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NEON Biorepository

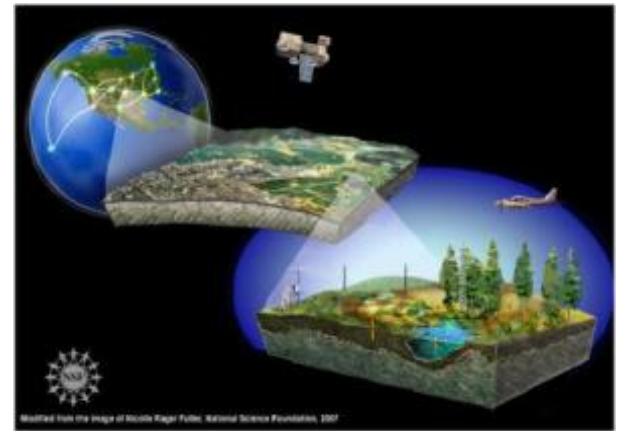
National Ecological Observatory Network

A project sponsored by the National Science Foundation and operated under cooperative agreement by Battelle.

2017 Annual ADBC Summit hosted by iDigBio, 2-3 November 2017

What is NEON?

- NSF-funded large science facility
- Enable decadal/continental-scale ecology
 - Standardized data collection across the observatory
 - Free and openly available data
 - Standardized, reliable framework for additional research



NEON Field Sites: A Continental Design



Field Sites located in

24
STATES

(plus Puerto Rico)

The Observatory includes

81
FIELD SITES

(47 Terrestrial; 34 Aquatic)

Providing approximately

195
DATA PRODUCTS

(spanning decades and standardized across sites)

