

2024 October IMPROVE Steering Committee Meeting

Visibility Monitoring Contract Updates

By Mark Tigges –ARS

Tony Prenni – NPS ARD

October 29, 2024

Ambilabs Two Wavelength Integrating Nephelometer (2WIN)

- After 30 years (1993 - 2023), All Optec NGN2 Ambient Nephelometers shut down.*
- Fiscal Year 2023-2024 Funding was Directed by NPS to Integrate and Install 2WIN's at 10 Sites.
- Fiscal Year 2024-2025 SOW is Operations Including Data Validation and Reporting.
- Procedures, SOP's, and Issues Will be Addressed in the Coming Months.
- 2WIN Sites:

Acadia National Park

Big Bend National Park

Dinosaur National Park

Glacier National Park

Grand Canyon National Park

Great Smoky Mountains NP

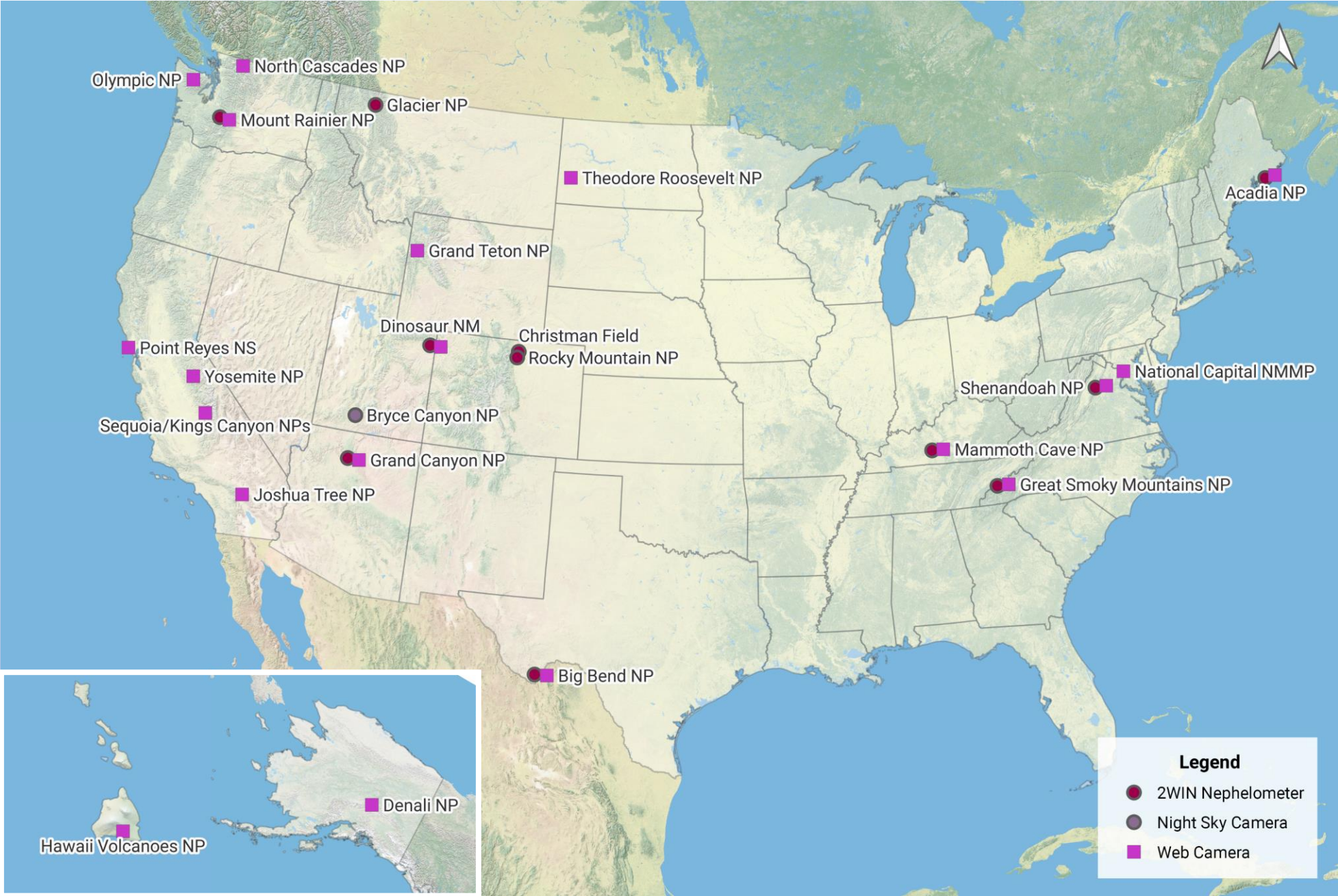
Mammoth Cave National Park

Mount Rainier National Park

Rocky Mountain National Park

Shenandoah National Park

*Jim Renfro at Great Smoky Mountains NP operates an NGN2 at the Look Rock Site.



