

Table 1. 2023 Site Specifications.

National Park Unit	Site Name	State	NPS Abbr.	CASTNET Abbr.	AQS ID Number	Latitude (degrees north)	Longitude (degrees west)	Elev. (m)	O ₃ Years ^a	SO ₂	CO	NO _x /NO _y	PM	WS/WD	TMP	RH	RNF	SOL	Filter Pack ^b
Sites operated by the National Park Service (Gaseous Pollutant Monitoring Program)																			
Big Bend	K-Bar Ranch Road	TX	BIBE-KB	BBE401	48-043-0101	29.3028	103.1778	1057	34	---	---	---	---	X	X	X	---	---	X
Canyonlands	Island in the Sky	UT	CANY-IS	CAN407	49-037-0101	38.4583	109.8214	1794	32	---	---	---	---	X	X	X	---	---	X
Carlsbad Caverns	Biology Building	NM	CAVE-BB	CAV436	35-015-0010	32.1783	104.4406	1357	5	---	---	---	---	X	X	X	---	---	---
Chaco Culture	Radio Repeater	NM	CHCU-RR	CHC432	35-045-0020	36.0350	107.9042	1965	7	---	---	X	---	X	X	X	---	---	---
Chiricahua	Entrance Station	AZ	CHIR-ES	CHA467	04-003-8001	32.0094	109.3892	1569	33	---	---	---	---	X	X	X	X	X	X
Craters of the Moon	Visitor Center	ID	CRMO-VC	CRM435	16-023-0101	43.4606	113.5622	1815	32	---	---	---	---	X	X	---	---	---	---
Death Valley	Park Village	CA	DEVA-PV	DEV412	06-027-0101	36.5092	116.8481	125	31	---	---	---	---	X	X	---	---	---	---
Denali	Headquarters	AK	DENA-HQ	DEN417	02-068-0003	63.7233	148.9675	663	37	---	---	---	---	X	X	X	X	X	X
Dinosaur	West Entrance Housing	UT	DINO-WE	DIN431	49-047-1002	40.4372	109.3047	1463	23	---	---	---	---	X	X	---	X	X	X
Everglades	Beard Center	FL	EVER-BC	EVE419	12-086-0030	25.3911	80.6808	1	---	---	---	---	---	---	---	---	---	---	X
Glacier	West Glacier Horse Stables	MT	GLAC-WG	GLR468	30-029-8001	48.5103	113.9969	964	32	---	---	---	---	X	X	---	---	---	X
Grand Canyon	The Abyss	AZ	GRCA-AS	GRC474	04-005-8001	36.0586	112.1836	2073	31	---	---	---	---	X	X	X	---	---	X
Grand Teton	Science School	WY	GRTE-SS	GRT434	56-039-0008	43.6708	110.5994	2105	13	---	---	---	---	X	X	X	---	---	---
Great Basin	Maintenance Yard	NV	GRBA-MY	GRB411	32-033-0101	39.0050	114.2158	2058	31	---	---	---	---	X	X	X	---	---	X
Great Smoky Mountains	Cades Cove	TN	GRSM-CC	---	47-009-0102	35.6042	83.7831	564	31	---	---	---	---	X	X	X	X	X	---
Great Smoky Mountains	Kuwohi (Clingmans Dome)	TN	GRSM-CD	---	47-155-0102	35.5619	83.4981	2021	31	---	---	---	---	X	X	X	X	X	---
Great Smoky Mountains	Cove Mountain	TN	GRSM-CM	---	47-155-0101	35.6967	83.6086	1243	36	---	---	---	---	X	X	X	X	---	---
Great Smoky Mountains	Look Rock NCore	TN	GRSM-LN	GRS420	47-009-0101	35.6336	83.9417	801	---	X	X	X	---	---	---	---	---	---	---
Great Smoky Mountains	Look Rock	TN	GRSM-LR	GRS420	47-009-0101	35.6336	83.9417	801	36	---	---	---	X	X	X	X	X	X	X
Hawaii Volcanoes	Visitor Center	HI	HAVO-VC	---	15-001-0005	19.4308	155.2578	1215	---	X	---	---	X	X	X	X	---	---	---
Joshua Tree	Black Rock	CA	JOTR-BR	JOT403	06-071-9002	34.0694	116.3889	1243	31	---	---	---	---	X	X	X	---	---	X
Joshua Tree	Cottonwood Visitor Center	CA	JOTR-CV	---	06-065-0010	33.7472	115.8201	943	6	---	---	---	X	X	X	X	X	X	---
Lassen Volcanic	Manzanita Lake Fire Station	CA	LAVO-ML	LAV410	06-089-3003	40.5400	121.5764	1755	37	---	---	---	---	X	X	X	---	---	X
Mammoth Cave	Houchin Meadow	KY	MACA-HM	MAC426	21-061-0501	37.1317	86.1431	230	27	X	X	X	---	X	X	X	---	---	X
Mesa Verde	Resource Management Area	CO	MEVE-RM	MEV405	08-083-0101	37.1983	108.4906	2170	31	---	---	---	---	X	X	X	---	---	X
Petrified Forest	South Entrance	AZ	PEFO-SE	PET427	04-017-0119	34.8225	109.8950	1712	22	---	---	---	---	X	X	---	---	---	X

Table 1. 2023 Site Specifications (continued).