CONCEPT/DESIGN

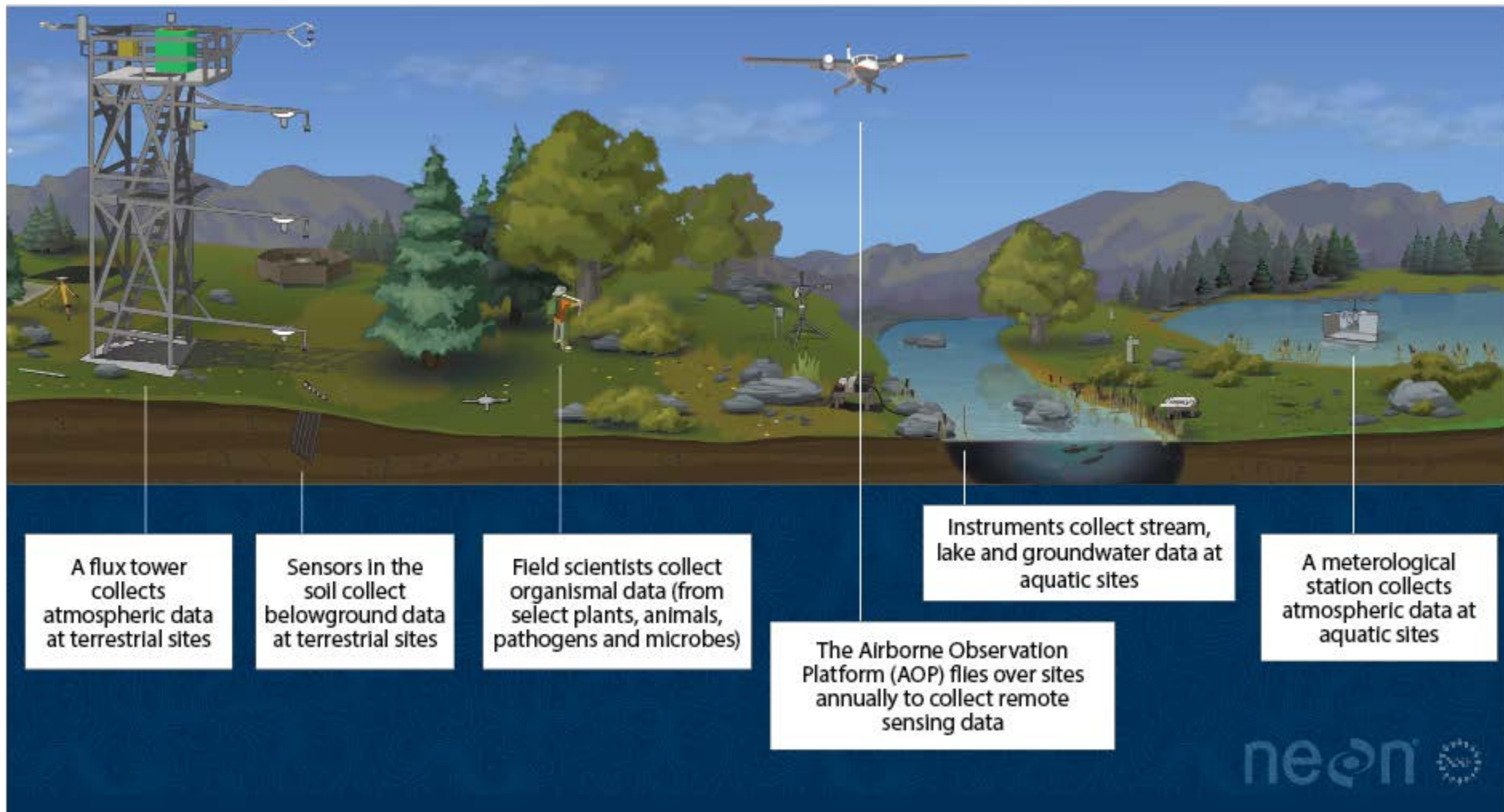
CONSTRUCTION

OPERATIONS

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Collection Methods at NEON Field Sites





NEON Timeline

NEON Biorepository

- **Foster continental and decadal scale ecology**
 - Diverse array of samples and specimens (~100,000/year)
 - Archived for the duration of Observatory
- **A record, reference and resource for future studies**



- Open to researchers now and in the future



- **Status**

- Evaluating proposals
- Refining budget requirements
- Target: Summer 2018



Guiding Principles

- Receptive and responsive to investigator requests.
- Close collaboration with the requesting PI will be a key to success.
- Strike a balance between the immediate needs of individual requests and the desire to reserve a suite of samples to allow for decadal and broad geographic scale analyses.
- Resulting data to be made publically available.
- Priority for loans:
 - NSF-BIO vs. other NSF vs. non-NSF
 - Consistency with NEON mission

Functional Design Features

Single institution or small consortium

Capacity

- 30-year time horizon
- Capacity to grow over time

Efficiency

- Discoverable
- Responsive to external researchers
- Timely and efficient sample processing
- Timely loan processing

Collection Management

- Curation best practices
- Accommodate destructive & non-destructive uses
- Reserve portion for longer-term studies
- Risk mitigation; emergency/disaster planning

Technical & Operating Requirements

Accessioning	90% within 10 business days
Sorting & Identification	Most processing prior to receipt
Unique Identifiers	NEON, Institution, GUIDs....
Cataloging	90% available within 3-6 months
Loans	90% fulfilled within 4 weeks
Destructive Sampling	Sample use policy in development
Internal Controls	Safety, physical security and emergency plan
Deaccessioning	Prior coordination with NEON Project
Annual Reporting	Loan activities, sample use and publication

Information Management

Consistent across sample types

- Use of off-the-shelf solutions

Collection management system

- Support discoverability
- Track specimen transactions
- Serve collection data/metadata
- Integrate collections data with object tracking, geospatial information, and usage
- Continuously updated and accessible via the web

Use of accepted community standards

- E.g., TDWG

3rd party interfaces

- E.g., GBIF, GenBank, VertNet, iDigBio,....

