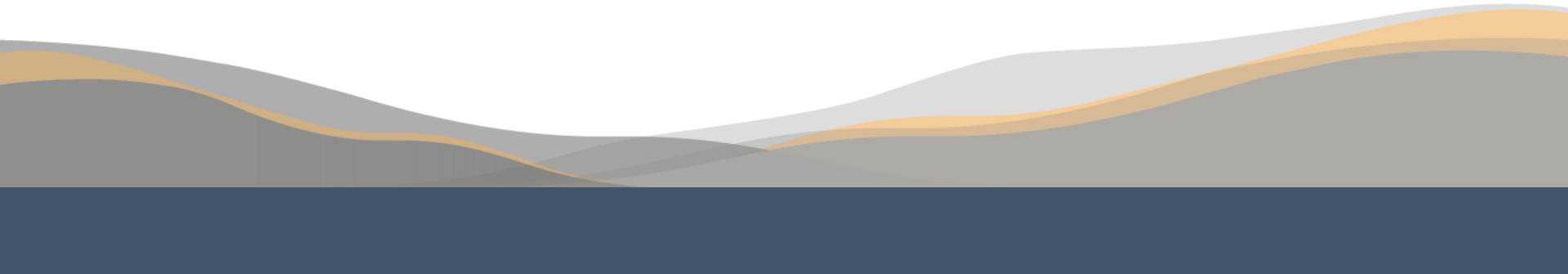




2019 WATER RESOURCES REPORT

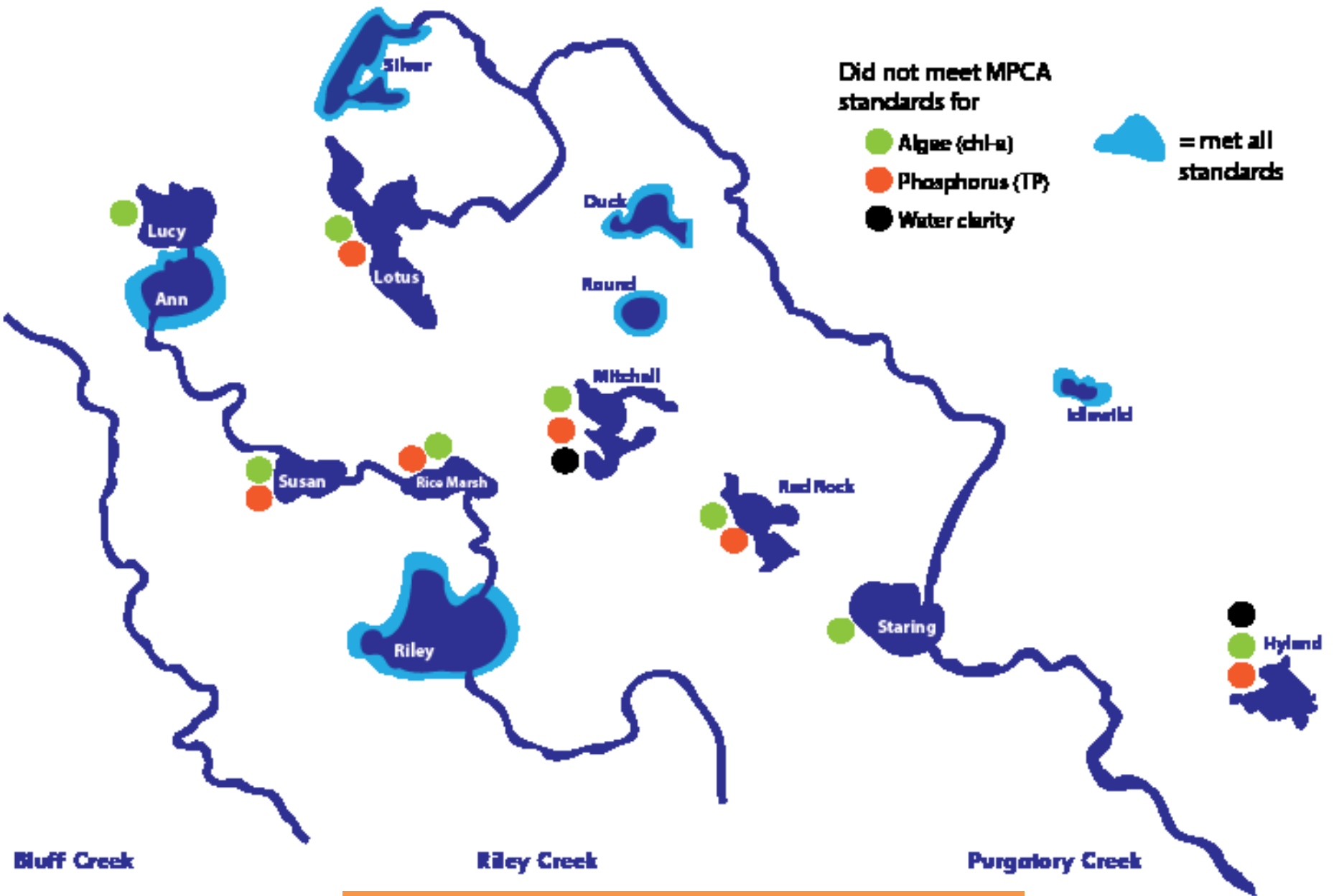
Board Meeting – January 8th, 2020



2019 LAKE WATER QUALITY



2018 LAKE WATER QUALITY



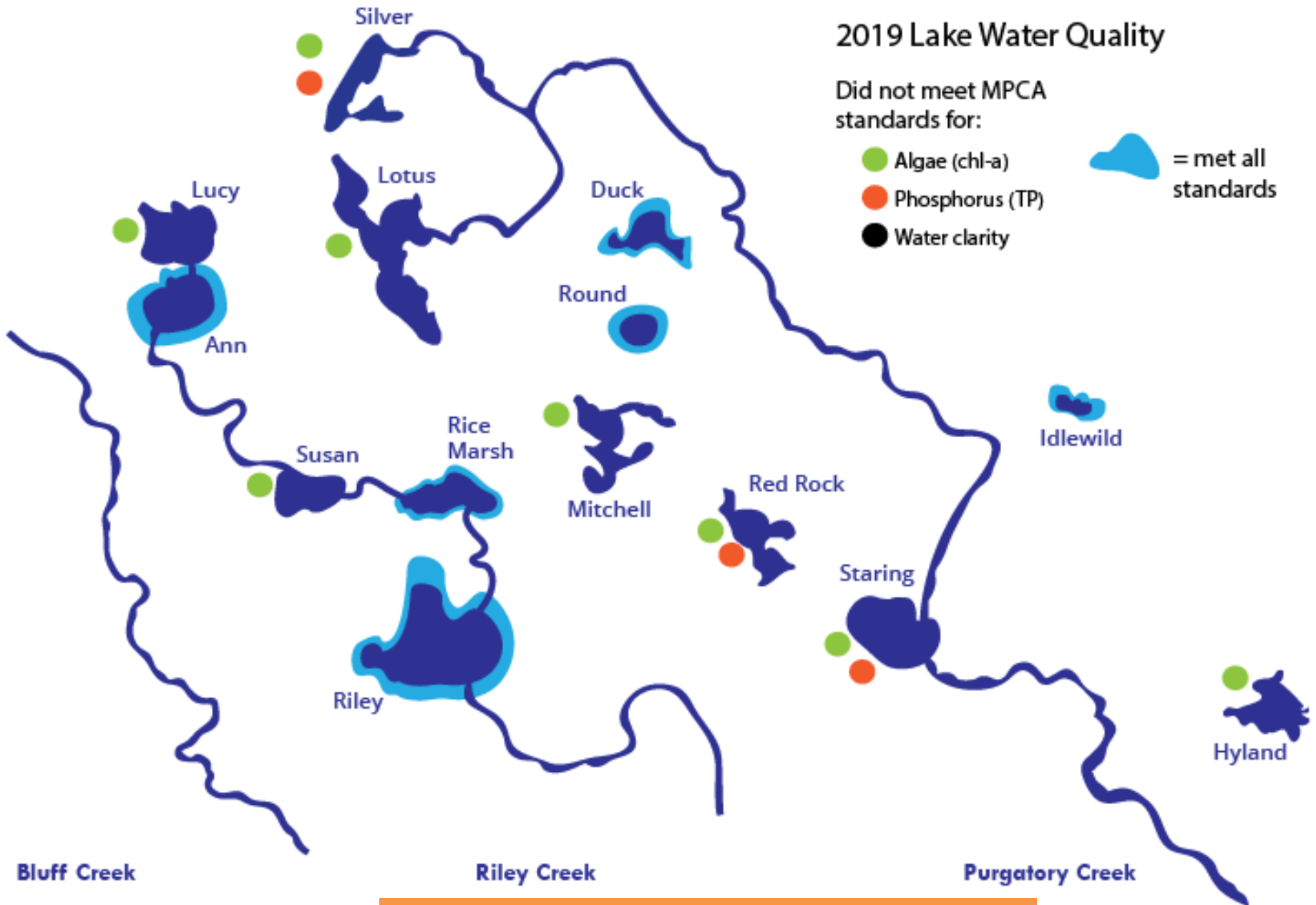
❖ All lakes met the Nitrate standard in 2018