National Park Unit	Site Name	State	NPS Abbr.	CASTNET Abbr.	AQS ID Number	Latitude (degrees north)	Longitude (degrees west)	Elev. (m)	O ₃ Years ^a	SO ₂	CO	NO _x /NO _y	PM	WS/WD	TMP	RH	RNF	SOL	Filter Pack ^b
Sites operated by the National Park Service (Gaseous Pollutant Monitoring Program)																			
Pinnacles	SW of East Entrance Station	CA	PINN-ES	PIN414	06-069-0003	36.4833	121.1569	317	37	---	---	---	---	X	X	X	---	---	X
Rocky Mountain	Longs Peak	CO	ROMO-LP	ROM406	08-069-0007	40.2710	105.5456	2742	40	---	---	---	---	X	X	X	---	X	X
Sequoia and Kings Canyon	Ash Mountain	CA	SEKI-AS	SEK430	06-107-0009	36.4894	118.8292	510	25	---	---	---	X	X	X	X	---	---	X
Sequoia and Kings Canyon	Lower Kaweah	CA	SEKI-LK	---	06-107-0006	36.5658	118.7772	1890	40	---	---	---	---	X	X	X	---	---	---
Shenandoah	Big Meadows	VA	SHEN-BM	SHN418	51-113-0003	38.5231	78.4347	1068	41	---	---	---	---	X	X	X	---	---	X
Voyageurs	Sullivan Bay	MN	VOYA-SB	VOY413	27-137-0034	48.4128	92.8292	427	28	---	---	---	---	X	X	X	---	---	X
Yellowstone	Old Faithful Snow Lodge	WY	YELL-OS	---	56-039-1013	44.4582	110.8253	2230	---	---	X	X	X	X	X	X	---	---	---
Yellowstone	West Entrance	MT	YELL-WS	---	30-031-0017	44.6569	111.0894	2030	---	---	X	X	X	X	X	X	---	---	---
Yellowstone	Water Tank	WY	YELL-WT	YEL408	56-039-1011	44.5653	110.4003	2430	28	---	---	---	---	X	X	X	---	---	X
Yosemite	Turtleback Dome	CA	YOSE-TD	YOS404	06-043-0003	37.7133	119.7061	1599	31	---	---	---	---	X	X	X	---	---	X
Zion	Dalton's Wash	UT	ZION-DW	ZIO433	49-053-0130	37.1983	113.1506	1213	20	---	---	---	---	X	X	---	---	---	---
Sites operated by the NPS for the Bureau of Land Management																			
Rangely	Golf Course	CO	RANG-GC	---	08-103-0006	40.0869	108.7614	1655	14	---	---	X	X	X	X	X	X	X	---
Sites operated by cooperating state agencies																			
Acadia	Cadillac Mountain	ME	ACAD-CM	---	23-009-0102	44.3517	68.2269	466	29	---	---	---	---	X	X	X	---	---	---
Acadia	McFarland Hill	ME	ACAD-MH	ACA416	23-009-0103	44.3772	68.2608	153	26	X	X	X	X	X	X	X	X	X	X
Badlands	Visitor Center	SD	BADL-VC	---	46-071-1001	43.7436	101.9414	739	18	---	---	---	X	---	---	---	---	---	---
Cape Cod	Cape Cod	MA	CACO-XX	---	25-001-0002	41.9758	70.0247	41	37	---	---	---	---	X	X	X	---	X	---
Chamizal	Chamizal	TX	CHAM-XX	---	48-141-0044	31.7656	106.4550	1128	32	---	---	---	---	X	X	X	---	X	---
Congaree	Congaree Bluff	SC	COSW-BL	---	45-079-0021	33.8147	80.7811	34	24	---	---	---	---	---	---	---	---	---	---
Everglades	Cutler Road	FL	EVER-CR	---	12-086-0029	25.5861	80.3269	4	39	---	---	---	---	---	---	---	---	---	---
Great Smoky Mountains	Purchase Knob	NC	GRSM-PK	---	37-087-0036	35.5900	83.0775	1550	29	---	---	---	---	---	---	---	---	---	---
Indiana Dunes	Ammunition Bunker	IN	INDU-AB	---	18-089-0022	41.6067	87.3047	183	31	X	---	---	X	X	X	X	---	X	---

Table 1. 2023 Site Specifications (continued).

National Park Unit	Site Name	State	NPS Abbr.	CASTNET Abbr.	AQS ID Number	Latitude (degrees north)	Longitude (degrees west)	Elev. (m)	O ₃ Years ^a	SO ₂	CO	NO _x / NO _y	PM	WS/ WD	TMP	RH	RNF	SOL	Filter Pack ^b
Sites operated by cooperating state agencies																			
<i>Mount Rainier</i>	Jackson Visitor's Center	WA	MORA-JV	---	53-053-0012	46.7853	121.7378	1615	26	---	---	---	---	---	---	---	---	---	---
<i>Saguaro</i>	East	AZ	SAGU-EA	---	04-019-0021	32.1744	110.7364	938	32	---	---	---	---	X	X	X	---	---	---
<i>Theodore Roosevelt</i>	Painted Canyon, VC	ND	THRO-VC	THR422	38-007-0002	46.8947	103.3778	840	26	X	---	---	X	---	---	---	---	---	X
<i>Wind Cave</i>	Visitor Center	SD	WICA-VC	WNC429	46-033-0132	43.5575	103.4839	1288	20	---	---	---	X	---	---	---	---	---	X
<i>Yosemite</i>	Village	CA	YOSE-VI	---	06-043-1001	37.7458	119.6028	1216	---	---	---	---	X	---	---	---	---	---	---

^a The values in this column represent the number of years an ozone analyzer has been operational at the site.

^b A filter pack is a part of the CASTNET network and is used to measure dry deposition using the "inferential method." This method combines air quality concentration data with meteorological measurements and land use functions to compute deposition velocities. Ambient air is drawn across the filter at either 3.0 or 1.5 liters per minute. The filter is then analyzed in a lab to yield weekly average concentrations of particulate sulfate (SO₄²⁻), particulate nitrate (NO₃⁻), particulate ammonium (NH₄⁺), sulfur dioxide (SO₂), and nitric acid (HNO₃). In some cases, the positive ions Na⁺, K⁺, Ca²⁺, and Mg²⁺ are also measured from the filter samples.

Operating agency key: plain text = site operated by the National Park Service
italics = site operated by a state agency

Parameter key: O₃ = ozone (ppb)
 SO₂ = sulfur dioxide (ppb)
 CO = carbon monoxide (ppm)
 NO_x = oxides of nitrogen (ppb)
 PM = particulate matter (µg/m³)
 WS = wind speed (m/s)
 WD = wind direction (degrees)
 TMP = air temperature (degrees C)
 RH = relative humidity (%)
 RNF = precipitation (mm/hr)
 SOL = solar radiation (watts/m²)

Note : Dashed lines indicate parameter not measured at that site.

