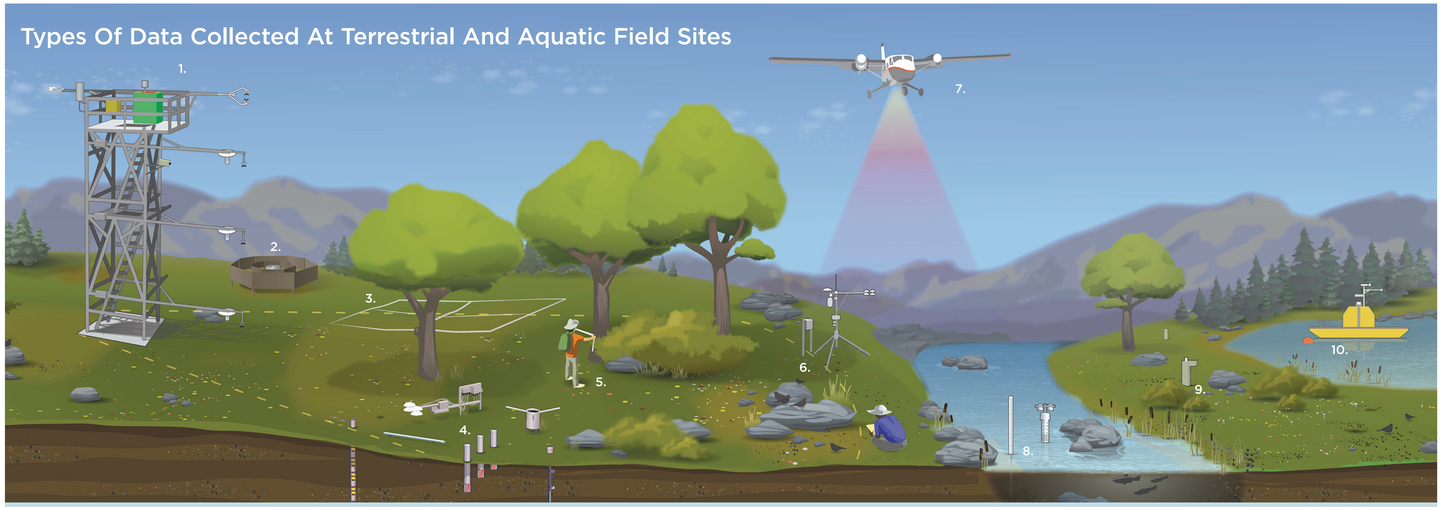
Open Access Soil, Meteorological, Surface Water, and Groundwater Data

Types Of Data Collected At Terrestrial And Aquatic Field Sites



1. A flux tower collects atmospheric data at terrestrial sites.

2. Primary precipitation is measured using a Double Fence Intercomparison Reference.

3. Sampling plots are located within, and outside of the tower footprint.

4. Automated instruments collect soil data at terrestrial sites.

5. Field scientists collect organismal data from select plants, animals, pathogens, and microbes.

6. A meteorological station collects atmospheric data at aquatic sites.

7. The Airborne Observation Platform (AOP) flies over most sites annually to collect remote sensing data.

8. Surface water and depth profile data are collected at streams, rivers, and lakes.

9. Groundwater wells capture changes in groundwater elevation, temperature, and specific conductance.

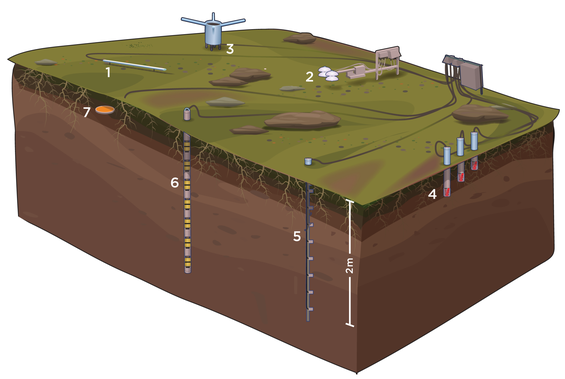
10. Buoy stations at lake sites collect data about surface water quality.

Terrestrial Field Sites

NEON collects automated instrument data at 47 terrestrial field sites. Field sites are strategically located in distinct ecoclimatic regions across the United States.

Soil Sensor Arrays

NEON installs an array of five soil plots within or near the flux tower's footprint and in the locally dominant (1 km2 scale) soil type of each terrestrial field site. Soil plots are typically spaced up to 40 m apart. Sensors at these plots measure physical and chemical porperties of soil at various depths and soil heat flux at the soil surface.



