidio that recorded such an important block of knowledge of early California climate. The climatic data and information from the observations made there are readily available for the entire period of record. They may be accessed through the National Climatic Data Center, the Western Regional Climate Center, and the State Climatologist of California. The challenge of this study was to identify the Presidio's role in the development of a federal weather observational program and where it fit in the route that followed from the Army surgeons, the Signal Service Observer Sergeants, the Weather Bureau meteorologists, to the National Weather Service observational network of today.

LOCATION OF OBSERVATIONS

Latitude and Longitude

The earliest location of the observations at the Presidio (Figure 1) was identified as being at 37˚ 48' N and 122˚ 22' W. The location in latitude and longitude never changed throughout the observational period. There was a notation on the 16 August 1852 observation form that the barometer's position had changed because the hospital had moved. Both the before and the after locations are uncertain.

Elevation

In October 1862, the elevation was recorded as "About 50 ft." In the August 1888 report the elevation was given as 58.462 feet. The precision of the entry gives the impression that a survey was done. However, the observer made no mention of one.

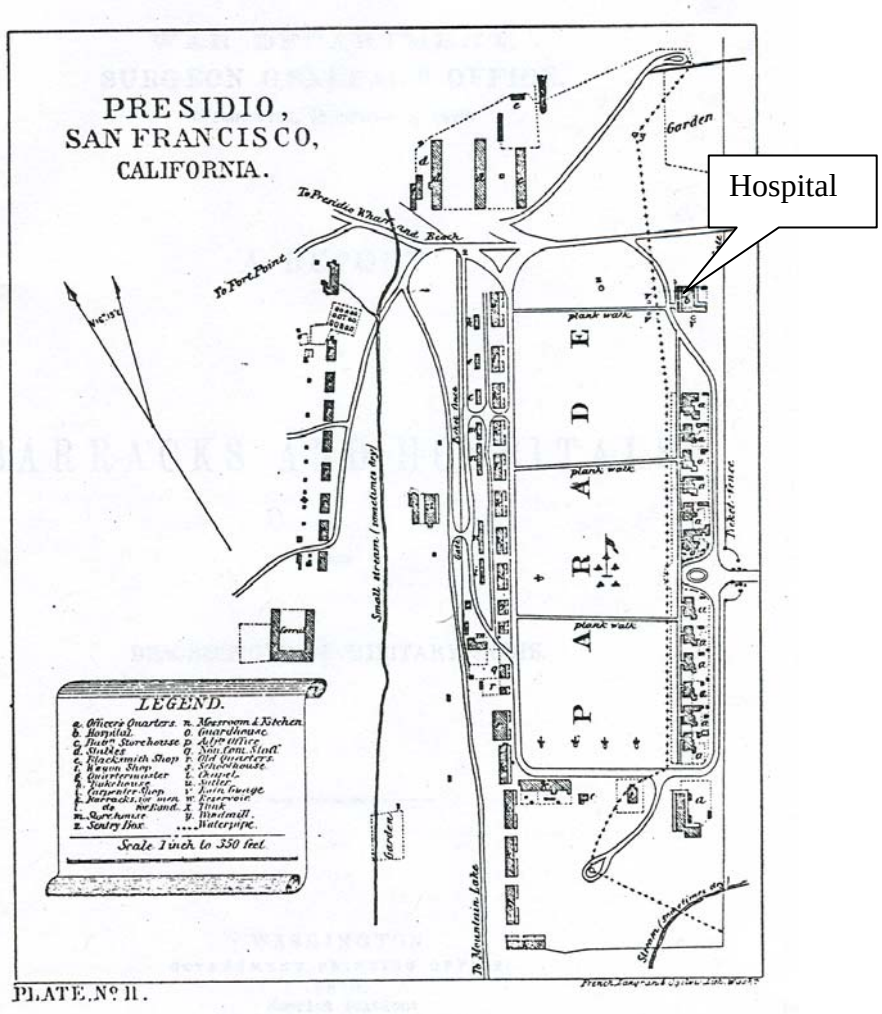


Figure 1. The Presidio
Source: Baily and McKee, 1875

Environment

The Old Post Hospital, as it came to be called, was built at the Presidio in January 1857. It was replaced by the new Post Hospital (Figure 2) in 1864 to care for the soldiers.

Figure 2. New Post Hospital in 1895 as viewed from the east. San Francisco Bay is to the north (right).
Source: National Park Service

The relatively open space north (to the right in Figure 2) of the hospital is the likely location of the weather observations. The photograph was taken five years after the last weather observations. It is likely that the exposure was excellent during the observation period. In the Post Surgeons' J. C. Baily and J. C. McKee's report in 1875, the Post was described as having no shade trees.

> The Presidio of San Francisco, Ca1., is situated in the northwest suburbs of the town, on a gravelly slope which ascends gradually from the sands and salt-water marshes on the southern margin of the harbor of San Francisco. It overlooks the bay, and has in view the posts of Fort Point, a mile to the northwest, near the harbor-mouth, that of Alcatraz Island to the north and eastward, and that of Point San Jose to the east.
>
> The reservation contains about 1,540 acres, and has a frontage on the bay of about a mile and a half. Back from the post the ground rises more rapidly into grass-covered hills. There are no shade trees in the vicinity. The climate is varied and variable; often times

> mild and pleasant during the early part of the day, and chilly and damp toward its close. Strong winds frequently prevail toward the end of summer and autumn, while in winter there is much moisture in the atmosphere, either falling as a heavy rain or enveloping the post in a thick, penetrating mist, which creeps in from the ocean and spreads itself over the lower-lying portions of the harbor boundaries.
>
> The site of the post is well drained naturally, by a fall of one foot in twenty, but this is aided by shallow ditches around the various buildings, so that even immediately after heavy rains there are no standing pools. The parade-ground is grassy during the whole year.
>
> The post is built on three sides of a parallelogram, 550 by 150 yards, which is open to the bay or northeast side.

Major Baily wrote about the Wright Hospital at length (this was the Surgeon's report) saying it measured 40 feet by 80 feet with a wing 22 feet by 35 feet. The whole building had a brick basement and with a porch in front. (An 1870 plan indicated porches on both front and rear.) The hospital, divided into four wards and a smaller ward for prisoners, contained fifty beds. The average occupancy at that time came to seventeen. The hospital attendants had their own room. These rooms contained water pipes, marble basins, wardrobes, tables, and chairs. They had coal-burning fireplaces. The hospital also contained a dispensary, library, post-mortem room, two bathrooms, kitchen, pantry, storeroom, and mess room. The hospital library held 500 volumes — travel, biography, history, fiction, and religion. The hospital kept one cow and maintained a small vegetable garden.

By 1878, most of the reservation consisted of grass covered sand hills. Cattle and horses grazed the treeless hills and dales while strong winds from the ocean brought drifting sand through the land. The annual rainy season, however, produced acres of grasses and wildflowers:

The Presidio Post was described by the Alta California in 1850.

> The surface of the hills present at the present time a most refreshing appearance, covered with verdure and brilliant with the various tints of the wild flowers, with which they are studded in all directions... And then the red, luscious strawberries in the vicinity of the Fort, peeping up from the dark green leaves, relieved by the white fragrant blossoms, giving promise of more anon.

In 1883, the Post developed a plan for the Presidio Forest. The plan was to plant trees on the ridges and along the streams while leaving the valleys as grassland. The tree planting began in 1886 according to the San Francisco Chronicle. By 1892, 329,975 trees had been planted. Some of those are visible in Figures 3 near the hospital.

By 1902, trees covered 420 of the 1,540 acres of the Post.

About this time the commanding officer of the new general hospital at the Presidio asked Rawles to plant trees around the hospital's officers' quarters. Note the eucalyptus now standing on the right in Figure 3. It may have been one of those trees. Note also that an octagonal-shaped structure had been added on the right side of the original hospital.

Figure 3. Post Hospital in 2005 as viewed from the east
Source: Author

The octagonal design of the operating rooms in the new addition added more available lighting for the surgeries.

Note the size of the eucalyptus in the left foreground in Figure 4. It had not been planted by 1895 when the photograph in Figure 1 was taken, indicating that its age must be less than one hundred and ten years.

Figure 4. Post Hospital as viewed from the north in 2005
Source: Author

The Letterman Hospital was built in 1899 and afterward the old Wright Hospital was used as a clinic and dispensary.

INSTRUMENTATION

Thermometer

The first observations in 1847 had only a thermometer as a measuring instrument. July 1870 marked the first use of a self-registering minimum thermometer. In October 1871, the first readings from a self-registering maximum thermometer were made.

Barometer

A note in the first observations in 1847 stated that a barometer had not been furnished at the beginning. The first barometer readings were in July 1852. The following month, its elevation was listed as above the Pacific Ocean. On 16 August 1852, the position of the barometer has changed because the Hospital had been moved.

In October 1862, the barometer readings were omitted after 16 October 1862. They resumed on 18 November 1862. No reason was given.

Rain Gauge

1847 — 1852

The Presidio was not provided a rain gauge when the observations first began. Rain days were mentioned in the remarks but amounts were not measured.

1852 — 1873

The first measurement of rainfall was on 29 October 1852 with a “heavy rain” of 0.69 inch recorded. In December 1852, what was apparently an accumulated amount of rainfall was entered and appears at first glance as if it were a daily amount. It was entered on the ending date of a precipitation event with a cumulative amount measured between the beginning time and date, and the ending time and date as listed on the form. That method of recording the rainfall continued until 3 December 1873.

1874-1892

After 3 December 1873, the rainfall was recorded on the date indicated. Amounts were not accumulated.

Hygrometer

The first entries for a hygrometer began on 1 October 1856. The identification of the type of instrument is unavailable.