2019 Lake Water Quality

Did not meet MPCA standards for:

- Algae (chl-a)
- Phosphorus (TP)
- Water clarity

 = met all standards



Bluff Creek

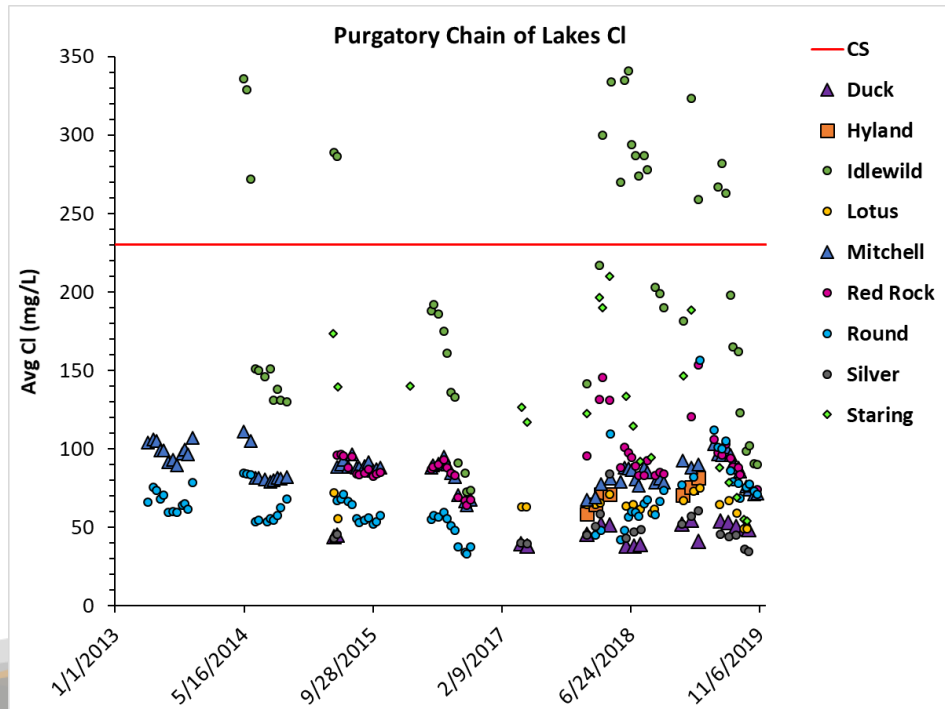
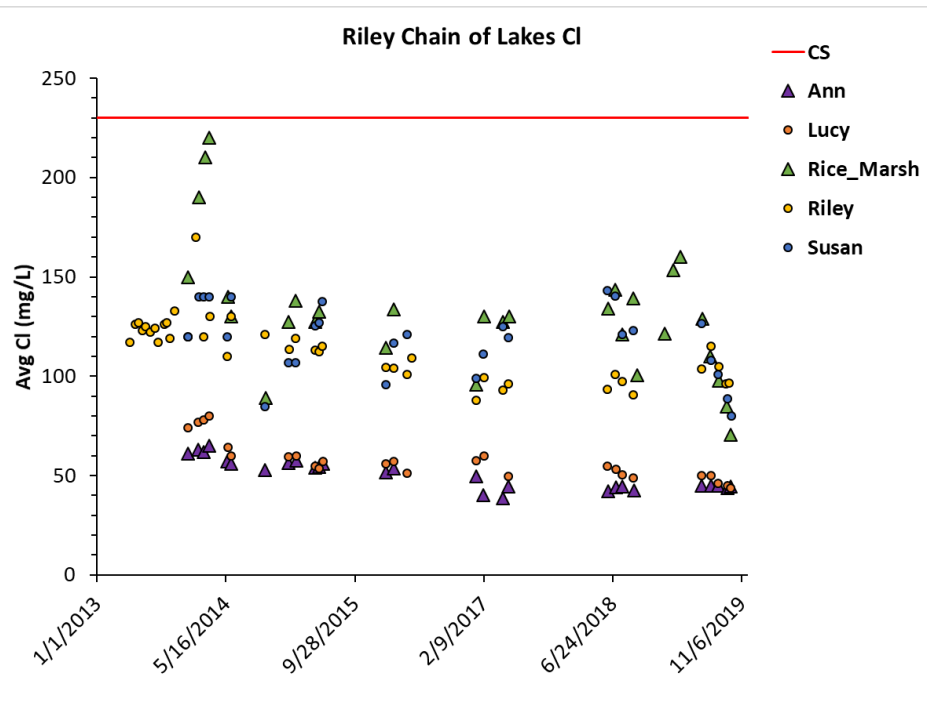
Riley Creek

Purgatory Creek

❖ All lakes met the Nitrate standard in 2019

CHLORIDE

- All Riley Chain Lakes met Chloride Standard
- Lake Idlewild did not meet Chloride Standard