Table 2. 2023 Summary of 8-hour average ozone concentrations (ppb).

National Park Unit	Site Name	Valid Number of Days	1st Highest	2nd Highest	3rd Highest	4th Highest	# Days with 8-Hour Average O ₃ Values ≥70 ppb ^a
Sites operated by the National Park Service (Gaseous Pollutant Monitoring Program)							
Big Bend	K-Bar Ranch Road	327	71	67	67	64	1
Canyonlands	Island in the Sky	348	64	64	63	63	0
Carlsbad Caverns	Biology Building	332	83	77	76	76	11
Chaco Culture	Radio Repeater	350	71	70	65	65	1
Chiricahua	Entrance Station	349	73	71	69	67	2
Craters of the Moon	Visitor Center	358	64	63	61	60	0
Death Valley	Park Village	358	75	73	71	71	5
Denali	Headquarters	341	54	52	51	49	0
Dinosaur	West Entrance Housing	360	119	108	106	98	33
Glacier	West Glacier Horse Stables	344	61	60	59	57	0
Grand Canyon	The Abyss	352	78	69	67	64	1
Grand Teton	Science School	361	62	61	61	60	0
Great Basin	Maintenance Yard	359	68	68	66	65	0
Great Smoky Mountains	Cades Cove	271	70	68	67	64	0
Great Smoky Mountains	Cove Mountain	230	70	64	63	63	0
Great Smoky Mountains	Kuwahohi (Clingmans Dome)	214	72	71	70	69	2
Great Smoky Mountains	Look Rock	355	79	72	72	71	4
Joshua Tree	Black Rock	300	84	79	79	79	24
Joshua Tree	Cottonwood Visitor Center	357	74	71	71	71	4
Lassen Volcanic	Manzanita Lake Fire Station	338	64	64	61	61	0
Mammoth Cave	Houchin Meadow	356	75	74	74	71	4
Mesa Verde	Resource Management Area	363	64	64	63	62	0
Petrified Forest	South Entrance	358	65	64	63	63	0
Pinnacles	SW of East Entrance Station	356	68	68	67	66	0
Rocky Mountain	Longs Peak	359	68	68	68	67	0
Sequoia and Kings Canyon	Ash Mountain	354	88	87	86	86	39
Sequoia and Kings Canyon	Lower Kaweah	209	82	80	80	79	31
Shenandoah	Big Meadows	311	77	69	69	68	1
Voyageurs	Sullivan Bay	335	75	72	70	68	2
Yellowstone	Water Tank	360	58	58	58	57	0
Yosemite	Turtleback Dome	363	74	69	69	68	1
Zion	Dalton's Wash	355	67	65	64	64	0
Sites operated by the NPS for the Bureau of Land Management							
Rangely	Golf Course	244	92	73	72	71	5
Sites operated by cooperating state agencies							
<i>Acadia</i>	Cadillac Mountain	217	68	66	65	65	0
<i>Acadia</i>	McFarland Hill	360	68	66	64	63	0
<i>Badlands</i>	Visitor Center	353	73	70	69	68	1
<i>Cape Cod</i>	Cape Cod	354	82	73	71	66	3
<i>Chamizal</i>	Chamizal	359	77	70	69	68	1
<i>Congaree</i>	Congaree Bluff	260	60	59	57	57	0
<i>Everglades</i>	Cutler Road	350	87	67	64	64	1

Table 2. 2023 Summary of 8-hour average ozone concentrations (ppb) (continued).

National Park Unit	Site Name	Valid Number of Days	1st Highest	2nd Highest	3rd Highest	4th Highest	# Days with 8-Hour Average O ₃ Values ≥70 ppb ^a
Sites operated by cooperating state agencies							
<i>Great Smoky Mountains</i>	Purchase Knob	239	71	70	69	69	1
<i>Indiana Dunes</i>	Ammunition Bunker	360	80	78	77	76	13
<i>Mount Rainier</i>	Jackson Visitor's Center	354	62	61	57	57	0
<i>Saguaro</i>	East	362	73	72	70	70	2
<i>Theodore Roosevelt</i>	Painted Canyon, VC	356	82	74	72	70	3
<i>Wind Cave</i>	Visitor Center	339	73	67	65	64	1

^a The primary and secondary National Ambient Air Quality Standard for ozone is 0.070 ppm over an 8-hour period. (An exceedance of the standard occurs when an 8-hour average ozone concentration is greater than or equal to 70 ppb. A violation of the standard occurs when the 3-year average of the fourth highest daily maximum 8-hour average ozone concentration equals or exceeds 70 ppb.) Exceedances of the standard are in red.

Operating agency key: plain text = site operated by the National Park Service
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Color shading key: **Red** = 4th highest 8-hour average ozone concentration >70 ppb, >3 days with 8-hour average >70 ppb

Table 3. 2023 Ozone violation summary - primary standard^a.