2 Liter/min Inlet

DC Power Distribution

Ethernet LAN Switch

Fan Thermostat

Campbell Scientific Datalogger

PM2.5 Cyclone

Ambilabs 2WIN

Fan into Chamber

CO2 Span Gas 2-stage regulator

Fan out of Chamber

CO2 Span Gas Flow Meter

Span Gas HEPA Filter

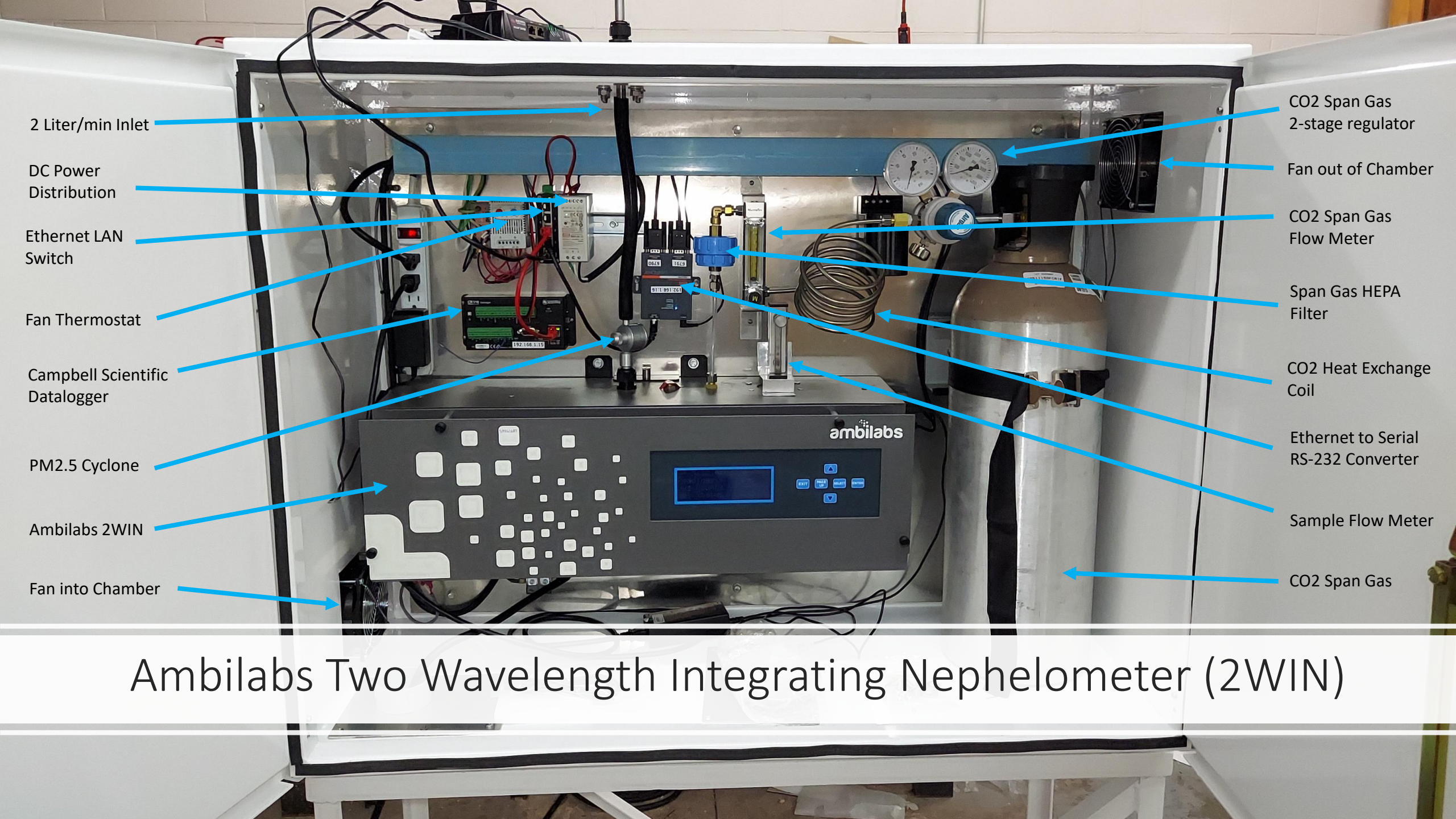
CO2 Heat Exchange Coil

Ethernet to Serial RS-232 Converter

Sample Flow Meter

CO2 Span Gas

Ambilabs Two Wavelength Integrating Nephelometer (2WIN)



2WIN Network Challenges 2024-2025

Travel Budgets – Travel to 2WIN sites is provided by the GPMP network

- This year travel to a subset of sites has been cut to once per year.
- Two nephelometer sites receive no visits from ARS.

Two Visits Annually

Dinosaur

Grand Canyon

Great Smoky

Mammoth Cave

One Visit Annually

Big Bend

Glacier

Rocky Mountain

Shenandoah

No Visits

Acadia

Mount Rainier

2WIN Network Challenges 2024-2025

(Continued)

Year End Funds Award – This is the second consecutive year NPS has awarded end of year funds to provide upgrades to aging shelters, instrumentation, and integrated systems in both GPMP and NPSVIS.



2WIN Network Challenges 2024-2025

(Continued)

Year End Funds Award – More before and after images.....



2WIN Network Challenges 2024-2025

(Continued)

2WIN Data Validation and Documentation

- Operator training and weekly/monthly activities
- Data collection screening
- Data processing and validation
- SOP development and completion

Data View Site Support Platform

NPS Deployment Scheduled for January 2025

- ARS created site support software to assist our clients with air quality site operations.
- Data View can be accessed both by the site laptop or by mobile device.
- The **Dashboard** provides a way to efficiently review near-real-time data, pollutant plots, checklists, past maintenance and calibration trip reports, administrative contacts, and more
- The Web-based digital site **logbook** is databased and available from anywhere.
- Weekly and Monthly Databased **Checklists** to guide and document the visit include imbedded instructions.
- ARS is in the process of adding 2WIN support to Data View

<https://dataview.air-resource.com/>

Thank You

Photo by Dave Beichley



2WIN Heat Mitigation



- Left-side panel modified to allow for a cooling fan to push enclosure air into nephelometer electronics.
- Front panel remounted with two-inch standoffs to allow air and heat to escape.
- Filters on environmental enclosure fans were replaced with porous media, improving air flow.
- Sites tested through today are not the dustiest in network (BIBE).
- Experience will help uncover issues with this initial heat mitigation approach.