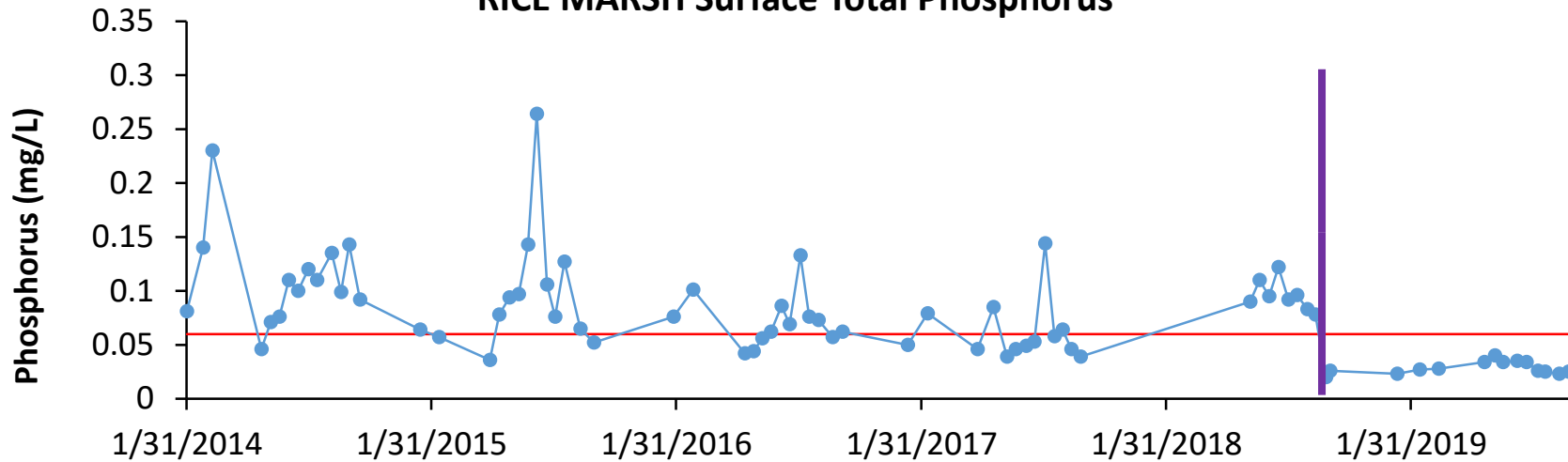


Aluminum Sulfate Treatments

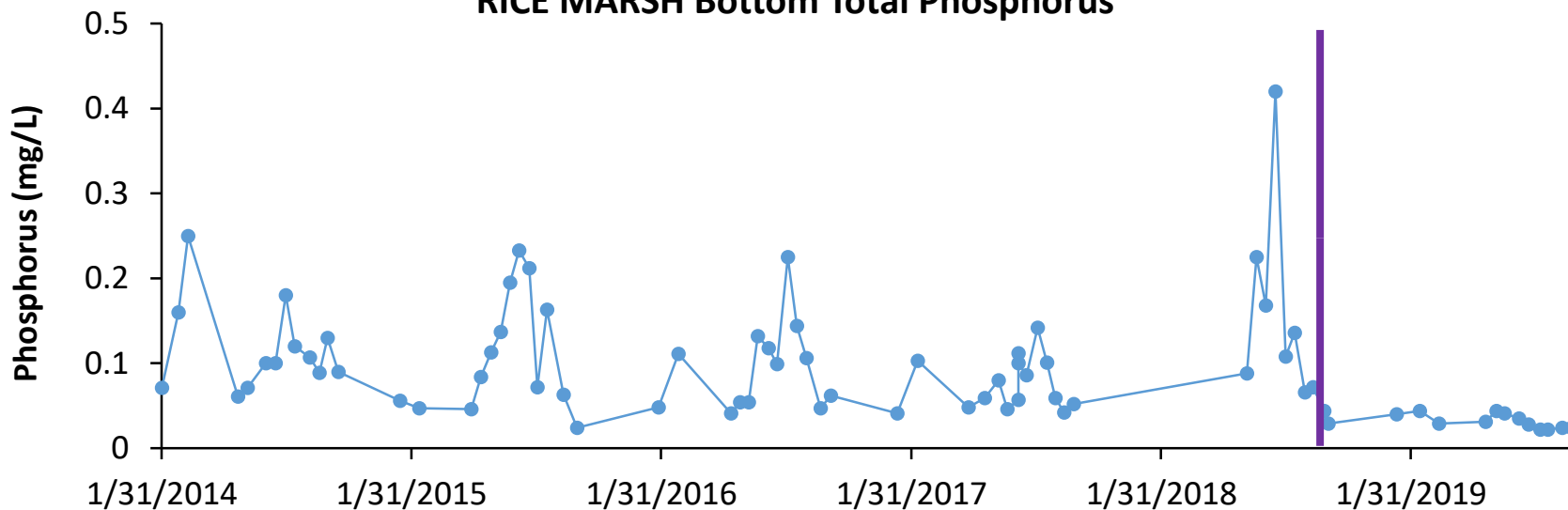


RICE MARSH ALUM TREATMENT

RICE MARSH Surface Total Phosphorus



RICE MARSH Bottom Total Phosphorus

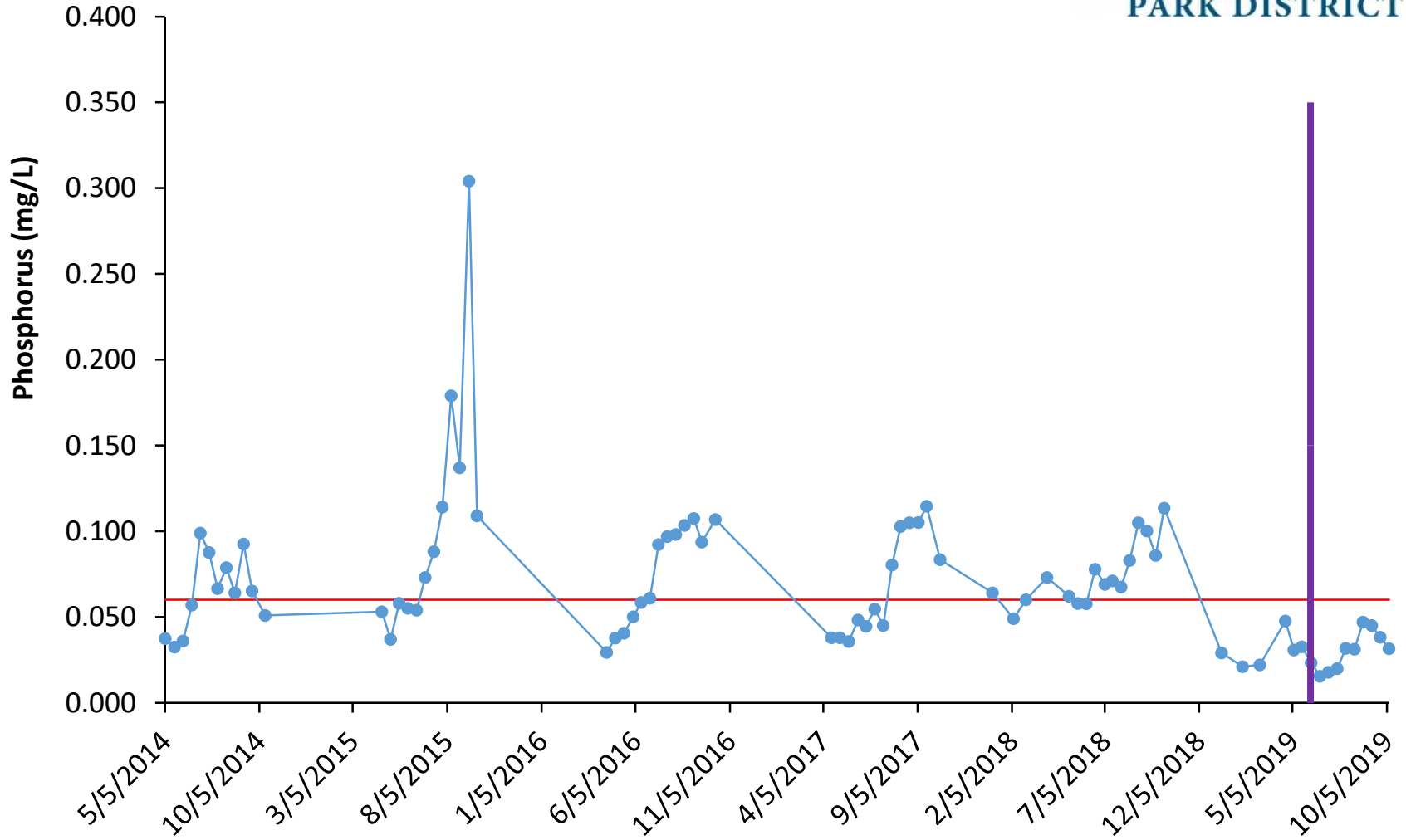


HYLAND ALUM TREATMENT



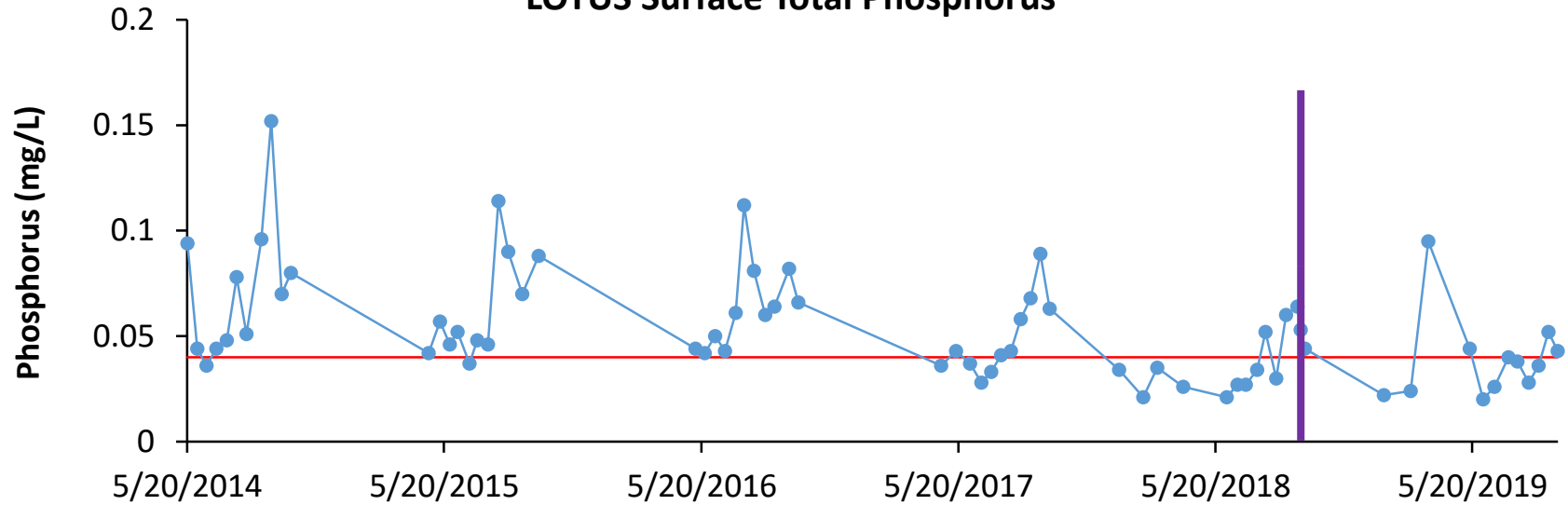
Three Rivers
PARK DISTRICT

HYLAND Surface Total Phosphorus

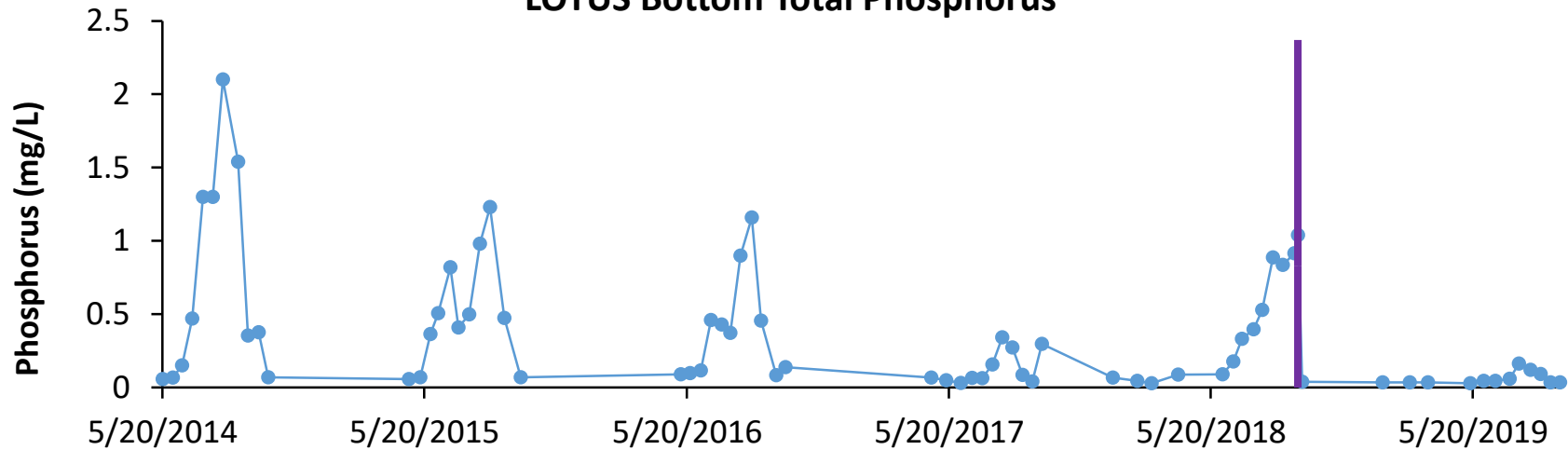


