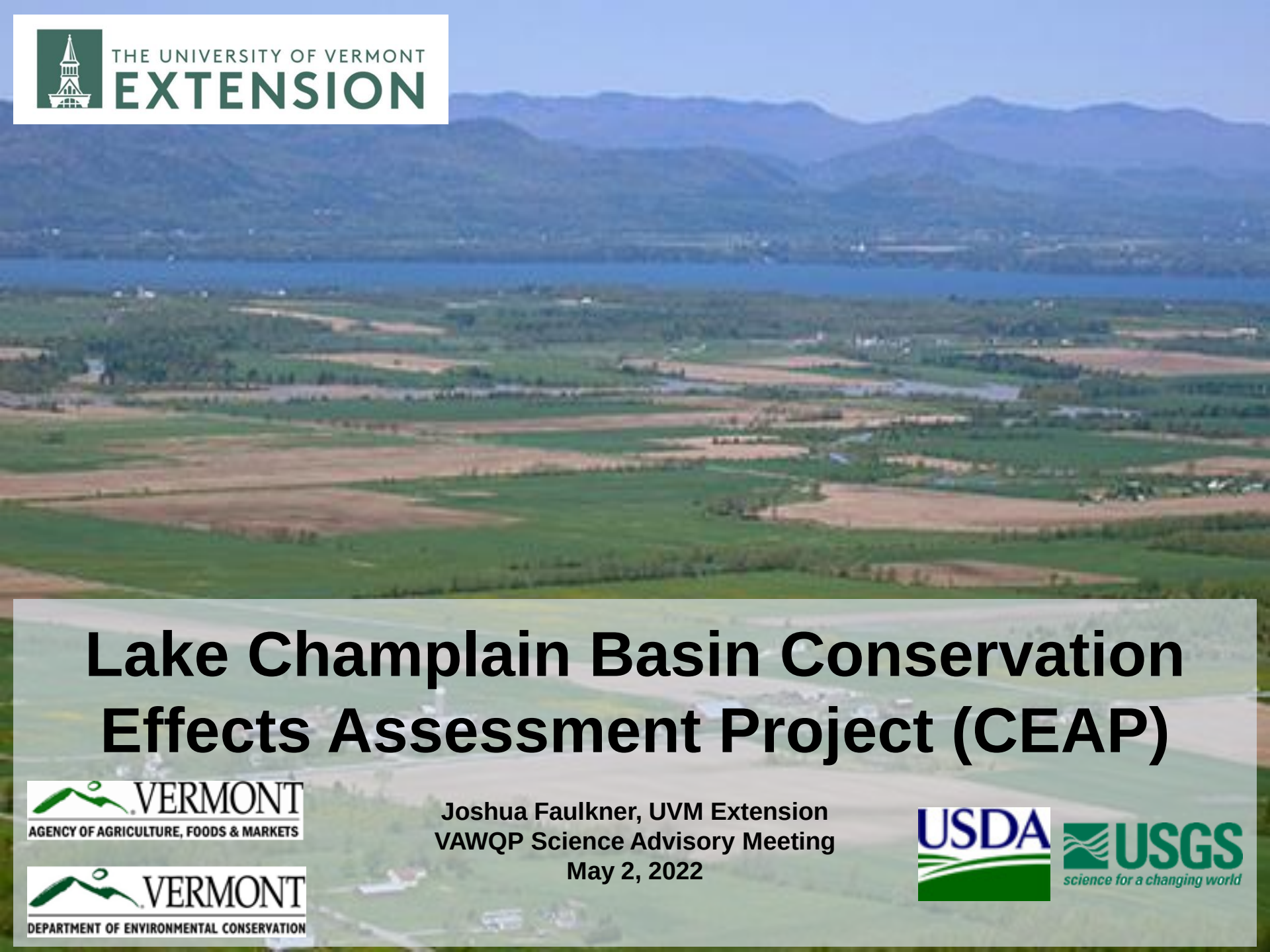


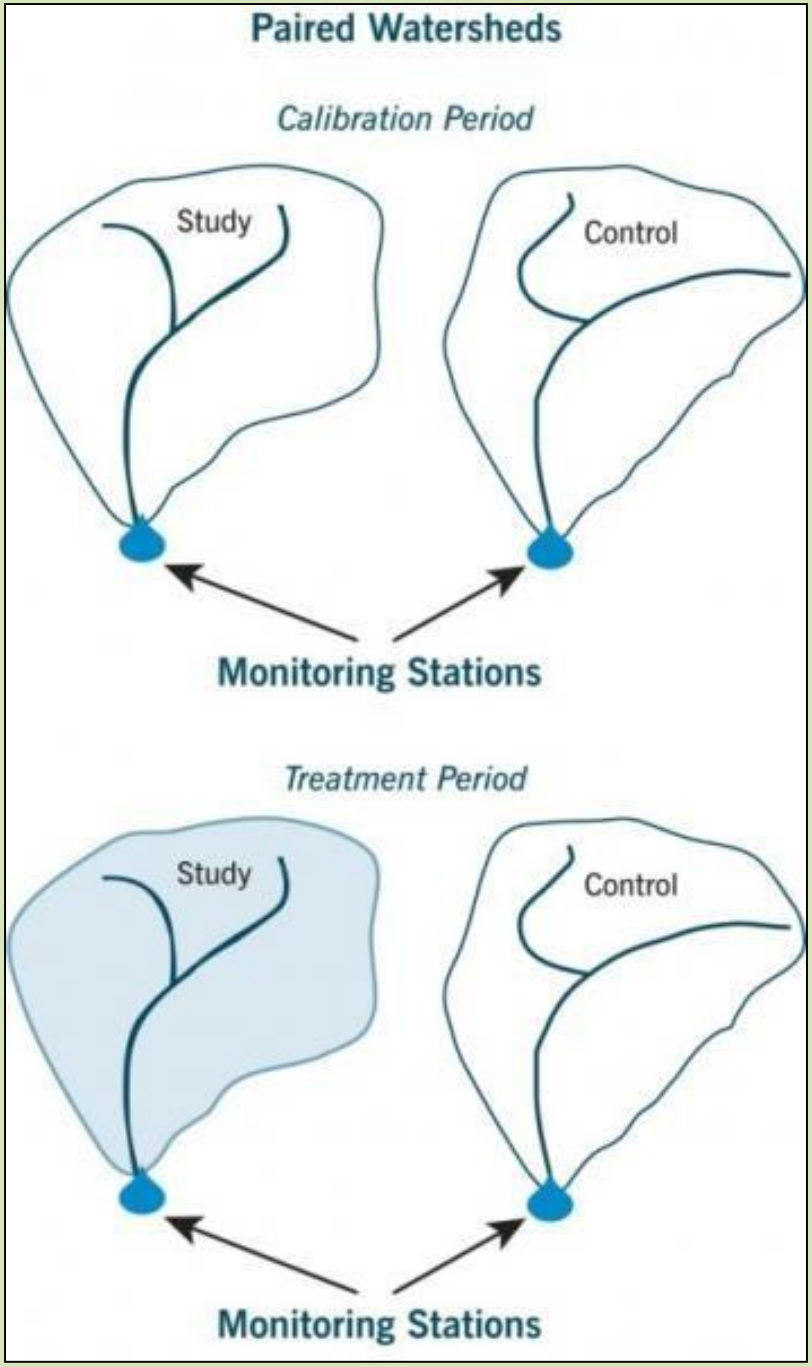
Lake Champlain Basin Conservation Effects Assessment Project (CEAP)