National Park Unit	Site Name	2021-2023	2020-2022	2019-2021	2018-2020	2017-2019	2016-2018	2015-2017
Sites operated by the National Park Service (Gaseous Pollutant Monitoring Program)								
Big Bend	K-Bar Ranch Road	(63)	61	61	63	64	63	62
Canyonlands	Island in the Sky	65	66	66	66	65	65	64
Carlsbad Caverns	Biology Building	78	77	74	(73)	(74)	---	---
Chaco Culture	Radio Repeater	67	68	68	67	(65)	(66)	(64)
Chiricahua	Entrance Station	66	65	66	66	66	66	65
Craters of the Moon	Visitor Center	63	65	64	64	63	63	60
Death Valley	Park Village	71	72	72	73	72	(73)	(70)
Denali	Headquarters	52	53	52	52	52	50	50
Dinosaur	West Entrance Housing	76	64	67	66	70	72	72
Glacier	West Glacier Horse Stables	55	53	54	53	53	52	53
Grand Canyon	The Abyss	63	63	62	64	64	65	66
Grand Teton	Science School	61	61	61	59	59	60	59
Great Basin	Maintenance Yard	64	66	68	69	67	66	64
Great Smoky Mountains	Cades Cove	61	58	56	58	60	62	61
Great Smoky Mountains	Cove Mountain	(63)	61	60	62	64	67	67
Great Smoky Mountains	Kuwohi (Clingmans Dome)	(63)	(60)	(60)	(62)	(62)	(63)	(63)
Great Smoky Mountains	Look Rock	67	63	62	63	65	67	67
Joshua Tree	Black Rock	79	81	82	86	88	89	87
Joshua Tree	Cottonwood Visitor Center	69	68	(66)	(71)	(73)	(82)	---
Lassen Volcanic	Manzanita Lake Fire Station	65	68	67	68	66	68	64
Mammoth Cave	Houchin Meadow	64	59	59	59	61	63	64
Mesa Verde	Resource Management Area	64	66	66	68	67	68	66
Petrified Forest	South Entrance	64	66	66	67	66	65	63
Pinnacles	SW of East Entrance Station	66	67	66	65	64	68	68
Rocky Mountain	Longs Peak	70	72	71	70	68	70	68
Sequoia and Kings Canyon	Ash Mountain	88	91	90	88	86	89	89
Sequoia and Kings Canyon	Lower Kaweah	(80)	(83)	(82)	83	82	86	84
Shenandoah	Big Meadows	63	58	57	57	60	63	63
Voyageurs	Sullivan Bay	60	55	56	56	56	55	54
Yellowstone	Water Tank	59	62	64	63	62	62	61
Yosemite	Turtleback Dome	72	77	77	79	77	79	75
Zion	Dalton's Wash	65	66	65	66	66	66	65
Sites operated by the NPS for the Bureau of Land Management								
Rangely	Golf Course	67	65	66	65	65	64	63

Table 3. 2023 Ozone violation summary - primary standard^a (continued).

National Park Unit	Site Name	2021-2023	2020-2022	2019-2021	2018-2020	2017-2019	2016-2018	2015-2017
Sites operated by cooperating state agencies								
<i>Acadia</i>	Cadillac Mountain	66	67	67	65	69	70	71
<i>Acadia</i>	McFarland Hill	63	61	60	60	64	63	64
<i>Badlands</i>	Visitor Center	62	60	57	60	62	63	61
<i>Cape Cod</i>	Cape Cod	65	64	64	64	67	69	(69)
<i>Chamizal</i>	Chamizal	68	69	71	74	74	71	69
<i>Congaree</i>	Congaree Bluff	57	55	55	54	55	55	55
<i>Everglades</i>	Cutler Road	61	60	58	61	61	62	(61)
<i>Great Smoky Mountains</i>	Purchase Knob	65	62	61	62	63	64	64
<i>Indiana Dunes</i>	Ammunition Bunker	72	71	69	70	68	70	68
<i>Mount Rainier</i>	Jackson Visitor's Center	58	59	58	61	64	64	63
<i>Saguaro</i>	East	68	69	67	69	69	71	69
<i>Theodore Roosevelt</i>	Painted Canyon, VC	64	58	60	57	60	59	60
<i>Wind Cave</i>	Visitor Center	64	63	61	60	61	62	61

^a The 2015 primary and secondary National Ambient Air Quality Standard for ozone is 0.070 ppm over an 8-hour period. This standard was used for the 2018-2020 period through 2014-2016. (An exceedance of the standard occurs when an 8-hour average ozone concentration is greater than or equal to 71 ppb. A violation of the standard occurs when the 3-year average of the fourth highest daily maximum 8-hour average ozone concentration equals or exceeds 71 ppb.)

Operating agency key: plain text = site operated by the National Park Service
italics = site operated by a state agency

Color shading key: **Red** = ozone violation based on the standard in place at that time

Note : A number in parenthesis () indicates that data completeness was not met. The primary standard required 90 percent data completeness, on average, during the 3-year period, with no single year within the period having less than 75 percent data completeness. This data completeness requirement would have to be satisfied in order to determine that the standard has been met at a monitoring site. However, calendar years with less than 75 percent data completeness are included in the computation if the annual fourth-highest daily maximum 8-hour concentration is greater than the level of the standard. A site could be found not to have met the standard with less than complete data.

Table 4. 2023 Summary of indices for resource injury (SUM06 and W126).