LOTUS ALUM TREATMENT

LOTUS Surface Total Phosphorus

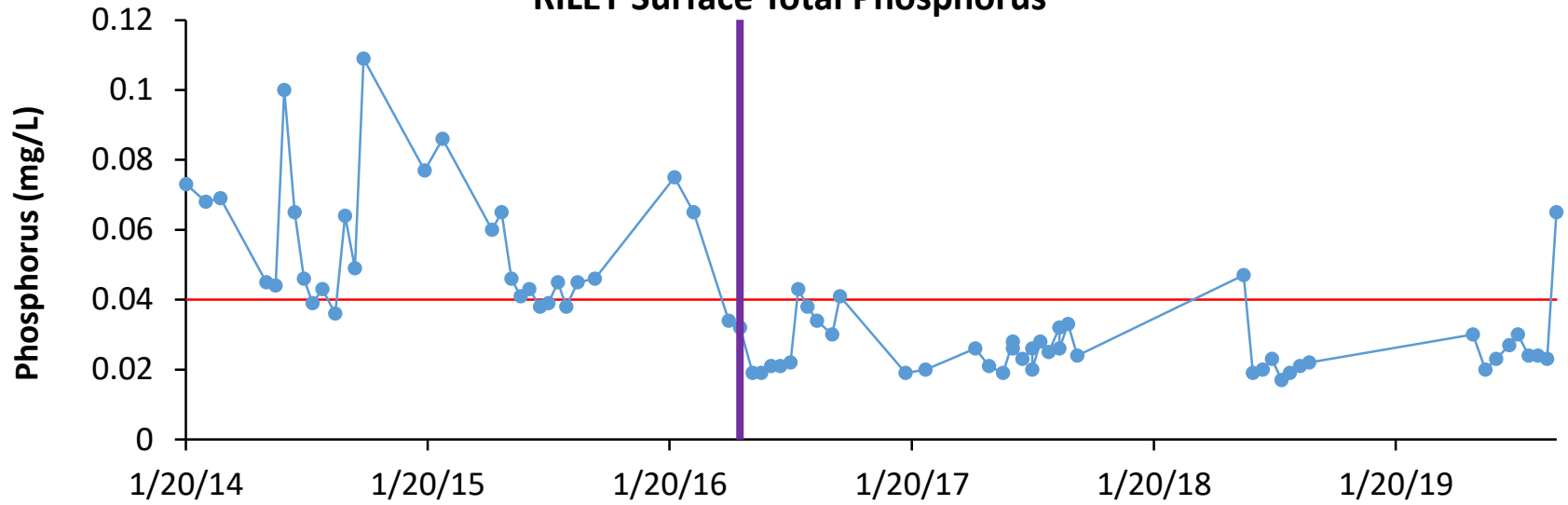


LOTUS Bottom Total Phosphorus

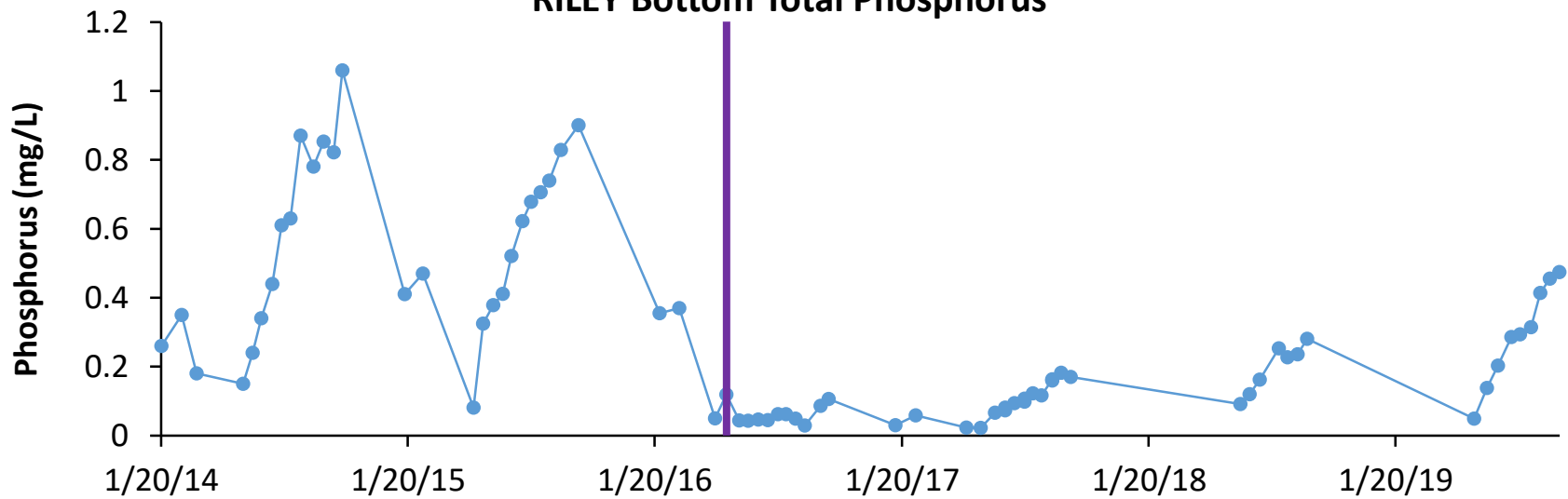


RILEY ALUM TREATMENT

RILEY Surface Total Phosphorus



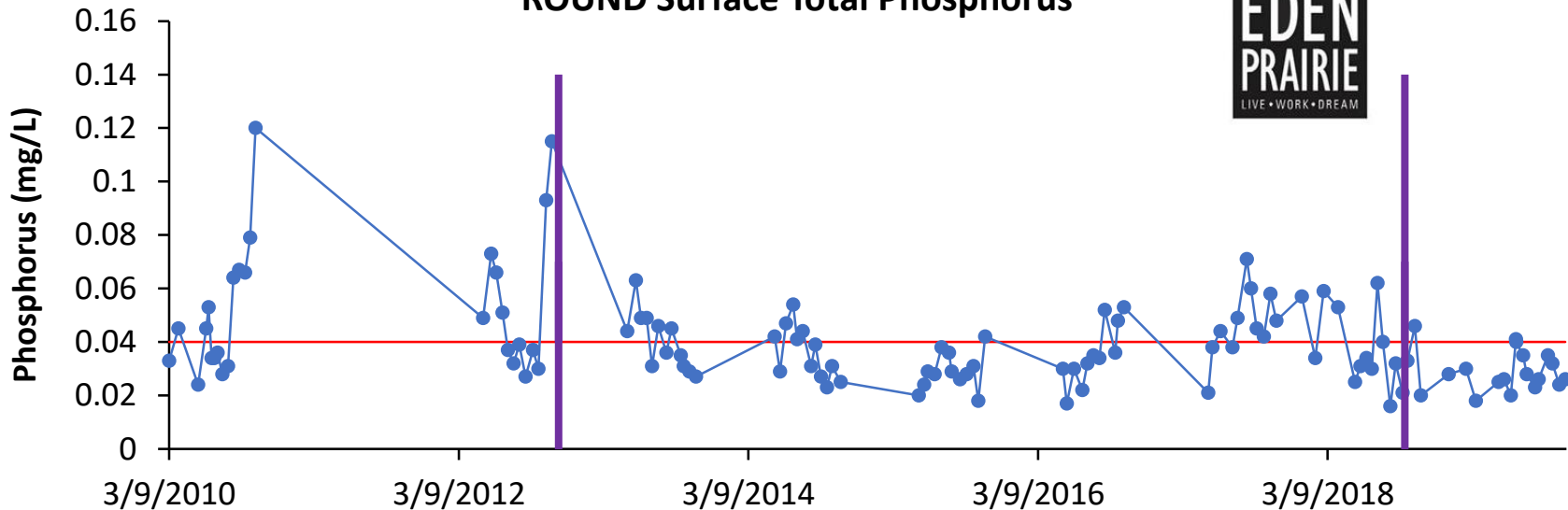
RILEY Bottom Total Phosphorus



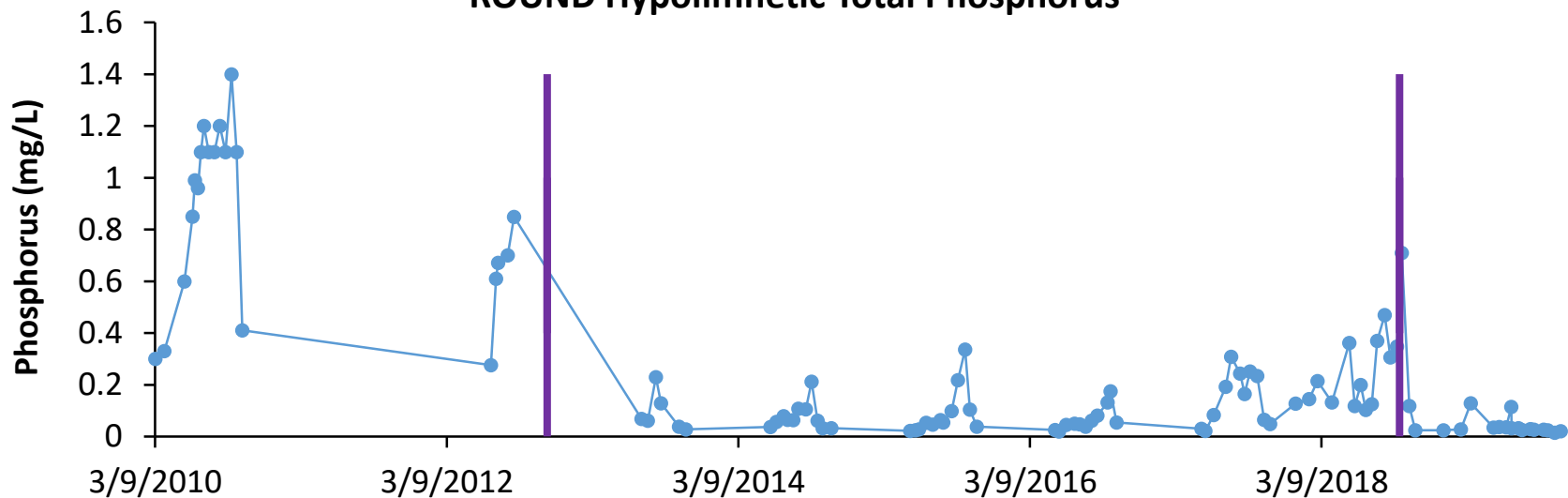
ROUND ALUM TREATMENT



ROUND Surface Total Phosphorus



ROUND Hypolimnetic Total Phosphorus