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Ground Beetles	<ul style="list-style-type: none"> • Pinned/pointed • Pooled • Bycatch 	9,400 2,444 3,901
Mosquitos	<ul style="list-style-type: none"> • Pinned/pointed • Pooled 	6,080 2,050
Ticks	<ul style="list-style-type: none"> • Whole specimens 	2962
Small Mammals	<ul style="list-style-type: none"> • Whole specimens • Blood • Ear punches • Fecal pellets • Hair/whiskers 	940 2,820 3,525 5,076 3,525
Plant Biomass	<ul style="list-style-type: none"> • Above-ground foliage • Below-ground biomass • Leaf litter 	272 320 120
Plants	<ul style="list-style-type: none"> • Whole specimens 	640
Soil	<ul style="list-style-type: none"> • Microbes (cryogenic) 	20,325
Soil	<ul style="list-style-type: none"> • Air-dried 	360
DNA Extractions	<ul style="list-style-type: none"> • Beetle • Mosquito • Small mammal • Soil microbe 	4,512 1,920 1,920 4,512
Disease Pools (nucleic acid extracts)	<ul style="list-style-type: none"> • Tick • Mosquito 	4,418 20,962

Aquatic Samples

Algae	• Soft-bodied	918
	• Diatoms	1,836
	• Macroalgae	525
Aquatic Plants	• Macrophytes	510
	• Mosses, lichens, liverworts	510
Benthic Macroinvertebrates	• Specimens	816
	• Homogenates	816
Zooplankton	• Specimens	63
	• Homogenates	63
Fish	• Whole specimens	1,020
	• Fin clips	1,700
Aquatic Microbes	• Water	576
	• Benthic	612

Recent Bioarchive Requests

Ground beetle	<ul style="list-style-type: none">• Regional context of community assembly• Specimen digitization• Spatio-temporal variation in animal communities
Beetle by-catch	<ul style="list-style-type: none">• Use of eDNA extracts to inform biodiversity assessments• Ant abundance and thermal ecology• Non-carabid beetles – abiotic drivers of abundance & diversity
Mosquitos	<ul style="list-style-type: none">• Teaching collection• Pathogen analysis• Examine large scale patterns in C & N among mosquito taxa• Mosquito distribution patterns in Wisconsin
Plants	<ul style="list-style-type: none">• DNA extractions and sequencing
Small mammal	<ul style="list-style-type: none">• Hair/whiskers – isotopic analysis
Soil – Frozen	<ul style="list-style-type: none">• Microbial biogeography• Microbial C and N cycling• Role of microbes in soil matrix• Effects of fire on soil microbial communities (2)
Soil – Air-dried	<ul style="list-style-type: none">• Soil diffusivity

Technical Working Groups

- **Aquatic Ecology**
 - **Biorepository**
 - **Breeding Birds**
 - **Data Standards**
 - **Fish**
 - **Foliar Sampling**
 - **Ground Beetle**
 - **Microbial**
 - **Mosquito**
 - **Small Mammals**
 - **Terrestrial Biogeochemistry**
 - **Terrestrial Plant Diversity/Phenology**
 - **Terrestrial Plant Productivity/Biomass**
- Airborne Sampling Design
 - Aquatic Instrument
 - Atmospheric Chemistry
 - LiDAR
 - Mobile Deployment Platform
 - Soil Sensor
 - Spatial Sampling TW
 - Surface Atmosphere Exchange
 - Terrestrial Instrument Data QA/QC



Useful Website Pages

- **Archival Samples:** <http://www.neonscience.org/data/archival-samples>
- **Technical Working Groups:**
<http://www.neonscience.org/observatory/observatory-blog/seeking-scientists-engineers-data-experts-advise-neon-project>
- **Field Sites:** <http://www.neonscience.org/field-sites/field-sites-map>
- **Field Protocols:** <http://www.neonscience.org/data-collection/protocols-standardized-methods>
- **Info for Researchers:** <http://www.neonscience.org/resources/information-researchers>
- **Data Portal:** <http://www.neonscience.org/data>



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