Joshua Faulkner, UVM Extension

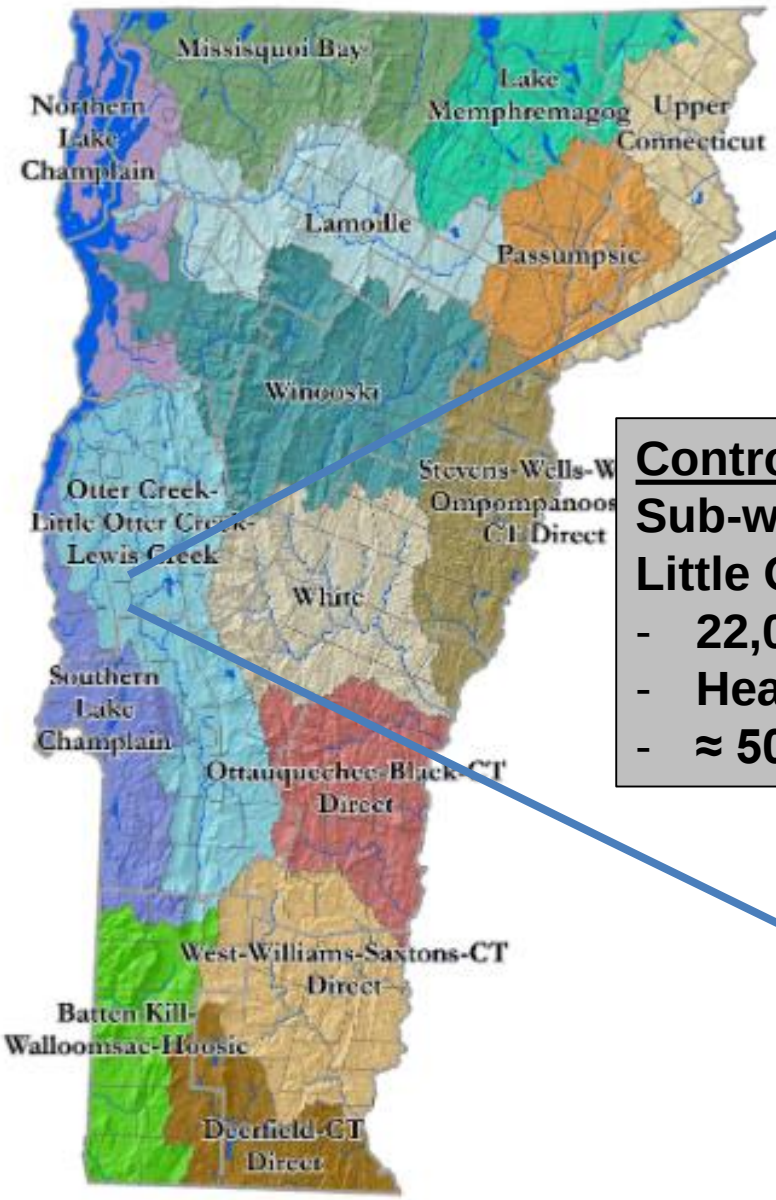
VAWQP Science Advisory Meeting
May 2, 2022

Experimental Design

- Paired watersheds
- Year 1&2
  - Calibration period
- Year 3+
  - Treatment period
  - Conservation acceleration
- 10 years+ ?!!