THE OBSERVERS

Throughout the history of climate observations at the Presidio, only surgeons made the daily readings. In the beginning, surgeons there were unique within the Army. According to Gillette, surgeons were contracted to provide medical services to the Army. Afterward, they were commissioned in the Army with rank and titles. Physicians entered the Army with the rank of 1st Lieutenant and were given the title of Assistant Surgeon. After three to five years, they could be promoted to the rank of Captain but would retain the title. If they were promoted to the rank of Major, they were given the title of Surgeon. They would retain that title if they were promoted to Lt. Colonel or Colonel. The rank of Colonel was the highest rank possible, even for the Surgeon General of the Army. Sometimes, exigencies required the use of contract physicians. In such cases, they were given the title of Assistant Surgeon.

1847-1868

The first surgeon, Robert Murray (Figure 5), was a native of Maryland and was commissioned as an Assistant Surgeon on 29 June 1846. He was assigned to the Presidio in March 1847. He was not the first observer, that was William C. Parker a month later, but he would become one on a second tour at the Presidio nine years later. Most of his first tour was spent in Los Angeles, Monterey, and Camp Far West before being reassigned to Boston and New York in 1850.

Figure 5. Robert Murray, first surgeon assigned to the Presidio
Source: http://www.members.tripod.com/~howardlanham/linkgr3/link168.html, last visited April 2005

William C. Parker was the first observer at the Presidio. He was an Assistant Surgeon from New York. His observations were October 1847 through April 1848. He was discharged on 1 October 1848.

George F. Turner was an Assistant Surgeon who entered the service from Massachusetts on 23 July 1823. He made the observations from March 1850 through May 1850. He died on 17 October 1854.

Charles. M. Hitchcock was a Surgeon when he made the July 1852 through September 1852 observations. He was a graduate of the University of Pennsylvania Medical School, was in the Army as surgeon at West Point from 1840 to 1845, and went to California in 1852. He resigned on 31 March 1853. He died in San Francisco 3 April 1885 at age 72 and is buried in Colma, California.

Charles L. Tripler (Figure 6) was the observer from November 1852 through February 1854. The observations for the first five days of September 1853 were missing. The remarks explained, “Not observed on account of the necessary absence of the Hospital Steward.” The note was written by someone left-handed and in a different script used anywhere in Tripler’s records. Perhaps it was the Steward’s.

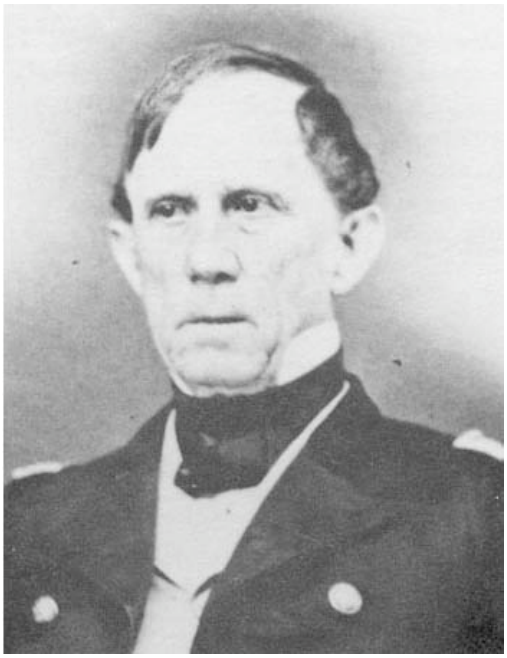


Figure 6. Charles L. Tripler,
Source: Gillette, 1987

The observer and the observations for 1855 are not known.

William Alexander Hammond was commissioned on 29 June 1859. He was Acting Assistant Surgeon and submitted the Presidio observations in January through August 1856. He signed as “In Charge of Hospital.”

Robert Murray (Figure 7) returned to the Presidio in 1854 and was the observer from September 1856 until March 1857. He remained there until June 1861 when he was assigned to the Army of Ohio as its medical director serving under Generals Buell and Rosecrans. By the end of the War, he had been given the rank of Brevet Colonel. On 23 November 1883, he was promoted to Brigadier General and became Surgeon General of the United States Army. He retired on 6 August 1886 and died in 1913 at the age of ninety.

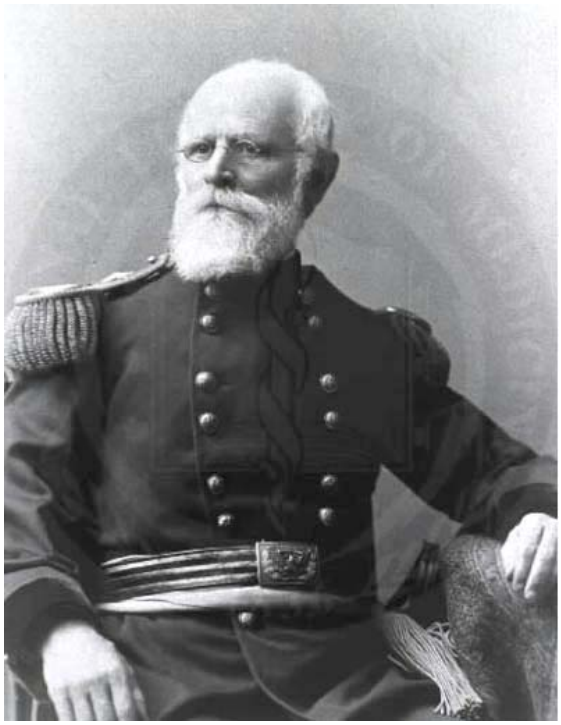


Figure 7. Robert Murray, Surgeon General of the United States Army, 1883 to 1886
Source: http://history.amedd.army.mil/tsgs/Murray.htm, last visited April 2005

Assistant Surgeon LaFayette Guild made the observation from May 1857 through June 1857. He was commissioned on 2 March 1849 in Alabama. He was dismissed from the Army on 1 July 1861.

Joseph K. Barnes, Surgeon, (Figure 8) made the observations during July 1857. His medical degree was from the University of Pennsylvania in 1838. He was commissioned as an Assistant Surgeon on 15 June 1840. He served in the action against the Seminoles in Florida and in the Mexican War. Before the Civil War began, he served at several locations including the Presidio. During the Civil War on 3 September 1863, he was made the Surgeon General of the

Army, eventually rising to the rank of Major General. He was at the deathbed of President Abraham Lincoln and later was one of the physicians that cared for President Garfield during his final weeks of life. He retired from the Army at age 65 and died one year later.

Figure 8. Joseph K. Barnes, Surgeon General of the United States Army, 1864 to 1882
Source: Gillette, 1987

Josiah Simpson signed the observations form as a Surgeon in September 1857. He was a veteran of the Mexican War with Tripler. He was appointed Assistant Surgeon on 1 July 1837. This native of New Jersey was promoted to Colonel on 13 March 1865. He died on 3 March 1874.

Richard Potts was an Assistant Surgeon from Maryland who made observations for the three months of October, November, and December 1857. He resigned from the Army on 7 May 1861 and joined the Confederate Army as a Surgeon.

Josiah Simpson resumed posting the observations during July and August 1858.

William Francis Edgar was a Kentuckian who was commissioned on 21 March 1849. He was retired on 27 August 1862. As an Assistant Surgeon, he recorded the climate from September1858 and October 1858. He died 30 January 1883.

Charles Carter Keeney, an Assistant Surgeon, made the climate observations from November 1858 through Jun 1859. He was a native of New York who became a Medical Inspector for the Army in 1862. He was promoted to Colonel on 30 June 1882. He died on 30 June 1883.

Charles McCormick (Figure 9), an Assistant Surgeon, was commissioned on 30 August 1836 in the District of Columbia. He made the climate record entries from July 1859 through September 1859. He was a Major and a Surgeon at that time.

Figure 9. Charles McCormick, Presidio Observer
Source: Gillette, 1995

Charles Carter Keeney resumed the observations from October 1859 through April 1860. There followed two single months of observers. John Jefferson Milhau who was an Assistant Surgeon did the May 1860 readings. The June 1860 report was made by Charles McCormick — his second time for observing. Charles C. Keeney resumed the observations in July1860 and continued through May 1861

John Broadman Trask was the observer for June and July 1861. He was born in Massachusetts and received his medical degree from Yale. He went to California in 1850. After his service as an Army Surgeon during the Civil War, he practiced medicine in California. He helped found the California Academy of Science and he was the first scientist to describe California's fossils. He was appointed the first state geologist in 1860.

John Jefferson Milhau was born in France and was commissioned in New York as an Assistant Surgeon on 30 April 1851. He resumed observation at the Presidio in August and

continued through September 1861. Life would become more exciting just eight months later. General George B. McClellan would write about his role in the battle of Williamsburg, Virginia.

> Assist. Surg. John J. Milhau, medical department, the medical director of the corps, was most indefatigable in his attention to the wounded during the action and the following night. He performed many operations himself. He was very active in procuring and arranging transportation for them to Queen's Landing, at which point they were embarked for Fort Monroe.

He was promoted to Brigadier General on 28 September 1866. He resigned from the Army on 1 October 1875 and died on 8 May 1891.

William Williams Hays was employed by the Smithsonian Institution as a Meteorologist to finance his medical school expenses at Georgetown University. He joined the Army as an Assistant Surgeon when the Civil War began. He was assigned to the Presidio and made the observations during October 1862. He left the Army after the War and settled in San Luis Obispo County. He became a meteorological observer of temperature and rainfall for the Smithsonian Institution. Some of his data were included in a publication of Engineers and Irrigation in 1873 (Table 1).