National Park Unit	Site Name	O ₃ % Valid	SUM06 ^a (ppm-hr)	SUM06 Period	W126 ^b (ppm-hr)	W126 Period	NPS W126 ^c (ppm-hr)	NPS W126 Period
Sites operated by the National Park Service (Gaseous Pollutant Monitoring Program)								
Big Bend	K-Bar Ranch Road	92.4	5.0	April-June	6.6	April-June	7.6	April-June
Canyonlands	Island in the Sky	95.9	8.5	May-July	11.0	May-July	12.1	May-July
Carlsbad Caverns	Biology Building	92.9	24.4	August-October	15.8	August-October	20.7	June-August
Chaco Culture	Radio Repeater	96.2	16.5	April-June	13.2	May-July	14.4	May-July
Chiricahua	Entrance Station	96.5	10.5	May-July	9.4	March-May	13.9	May-July
Craters of the Moon	Visitor Center	97.9	2.2	March-May	6.8	March-May	7.7	March-May
Death Valley	Park Village	97.8	33.0	May-July	20.1	May-July	21.5	May-July
Denali	Headquarters	93.8	0.0	January-March	1.8	March-May	2.4	March-May
Dinosaur	West Entrance Housing	97.2	38.1	January-March	30.7	January-March	13.4	March-May
Glacier	West Glacier Horse Stables	94.1	0.8	May-July	2.7	April-June	4.1	March-May
Grand Canyon	The Abyss	97.1	15.5	May-July	13.0	May-July	14.2	May-July
Grand Teton	Science School	98.5	4.2	April-June	7.8	March-May	8.8	March-May
Great Basin	Maintenance Yard	98.8	11.2	April-June	10.7	May-July	11.8	May-July
Great Smoky Mountains	Cades Cove	96.4	6.1	April-June	6.0	April-June	6.9	April-June
Great Smoky Mountains	Cove Mountain	63.7	3.2	June-August	3.7	June-August	4.8	May-July
Great Smoky Mountains	Kuwohi (Clingmans Dome)	62.5	6.8	April-June	7.4	April-June	8.3	April-June
Great Smoky Mountains	Look Rock	97.5	9.6	April-June	8.2	April-June	9.1	April-June
Joshua Tree	Black Rock	82.3	42.6	May-July	26.4	May-July	27.9	May-July
Joshua Tree	Cottonwood Visitor Center	96.8	28.2	May-July	17.0	May-July	18.3	May-July
Lassen Volcanic	Manzanita Lake Fire Station	92.3	3.3	June-August	5.0	July-September	5.8	July-September
Mammoth Cave	Houchin Meadow	93.9	10.9	April-June	8.9	April-June	9.9	April-June
Mesa Verde	Resource Management Area	99.4	6.5	June-August	10.1	May-July	11.2	May-July
Petrified Forest	South Entrance	99.3	13.6	May-July	11.3	May-July	12.4	May-July
Pinnacles	SW of East Entrance Station	97.7	7.0	July-September	6.1	July-September	6.9	July-September
Rocky Mountain	Longs Peak	98.5	12.3	April-June	11.2	April-June	12.3	April-June
Sequoia and Kings Canyon	Ash Mountain	98.2	48.2	July-September	33.4	July-September	35.0	July-September
Sequoia and Kings Canyon	Lower Kaweah	98.9	40.8	June-August	27.7	June-August	29.1	June-August
Shenandoah	Big Meadows	86.8	5.9	April-June	5.9	April-June	8.1	April-June
Voyageurs	Sullivan Bay	90.5	7.4	April-June	6.1	April-June	6.9	April-June
Yellowstone	Water Tank	98.9	0.4	April-June	5.0	April-June	5.8	April-June
Yosemite	Turtleback Dome	99.3	12.6	June-August	11.3	July-September	12.4	July-September
Zion	Dalton's Wash	97.6	14.5	May-July	11.7	May-July	12.9	May-July
Sites operated by the NPS for the Bureau of Land Management								
Rangely	Golf Course	91.9	9.3	February-April	9.6	February-April	9.5	May-July
Sites operated by cooperating state agencies								
<i>Acadia</i>	Cadillac Mountain	93.8	2.0	May-July	2.8	May-July	4.3	March-May
<i>Acadia</i>	McFarland Hill	98.7	1.7	April-June	3.6	March-May	4.4	March-May
<i>Badlands</i>	Visitor Center	96.4	11.5	April-June	10.0	April-June	10.6	May-July
<i>Cape Cod</i>	Cape Cod	96.8	3.1	April-June	4.8	March-May	5.3	March-May
<i>Chamizal</i>	Chamizal	98.1	11.3	June-August	10.0	June-August	11.0	June-August
<i>Congaree</i>	Congaree Bluff	98.4	1.7	April-June	2.4	April-June	2.9	March-May
<i>Everglades</i>	Cutler Road	96.4	3.1	March-May	3.4	March-May	3.9	March-May
<i>Great Smoky Mountains</i>	Purchase Knob	94.6	10.7	April-June	9.2	April-June	9.6	April-June

Table 4. 2023 Summary of indices for resource injury (SUM06 and W126) (continued).

National Park Unit	Site Name	O ₃ % Valid	SUM06 ^a (ppm-hr)	SUM06 Period	W126 ^b (ppm-hr)	W126 Period	NPS W126 ^c (ppm-hr)	NPS W126 Period
<i>Indiana Dunes</i>	Ammunition Bunker	97.9	16.6	May-July	11.8	May-July	12.8	May-July
<i>Mount Rainier</i>	Jackson Visitor's Center	99.3	1.6	June-August	2.4	March-May	3.1	March-May
<i>Saguaro</i>	East	99.1	21.3	May-July	14.9	May-July	15.4	May-July
<i>Theodore Roosevelt</i>	Painted Canyon, VC	96.9	9.9	May-July	8.4	May-July	8.9	May-July
<i>Wind Cave</i>	Visitor Center	93.1	7.6	April-June	7.7	April-June	8.2	April-June

^a SUM06 exposure index represents the 0800-2000 hourly ozone concentrations equaling or exceeding 0.06 ppm. The value reported here represents a three-month maximum value during the ozone season. Units are ppm-hr.

^b W126 exposure index represents 0800-2000 hourly ozone concentrations where each concentration is weighted by a function that gives greater emphasis to the higher hourly concentrations while still including the lower ones. The value reported here represents a three-month maximum value during the ozone season. Units are ppm-hr. For more information on the W126 exposure index go to <https://www.nps.gov/subjects/air/glossary.htm>

^c NPS W126 represents a three-month maximum value during the growing season (March to September) with a monthly completeness criteria of 50%, a three-month completeness criteria of 75%, and a seasonal completeness criteria of 60%.

Operating agency key: plain text = site operated by the National Park Service
italics = site operated by a state agency

Table 5. 2023 Summary of sulfur dioxide data.

National Park Unit	Site Name	Highest Daily Maximum 1-Hour Average Concentration ^a (ppb)						Highest Daily Maximum 3-Hour Average Concentration ^b (ppb)				
		1 st Highest	2 nd Highest	3 rd Highest	4 th Highest	99 th Percentile Value	No. of Days with 1-Hr Average >75 ppb	1 st Highest	2 nd Highest	3 rd Highest	4 th Highest	No. of Days with 3-Hr Maximum >549 ppb
Sites operated by the National Park Service (Gaseous Pollutant Monitoring Program)												
Great Smoky Mountains	Look Rock NCore	1.4	1.4	1.4	1.4	1	0	1.0	0.7	0.6	0.6	0
Hawaii Volcanoes *	Visitor Center	372.5	362.4	231.8	144.3	144	9	270.9	167.5	137.0	110.4	0
Mammoth Cave	Houchin Meadow	2.0	1.8	1.7	1.5	2	0	1.2	1.0	0.9	0.9	0
Sites operated by cooperating state agencies												
<i>Acadia</i>	McFarland Hill	0.9	0.7	0.6	0.6	1	0	0.6	0.5	0.5	0.4	0
<i>Indiana Dunes</i>	Ammunition Bunker	49.4	26.5	26.3	23.5	24	0	42.2	36.3	22.4	20.9	0
<i>Theodore Roosevelt</i>	Painted Canyon, VC	7.3	6.0	5.9	5.9	6	0	5.4	5.3	5.2	5.1	0

^a The primary hourly National Ambient Air Quality Standard for sulfur dioxide is a daily maximum 1-hour average of 75 ppb. (An exceedance of the standard occurs when a daily maximum 1-hour average exceeds 75 ppb. A violation of the standards occurs when the 3-year average of the 99th percentile of the daily maximum 1-hour average exceeds 75 ppb.)

