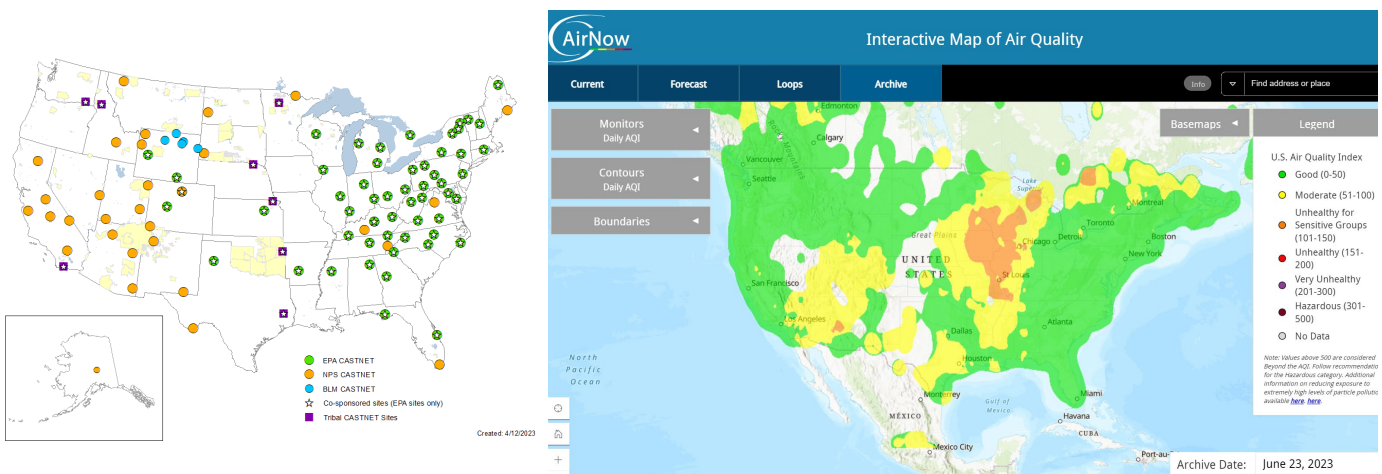


## Expanding Air Monitoring in Indian Country The Clean Air Status and Trends Network (CASTNET)

The Clean Air Status and Trends Network provides air quality and atmospheric deposition data from standardized monitoring stations operating throughout the contiguous United States, Alaska, and Canada. The EPA Office of Atmospheric Protection manages and operates CASTNET in cooperation with the National Park Service and the Bureau of Land Management, and other partners, including state, and local agencies, and eight Tribal Nations.

The EPA established CASTNET in 1987 to track and assess the ongoing effectiveness of legislatively mandated reductions of emissions of air pollutants from the power sector. Over the past two decades, the EPA expanded the mission and utility of CASTNET to further support Agency priorities related to air quality and climate change, and their effects on human and ecological health. CASTNET also has a long-term collaborative relationship with the National Atmospheric Deposition Program (NADP), which monitors ammonia, mercury, fluorinated organic chemicals (PFAS), and other pollutants at many collocated sites.

Tribal communities use CASTNET and NADP ambient air quality and deposition data in many ways, including for policy and management decisions related to human health and ecological impacts of air pollution, developing conservation strategies, permitting, and in modeling and regulatory development. Several tribal partners use their CASTNET site and measurement data as a hands-on, educational and training resource for students. CASTNET develops the technical know-how that can help expand tribal-led monitoring to address persistent and emerging environmental issues.



Map (above left) shows the distribution of CASTNET sites and partners. CASTNET ozone data are reported near real-time to AIRNow, allowing communities prompt access to air quality health advisories. The map (above right) shows a daily snapshot of air quality on the AIRNow website (<https://www.airnow.gov/>). In the example shown, air quality in most of the United States is good. However, parts of the central U.S. and southern California experienced air quality unhealthy for sensitive groups.

### CASTNET Tribal Partners

Tribal Nations have historically played an important role in environmental issues, including air quality management and monitoring. Tribes, often disproportionately affected by air pollution and other environmental hazards, have a need for high-quality, reliable data to assess the health of their citizenry and lands. Through networks like CASTNET and NADP, EPA has developed fruitful relationships with tribal agencies and continually seeks new partnership opportunities to help meet tribal air quality data and training needs, and build monitoring capacity. Many CASTNET tribal partners have added complementary equipment or measurements to their site including mercury deposition, PFAS in precipitation, wildfire tracers, and PM sensors. Information about each CASTNET tribal site is summarized in the table below.

Tribal Partner	Year Site Established	Site ID	Site Type
Cherokee Nation	2002	CHE185	F
Alabama-Coushatta Tribe of Texas	2004	ALC188	F
Santee Sioux Nation, Nebraska	2006	SAN189	F
Red Lake Band of Chippewa Indians, Minnesota	2014	RED004	S
Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas	2014	KIC003	S
Nez Perce Tribe	2015	NPT006	SO
Confederated Tribes of the Umatilla Indian Reservation	2020	UMA009	SO
La Posta Band of Diegueno Mission Indians of the La Posta Indian Reservation, California	2023	LPO010	SO

F= full site with temperature-controlled shelter, filter pack, and ozone; S=small footprint site with filter pack; SO=small footprint site with small enclosure for ozone analyzers



*Nez Perce Tribe's CASTNET site (left). Image of a small footprint site with a small, temperature-controlled enclosure housing an ozone analyzer. Site includes a 10-meter tilt down tower. The ozone inlet is in the rain shield on top of the tower.*