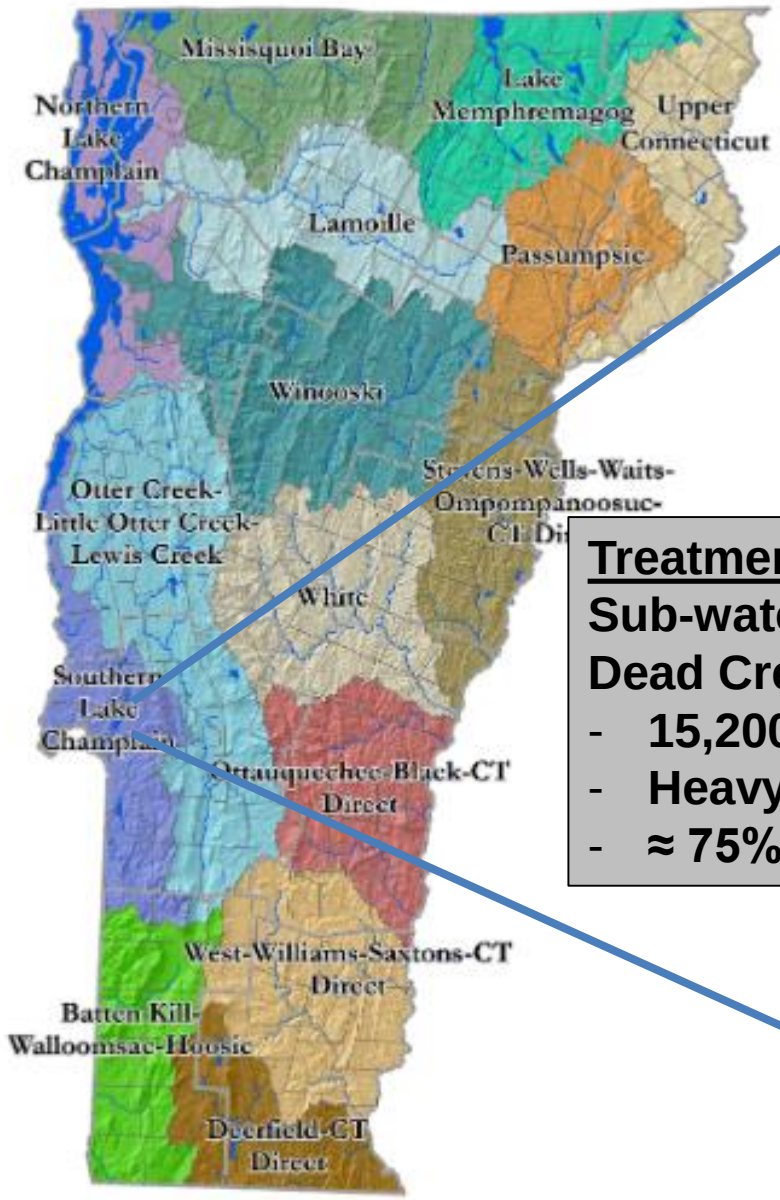


CEAP: Paired Watershed Approach

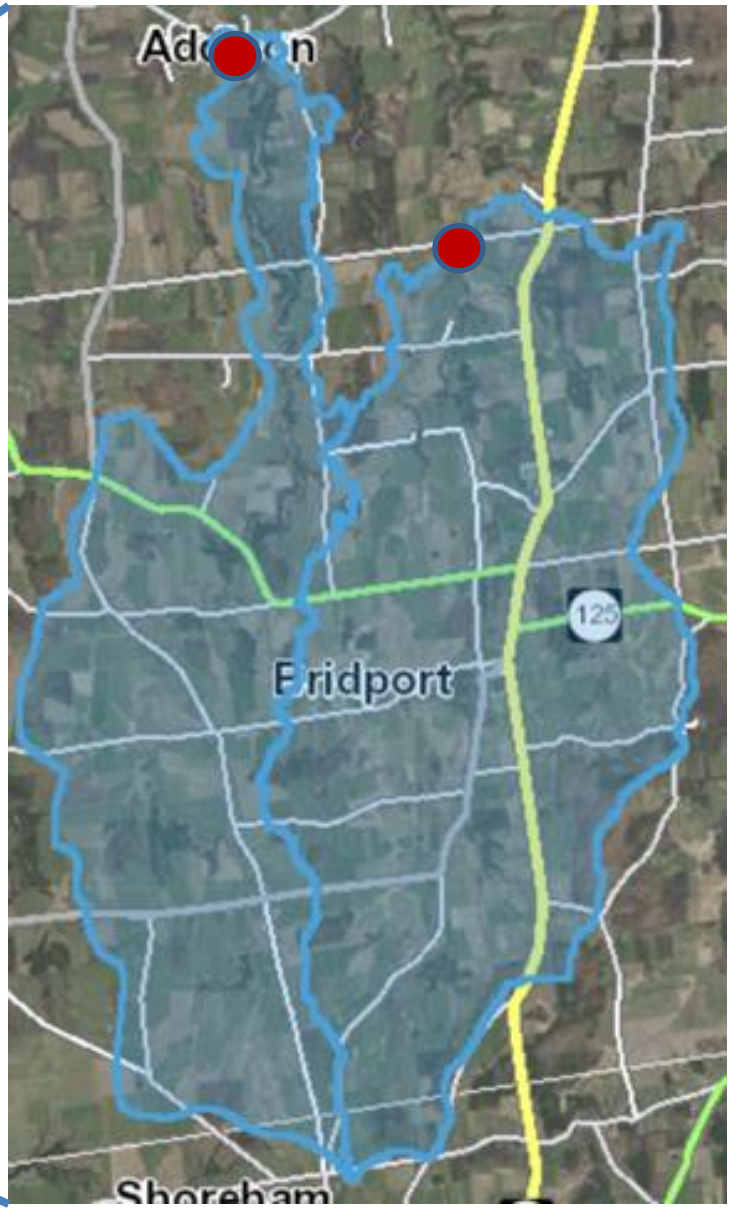


Control Watershed
Sub-watershed of Little Otter Creek
- **22,000 ac**
- **Heavy clay soils**
- **≈ 50% ag**