WARM AIR

COOL AIR

ambilabs

192.168.1.15

192.168.1.15

91.1.861.1.1

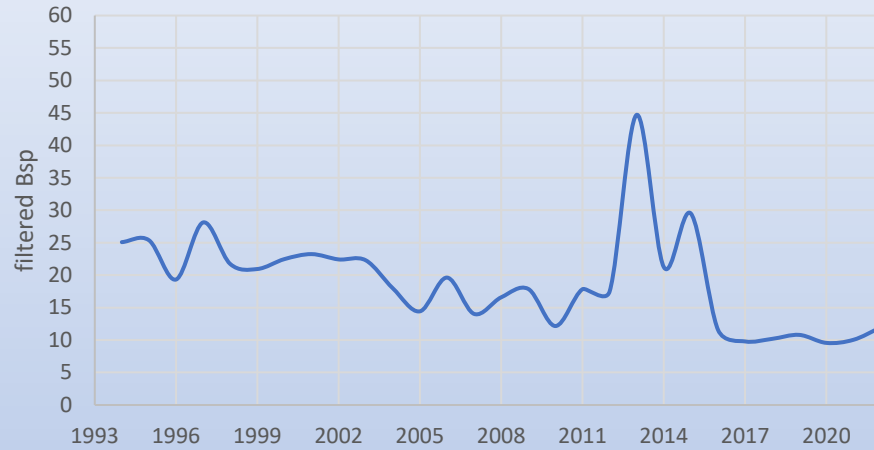
DG13 TG13

9CE5

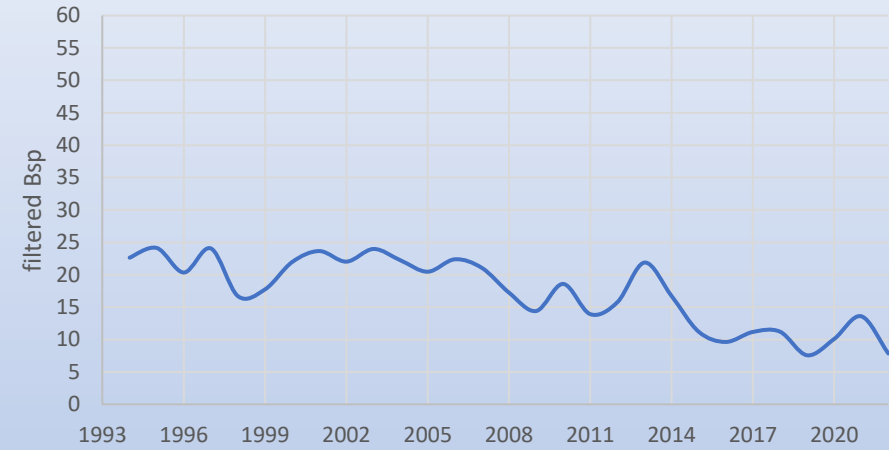
CS11155P-C010

30 Years of Optec Data: Acadia Snapshot

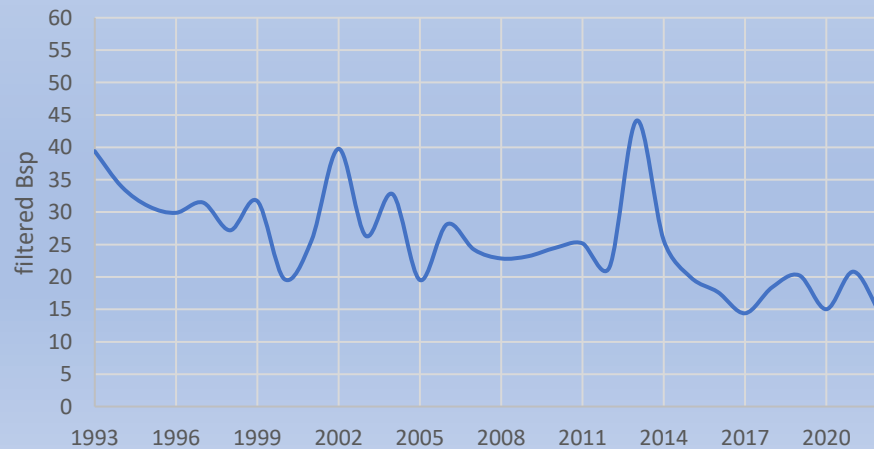
Acadia NP - ACAD1/2 Site
Winter



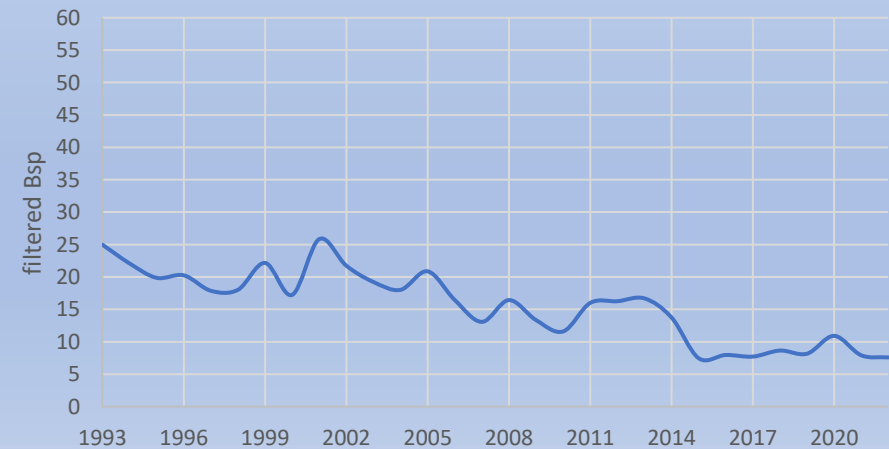
Acadia NP - ACAD1/2 Site
Spring



Acadia NP - ACAD1/2 Site
Summer