^b The secondary National Ambient Air Quality Standard for sulfur dioxide is 0.5 ppm over a 3-hour period not to be exceeded more than once per year. (A value greater than 0.5 ppm, 549 ppb, or 1,300 µg/m³ exceeds the standard.) (40 CFR 50.5.)

* This site collected sulfur dioxide data using a range that is not EPA approved.

Operating agency key: plain text = site operated by the National Park Service
italics = site operated by a state agency

Color shading key: **Red** >75 ppb 99th percentile value, or >549 ppb 3-hour average

Table 6. 2023 Summary of carbon monoxide data.

National Park Unit	Site Name	Highest Daily Maximum 1-Hour Average Concentration ^a (ppm)					No. of Days with 1-Hr Average >35 ppm	Highest Daily Maximum 8-Hour Average Concentration ^b (ppm)				No. of Days with 8-Hr Average >9 ppm
		1 st Highest	2 nd Highest	3 rd Highest	4 th Highest	1 st Highest		2 nd Highest	3 rd Highest	4 th Highest		
Sites operated by the National Park Service (Gaseous Pollutant Monitoring Program)												
Great Smoky Mountains	Look Rock NCore	0.585	0.552	0.513	0.504	0	0.552	0.495	0.477	0.466	0	
Mammoth Cave	Houchin Meadow	0.747	0.501	0.489	0.387	0	0.688	0.617	0.486	0.410	0	
Yellowstone	Old Faithful Snow Lodge	0.590	0.314	0.313	0.303	0	0.427	0.281	0.267	0.253	0	
Yellowstone	West Yellowstone	4.453	3.626	1.897	1.412	0	0.840	0.735	0.438	0.436	0	
Sites operated by cooperating state agencies												
<i>Acadia</i>	McFarland Hill	0.461	0.396	0.385	0.372	0	0.390	0.355	0.339	0.330	0	

^a The primary hourly National Ambient Air Quality Standard for carbon monoxide is a daily maximum 1-hour average of 35 ppm. (An exceedance of the standard occurs when a daily maximum 1-hour average exceeds 35 ppm. A violation of the standard occurs when a daily maximum 1-hour average exceeds 35 ppm more than once in a calendar year.)

^b The primary National Ambient Air Quality Standard for carbon monoxide is 9 ppm over an 8-hour period. (An exceedance of the standard occurs when an 8-hour average exceeds 9 ppm. A violation of the standard occurs when a daily maximum 8-hour average exceeds 9 ppm more than once in a calendar year.) (40CFR 50.8.)

Operating agency key: plain text = site operated by the National Park Service
italics = site operated by a state agency

Color shading key: **Red** >35 ppm 1-hour average or >9 ppm 8-hour average

Table 7. 2023 Summary of nitrogen dioxide data.

National Park Unit	Site Name	Highest Daily Maximum 1-Hour Average Concentrations ^{ab} (ppb)						
		1st Highest	2nd Highest	3rd Highest	4th Highest	98 th Percentile Value	No. of Days with 1-Hour Average >100 ppb	Annual Arithmetic Mean
Sites operated by the National Park Service (Gaseous Pollutant Monitoring Program)								
Chaco Culture	Radio Repeater	7.4	5.7	5.4	5.0	4	0	1
Great Smoky Mountains	Look Rock NCore	8.1	6.7	6.4	6.0	5	0	1
Mammoth Cave	Houchin Meadow	18.6	13.9	13.5	13.0	11	0	2
Yellowstone	Old Faithful Snow Lodge	27.3	25.9	15.2	14.2	13	0	1
Yellowstone	West Yellowstone	30.6	28.1	27.9	27.8	21	0	2
Sites operated by the NPS for the Bureau of Land Management								
Rangely	Golf Course	15.2	14.1	13.3	13.2	12	0	1

^a The primary hourly National Ambient Air Quality Standard for nitrogen dioxide is a daily maximum 1-hour average of 100 ppb. (An exceedance of the standard occurs when a daily maximum 1-hour average exceeds 100 ppb. A violation of the standard occurs when the 3-year average of the 98th percentile of the daily maximum 1-hour average exceeds 100 ppb. (40 CFR 50.11)

^b The primary and secondary annual National Ambient Air Quality Standard for nitrogen dioxide is an annual arithmetic mean of 53 ppb. (An exceedance and violation of the standard occurs when an annual arithmetic mean of NO₂ concentrations is greater than 53 ppb.) (40 CFR 50.11.)

Operating agency key: plain text = site operated by the National Park Service

italics = site operated by a state agency

Color shading key: **Red** >53 ppb annual arithmetic mean or >100 ppb 98th percentile value

Table 8. 2023 Summary of oxides of nitrogen data.

National Park Unit	Site Name	Highest Daily Maximum 1-Hour Average Concentrations (ppb)				No. of Days with 1-Hour Average >100 ppb
		1st Highest	2nd Highest	3rd Highest	4th Highest	
Sites operated by the National Park Service (Gaseous Pollutant Monitoring Program)						
Chaco Culture	Radio Repeater	7.4	5.5	5.2	4.5	0
Great Smoky Mountains	Look Rock NCore (NO _v)	9.7	6.6	6.3	5.9	0
Mammoth Cave	Houchin Meadow (NO _v)	18.6	14.7	13.9	13.4	0
Yellowstone	Old Faithful Snow Lodge	86.9	49.0	41.6	38.4	0
Yellowstone	West Yellowstone	208.3	169.6	99.4	83.9	2
Sites operated by the NPS for the Bureau of Land Management						
Rangely	Golf Course	19.9	16.0	14.4	14.3	0
Sites operated by cooperating state agencies						
<i>Acadia</i>	McFarland Hill (NO _v)	18.8	16.1	10.0	9.5	0
Operating agency key:	plain text = site operated by the National Park Service <i>italics</i> = site operated by a state agency					

Table 9. 2023 Summary of PM_{2.5} data from reference and equivalency methods.