Table 1. Temperatures in and adjacent to the Great Valley
Source: U.S. Army Corps of Engineers, 1873

Places	Altitude above the sea.	Geographical position.		Period of observation.	Temperature.				Rain and snow.
		Latitude.	Longitude.		Mean of hottest day.	Mean of coldest day.	Range.	Mean.	
In the Great Valley:	*feet*	*o ' *	*o ' *		*o*	*o*	*o*	*o*	*In.*
Fort Reading[1]	674	40.31	122.05	4 yrs	83.0	44.0	39.0	62.1	29.1
Chico[2]	150	39.46	121.50	1 1/2 yrs	92.3	37.0	55.3	64.7	17.7
Colfax[2]	2,421	39.03	120.55	1 1/2 yrs	91.7	33.3	58.4	62.7	30.8
Marysville[3]	76	39.12	121.42	1 yr	90.0	38.0	52.0	63.3	--
Sacramento[4]	54	38.31	121.20	24 yrs	94.0	32.0	62.0	60.3	19.6
Vacaville, Solano[5]	100	38.20	122.00	1 yr	86.0	37.0	49.0	53.3	24.2
Stockton[6]	23	37.37	121.14	1 1/2 yrs	91.0	41.0	50.0	66.0	4.8
Fort Miller, (Millerton)[7]	402	37.00	119.40	5 yrs	90.0	47.0	43.0	66.0	24.5
Auburn[2]	1,363	38.57	121.02	1 1/2 yrs	91.0	34.3	56.7	62.8	17.6
Benicia[8]	183	38.08	122.14	18 yrs	80.0	44.0	36.0	59.1	22.9
San Francisco[9]	22	37.48	122.27	19 yrs	78.0	37.0	41.0	56.4	21.5
Monterey[10]	140	36.36	121.52	6 yrs	59.0	50.0	9.0	55.0	12.2
Santa Barbara[11]	300	34.31	119.38	1 yr	92.0	42.0	50.0	60.2	15.0
San Diego[12]	150	32.42	117.14	7 yrs	74.0	52.0	22.0	62.0	10.4
Fort Yuma[12]	120	32.43	114.36	6 yrs	92.0	56.0	36.0	74.0	3.2
Port Orford, Oreg.[12]	50	42.44	124.29	4 yrs	61.0	46.0	15.0	53.6	71.6

Authorities and Remarks:
1. Army Meteorological Register, 1855.
2. Engineer department Central Pacific Railroad, 1870-'71.
3. W. C. Belcher, 1858.
4. Thomas M. Logan, M.D.
5. Prof. J. C. Simmon.
6. Engineer department Central Pacific Railroad.
7. Army Meteorological Register.
8. W. W. Hays, surgeon U.S.A.
9. Henry Gibbons, M.D.
10. Army Meteorological Register.
11. J. A. Johnson.
12. Army Meteorological Register.

A Hospital Steward, David F. Parkinson, assumed the observer role when Dr. Hays departed. Parkinson, whose rank was never mentioned, was the only non-medical officer in the forty-three year period of record. There was a Sergeant by that name in the 16th Infantry at the Presidio who was commissioned as a Second Lieutenant on 13 April 1865. Perhaps that is the same individual. Parkinson's observations provide the record from December 1862 through October 1864 with two exceptions of short interruptions.

Those exceptions were when John O. Bronson, Surgeon, U.S. Volunteers, entered the data for March through May 1863 and for July 1863. He was a native of Connecticut who was mustered out of the Army on 1 November 1865. He died on 29 March 1897.

The next three observers were from the California Volunteers. The first was Isaac Parry, a Surgeon with the California Volunteers, who recorded the weather during November 1864. He had enlisted as a Surgeon on 8 October 1861 in Napa, California. He resigned on 26 August 1865. The second was Edward Phelps, an Assistant Surgeon with the California Volunteers. He had entered the Army from San Francisco on 1 June 1863 and was with the 7th Infantry when he made the observations from December 1864 through August 1865. He was replaced by his predecessor, Isaac Parry, who made the record for March through July 1865. Charles A. Kirkpatrick, who was a Surgeon, replaced him during August 1865. He had joined the Army at Camp McDougal in California on 1 October 1861. His 8th Infantry was mustered out in October 1865.

Charles Smart (Figure 10), who was born in Scotland, was the observer during September 1865. This Assistant Surgeon had entered the Army on 30 March 1864 in New York. In 1901 he was a Colonel and an Assistant Surgeon General of the U.S. Army.

Figure 10. Charles Smart, Presidio Observer
Source: Gillette, 1995

Charles Squire Wood was an Assistant Surgeon from Connecticut who served with the U.S. Volunteers. He was a Lt. Col. when he filled the observation forms for October and November 1865. He was followed by John H. Kinsman who an Assistant Surgeon from Massachusetts. He was the observer from November 1865 through January 1866. He died on 2 June 1902.

James Thomas Ghiselin (Figure 11) was from Maryland where he entered the Army on 1 June 1855. This Major and Assistant Surgeon kept the climate record at the Presidio from December 1866 through March 1867. He resigned on 6 June 184 and died on 2 March 1896.

Figure 11. James T. Ghiselin, Presidio Observer
Source: Gillette, 1987

Peter W. Randle was the observer from April 1867 through July 1867. He had been an Assistant Surgeon with the 1st Infantry Regiment. He joined them in San Francisco on 16 August 1861.

John Vance Lauderdale was the observer from August 1867 through March 1868. He was born in New York in 1832 and attended University of New York. He was appointed Assistant Surgeon in the Army on 14 May 1867. He moved to the Presidio by way of the Isthmus of Panama in 1867. Upon arrival at the Presidio in that August, he began making the daily weather observations. He continued those duties until he left for his reassignment to Yuma, Arizona. Years later, on December 29, 1890, the day of the Battle of Wounded Knee, he was ordered to the Pine Ridge Agency in South Dakota. His letters to his wife reported on the aftermath of the battle and care of the wounded. He retired in 1896 at age sixty-four, He died in 1931 as the oldest retired officer in the U.S. Army.

Levi H. Patty was born in Covington, Ohio and moved to California in 1863. There he was employed as a contract physician at the Presidio from December 1865 until August 1875. He was the observer at the Presidio from April through November 1868.

1868-1872

Joseph Clark Baily made the weather observations from December 1868 through January 1869 at the Presidio. He was born in Pennsylvania and joined the Army on 27 October 1857 as an Assistant Surgeon. He served at the Presidio from June 1868 through April 1872. At the Presidio in 1869, he held the rank of Major and the title of Surgeon. He had a second tour at the Presidio from December 21, 1877 through September 18, 1882. He was promoted to Colonel after subsequent assignments in 1892. He died on 16 May 1894.

Elias. J. Marsh**,** a native of New Jersey, entered the Army as an Assistant Surgeon on 19 August 1862. He made the observations at the Presidio for March 1869. During the Civil War, had held the rank of Brevet Major. He was discharged in 1870.

Levi H. Patty resumed the observations from April 1869 through April 1870. He later went to Missouri and graduated from the St. Louis Medical College in 1877. He returned to California and practiced in Petaluma.

Major Baily resumed the observations in May 1870 and continued through April 1872.

1872-1877

Thomas McMillin was the observer from May through October 1872. He became an Assistant Surgeon in the Army on 19 August 1862. He was promoted to Lieutenant Colonel in 1867 for his distinguished service during a cholera outbreak. He was at the Presidio from 12 April 1872 to 6 April 1873. He died on 6 April 1873.

There followed four short-time observers. Edwin Bentley made the observations for December 1872. He was from Connecticut and had begun service as an Assistant Surgeon on 1 October 1861. He was at the Presidio from 20 November 1872 through March 1873. During his career, he advanced to the rank of Lt. Col. during the Civil War and retired on 3 July 1888. P. H. Humphrey observed from December 1872 through March 1873. William Lands Newlands followed him. He was from Missouri and observed from April through June 1873. He resigned from the Army in 1878.

Calvin DeWitt was a Captain in the Pennsylvania Infantry who resigned in 1863, re-entered as an Assistant Surgeon on 14 May 1867, and completed his career as a Colonel in 1901. He was the observer at the Presidio during July through October 1873.

In November 1873, James Cooper McKee began observing the weather. He was a Pennsylvanian who had become an Assistant Surgeon in the Army on 2 October 1858. He continued observations through November 1876 with two exceptions.

The first substitute was Edwin Bentley who filled in from August through October 1874. He was from Connecticut and later retired as a Lt. Col. on 13 March 1865. The second was M. M. Shearer who filled in during August and September 1875. M.M. Shearer was an acting assistant surgeon 3 May 1875 to 23 January 1876.

Samuel Appleton Storrow received his Army commission on 5 August 1861 in Virginia. He was an assistant surgeon at the Presidio from 21 February 1876 to 21 December 1877. He was a Major when he made the observations from December 1876 through November 1877.

1877-1892

In December 1877, Joseph C. Baily returned to the Presidio. With the exception of three short periods, he observed until March 1883. Those three short periods were June and July 1878, October 1878, and December 1880 to January 1881. During those substitute periods, the observer was Alfred Alexander Woodhull who began his career as an Assistant Surgeon on 19 September 1861. The native of New Jersey remained in the Army until he retired as a Colonel in 1901.

James Cooper McKee returned as observer from April through October 1883. John Brooke who arrived at the Presidio in November 1883 replaced him. That native of Pennsylvania became an Assistant Surgeon on 2 March 1862 and was promoted to Major for meritorious service in 1865. He observed the weather for three years at the Presidio. He retired on 22 February 1894 and died 12 May 1902. He was replaced by a Medal of Honor recipient (Figure 12).

Figure 12. Henry R. Tilton, Medal of Honor Winner and Presidio Observer 1886-1889
Source: http://history.amedd.army.mil/moh/tiltonh.htm

Henry Remsen Tilton (Figure 12) assumed the observer role in June 1886. He had begun his Army service on 26 August 1861 at Jersey City, New Jersey as an Assistant Surgeon. He had reached the rank of Major by the end of the Civil War. For his bravery on 30 September 1877 at Bear Paw Mountain in Montana, he earned the Medal of Honor. The citation stated that he "fearlessly risked his life and displayed great gallantry in rescuing and protection the wounded me." The medal was awarded on 22 March 1895.

Francis Laban Town made the last six years of observations at the Presidio. His observations spanned the period from January 1886 through February 1892. He was born in New Hampshire and graduated from Dartmouth College Medical Department in 1860. He became an Assistant Surgeon in the Army on 28 May 1861. His service included the Army of the Cumberland during the Civil War, as Chief Surgeon of the Military District of Kentucky, and as Post Surgeon in Montana, Maine, Oklahoma Territory, and Washington. He served at the Presidio in 1888 through 1892. While there he made the last weather observations at the Presidio. He was the Assistant Surgeon General of the Army on 28 June 1894. After thirty-five years of service, he retired as a Colonel on 10 October 1896. Colonel Town (Figure 13) died in 1922.