Fish Kills and Fish Stocking

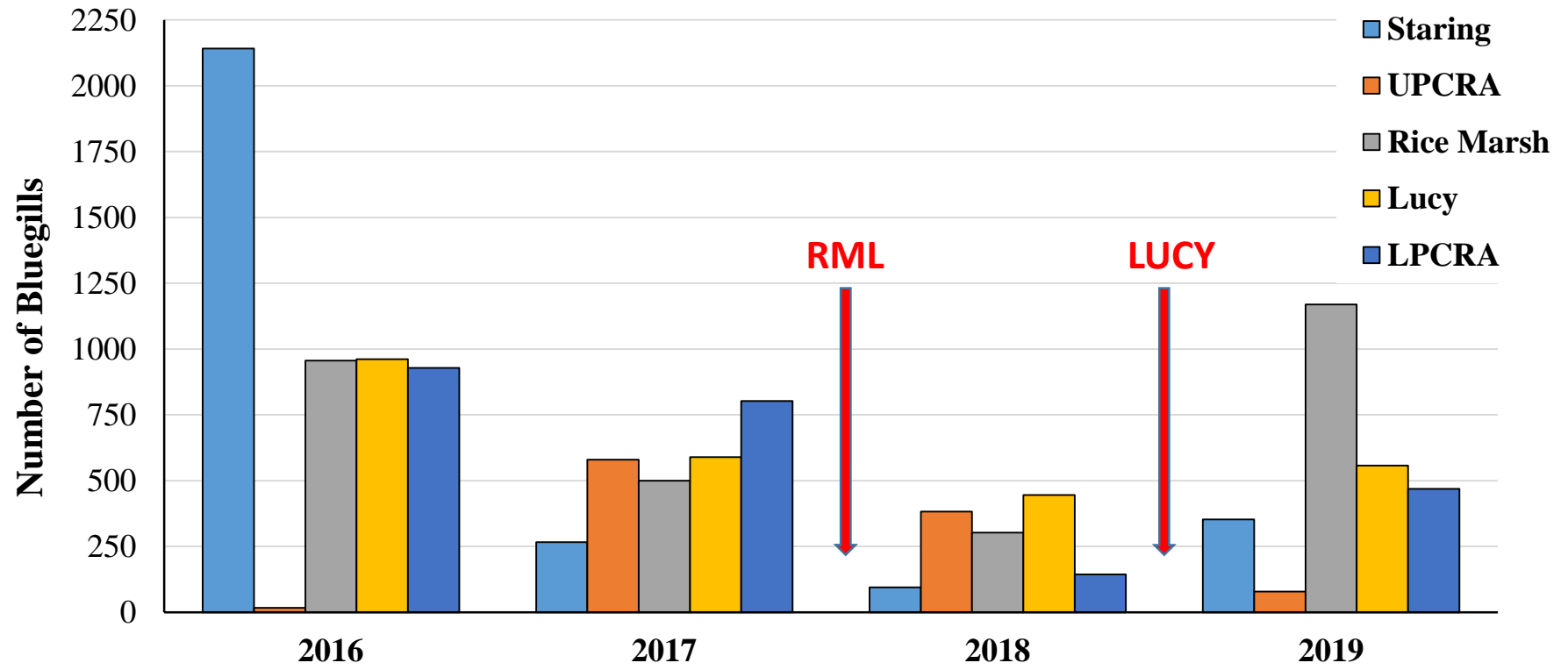
- DUCK LAKE
- LAKE LUCY
- *Flexibacter columnaris* – No Fish Kills



| | Number of Bluegill Stocked | |
|--------------|----------------------------|-------------|
| Lake | 2018 | 2019 |
| Rice Marsh | 1000 | 300 |
| Staring | 300 | 200 |
| UPCRA | 200 | 100 |
| LPCRA | 500 | 100 |
| Lucy | -- | 300 |
| *Duck | 20 | ? |
| TOTAL | 2020 | 1000 |