CEAP: Paired Watershed Approach

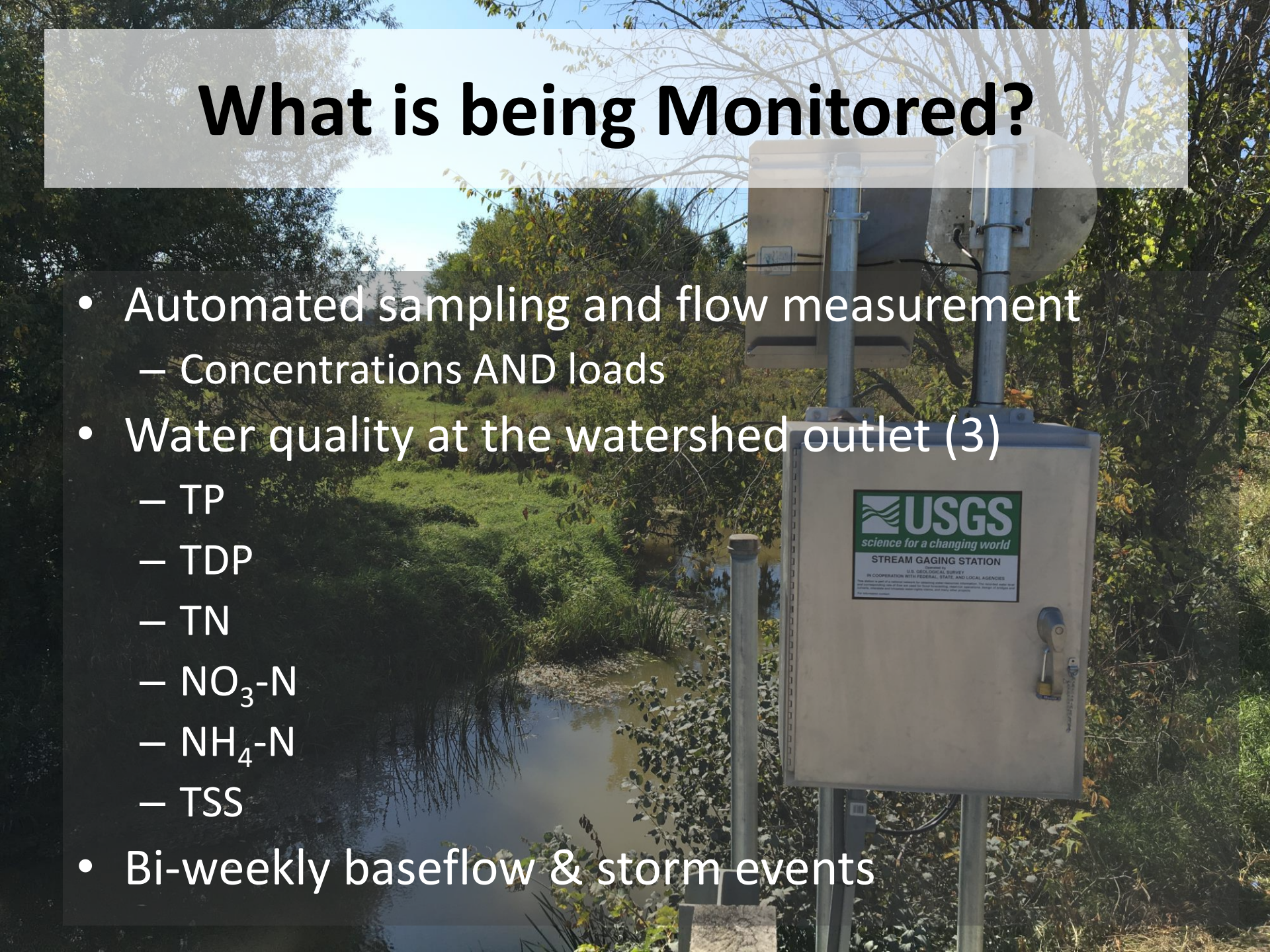


Treatment Watershed
Sub-watersheds of Dead Creek
- **15,200 ac**
- **Heavy clay soils**
- **≈ 75% ag**

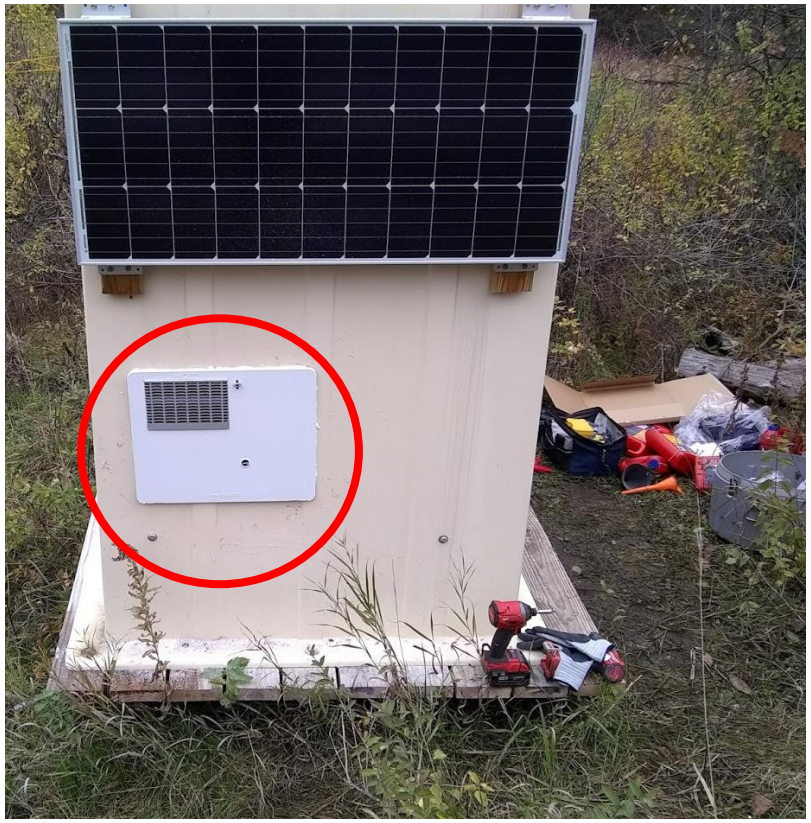


What is being Monitored?

- Automated sampling and flow measurement
  - Concentrations AND loads
- Water quality at the watershed outlet (3)
  - TP
  - TDP
  - TN
  - NO_3-N
  - NH_4-N
  - TSS
- Bi-weekly baseflow & storm events