Figure 13. Francis L. Town, the Last Presidio Observer
Source: New Hampshire Division of Historical Resources

THE PRESIDIO OBSERVATIONS

The Early Years

William C. Parker made the first observations at the Presidio. He submitted data from three months (October, November, and December 1847) on a hand drawn form. The first page of his submission is in Figure 14. The heading uses the original term "Diary of the Weather" proposed by the first Surgeon General when the network was first initiated. Handwritten forms were used prior to 1820 but the reason for this one seems to have been from a lack of the printed forms.

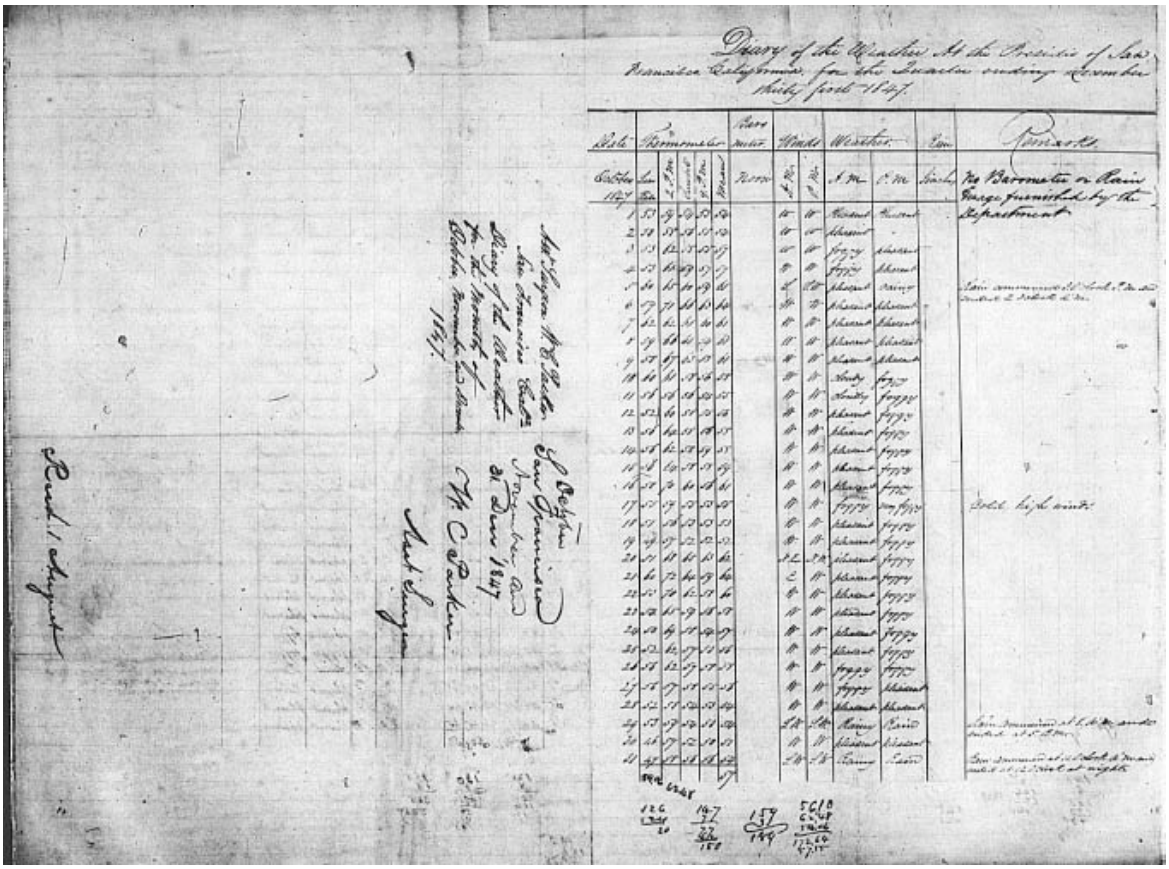
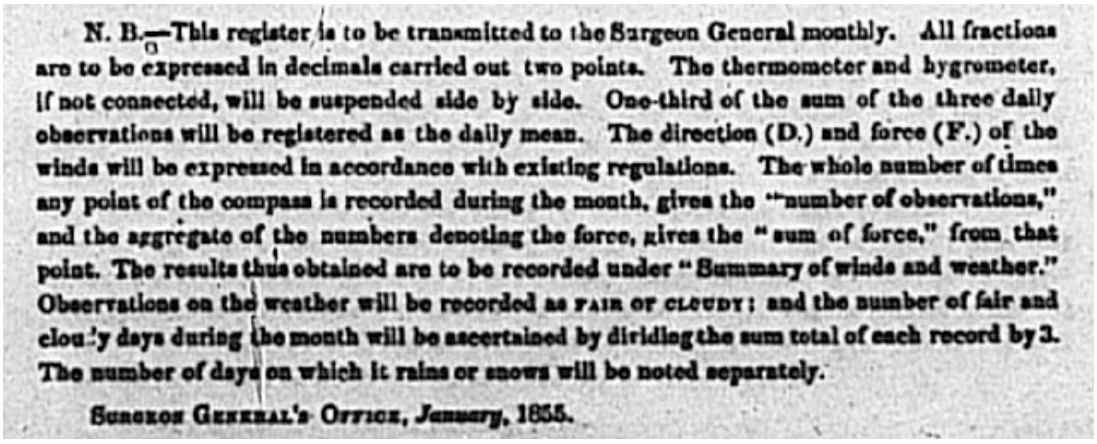


Figure 14. First observations from the Presidio, October 1847
Source: Original, National Climatic Data Center

The thermometer was read at sunrise, 2 p.m., sunset, and 9 p.m. The wind direction and the weather were summarized for morning and afternoon. The columns titled "barometer" and "rain inches" had no entries. The remarks say that the barometer and rain gauge had not been received. Notice that on the left side of the form is a note, "Asst. Surgeon W. C. Parker, San Francisco Cal.[a] Diary of the Weather for the Month of October, November and December 1847. At the far left of the form is a note, "Recd. 1 August." Postal service was apparently still using ships and the telegraph wasn't yet available.

In May 1850, the observations were on the Meteorological Register, the Army's Form 3. The observation times were sunrise, 9 a.m., 3 p.m., and 9 p.m. The Army had adopted these new times when the Form 3 was placed into use. Those observations included the barometer and a rain gauge was in use by October 1852.

The observations for the calendar year 1855 are missing. The reason is unknown. In January 1856, a new version of the Meteorological Register was used. The revised Form 3 changed the observation times to 7 a.m., 2 p.m., and 9 p.m. There was a column for hygrometer on the new form but no entries were made, the requirement for them was lifted in 1846. The observers continued to accumulate rainfall for each precipitation event. Instructions for using the new form (Figure 15) were at the bottom of the form.



N. B.—This register is to be transmitted to the Surgeon General monthly. All fractions are to be expressed in decimals carried out two points. The thermometer and hygrometer, if not connected, will be suspended side by side. One-third of the sum of the three daily observations will be registered as the daily mean. The direction (D.) and force (F.) of the winds will be expressed in accordance with existing regulations. The whole number of times any point of the compass is recorded during the month, gives the "number of observations," and the aggregate of the numbers denoting the force, gives the "sum of force," from that point. The results thus obtained are to be recorded under "Summary of winds and weather." Observations on the weather will be recorded as FAIR or CLOUDY; and the number of fair and cloudy days during the month will be ascertained by dividing the sum total of each record by 3. The number of days on which it rains or snows will be noted separately.

SURGEON GENERAL'S OFFICE, *January*, 1855.

Figure 15. Instructions for Meteorological Register, 1855
Source: Original Record, January 1856, Presidio

There is a gap in the record between September 1861 and October 1862. No reason was found.

The form used in October 1862 was the Register of Meteorological Observations Under the Direction of the Smithsonian Institution, Adopted by the Commissioner of Patents for his Agricultural Report. The observer, W. W. Hays, may have provided the form because he had previously worked for the Smithsonian. For November 1862

The Later Years

The Post Surgeon, Lt. Col. Baily, made the climate record from the Presidio in January 1869 (Figure 16).