Winterkill Recovery

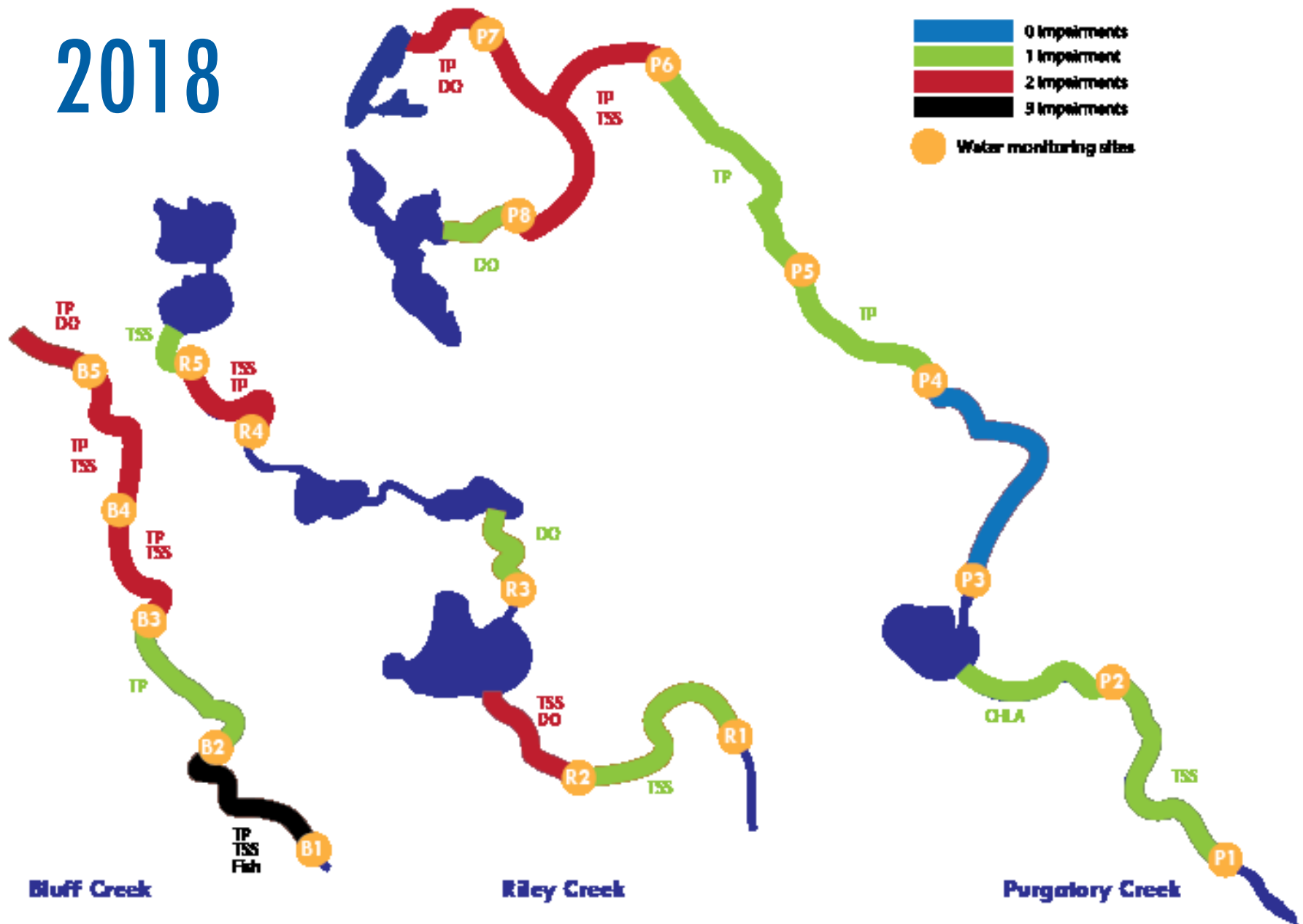
- No stocking in 2020



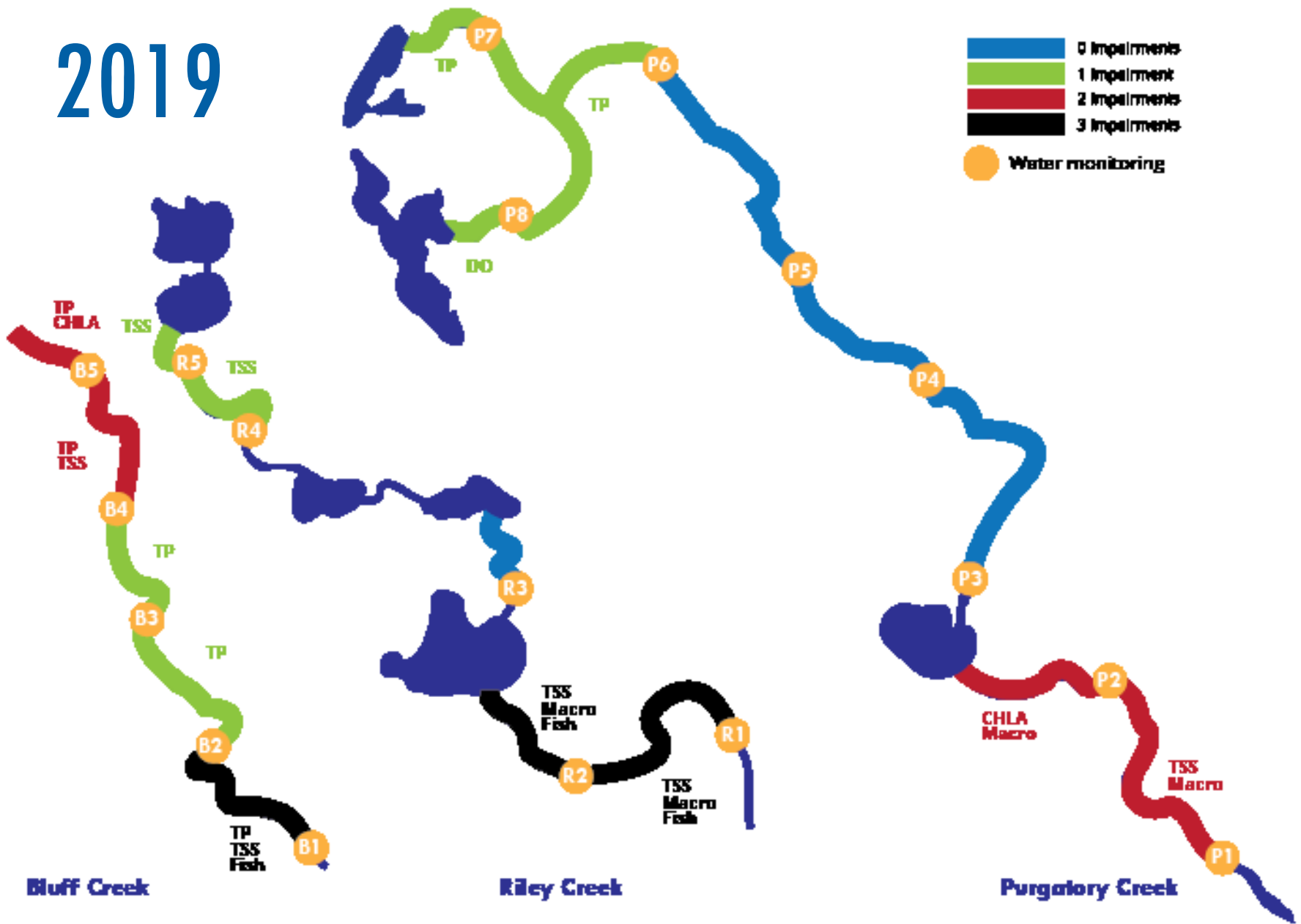
2018 CREEK WATER QUALITY



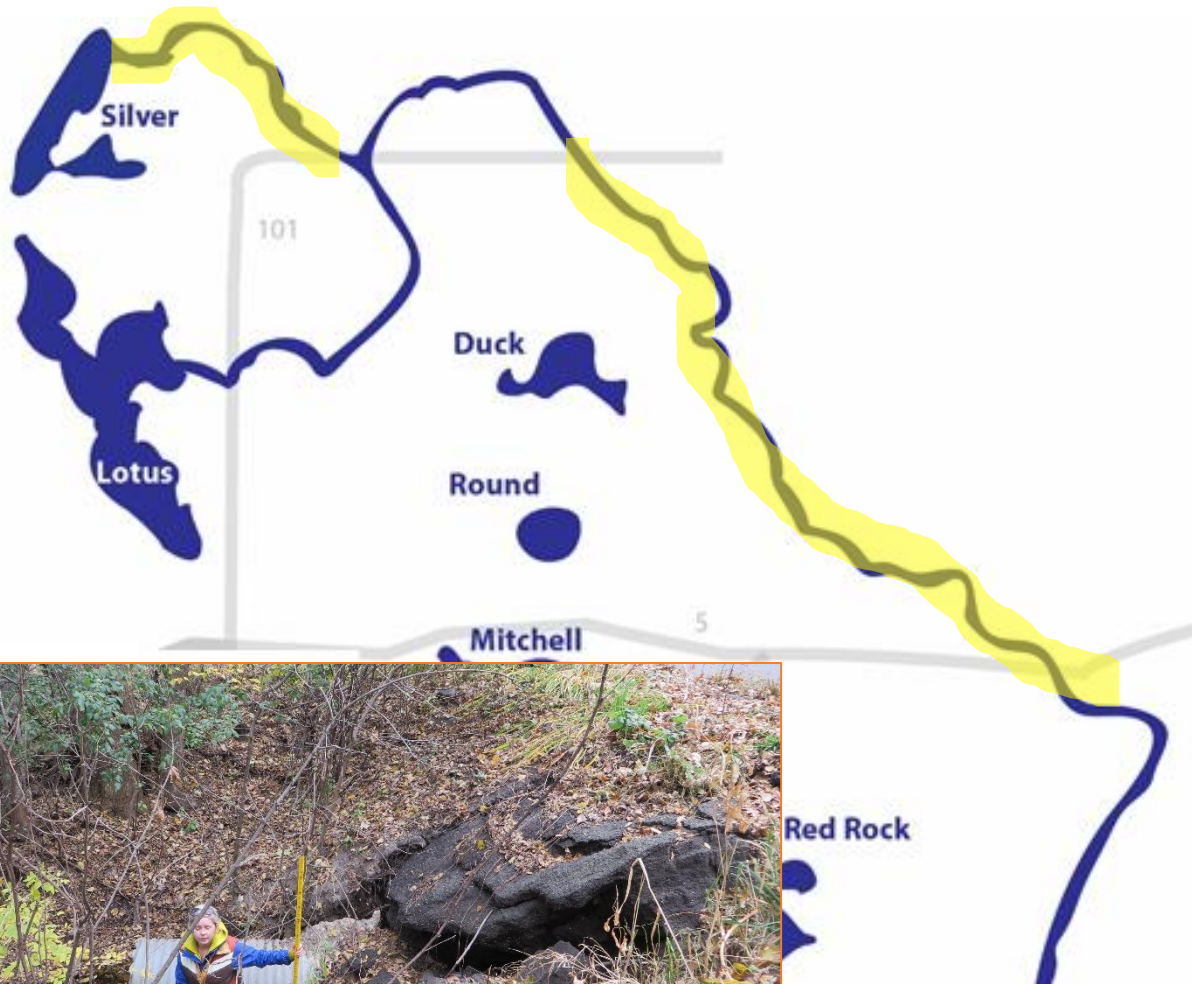
2018



2019



CRAS Update – Purgatory Creek



| Reach | Subreach | Old Tier I Score | 2019 Tier I Score |
|-------|----------|------------------|-------------------|
| P3 | P3A | 16 | 14 |
| P3 | P3B | 14 | 14 |
| P4 | P4A | 14 | 12 |
| P4 | P4B | 18 | 17 |
| P5 | P5A | 12 | 10 |
| P5 | P5B | 12 | 12 |
| P5 | P5C | 12 | 14 |
| P5 | P5D | 14 | 14 |
| P5 | P5E | 12 | 12 |
| P7 | P7A | 14 | 12 |
| P7 | P7C | 14 | 14 |
| P7 | P7D | 22 | 18 |