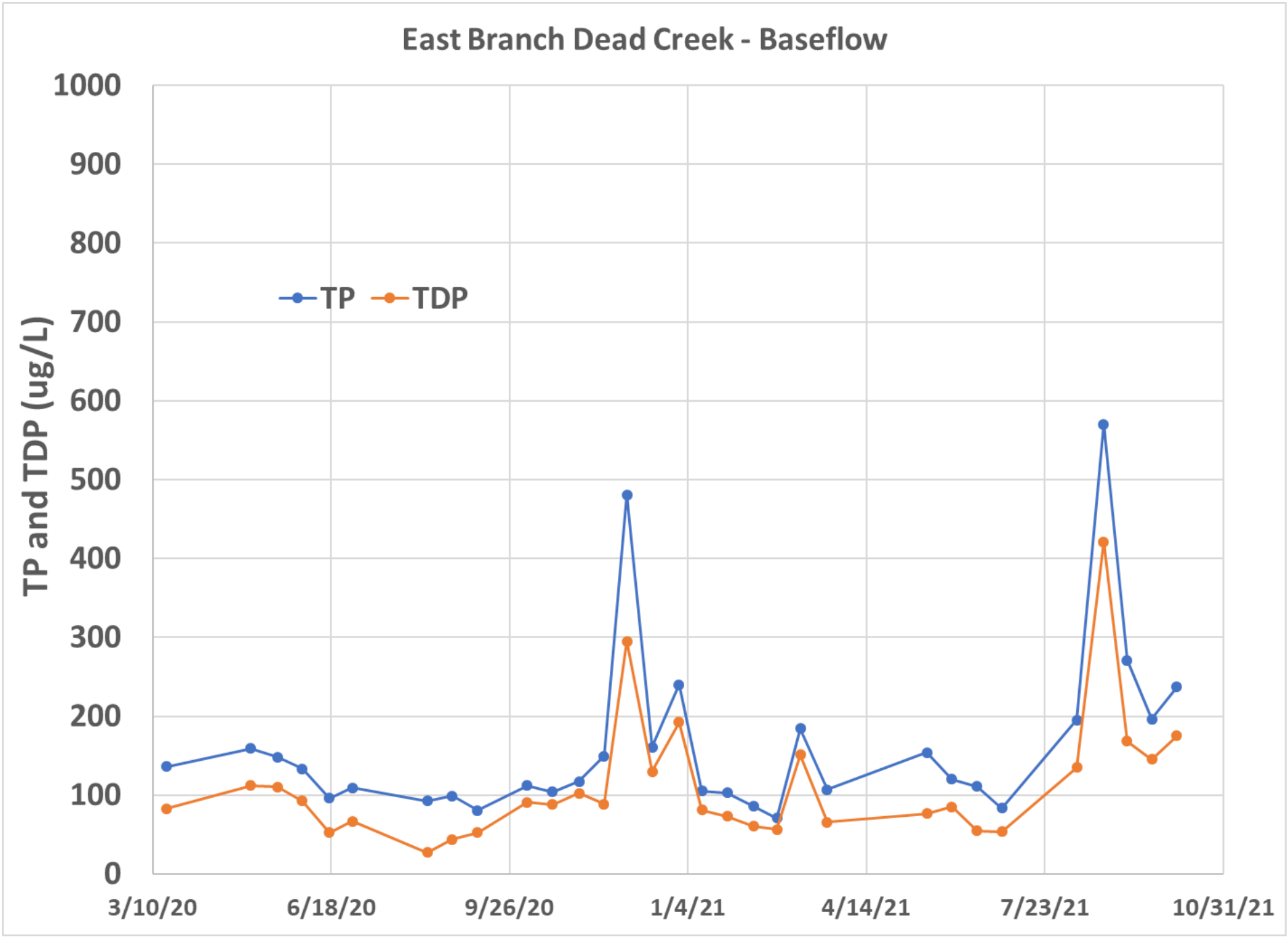


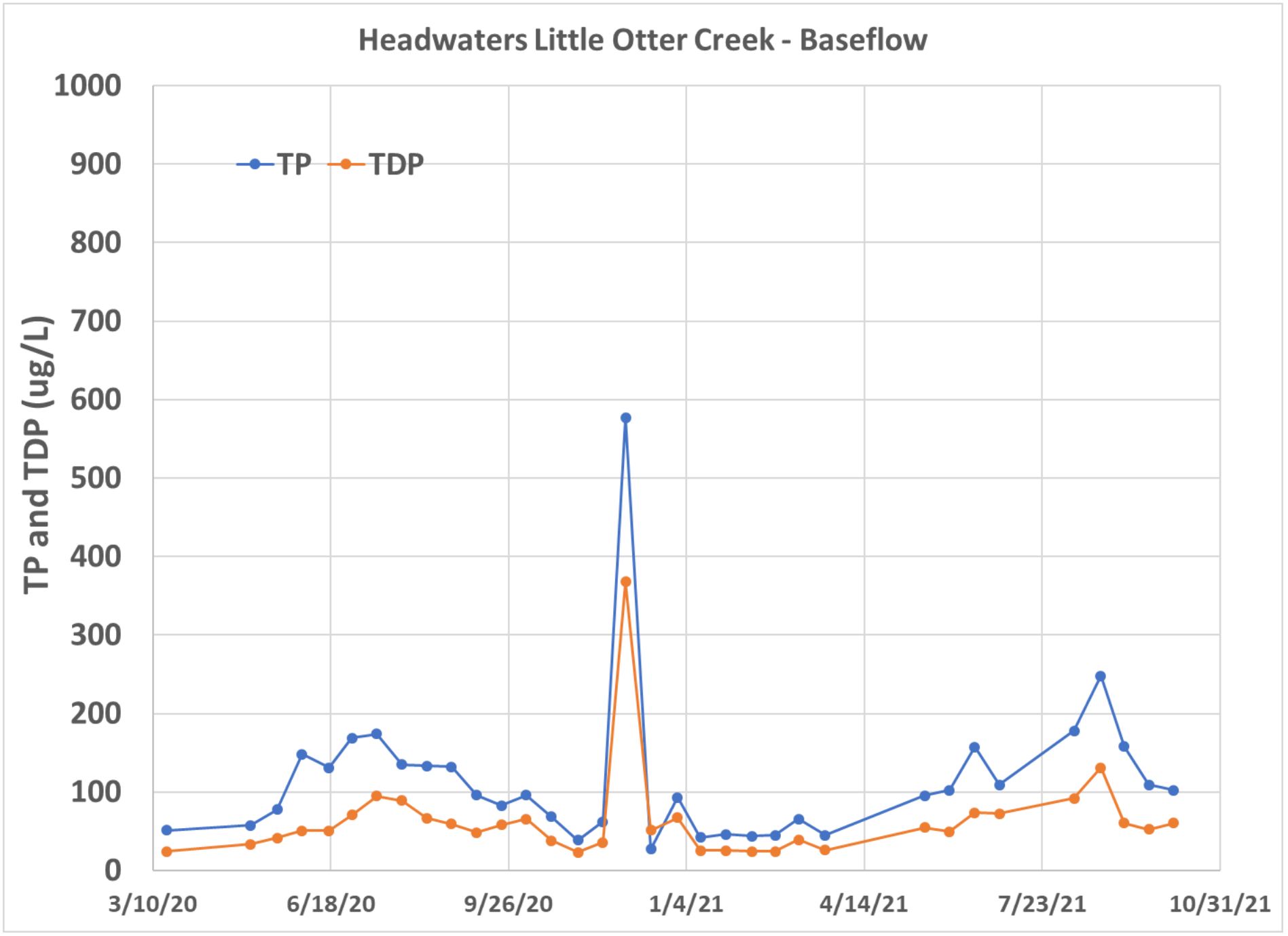
Capturing the Elusive ‘New England Winter WQ Data’