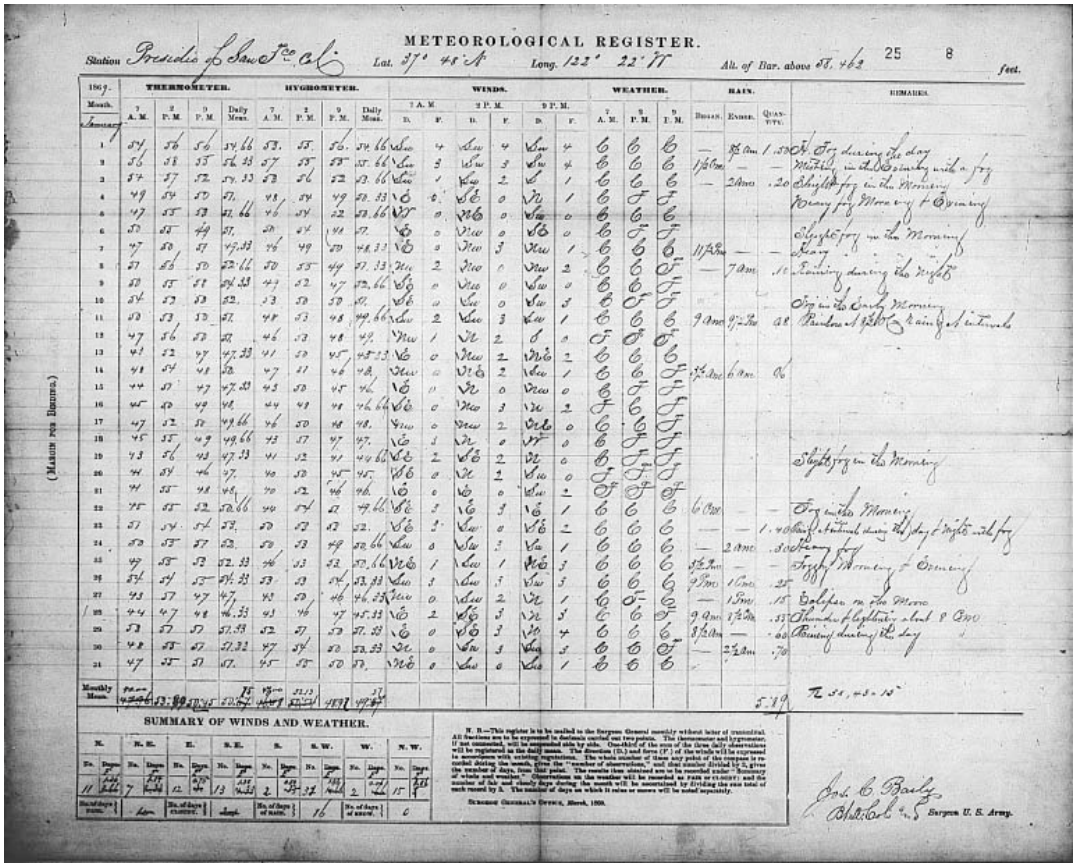


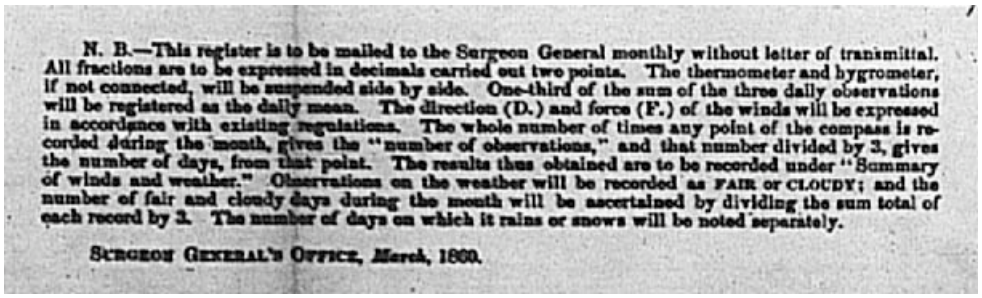
Figure 16. Presidio Climate Record, Front Side, January 1869.
Source: Original Record, National Climatic Data Center

The observation times were at 7 a.m., 2 p.m., and 9 p.m. The thermometer, hygrometer, wind direction and force, and weather (cloudy, fog, etc.,) were entered at those times. The wind direction was entered using a letter for the eight principal directions. The force was estimated using numbers from zero to 10. Zero equaled calm and 10 equaled 70 miles per hour. The rain beginning and ending times, the rain amount in inches and hundredths, and the remarks were entered at the end of the day. At the bottom of the temperature and hygrometer columns were the monthly means of those values. The monthly total rainfall was entered at the bottom of the rainfall amount column. At the bottom left on the form was a climate summary for the month. It summarized the wind direction (eight points) by frequency of direction. It also summarized the number of days that had reports of fair skies, cloudy skies, rain, and snow.

The Surgeon General Joseph Lovell in 1818 ordered each Army surgeon to ".... keep a diary of the weather...." and to note ".... everything of importance relating to the medical topography of his station, the climate, diseases prevalent in the vicinity...." The emphasis was on subjective observations and, at least in effect, data were collected to supplement the observer's remarks. The remarks column on the observations forms was typically filled with their comments that provided that qualitative enhancement to the data. Some of the entries, such as the "eclipse on the moon" on 27 January, now seem unrelated to climate. At that time, both the

Surgeon General's and the Smithsonian Institution's networks were required to report such things.

At the bottom right of the form were the instructions to the observer (Figure 17) for completing the form.



N. B.—This register is to be mailed to the Surgeon General monthly without letter of transmittal. All fractions are to be expressed in decimals carried out two points. The thermometer and hygrometer, if not connected, will be suspended side by side. One-third of the sum of the three daily observations will be registered as the daily mean. The direction (D.) and force (F.) of the winds will be expressed in accordance with existing regulations. The whole number of times any point of the compass is recorded during the month, gives the "number of observations," and that number divided by 3, gives the number of days, from that point. The results thus obtained are to be recorded under "Summary of winds and weather." Observations on the weather will be recorded as FAIR or CLOUDY; and the number of fair and cloudy days during the month will be ascertained by dividing the sum total of each record by 2. The number of days on which it rains or snows will be noted separately.

SURGEON GENERAL'S OFFICE, *March*, 1860.

Figure 17. Surgeon General's Instructions for Observations.
Source: Meteorological Register, 1860, Presidio

On the backside of the form were the barometer readings and the temperature of the thermometer that was attached to it (Figure 18).

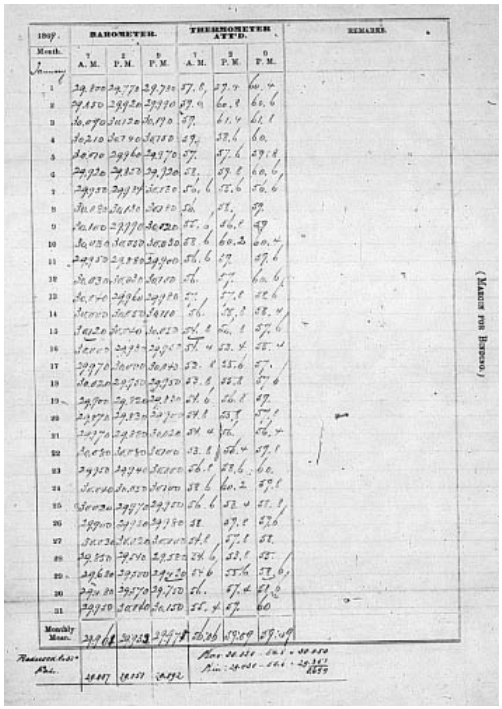


Figure 18. Presidio Climate Record, Backside, January 1869.
Source: Original Record, National Climatic Data Center

The daily observations at the Presidio were reported each month to the Army Surgeon General until shortly after the weather network of the U.S. Army's Signal Service was begun in

1870. In 1874, the Army's observations from the Post Surgeons were forwarded to the Signal Service in Washington who maintained the archive. That change did not seem to change the independence of the Army surgeons. In 1875, they included a climatological summary of their observations in one of their reports (Table 2) with no mention of the Signal Service.

Table 2. Presidio Climate Data 1870-1874
Source: Baily and McKee, 1875

Meteorological report, Presidio of San Francisco, Cal., 1870–'74.

Month.	1870–'71.				1871–'72.				1872–'73.				1873–'74.			
	Temperature.			Rain-fall in inches.	Temperature.			Rain-fall in inches.	Temperature.			Rain-fall in inches.	Temperature.			Rain-fall in inches.
	Mean.	Max.	Min.		Mean.	Max.	Min.		Mean.	Max.	Min.		Mean.	Max.	Min.	
	°	°	°		°	°	°		°	°	°		°	°	°	
July	60. 97	83	54°	0. 00	55. 68	83	46°	0. 00	77. 93	93°	58°	2. 56	56. 54	76°	42°	0. 02
August	61. 61	71	53°	0. 00	56. 41	85	46°	0. 00	56. 30	74°	48°	0. 03	58. 71	77°	41°	0. 00
September	60. 01	71	51°	0. 04	56. 56	74	46°	0. 00	58. 44	80°	45°	0. 07	56. 98	89°	50°	0. 00
October	60. 10	85	45°	0. 00	61. 43	92°	45°	0. 04	57. 05	74°	46°	0. 14	58. 77	77°	45°	0. 56
November	56. 29	71	43°	0. 56	54. 30	76°	38°	2. 41	54. 42	67°	41°	2. 93	56. 91	71°	44°	0. 86
December	48. 33	63	35°	3. 82	52. 31	63°	36°	9. 96	51. 13	61°	37°	6. 58	49. 71	58°	32°	9. 57
January	49. 26	63	37°	2. 19	51. 85	61°	42°	5. 03	53. 41	67°	40°	4. 25	48. 11	62°	37°	3. 96
February	49. 03	58	36°	3. 36	54. 09	63°	42°	10. 50	49. 71	66°	39°	7. 39	49. 50	60°	36°	1. 31
March	52. 41	73	39°	0. 61	53. 33	80°	42°	2. 61	53. 39	77°	40°	0. 58	49. 56	66°	35°	2. 57
April	52. 63	71	41°	1. 21	52. 51	73°	36°	1. 08	52. 95	76°	38°	0. 46	54. 03	74°	42°	0. 67
May	53 98	67	46°	0. 38	54. 52	85°	45°	0. 00	53. 92	74°	45°	0. 11	56. 87	80°	44°	0. 18
June	55. 42	64	50°	0. 00	58. 25	92°	48°	0. 07	55. 50	66°	47°	0. 06	57. 99	81°	45°	0. 00
For the year	51. 93	85	35°	12. 05	55. 34	92°	36°	22. 70	56. 31	93°	37°	28. 18	54. 47	89°	35°	23. 64

* These observations are made with self-registering thermometers. The mean is from the standard thermometer.

In 1886, the Presidio's summarized precipitation data (Table 3) were published in a huge volume of data tables that presented California's climate data.

Table 3. Presidio's Precipitation Data 1849—1884
Source: Hall, 1886

PRECIPITATION TABLE, No. 123. COMPILED BY THE

Monthly: Rain and Melted Snow. SAN FRANCISCO—(PRESIDIO).

AUTHORITY: U. S. War Department. In Inches.