Lake Susan Iron Enhanced Sand Bench

| Nutrient | Average % Reduction |
|----------------|---------------------|
| Ortho-P | 79.3 |
| Dissolved-P | 38.0 |
| Total-P | 72.7 |
| Chl-a | 26.6 |



Spent Lime Treatment System

- Media Testing

- Sand is dirty
- Filtration rates unchanged after inundation and continuous flow
- More spent lime more removal

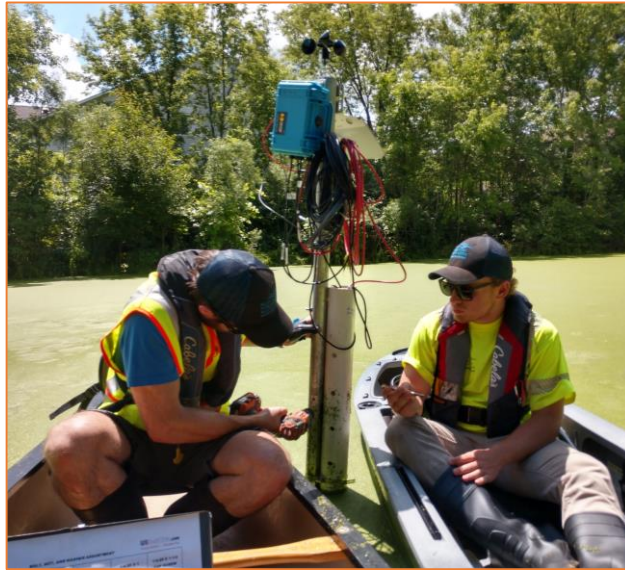
- System upgrades

- 70/30 plaster sand mixture
- Improve control of water flow

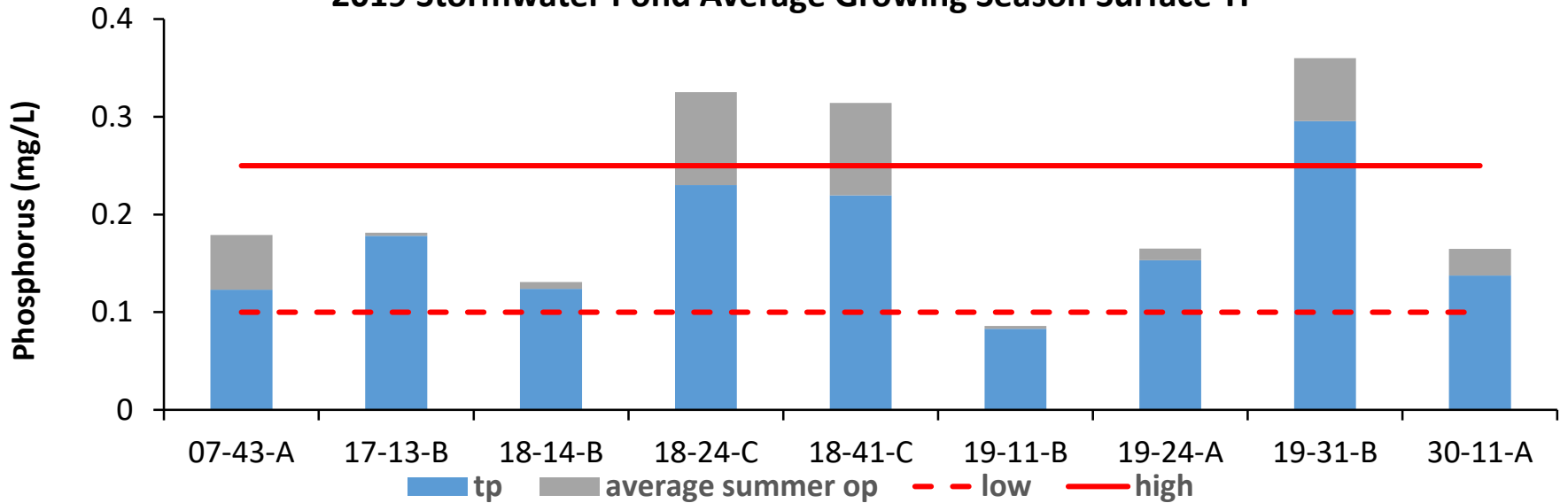
- 2020 monitoring



2019 Stormwater Pond Project



2019 Stormwater Pond Average Growing Season Surface TP



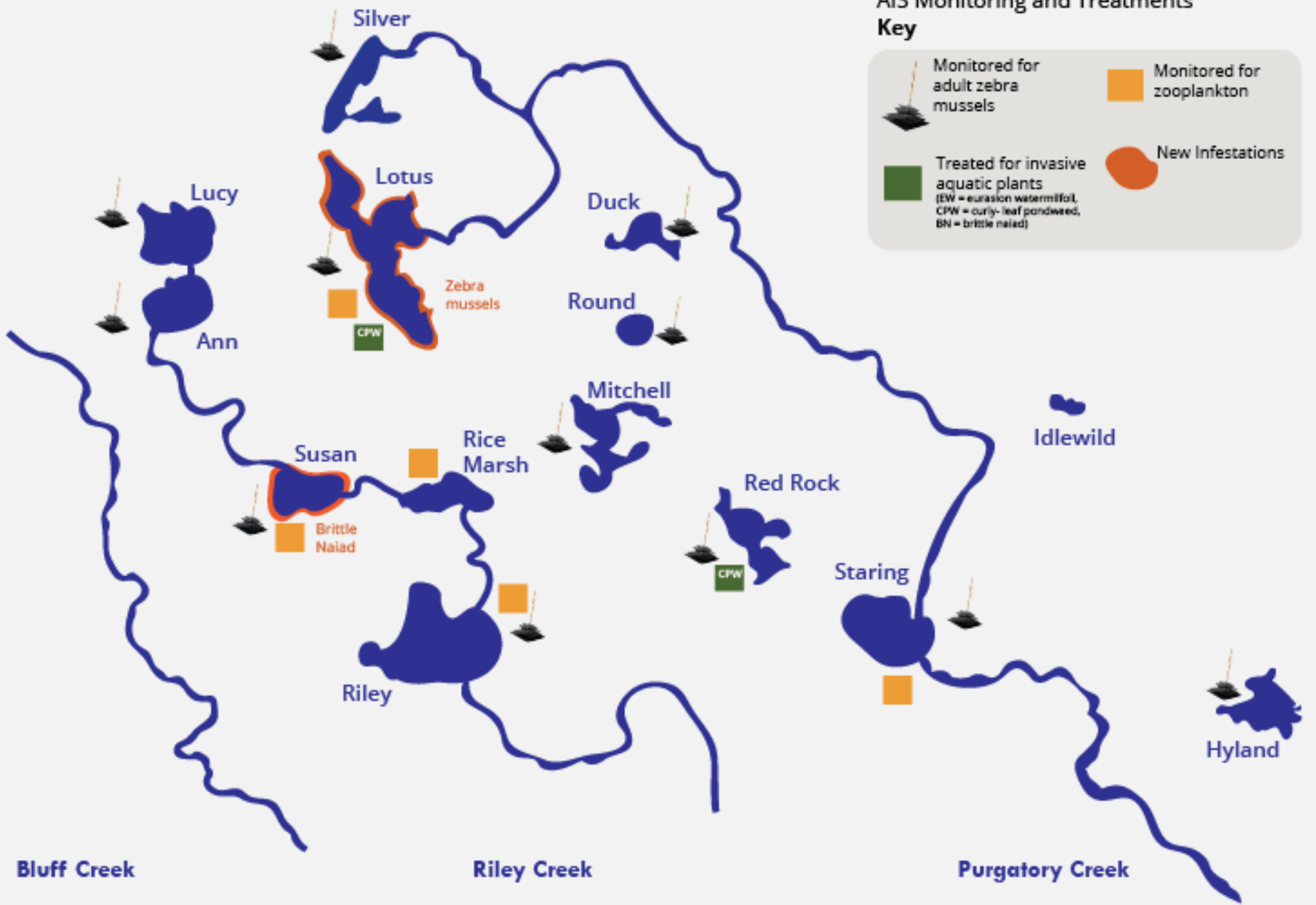
AQUATIC INVASIVE SPECIES MONITORING



AIS Monitoring and Treatments

Key

| | | | |
|---|--|---|---------------------------|
|  | Monitored for adult zebra mussels |  | Monitored for zooplankton |
|  | Treated for invasive aquatic plants (EW = eurasian watermilfoil, CPW = curly-leaf pondweed, BN = brittle naiad) |  | New Infestations |