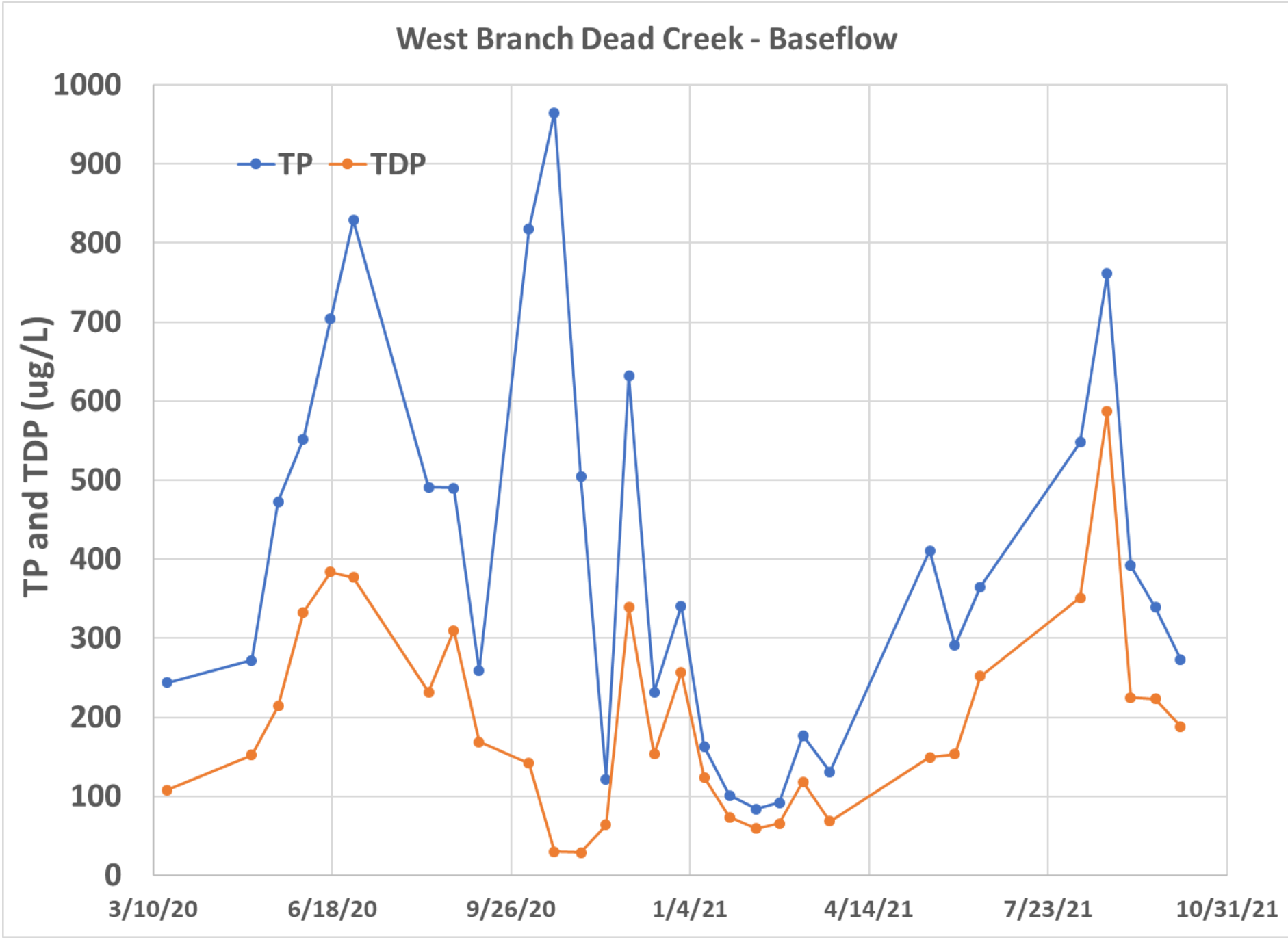


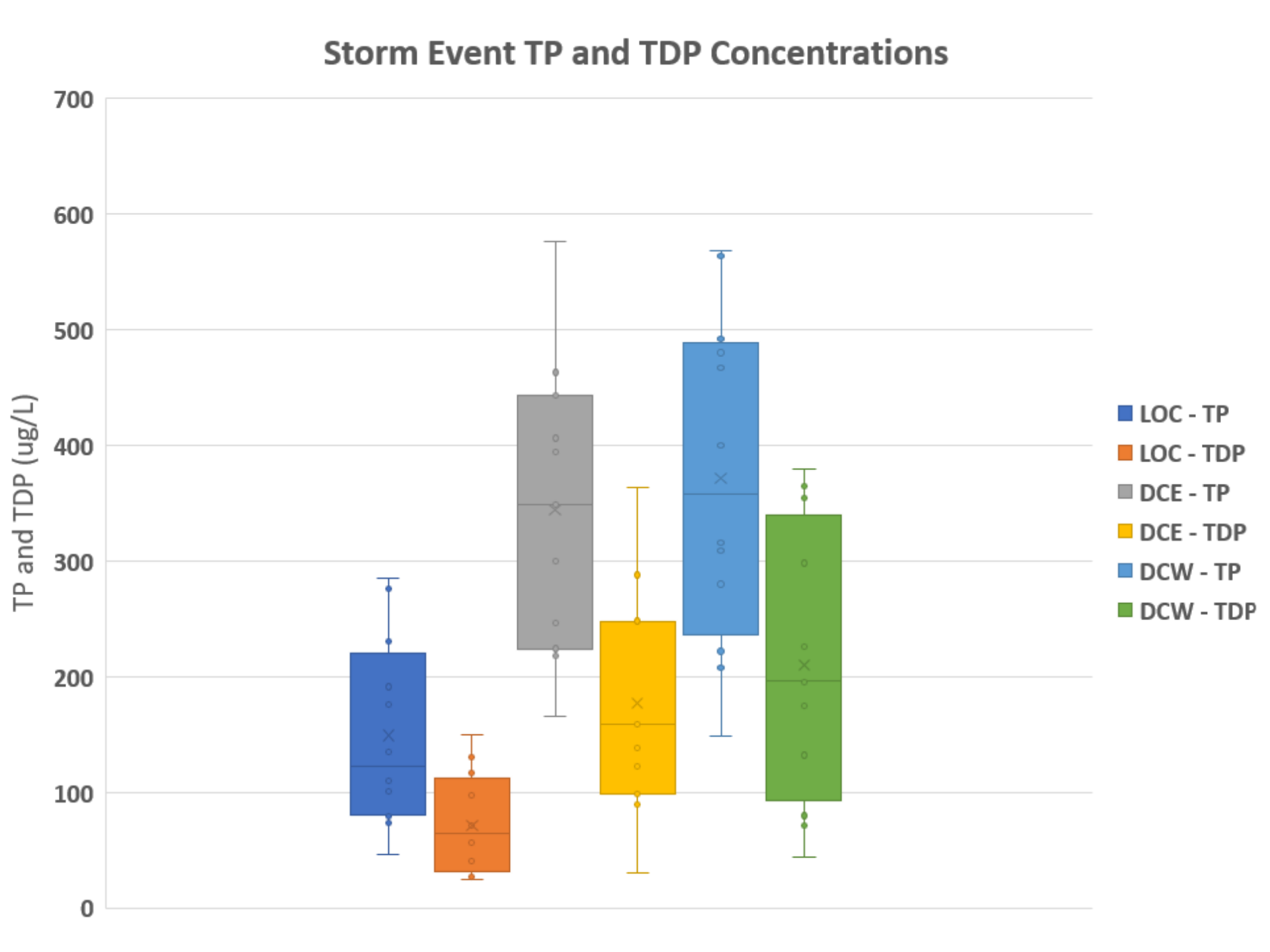
Management and Landuse Data

- Documentation of landuse, management, and conservation practices on every farm and field in watersheds (!)
  - State programs
  - Federal programs
  - Self-funded
  - Private Consultants
  - One-on-one farmer meetings


East Branch Dead Creek - Baseflow
TP and TDP (ug/L)
1000
900
800
700
600
500
400
300
200
100
0
TP
TDP
3/10/20
6/18/20
9/26/20
1/4/21
4/14/21
7/23/21
10/31/21