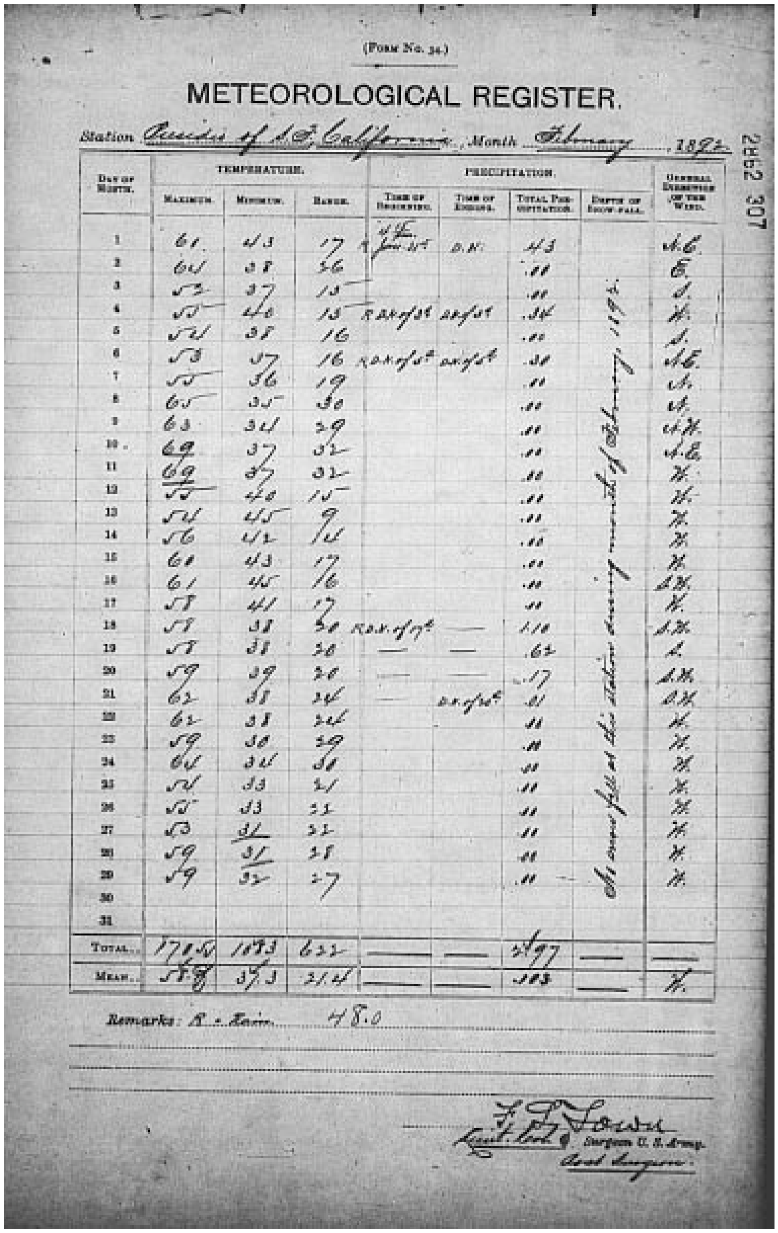
YEARS.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.
1849–50	------	------	------	------	------	------	8.38	------	0.00	0.01	------	------
1850–51	------	------	------	------	------	------	------	------	------	------	------	------
1851–52	------	------	------	------	------	------	------	------	------	------	0.00	0.00
1852–53	0.00	0.69	4.92	12.07	3.75	1.17	3.72	5.27	0.42	0.00	0.00	0.00
1853–54	0.23	0.28	2.00	1.86	3.04	5.87	3.11	2.24	0.06	1.05	0.01	0.03
1854–55	0.03	1.56	0.40	0.60	2.89	2.88	3.23	3.65	1.42	0.00	0.00	0.00
1855–56	0.00	0.00	0.88	4.31	5.74	0.24	1.17	2.24	0.54	0.00	0.00	0.00
1856–57	0.00	0.33	1.57	2.57	2.12	6.00	1.39	0.00	0.14	0.11	0.00	0.00
1857–58	0.00	0.45	2.84	2.90	3.07	1.02	3.46	1.12	0.16	0.00	0.03	0.01
1858–59	0.00	1.35	0.53	4.60	1.63	4.82	1.99	0.14	1.17	0.00	0.00	0.00
1859–60	0.02	0.02	3.45	1.10	1.58	1.78	4.07	3.35	3.23	0.10	0.18	0.00
1860–61	0.05	0.97	0.43	5.35	1.68	2.76	2.85	0.56	0.99	0.18	0.00	0.00
1861–62	------	------	------	------	------	------	------	------	------	------	------	------
1862–63	------	------	0.24	1.89	4.80	3.14	1.55	1.96	0.51	0.03	0.05	0.00
1863–64	0.25	0.00	3.06	0.93	1.27	1.01	1.28	0.36	0.00	0.00	0.00	0.04
1864–65	0.00	0.00	4.14	7.30	3.55	1.00	0.50	0.90	0.55	0.25	0.11	0.00
1865–66	0.00	0.00	2.04	3.89	8.17	1.24	2.33	0.18	1.78	0.04	0.00	0.00
1866–67	0.02	0.00	2.60	11.65	5.80	6.40	2.04	1.91	0.00	0.00	0.00	0.00
1867–68	0.00	0.75	2.70	7.92	8.38	5.87	5.88	2.09	0.00	0.25	0.00	0.00
1868–69	0.10	0.00	1.38	5.05	5.89	3.87	2.77	2.66	0.08	0.00	0.00	0.00
1869–70	0.00	2.00	1.12	3.34	2.87	2.96	1.33	1.09	0.22	0.00	0.00	0.00
1870–71	0.04	0.00	0.50	3.22	2.19	3.30	0.61	1.81	0.38	0.00	0.00	0.00
1871–72	0.00	0.04	2.41	9.96	5.03	10.50	2.61	1.08	0.00	0.07	0.00	0.03
1872–73	0.08	0.14	2.93	8.58	1.74	7.39	0.56	0.46	0.11	0.06	0.02	0.00
1873–74	0.00	0.54	0.78	9.57	3.96	1.31	2.57	0.62	0.18	0.00	0.00	0.00
1874–75	0.00	1.71	3.40	0.10	4.75	0.00	0.87	0.00	0.04	0.56	0.00	0.00
1875–76	0.00	0.23	6.26	2.59	4.82	2.72	2.78	0.00	0.00	0.00	0.04	0.00
1876–77	0.08	2.37	0.17	0.00	4.15	0.66	0.58	0.00	0.07	0.00	0.00	0.00
1877–78	0.00	0.39	1.04	1.96	8.03	9.58	2.33	0.64	0.20	0.00	0.00	0.00
1878–79	0.26	0.74	0.46	0.56	3.00	3.65	6.66	1.74	1.18	0.04	0.00	0.00
1879–80	0.00	0.68	3.75	4.24	2.32	1.43	1.91	7.35	0.88	0.00	0.00	0.00
1880–81	0.00	0.05	0.26	9.20	6.04	4.06	0.62	1.70	0.10	0.62	0.00	0.00
1881–82	0.17	0.48	2.08	3.17	1.41	2.70	2.78	0.86	0.12	0.00	0.00	0.00
1882–83	0.36	2.24	3.30	2.14	1.40	0.82	2.43	1.09	3.00	0.04	0.00	0.00
1883–84	0.34	0.74	1.64	0.58	3.64	4.12	5.86	5.10	0.14	1.93	0.00	0.00
Means	0.06	0.64	2.07	4.29	3.83	3.37	2.45	1.71	0.57	0.17	0.01	0.00

In September 1888, the Surgeon General issued new instructions based on an agreement with the Signal Service. They increased the number of surgeons who submitted the reports from

40 to 160. However, they discontinued the three times per day readings that had been the norm for many years. The new Form 34 reported only the daily maximum, minimum, and range of the temperature; the precipitation beginning and ending times, amount of rainfall, and depth of snow; the general direction of the wind; and the monthly totals or means. At the Presidio, Major Tilton began using the new form in August 1888.

THE END OF THE PRESIDIO'S CLIMATE OBSERVATIONS

The last observations (Figure 19) at the Presidio were made by Lt. Col. Town during February 1892. The form was received by the Weather Bureau on 14 March 1892. Postal service had improved since the first observation.



(Form No. 34.)

METEOROLOGICAL REGISTER.

Station Presidio of S.F., California, Month February, 1892.

Day of Month.	Temperature: Maximum.	Minimum.	Range.	Precipitation: Time of Beginning.	Time of Ending.	Total Precipitation.	Depth of Snow-fall.	General Direction of the Wind.
1	61	43	17	[illegible]	D.N.	.43		S.E.
2	64	38	26			.00		E.
3	52	37	15			.00		S.
4	55	40	15	R.B.N. of 3rd	B.N. of 4th	.34		W.
5	54	38	16			.00		S.
6	53	37	16	R.B.N. of 5th	B.N. of 6th	.30		S.E.
7	55	36	19			.00		S.
8	65	35	30			.00		S.
9	63	34	29			.00		S.W.
10	69	37	32			.00		S.E.
11	69	37	32			.00		W.
12	55	40	15			.00		W.
13	54	45	9			.00		W.
14	56	42	14			.00		W.
15	60	43	17			.00		W.
16	61	45	16			.00		S.W.
17	58	41	17			.00		W.
18	58	38	20	R.B.N. of 17th	—	1.10		S.W.
19	58	38	20	—	—	.62		S.
20	59	39	20	—	—	.17		S.W.
21	62	38	24	—	B.N. of 21st	.01		S.W.
22	62	38	24			.00		W.
23	59	30	29			.00		W.
24	64	34	30			.00		W.
25	54	33	21			.00		W.
26	55	33	22			.00		W.
27	53	31	22			.00		W.
28	59	31	28			.00		W.
29	59	32	27			.00		W.
30								
31								
Total	1705	1083	622	—	—	2.97	—	—
Mean	58.8	37.3	21.4	—	—	.103	—	W.

No snow fell at this station during month of February, 1892.

Remarks: R = Rain. 48.0

F. L. Town
Lieut. Col. & Surgeon U. S. Army.
Asst. Surgeon.

Figure 19. The Presidio's Last Observations, February 1892
Source: Original, National Climatic Data Center

The hospital building still stands at the Presidio. The site is no longer a military base but a walking tour is still available. Inquire at the Visitor's Center (Figure 20).