National Park Unit	Site Name	Sampler Type*	% Valid	Annual Arithmetic Mean ^a (µg/m ³)	Highest Daily Maximum 24-Hour Average Concentrations ^b (µg/m ³)					98 th Percentile Value	No. of Days with 24-Hour Average >35 µg/m ³
					1st Highest	2nd Highest	3rd Highest	4th Highest			
Sites operated by the National Park Service (Gaseous Pollutant Monitoring Program)											
Great Smoky Mountains	Look Rock NCore	TEOM	99.1	8.7	50.7	46.1	40.0	30.5	22.7	3	
Hawaii Volcanoes	Visitor Center	BAM	82.2	0.7	9.1	8.2	6.8	6.6	6.0	0	
Sequoia and Kings Canyon	Ash Mountain	BAM	92.2	9.0	123.1	107.0	95.1	85.6	70.3	14	
Yellowstone	Old Faithful Snow Lodge	BAM	94.3	2.2	21.1	20.7	13.0	12.8	7.4	0	
Yellowstone	West Yellowstone	BAM	99.4	2.5	26.7	24.4	15.5	13.9	8.5	0	
Sites operated by the NPS for the Bureau of Land Management											
Rangely	Golf Course	BAM	79.1	4.6	20.9	15.9	12.6	11.8	11.1	0	
Sites operated by cooperating state agencies											
<i>Acadia</i>	McFarland Hill	BAM	98.1	4.0	22.8	20.3	20.2	20.0	16.6	0	
<i>Badlands</i>	Visitor Center	BAM	99.0	6.7	157.7	88.0	73.7	59.8	31.6	7	
<i>Indiana Dunes</i>	Ammunition Bunker	BAM	96.5	9.0	98.2	89.9	44.9	43.4	25.5	4	
<i>Theodore Roosevelt</i>	Painted Canyon Visitor Ctr	BAM	97.3	7.0	150.9	79.1	69.2	52.9	35.0	7	
<i>Wind Cave</i>	Visitor Center	BAM	89.4	4.2	63.8	57.5	50.4	44.5	15.8	5	
<i>Yosemite</i>	Village	BAM	97.8	9.7	189.1	127.7	108.5	91.6	53.2	16	

^a The primary annual National Ambient Air Quality Standard for PM_{2.5} is an annual arithmetic mean of 15.0 µg/m³. (An exceedance of the standard occurs when an annual arithmetic mean of PM_{2.5} concentrations is greater than 15.0 µg/m³. A violation of the standard occurs when the 3-year average of the weighted annual mean PM_{2.5} concentrations is greater than 15.0 µg/m³.) (40 CFR 50.7.)

^b The primary daily National Ambient Air Quality Standard for PM_{2.5} is a 24-hour average concentration of 35 µg/m³. (An exceedance of the standard occurs when a 24-hour average PM_{2.5} concentration is greater than 35 µg/m³. A violation of the standard occurs when the 3-year average of the annual 98th percentile of 24-hour PM_{2.5} concentrations is greater than 35 µg/m³.) (40 CFR 50.7.)

* TEOM = tapered element oscillating microbalance
 BAM = beta attenuation monitor

Operating agency key: plain text = site operated by the National Park Service
 italics = site operated by a state agency

Color shading key: Annual arithmetic mean **Red** >15 µg/m³
 98th percentile value **Red** >35 µg/m³

Table 10. 2023 Summary of PM₁₀ data from reference and equivalency methods.

National Park Unit	Site Name	Sampler Type*	% Valid	Annual Arithmetic Mean ^a (µg/m ³)	Highest Daily Maximum 24-Hour Average Concentrations ^b (µg/m ³)				No. of Days with 24-Hour Average >150 µg/m ³
					1st Highest	2nd Highest	3rd Highest	4th Highest	
Sites operated by cooperating state agencies									
<i>Badlands</i>	Visitor Center	BAM	99.3	11	160	90	80	70	1
<i>Wind Cave</i>	Visitor Center	BAM	97.6	7	110	70	70	60	0
<i>Yosemite</i>	Village	BAM	85.0	20	230	160	150	120	2

^a The primary and annual National Ambient Air Quality Standard for PM₁₀ is an annual arithmetic mean of 50 µg/m³. (An exceedance of the standard occurs when an annual arithmetic mean of PM₁₀ concentrations is greater than 50 µg/m³. A violation of the standard occurs when the 3-year average of the weighted annual mean PM₁₀ concentrations is greater than 50 µg/m³.) (40 CFR 50.6.)

^b The primary daily National Ambient Air Quality Standard for PM₁₀ is a 24-hour average concentration of 150 µg/m³. (An exceedance of the standard occurs when a 24-hour average PM₁₀ concentration is greater than 150 µg/m³. A violation of the standard occurs when a 24-hour average concentration greater than 150 µg/m³ occurs more than once in a calendar year.) (40 CFR 50.6.)

* TEOM = tapered element oscillating microbalance
 BAM = beta attenuation monitor

Operating agency key: *italics* = site operated by a state agency

Color shading key: **Red** >50 µg/m³ annual arithmetic mean, > 150 µg/m³ 24-hour average

Table 11. 2023 PM₁₀ summary - maximum daily 24-hour average concentration in 2021-2023 (µg/m³)^a.