Acadia NP - ACAD1/2 Site
Fall



25 Years of Optec Data: Grand Canyon Snapshot

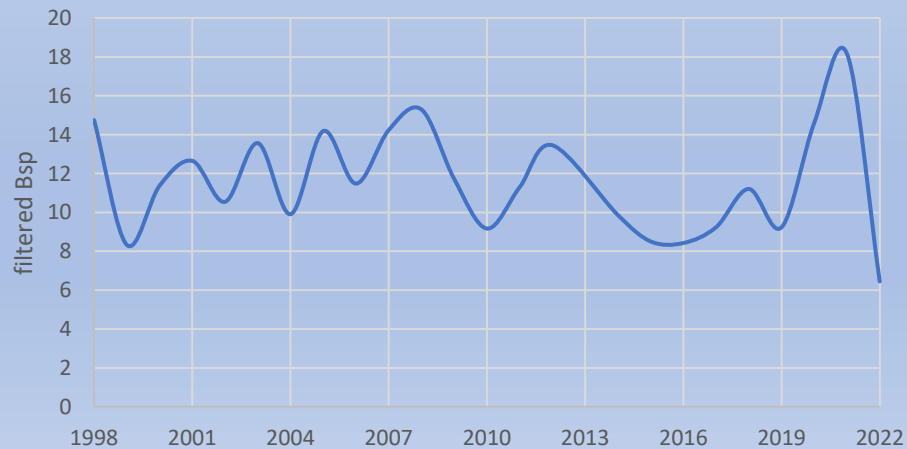
Grand Canyon - HANC1 Site
Winter



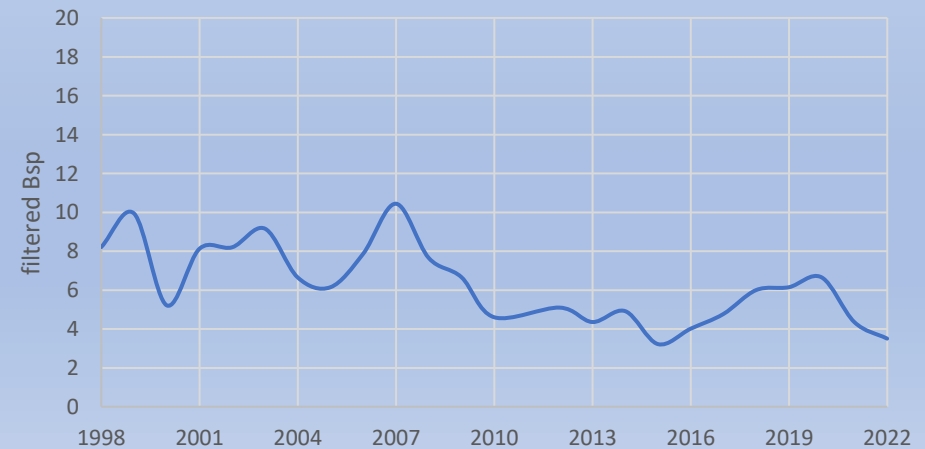
Grand Canyon - HANC1 Site
Spring



Grand Canyon - HANC1 Site
Summer

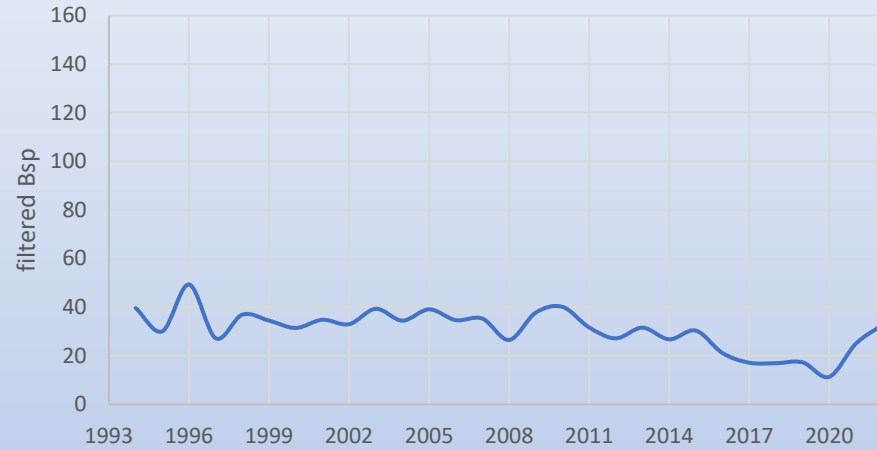


Grand Canyon - HANC1 Site
Fall

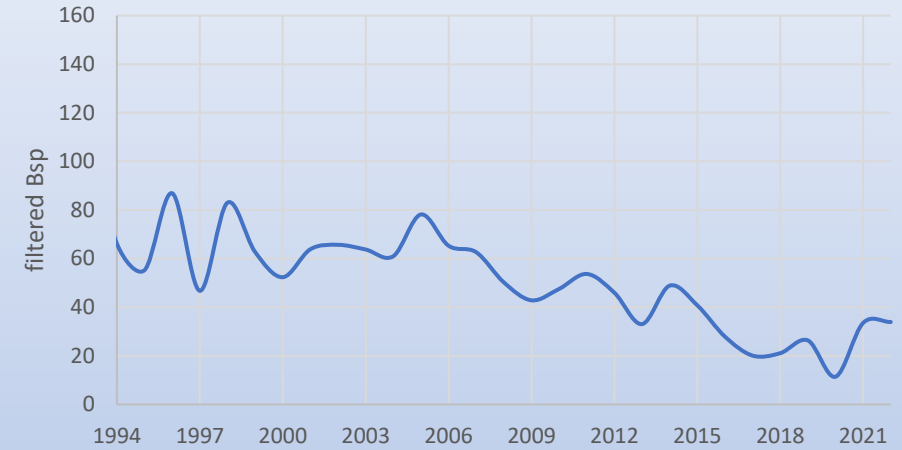


30 Years of Optec Data: Great Smoky Mtns Snapshot