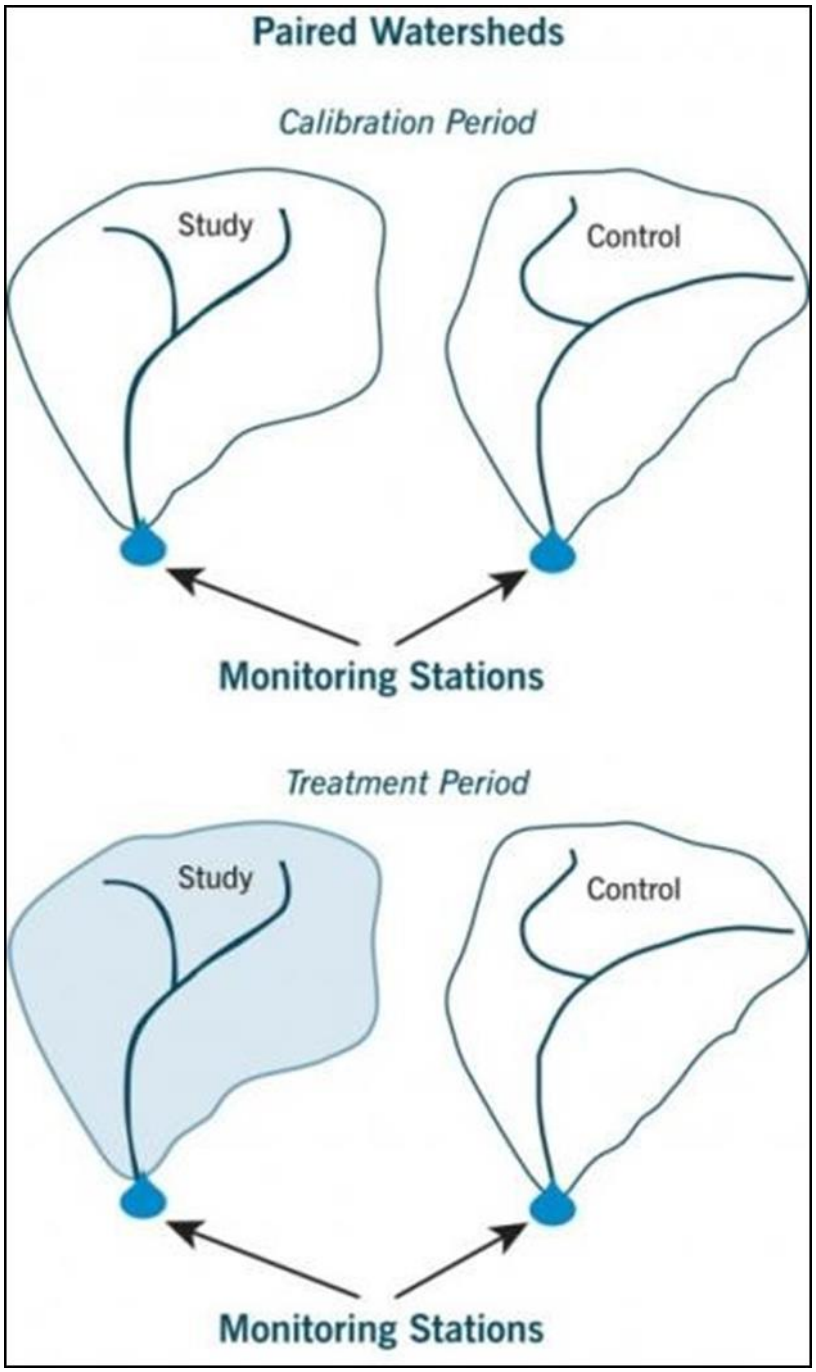

Headwaters Little Otter Creek - Baseflow
TP
TDP
TP and TDP (ug/L)
1000
900
800
700
600
500
400
300
200
100
0
3/10/20
6/18/20
9/26/20
1/4/21
4/14/21
7/23/21
10/31/21


West Branch Dead Creek - Baseflow
TP
TDP
TP and TDP (ug/L)
1000
900
800
700
600
500
400
300
200
100
0
3/10/20
6/18/20
9/26/20
1/4/21
4/14/21
7/23/21
10/31/21


Storm Event TP and TDP Concentrations
700
600
500
400
300
200
100
0
TP and TDP (ug/L)
LOC - TP
LOC - TDP
DCE - TP
DCE - TDP
DCW - TP
DCW - TDP