National Park Unit	Site Name	Sampler Type*	2023	2022	2021
Sites operated by cooperating state agencies					
<i>Badlands</i>	Visitor Center	BAM	160	60	190
<i>Wind Cave</i>	Visitor Center	BAM	110	60	160
<i>Yosemite</i>	Village	BAM	230	160	80

^a The primary daily National Ambient Air Quality Standard for PM₁₀ is a 24-hour average concentration of 150 µg/m³. (An exceedance of the standard occurs when a 24-hour average PM₁₀ concentration is greater than 150 µg/m³. A violation of the standard occurs when a 24-hour average concentration greater than 150 µg/m³ occurs more than once per year on average over 3 years.) (40 CFR 50.6.)

* TEOM = tapered element oscillating microbalance
 BAM = beta attenuation monitor

Operating agency key: *italics* = site operated by a state agency

Color shading key: **Red** = more than one 24-hour average concentration > 150 µg/m³ in calendar year

Table 12. 2023 Annual summary of selected meteorological data.

National Park Unit	Site Name	Wind Speed (m/s)		Ambient Temperature (degrees C)		Relative Humidity (%)			Precipitation (mm)
		Average	Average	Maximum	Minimum	Average	Maximum	Minimum	Annual Accumulation
Sites operated by the National Park Service (Gaseous Pollutant Monitoring Program)									
Big Bend	K-Bar Ranch Road	3.6	21.9	41.9	-3.5	39	95	4	---
Canyonlands	Island in the Sky	2.8	12.1	38.4	-12.6	43	99	3	---
Carlsbad Caverns	Biology Building	5.1	19.3	40.3	-5.6	37	100	4	---
Chaco Culture	Radio Repeater	4.0	10.9	36.3	-16.3	44	99	5	---
Chiricahua	Entrance Station	2.9	19.5	38.7	-1.6	37	98	5	212.3
Craters of the Moon	Visitor Center	2.8	6.0	37.5	-25.5	---	---	---	---
Death Valley	Park Village	3.8	25.7	50.1	7.2	---	---	---	---
Denali	Headquarters	1.3	-1.2	27.4	-31.3	72	98	21	289.9
Dinosaur	West Entrance Housing	1.4	12.1	39.6	-17.4	---	---	---	144.0
Glacier	West Glacier Horse Stables	0.7	6.4	35.6	-25.6	---	---	---	---
Grand Canyon	The Abyss	2.9	10.8	34.6	-11.7	44	100	2	---
Grand Teton	Science School	2.2	2.0	30.8	-31.6	73	100	14	---
Great Basin	Maintenance Yard	2.6	8.5	37.4	-22.9	46	98	6	---
Great Smoky Mountains	Cades Cove	1.3	13.9	32.2	-9.1	80	100	12	1,388.8
Great Smoky Mountains	Cove Mountain	3.7	11.9	26.7	-11.3	72	100	1	1,290.8
Great Smoky Mountains	Kuwhohi (Clingmans Dome)	2.0	9.8	22.6	-13.8	89	100	10	1,232.9
Great Smoky Mountains	Look Rock	2.1	14.3	29.7	-8.2	70	100	11	1,250.0
Hawaii Volcanoes	Visitor Center	3.4	15.8	25.4	7.7	87	95	11	---
Joshua Tree	Black Rock	3.9	14.7	38.7	-6.6	43	100	3	---
Joshua Tree	Cottonwood Visitor Center	2.6	18.5	40.5	-0.2	34	99	5	142.7
Lassen Volcanic	Manzanita Lake Fire Station	1.0	6.9	30.6	-18.0	67	100	11	---
Mammoth Cave	Houchin Meadow	1.7	14.8	34.9	-8.2	70	99	4	---
Mesa Verde	Resource Management Area	2.9	9.6	34.4	-15.8	46	95	6	---
Petrified Forest	South Entrance	4.1	13.4	38.7	-16.1	---	---	---	---
Pinnacles	SW of East Entrance Station	2.1	13.7	42.7	-6.5	65	100	7	---
Rocky Mountain	Longs Peak	2.3	4.0	26.8	-24.1	54	94	4	---
Sequoia and Kings Canyon	Ash Mountain	2.1	17.1	41.0	-0.3	53	95	9	---
Sequoia and Kings Canyon	Lower Kaweah	1.9	13.4	31.5	-10.4	60	100	7	---
Shenandoah	Big Meadows	1.7	9.4	28.8	-16.9	74	100	8	---
Voyageurs	Sullivan Bay	2.2	5.7	34.8	-34.7	75	98	16	---
Yellowstone	Old Faithful Snow Lodge	1.4	1.1	29.6	-39.8	71	99	11	---
Yellowstone	Water Tank	1.4	0.7	27.7	-35.8	72	99	14	---
Yellowstone	West Entrance	0.9	1.9	31.0	-38.1	74	100	11	---
Yosemite	Turtleback Dome	4.0	11.2	33.7	-7.6	54	100	9	---
Zion	Dalton's Wash	4.0	16.2	44.6	-7.6	---	---	---	---
Sites operated by the NPS for the Bureau of Land Management									
Rangely	Golf Course	3.1	9.2	38.6	-25.9	54	99	6	164.7

Table 12. 2023 Annual summary of selected meteorological data (continued).

National Park Unit	Site Name	Wind Speed	Ambient Temperature			Relative Humidity			Precipitation
		(m/s)	(degrees C)			(%)			(mm)
		Average	Average	Maximum	Minimum	Average	Maximum	Minimum	Annual Accumulation
Sites operated by cooperating state agencies									
<i>Acadia</i>	Cadillac Mountain	5.7	9.1	32.4	-14.0	83	100	20	---
<i>Acadia</i>	McFarland Hill	2.3	8.4	30.7	-27.6	78	100	17	1,563.4
<i>Cape Cod</i>	Cape Cod	2.2	11.8	33.9	-20.2	77	100	18	---
<i>Chamizal</i>	Chamizal	2.8	20.8	42.5	-2.4	34	99	7	---
<i>Indiana Dunes</i>	Ammunition Bunker	2.6	11.4	36.7	-15.2	75	100	17	---
<i>Saguaro</i>	East	---	21.7	42.7	-2.2	31	99	2	---

Note : Dashed lines represent no data available for that particular parameter at that site.

Operating agency key: plain text = site operated by the National Park Service

italics = site operated by a state agency