## The Benefits of Joining

EPA provides technical assistance, resources, and tools to help Tribes expand their monitoring capabilities. Tribes participating in CASTNET and NADP have realized many benefits – not only a suite of air quality measurements and access to high-quality data – but also scientific and technical training, reduced administrative, data management, and quality assurance responsibilities, and opportunities for educational engagements. EPA's CASTNET team prioritizes expanding independent monitoring capacity while offering tribes assistance to reduce the burdens associated with owning and maintaining monitoring equipment, establishing individual quality management plans, and developing IT infrastructure to store, flag and validate data. The data produced by the individual CASTNET tribal sites are comparable to the other approximately 100 CASTNET monitoring sites across the U.S. Map products, visualization tools, and air quality assessments developed by CASTNET include data from all the CASTNET tribal sites to support regional and local efforts to understand emissions sources, pollutant transport and human and ecological health impacts. CASTNET offers data that communities can use to advocate for emissions reductions, apply for resources to eliminate environmental health burdens, and develop communication tools that report health risks to the public.

## CASTNET and NADP Measurements

Pollutant Measured	Measurement Description	Measurement Use
Particles – sulfate (SO <sub>4</sub> <sup>2-</sup> ), nitrate (NO <sub>3</sub> <sup>-</sup> ), ammonium (NH <sub>4</sub> <sup>+</sup> ), base cations, sodium (Na <sup>+</sup> ), potassium (K <sup>+</sup> ), calcium (Ca <sup>2+</sup> ), magnesium (Mg <sup>2+</sup> ) chloride (Cl), Gases – sulfur dioxide (SO <sub>2</sub> ), nitric acid (HNO <sub>3</sub> )	Weekly filterpack	Model evaluation (CMAQ, CAMx), trends assessment, implementation of NOx, SOx, PM secondary NAAQS; PM2.5 speciation; power sector accountability; health assessments; sulfur dioxide is used to understand PM formation and satellite validation; nitric acid is an ozone precursor; important contributor to atmospheric N deposition; photochemical oxidation reactions; base cations used for model evaluation, ecosystem loadings
Ozone (O <sub>3</sub> )	Continuous measurements aggregated to hourly concentrations; Federal Equivalency Method (FEM)	NAAQS development and compliance in rural communities; regional ozone transport; wildfire impacts; exceptional event demonstrations (stratospheric intrusions); climate penalties impacting current and future AQ; health assessments; vegetation damage factors; model development and evaluation; background ozone concentrations; trends assessment
Organic Nitrogen (ON)	By difference using N measurements from Teflon filter (Total N – Inorganic N = ON)	Impacts from wildfires and biomass burning; model evaluation; deposition and critical loads
NO/NO <sub>y</sub>	Hourly concentrations of total oxides of nitrogen (NO <sub>y</sub> ) and NO calculate NO <sub>z</sub> by difference; continuous chemiluminescence analyzer	Ozone precursors; model development and evaluation; used in NCore/PAMS
Ammonia (NH <sub>3</sub> )	Bi-weekly passive sampler	Spatial and temporal trends in air quality and nitrogen deposition; contribution to formation of PM2.5; model development and evaluation; validation of satellite measurements; constrain emissions inventory
Wet Deposition (SO <sub>4</sub> <sup>2-</sup> , NH <sub>4</sub> <sup>+</sup> , NO <sub>3</sub> <sup>-</sup> , Na <sup>+</sup> , K <sup>+</sup> , Ca <sup>2+</sup> , Mg <sup>2+</sup> , Cl), pH, precipitation amount	Weekly precipitation sampler + rain gage	Produce wet and total deposition map products for program accountability; model development; platform for measuring emerging pollutants (e.g., PFAS, black carbon)
Mercury (Hg) ambient concentrations - gaseous elemental (GEM), gaseous oxidized (GOM), particle bound (PBM), total gaseous mercury (TGM), total mercury (total Hg) in wet deposition and litterfall	GEM, GOM, PBM - continuous speciation; TGM - monthly passive sampler; total Hg weekly - precipitation collector + rain gage; total Hg in litterfall seasonal passive collector	Indicator of mercury loadings to aquatic and terrestrial ecosystems; trends assessment, program accountability, model evaluation; health assessments
Per- and polyfluoroalkyl substances (PFAS) wet deposition	A wet only precipitation sampler + rain gage are used to collect wet deposition samples for targeted PFAS analyses	Contributes to understanding of atmospheric transport and processing, deposition, and accumulation of these compounds in terrestrial and aquatic ecosystems; health assessments

### Establishing a CASTNET site

Establishing and operating a CASTNET site is a team effort. EPA's Office of Atmospheric Protection coordinates with the EPA Region, the Tribe, and the CASTNET contractor on an array of activities, including identifying a new site location, setting up, operating, and maintaining equipment, and shipping samples to the lab. Typically, EPA or the CASTNET contractor purchases, owns, installs, maintains, and routinely calibrates the equipment. The tribal operator is responsible for visiting the site every Tuesday for sample change out and general site maintenance. The steps for starting a new tribal CASTNET site are found at <https://www.epa.gov/castnet/castnet-program-partners>.

Historic investments are being made to help communities address air and climate pollution, such as grants and technical assistance for air monitoring. CASTNET can be used as a platform to understand current and future air quality, including climate change impacts on emission reduction efforts and local air pollution. If you have any questions about the CASTNET monitoring program, contact David Schmeltz, EPA's CASTNET tribal coordinator ([schmeltz.david@epa.gov](mailto:schmeltz.david@epa.gov)) or Melissa Puchalski, EPA's CASTNET program manager ([puchalski.melissa@epa.gov](mailto:puchalski.melissa@epa.gov)).

Visit the CASTNET and NADP webpages: <https://www.epa.gov/castnet> | <https://nadp.slh.wisc.edu/>