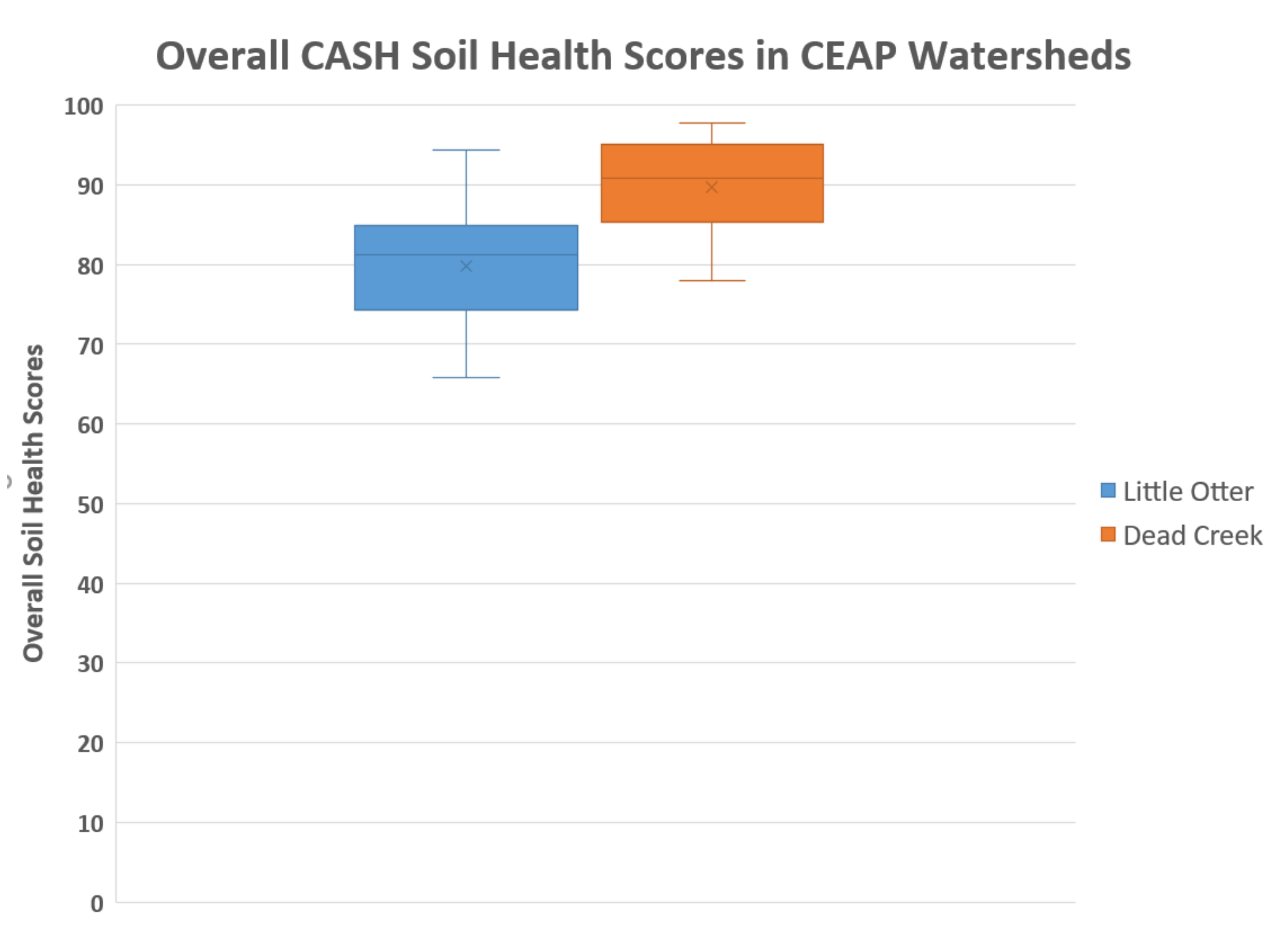
Beginning in 2022

- Transitioning ‘Calibration’ to ‘Treatment’ period
- Focus on accelerated conservation in Dead Creek watershed, and business as usual in Headwaters Little Otter
- Leaning on partners for programs/targeting…



Soil Health in CEAP Watersheds

- NRCS and VACD supporting survey of soil health across watersheds
- Fall 2020 & Spring 2021: 70 fields
- Bulk density cores and carbon stocks w/ 2021 samples
- Data returned to farmers

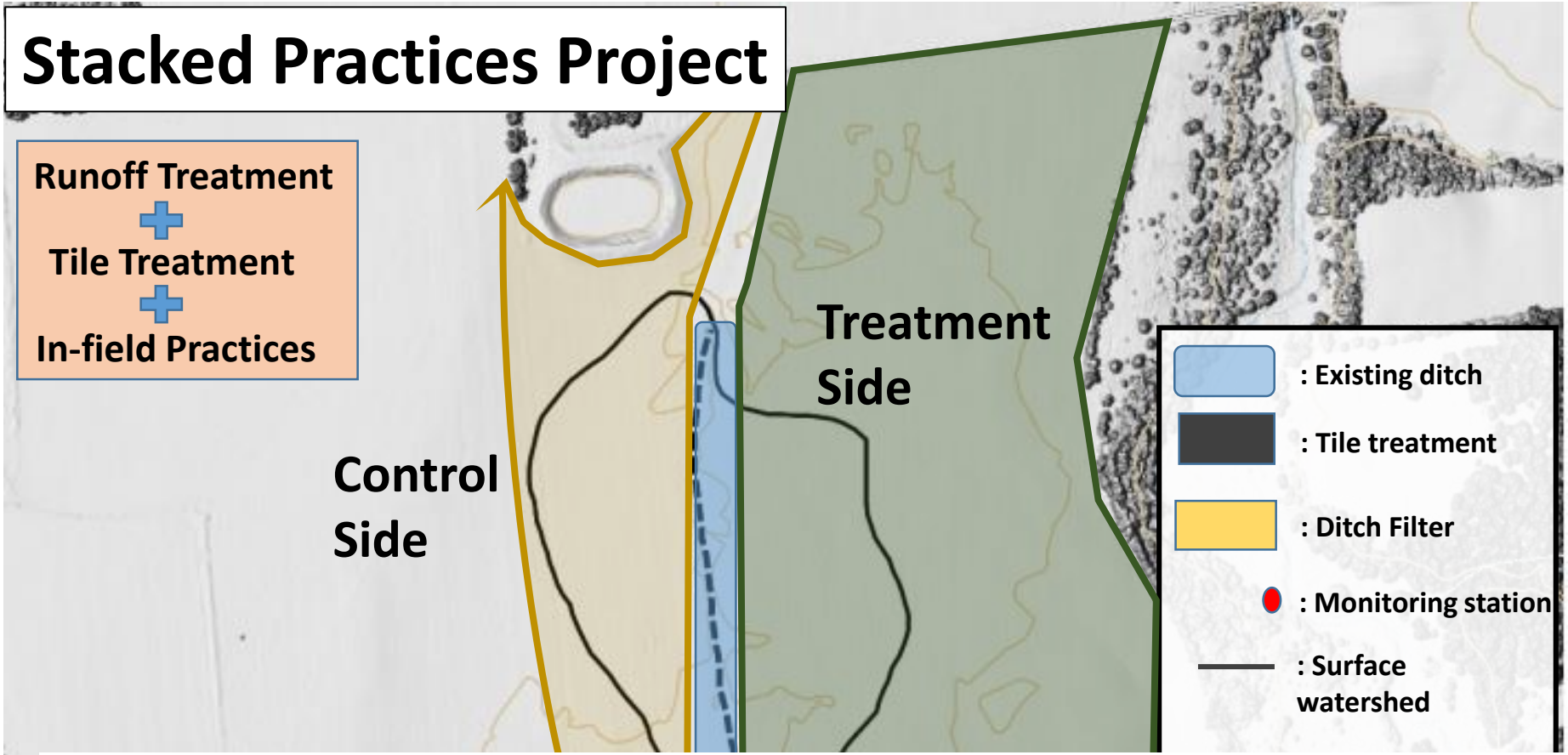

Overall CASH Soil Health Scores in CEAP Watersheds
Overall Soil Health Scores
100
90
80
70
60
50
40
30
20
10
0
Little Otter
Dead Creek

CEAP Stacked Practices Study

- Occurs within CEAP treatment watershed
- Evaluates individual practices, as well as synergies obtained through ‘stacking’
- Focus on innovative P-removal practices
- Surface and subsurface P removal structures
- Paired watershed design (i.e., calibration and treatment years)

Stacked Practices Project

Runoff Treatment
+
Tile Treatment
+
In-field Practices



In-field management practices being 'Stacked'

Control	Treatment
Conventional tillage	No-till
Broadcast manure	Injected manure
No cover crop	Cover crop

Ti

Distribution manifold for
ed water

Collection
manifold for
outlet

r outlet

a)

ch

Slide courtesy of Chad Penn, USDA-ARS

Paired Ditch Filter: To be filled with P filter media

Questions?