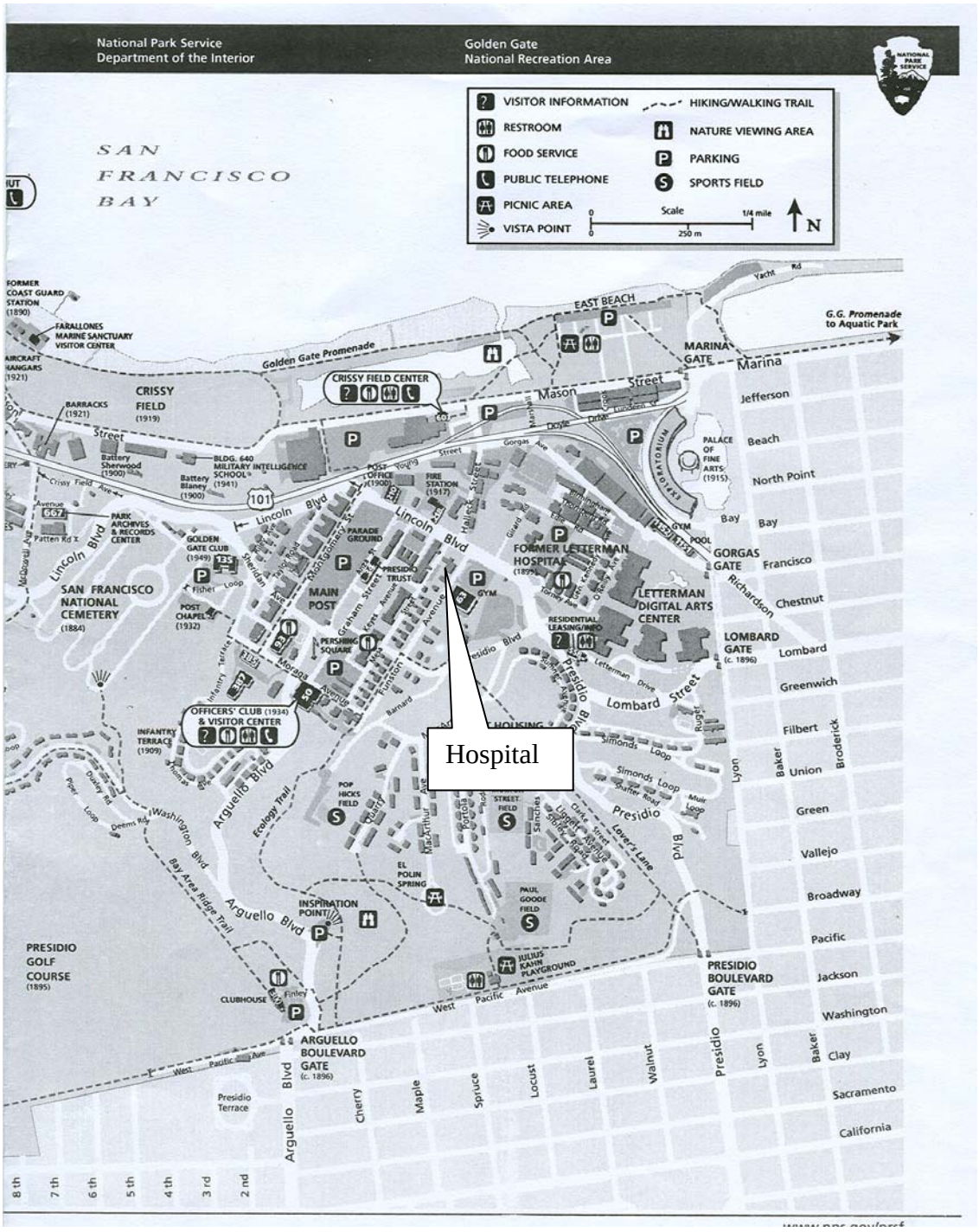


Figure 20. Current Map of the Presidio
Source: National Park Service

NEARBY OBSERVATION SITES

Observations have been made at several locations near the Presidio. Some were short term and some, like San Francisco, were long term. Some were in existence after the closure of the Presidio observation location. All are mentioned here to alert the reader to the existence of their data.

Alcatraz

Precipitation data were collected on Alcatraz Island (Figure 21) and published for 1861–1884 (Hall, 1886).

Figure 21. Alcatraz
Source: Author

Angel Island

Precipitation data were collected on Angel Island (Figure 22) and published for 1867–1884 (Hall, 1886).

Figure 22. Angel Island
Source: California Department of Parks and Recreation

California Academy of Science

The California Academy of Science site was at 37˚ 46' N and 122˚ 28' W. This cooperative station at the Morrison Planetarium in Golden Gate Park began observations on 1 August 1951. It ceased reporting on 31 July 1957.

Central Pacific Railroad Company

Precipitation data were collected by the Central Pacific Railroad Company and published for 1871—1884 (Hall, 1886). The location in San Francisco is presumed to have been at the railroad yards.

Fort Mason

Precipitation data were collected at Fort Mason and published for 1870—1884 (Hall, 1886).

Fort Point

Precipitation data were collected at Fort Point (Figure 23) and published for 1865—1869 (Hall, 1886).

Figure 23. Fort Point, 2005
Source: Author

San Francisco

This is the name under which the observations beginning in 1849 where taken. It was located at 37˚ 46' N and 122˚ 26' W. It was the ancestor of the old Signal Service and Weather Bureau Offices.

San Francisco International Airport

This station is located at 37˚ 37' N and 122˚ 24' W at the central terminal building at the airport.

San Francisco Oceanside

This station is located at the same latitude and longitude as Richmond Sunset station was. It continues to observe.

San Francisco WSO City and San Francisco Downtown

In 1997, the San Francisco Downtown name was changed to San Francisco WSO City and moved to the roof of the Harvey Milk Recreational Arts Building at 5 Scott Street in Duboce Park.

San Francisco Light Vessel

A light vessel station had synoptic observations from 29 January 1947 through 26 April 1971. It was located at 37˚ 45.0" W and 122˚ 45.5" W. A lighted horn buoy replaced it.

San Bruno

Beginning in July 1927, there was a station at the Administration Building at Mills Field. It was designated a first order station on 26 June 1944.

San Francisco Richmond Sunset

At the Sewage Treatment Plant for San Francisco at 4800 Lincoln Way, observations began on 1 July 1948. This station was located at 37˚ 46' N and 122˚ 30' W. The station continued as San Francisco Oceanside.

San Francisco Mission Delores

This station was located at 37˚ 46' N and 122˚ 26' W on the roof of a building on 16th Street between Church and Delores. Its first observations were on 1 July 1948. This name was used after the San Francisco WSO City station was moved to the airport.

Spring Valley Water Company

Precipitation data were collected by the Spring Valley Water Company and published for 1882—1884 (Hall, 1886). The location in San Francisco is uncertain.

Yerba Buena Island

Precipitation data were collected by the U.S. Lighthouse Board on Yerba Buena Island and published for 1975-1884 (Hall, 1886). Figure 24 is a photograph of the Island in 1935 when the San Francisco Bay Bridge was being built.

Figure 24. Yerba Buena Island, 1935
Source: NASA. Ames Research Center

APPENDIX 1

POST SURGEONS, PRESIDIO 1847-1889

Adapted from Thompson's Defender of the Gate

Robert Murray, assistance surgeon, March 1847 (Surgeon General, U.S. Army, 1883 – 1886) William C. Parker, assistant surgeon, April 1847 – July 1848 Alexander Perry, surgeon, October 30, 1848 – April 1849 George F. Turner, surgeon, May 1, 1849 – August 1850 William Hammond, surgeon, September 1850 – January 1851 Charles M. Hitchcock, surgeon, February – July 1851 John Hammond, assistant surgeon, March – December 6, 1854 Charles L. Teissler, assistant surgeon, December 1854 – January 1855 C.H. Lamb, surgeon, January – October 1855 Robert Murray, assistant surgeon, September 17, 1856 – June 1857 LaFayette Guild, assistant surgeon, July 1857 Richard Potts, assistant surgeon, October 21, 1857 – January 19, 1858 William F. Edgar, assistant surgeon, June 29 – September 1858 Charles C. Keeney, assistant surgeon, November 29, 1858 – June 6, 1861 John J. Milhau, assistant surgeon, August – October 1861 S.S. Todd, assistant surgeon, California Vols., October – December 1861 John F. Randolph, assistant surgeon, January – October 1862 John O. Bronson, surgeon, U.S. Vols., January 19, 1863 – February 1864 H.R. Egbert, surgeon, U.S. Vols., March – June 1864 John Vansant, assistant surgeon, June 25 – October 20, 1864, Isaac Parry, surgeon, California Vols., November 1864 – August 18, 1865 Charles E. Holbrook, acting assistant surgeon, November 6 1864 – March 6, 1865 Edward Dunscombe, acting assistant surgeon, November 1864 – February 1865 Edward Sharpe, surgeon, California Vols., January – March 1865 Edward Phelps, assistant surgeon, California Vols., November 1864 – August 18, 1865 Francis M. Cassels, assistant surgeon, California Vols., July – August 1865 Joseph W. Davis, assistant surgeon, California Volunteers, January 1865 Charles S. Wood, assistant surgeon, U.S. Vols., September – October 1865 William Hammond, acting assistant surgeon, February 8, 1865 – April 27, 1865 Charles Smart, assistant surgeon, September 26, 1865 – December 1865 C.A. Kirkpatrick, surgeon, California Vols., October 1865 John H. Kinsman, assistant surgeon, December 1865 – December 1865 James T. Ghiselin, assistant surgeon, April 26 – August 1867 John Lauderdate, assistant surgeon, September 1867 – April 1868 Levi H. Patty, acting assistant surgeon, April – June 30, 1868 Joseph C. Baily, assistant surgeon, June 1868 – April 1872 Levi H. Patty, acting assistant surgeon, April 22, 1868 – May 10, 1870 George B. Higginbottom, acting assistant surgeon, September 25 – October 14, 1869 Joseph C. Baily, assistant surgeon, May 10, 1870 – May 10, 1872 J.N. Achuff, acting assistant surgeon, October 27, 1870 – January 9, 1871 George Chismore, acting assistant surgeon, July 3 – September 3, 1872 John E. Tallon, acting assistant surgeon, July 5, 1872 – April 18, 1873 Edwin Bentley, assistant surgeon, November 20, 1872 – March 1873 Thomas McMillin, assistant surgeon, April 12, 1872 – April 6, 1873 P.H. Humphrey, acting assistant surgeon, January 24 – April 26, 1873 Calvin DeWitt, assistant surgeon, July 13 – November 18, 1873 James C. McKee, assistant surgeon, October 31, 1873 – August 1874 John E. Tallon, acting assistant surgeon, November 18, 1873 – July 24, 1875 John O. Skinner, assistant surgeon, November 10 – December 1974, (Medal of Honor, Modoc War) Bernard G. Semig, assistant surgeon, November 10, 1874 – April 1875 James C. McKee, assistant surgeon, November 27, 1874 – August 18, 1875, M.M. Shearer, acting assistant