Soil Measurements and Frequencies

1 Photosynthetically active radiation (PAR)	1Hz	**4** CO_2 concentrations	.1Hz
2 Net-shortwave & net-longwave radiation	1Hz	**5** Soil temperature	.1Hz
		6 Soil moisture & salinity	.1Hz
3 Precipitation	.5Hz	**7** Heat flux	.1Hz

Meteorological Measurements at Terrestrial & Aquatic Sites

		TERRESTRIAL SITES (frequency/location)			AQUATIC SITES (frequency/location)	
Measurement	**Sensor**	**Tower Top**	**Lower Levels**	**Soil Array**	**On Bank Met Station**	**Above Wate Met Station**
Global shortwave radiation	Kipp and Zonen CMP22 Pyranometer	1 Hz (only core sites)	⃠	⃠	⃠	⃠
Direct and diffuse shortwave radiation	Delta-T Devices SPN1 Sunshine Pyranometer	1 Hz	⃠	⃠	⃠	⃠
Net-shortwave and net-longwave radiation (4-component)	Hukseflux NR01 Net Radiometer	1 Hz	⃠	1 Hz (only longwave)	1 Hz	30 s
Photosynthetically Active Radiation (PAR)	Kipp & Zonen PQS 1 PAR Quantum Sensor (additional downward-facing sensor at tower top)	1 Hz	1 Hz	⃠	1 Hz	30 s
Photosynthetically Active Radiation (PAR) - quantum line	Licor LI-191-01 Quantum Line Sensor	⃠	⃠	1 Hz	⃠	⃠
Spectral sun photometer - calibrated sky radiances	CIMEL Electronique - CE318N-EBS9	15 min	⃠	⃠	⃠	⃠
Air temperature	Thermometrics Climate RTD 100 Ω Probe, housed within a Met One 076B fan aspirated radiation shield (triplet probes in tower top shield)	1 Hz	1 Hz	⃠	1 Hz	1 min
IR biological temperature	Apogee SI-111 infrared (IR) temperature sensor	⃠	1 Hz	1 Hz	⃠	⃠
Relative humidity	Vaisala HUMICAP Humidity and Temperature Probe - HMP 155	1 Hz	⃠	1 Hz	1 Hz	1 min
Barometric pressure	Vaisala - BAROCAP Digital Barometer PTB330	⃠	1 Hz	⃠	1 Hz	1 min
Precipitation/Primary - Double Fence Intercomparison Reference (DFIR)	Belfort AEPG II 600M weighing gauge	0.1 Hz (20 sites)			0.1 Hz (four sites)	
Precipitation/Secondary	Met One 372 tipping bucket (non-heated) and 379 tipping bucket (heated)	On event (37 sites)	⃠	⃠	On event (six sites)	⃠
Precipitation/Throughfall	Met One 372 tipping bucket (non-heated)	⃠	⃠	When event occurs	⃠	⃠
2D wind speed and direction	Gill - Wind Observer II; Extreme Weather Wind Observer; RM Young 05108-45 Wind Monitor-HD Alpine (buoy); Honeywell HMR 3330 (buoy)	⃠	1 Hz	⃠	1 Hz	-4 s
3D wind speed, direction and sonic temperature	Campbell Scientific. CSAT-3 3-D Sonic Anemometer	20 Hz	⃠	⃠	⃠	⃠
3D wind attitude and motion reference	Xsens North America Inc. MTI-300-2A5G4 Attitude Heading Reference System	40 Hz	⃠	⃠	⃠	⃠
CO_2 and H_2O concentration & flux	LI-COR - LI7200 gas analyzer	20 Hz	⃠	⃠	⃠	⃠
CO_2 and H_2O concentration (storage/profile)	LI-COR - LI840A	1 Hz	1 Hz	⃠	⃠	⃠
CO_2atmospheric isotopes (storage/profile)	PICARRO - G2131-i isotopic CO_2 analyzer	1 Hz	1 Hz	⃠	⃠	⃠
H_2O atmospheric isotopes (storage/profile)	PICARRO - I2130-i isotopic H_2O analyzer	1 Hz (21 sites)	1 Hz (21 sites)	⃠	⃠	⃠
Wet deposition chemistry and precipitation isotopes	N- Con Systems Company Wet Deposition Collector, Manufacture Model No: NEON 00-127-7	2 wks (37 sites)	⃠	⃠	2 wks (seven sites)	⃠
Phenology images	Stardot NetCam SC CAM-SEC5IR-B	15 min	15 min	⃠	15 min	

Additional measurements only at D10 & D13 terrestrial sites (MOAB, ONAQ, NIWO, RMNP, STER, CPER):
Dust and particulate size distribution (TSI DustTrak model: 8533EP): 1 Hz; Particulate mass (Ecotech HiVol 3000): 2 wks

QUICK FACTS ABOUT OUR AUTOMATED INSTRUMENTS

At terrestrial field sites:

- Meteorological and flux data are collected from flux towers have multiple levels of sensors.
- Five soil plots are placed in an array near the tower.