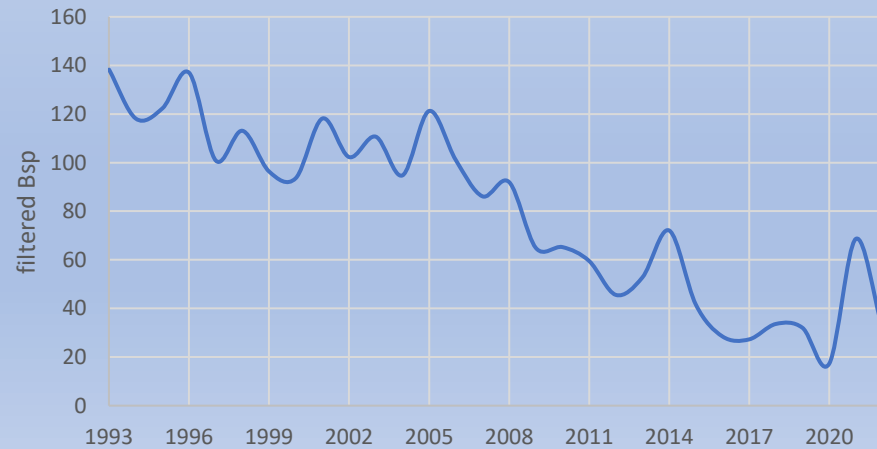
Great Smoky Mtns NP - GRSM1/2 Site
Winter



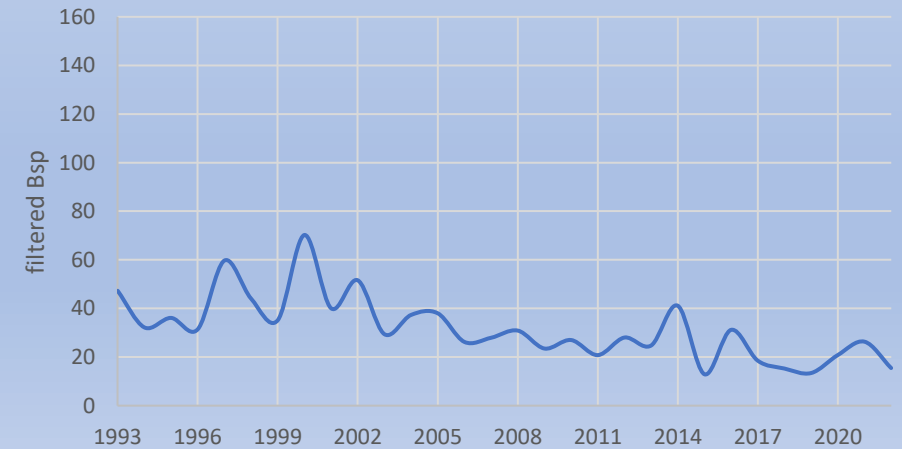
Great Smoky Mtns - GRSM1/2 Site
Spring



Great Smoky Mtns - GRSM1/2 Site
Summer



Great Smoky Mtns - GRSM1/2 Site
Fall



New Scene Monitoring & Web Camera Deployment

Description:

Bosch Ultra 8000MP with 4-13mm Varifocal lens

Old Cannon SLR 12 megapixel



New Bosch Ultra 8000MP 8 to 12 MP



New Scene Monitoring & Web Camera Deployment

Advantages

- Significantly cheaper to acquire than digital SLR system (computer, camera, support hardware).
- No on-site computer required as is needed with digital SLR.
- Motorized back focus for remote focus adjustment.
- Bosch enclosure available with Power-Over-Ethernet for simplified wiring.
- Significantly lower maintenance expected.
- Easier to install