surgeon, May 3, 1875 – January 23, 1876 John E. Tallon, acting assistant surgeon, August 18, 1875 – May 1876 James C. McKee, assistant surgeon, March 2, 1877 – September 21. 1877 Samuel A. Storrow, assistant surgeon, February 21, 1876 – December 21, 1877 John E. Tallon, acting assistant surgeon, March 2 – September 21, 1877 George M. Kober, acting assistant surgeon, October 26 – November 2, 1877 Joseph C. Baily, assistant surgeon, December 21, 1877 – September 18, 1882 Alfred A. Woodhull, assistant surgeon, Jun 6, 1878 – December 1878 William W. Gray, assistant surgeon, March – April 7, 1880 Henry I. Raymond, assistant surgeon, December 14, 1881 – February 20, 1882 Edward Everts, assistant surgeon, February 20 – September 16, 1882 H.C. Sawyer, acting assistant surgeon, July 20 – August 1882 Alonzo F. Steigers, acting assistant surgeon, August 28, 1882 – June 28, 1883 James C. McKee, assistant surgeon, May 30 – November 24, 1883 Walter W.R. Fisher, assistant surgeon, June 25, 1883 – August 18, 1884 John Brooke, assistant surgeon, November 24, 1883 – June 2, 1886 Henry S. Haskins, acting assistant surgeon, May 22 – July 1884 John J. Cochran, assistant surgeon, August 18, 1884 – May 27, 1885 William P. Kendall, assistant surgeon, August 12 – September 8, 1885 John J. Cochran, assistant surgeon, August 30, 1885 – March 20, 1886 Adrian S. Polhemus, assistant surgeon, September 14 – December 4, 1885 and March 18 April 28, 1886 M.M. Walker, acting assistant surgeon, April 7 – September 28, 1886 Henry R. Tilton, assistant surgeon, June 2, 1886 – June 12, 1889 John J. Cochran, assistant surgeon, June 18, 1886 – November 1888. M.M. Walker, acting assistant surgeon, November 19, 1886 – January 3, 1887 William D. Crosby, assistant surgeon, November 26, 1886 – January 6, 1887 Henry I. Raymond, assistant surgeon, January 7, 1887 – February 14, 1888 M.M. Walker, acting assistant surgeon, December 15, 1887 – June 15, 1888 Walter W.R. Fisher, assistant surgeon, February 25, 1888 – May 6, 1889 M.M. Walker, acting assistant surgeon, September 10, 1888 – May 26, 1889, Francis L. Town, assistant surgeon, January 7, 1889 – October 18, 1892 Leonard Wood, assistant surgeon, October 13, 1889

APPENDIX 2

Methodology

The primary sources of information for this study were the Presidio observers' daily weather records themselves. Copies of their monthly reports and the data digitized from those reports were available from the Midwestern Regional Climate Center in Champaign, Illinois, or the National Climatic Data Center in Asheville, North Carolina. The monthly reports can be considered original sources because they were written by the observers and not altered by subsequent readers.

There were a variety of secondary sources that held information about the Presidio, its history, and its people. The author visited and collected information from the holdings of the National Climatic Data Center at Asheville, North Carolina; Sacramento Archives & Museum Collection Center; California State Library; California State Archives; UC Davis' Library; UC Berkeley Bancroft Library; California Historical Society; San Francisco Public Library; The Sierra Sacramento Valley Museum of Medical History; the Library at the California Military Museum; the National Weather Service Office, San Francisco; and the LDS Family History Library in Salt Lake City, Utah.

The tertiary sources were reference materials that are available on-line. Among those were the metadata prepared by the Office of the State Climatologist of California, the Western Regional Climate Center, the National Climatic Data Center substation histories, and the Office of Medical History in the Office of the Surgeon General, U.S. Army. Two genealogical research sources, Ancestry.com and Genealogy.com were used to provide some of the personal information about the observers. For location analysis, the interactive maps available from TopoZone.com were used.

There was an attempt to glean information from all these sources that would allow a glimpse into the lives of the observers, the location of the observation site, and the historical environment that produced the climatic history of the Presidio. Maps, drawings, and photographs were included when appropriate to illustrate the information.

Throughout the research for and preparation of this study, the objective was to produce a document that future studies can use to evaluate the validity of the data that were collected here, judge the trustworthiness of the observers who collected them, and determine the climatological significance of the whatever variability may be discerned.

BIBLIOGRAPHY

Baily, J. C. and J. C. McKee, 1875. *Description of Military Post, The Presidio of San Francisco, California.* In Circular No. 8, War Department, Surgeon General's Office, A Report of the Hygiene of the United States Army with Descriptions of Military Posts. Government Printing Office, Washington.

Benton, Lisa M., 1998. *The Presidio, from Army Post to National Park.* Longitude Books, New York. 277 pages

Brown, Harvey E., 1873. *The Medical Department of the United States of Army from 1775 to 1873.* Office of Medical History, Office of the Surgeon General, Washington

Gillett, Mary C., 1987. *The Army Medical Department 1818-1865.* Center of Military History, U.S. Army, Washington

Gillett, Mary C., 1995. *The Army Medical Department 1865-1917.* Center of Military History, U.S. Army, Washington

Goodwin, R. Christopher, et al., 1995. *National Historic Context for Department of Defense Installations 1790-1940.* Volume I of IV Volumes. Contract No. DACW31-89-D-0059, U.S. Corps of Engineers, Baltimore Maryland.

Hall, William H., 1886. *Physical Data and Statistics of California.* State Engineering Department, Superintendent of State Printing, Sacramento

Hart, Herbert M., 1965. *Old Forts of the Far West.* Superior Publishing Company, Seattle. 192 pages

Heitman, Francis B., 1903. *Historical Register and Dictionary of the United States Army for its Organization, September 19, 1789, to March 2, 1903.* Vol I. Government Printing Office, Washington

Lauderdale, John Vance. *The John Vance Lauderdale Papers.* Yale Collection of Western Americana, Beinecke Rare Book and Manuscript Library, Yale University, New Haven, Connecticut

Lawson, Thomas, 1855. *Army Meteorological Register for Twelve Years 1843-1854.* Surgeon General Office, A.O.P Nicholson, Public Printer, Washington. 763 pages

Lewis Publishing Company, 1889. *Illustrated History of Sonoma County.* Lewis Publishing Company, Chicago. 737 pages

Marcy, R. B., 1872. *Outline Descriptions of the Posts and Stations of Troops in the Geographical Divisions and Departments of the United States.* Government Printing Office, Washington

Miller, Eric R., 1931. *The Evolution of Meteorological Institutions in the United States.* Monthly Weather Review, Vol. 59, No. 1, January 1931

National Park Service
http://www.nps.gov/prsf/index.htm (last visited 28 April 2005)

New Hampshire Division of Historical Resources.
http://www.nh.gov/nhdhr/warheroes/townf.html (last visited 28 April 2005)

Office of Medical History, Office of the Surgeon General, U.S. Army. Washington
http://history.amedd.army.mil/default_index2.html (last visited, 28 April 2005)

Roberts, Robert B., 1988. *Encyclopedia of Historic Forts: The Military, Pioneer, and Trading Posts of the United States.* McMillan, New York. 894 pages

San Francisco Chronicle. 28 December 1886. *Tree planting*

Schofield, John M., 1872. *Revised Outline Descriptions of the Posts and Stations of Troops in the Military District of the Pacific.* U.S. Army Quartermaster General.

Secretary of War, 1892. *Annual Report 1892*. Government Printing Office, Washington

Secretary of War, 1896. *Annual Report 1896*, Government Printing Office, Washington

Signal Service, 1882. *Instructions for Voluntary Observers of the Signal Service United States Army.* Government Printing Office, Washington

Smart, Charles. 1894. *The Connection of the Army Medical Department With the Development of Meteorology in the United States*, in Weather Bureau Bulletin 11, Washington

Surgeon General's Office, 1826. Meteorological Register, 1822-1825. Washington D. C.

Tate, Michael, 1999. *The Frontier Army in the Settlement of the West*. University of Oklahoma Press, Norman. 454 pages

Thompson, Erwin N., 1997. *Defender of the Gate: The Presidio of San Francisco, a History from 1846-1995*. Historic Resource Study, National Park Service. 645 pages

U.S. Army Corps of Engineers, 1873. *Engineers and Irrigation: Report of the Board of Commissioners on the Irrigation of the San Joaquin, Tulare, and Sacramento Valleys of the State of California.* EP 870-1-39, Engineer Historical Studies, Number 5. U.S. Army Corps of Engineers. Washington

War Department, 1870. *A Report on Barracks and Hospitals with Descriptions of Military Posts.* Circular No. 4, Surgeon General's Office. Government Printing Office, Washington

War Department, 1872. *Outline Description of U.S. Military Posts and Stations in the Year 1871.* Government Printing Office, Washington

Weir, James A., 1980. *19th Century Army Doctors on the Frontier and in Nebraska.* Nebraska History, Summer 1980.

Williamson, Robert Stockton, 1868. *On the Use of the Barometer on Surveys and Reconnaissances.* D. Van Norstrand, New York. 248 pages.