At aquatic field sites:

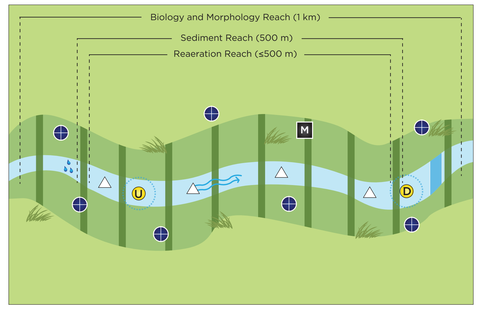
- Meteorological data are collected on the bank at all aquatic sites above the water at lake and river sites.
- Surface water and groundwater data are collected.

Aquatic Field Sites

NEON has 34 freshwater aquatic field sites, including 24 wadeable streams, seven lakes, and three non-wadeable rivers. Locations are representative of aquatic features and habitats typical of regions across the United States within each NEON Domain (excluding D20: Pacific Tropical) and near to NEON terrestrial field sites whenever feasible.

SENSOR STATION LOCATIONS BY AQUATIC SITE TYPE

Wadeable Stream

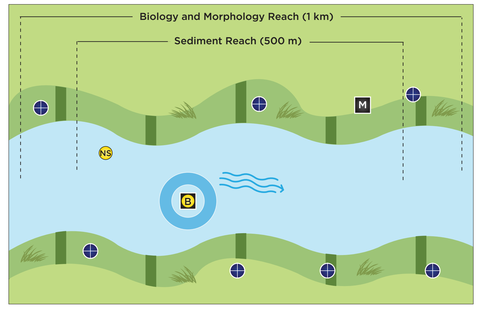


Legend

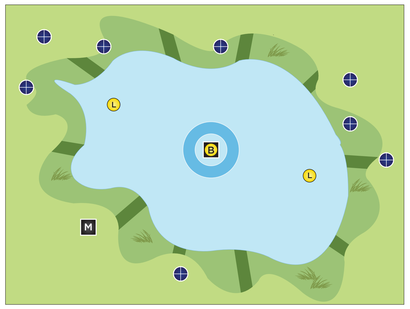
- Sensor Station
- Water Chemistry Sampling
- Groundwater Well
- M — Meteorological Station
- Riparian Assessment
- Reaeration Drip
- Rearation Sampling

Note: Fish, sediments, macroinvertebrates, zooplankton, plants, macroalgae, periphyton, and phytoplankton are sampled based on site-specific habitats and are not identified in the figures.

Non-Wadeable River



Lake



AUTOMATED INSTRUMENT MEASUREMENTS BY AQUATIC SITE TYPE

		Streams		Rivers		Lakes	
	Automated Instrument Measurements	Upstream (U)	Downstream (D)	Buoy (B)	Near Bank (NS)	Buoy (B)	Littoral (L)
●	PAR at water surface	✓	✓	✓	⃠	✓	⃠
●	PAR below water surface	⃠	⃠	✓	✓	✓	✓
●	Elevation of surface water (pressure transducer based)	✓	✓	⃠	✓	⃠	✓
●	Temperature in surface water	✓	✓	⃠	✓	⃠	✓
●	Temperature at specific depth in surface water (depths vary by site)	⃠	⃠	✓	⃠	✓	⃠
●	Water quality: specific conductivity, chlorophyll a, dissolved oxygen content, pH, turbidity, and fluorescent dissolved organic matter (fDOM)	✓ (no fDOM)	✓	✓	⃠	✓	⃠
●	Nitrate in surface water	⃠	✓	✓	⃠	✓	⃠
◍	Groundwater wells: specific conductivity, water temperature, elevation of groundwater	✓ Up to 8 per field site					
M	Meteorological measurements: wind speed and direction, air temperature, barometric pressure, relative humidity, shortwave radiation, and photosynthetically active radiation (PAR)	✓ One on bank		✓ One on bank, One on buoy		✓ One on bank, One on buoy	

BATTELLE

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