Disadvantages

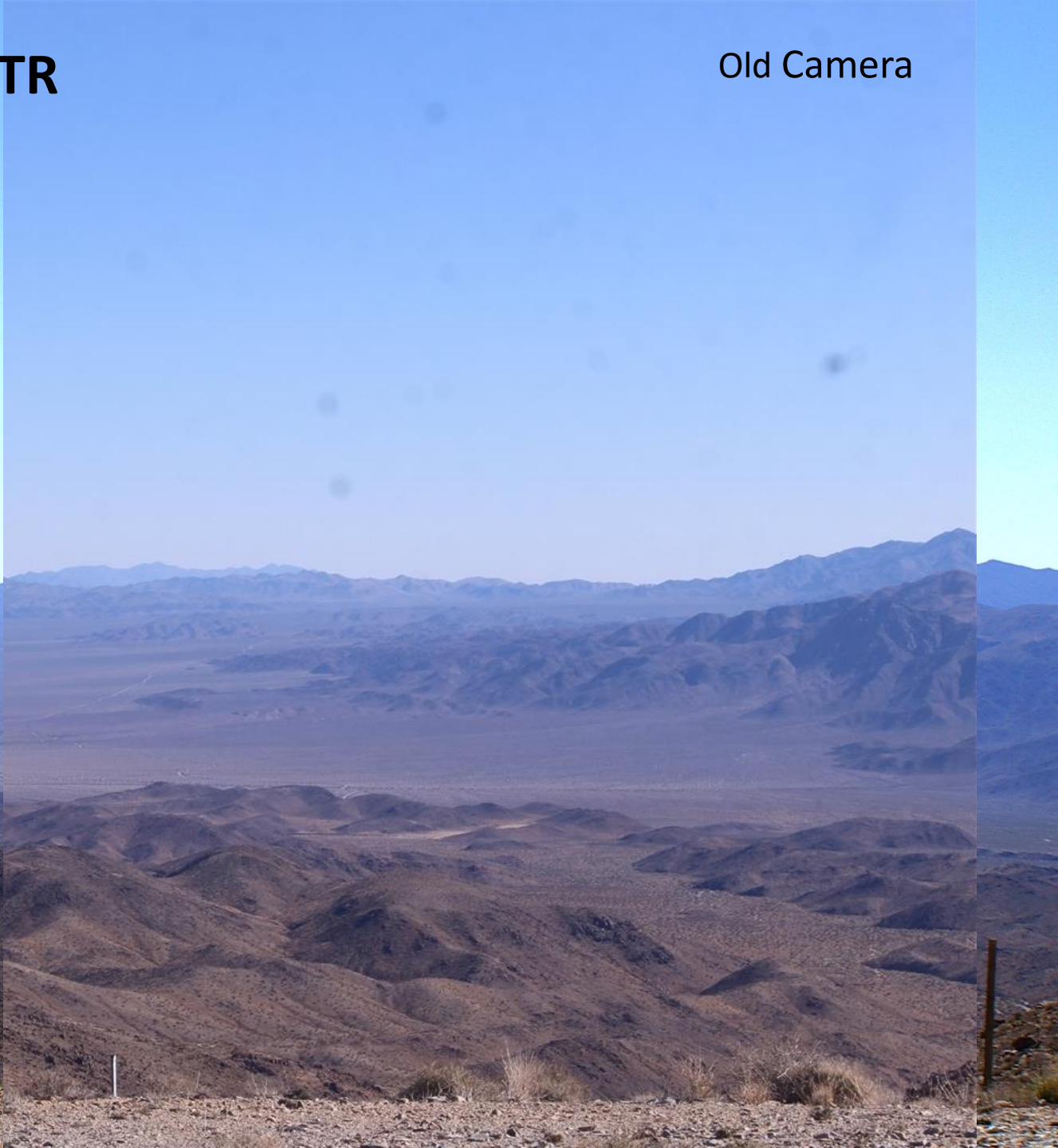
- Primitive color balance technology compared with digital SLR.
- Poor night performance (high gain image noise) compared with digital SLR. Not suitable for urban sites requiring night images.
- Smaller image sensor and lenses mean lower sensitivity and more distortion, especially at wide angles.
- Limited lens selection (limited fields of view) compare to digital SLR lenses.
- Still images cannot be saved on the camera. Images must be polled and saved remotely. No image backup in the event of onsite internet or remote polling failure.
- JPEG only, no raw output.

New Camera



JOTR

Old Camera



New Camera

PORE

Old Camera



2WIN Installation in West Glacier