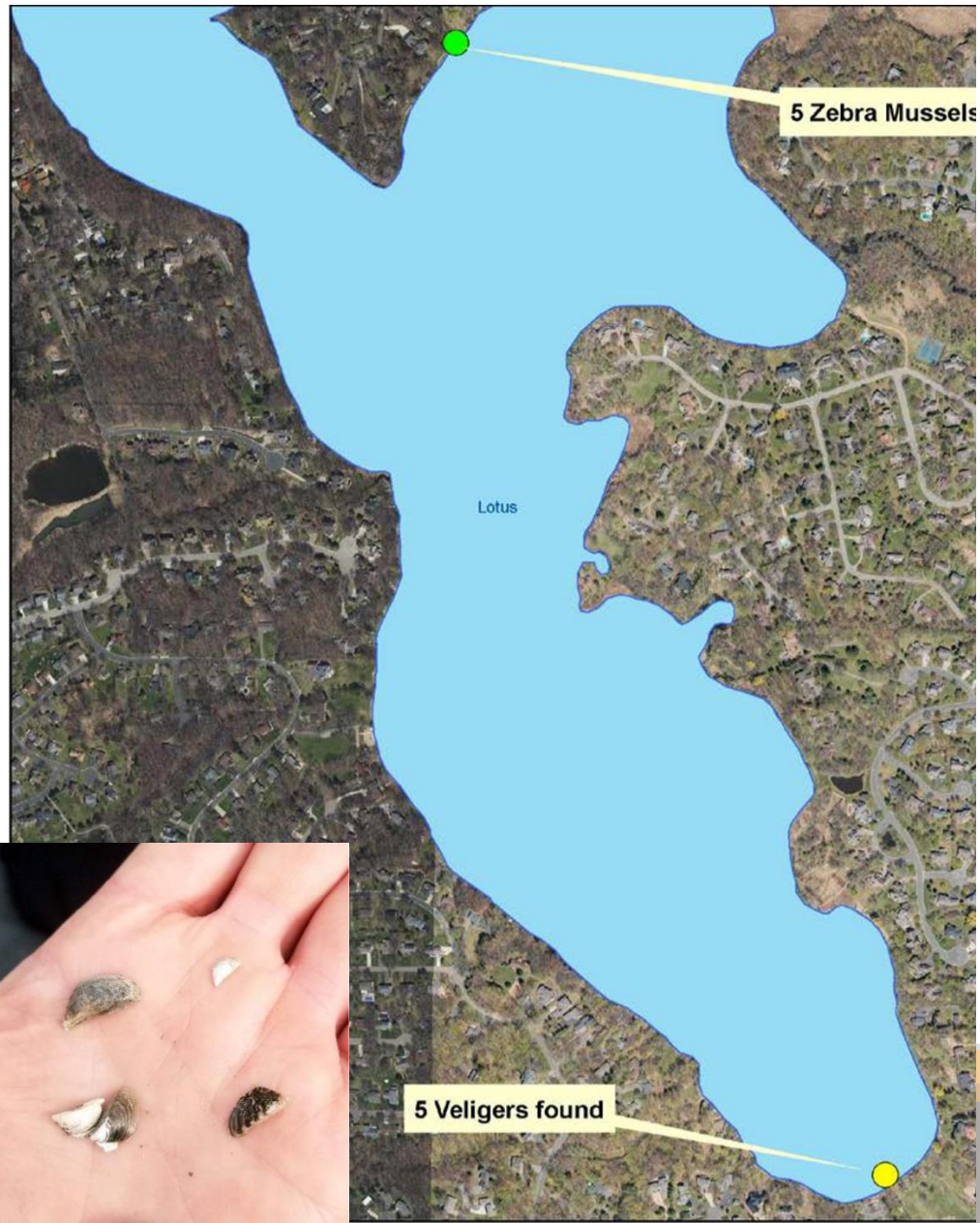
Bluff Creek

Riley Creek

Purgatory Creek

LOTUS LAKE ZEBRA MUSSELS

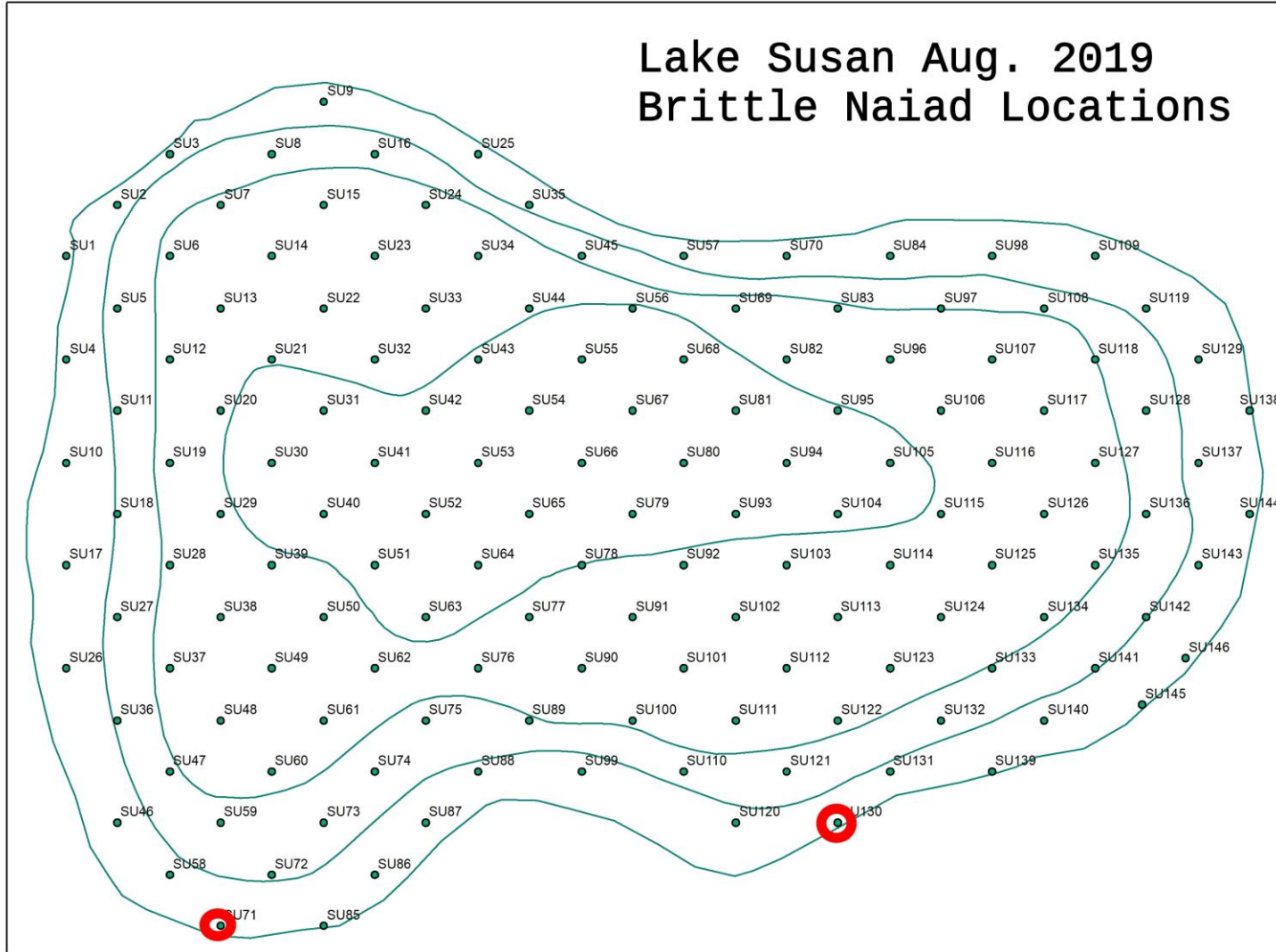
- 5 veligers found at boat launch
- 5 adults found on dock footing
- eDNA hits near both locations



Lake Riley vs Lotus Lake Zebra Mussels

| | LAKE | RILEY (2018) | LOTUS (2019) |
|---------------------------|-------------------|---------------------|---------------------|
| Shell Formation | Calcium (mg/L) | 48.70 | 45.55 |
| | Alkalinity (mg/L) | 121.75 | 129.20 |
| | pH | 8.69 | 7.88 |
| Trophic Variables | TP (mg/L) | 0.024 | 0.035 |
| | Chl-a (ug/L) | 7.98 | 32.51 |
| | secchi (m) | 3.43 | 1.45 |
| Physical Variables | Temp (degC) | 24.69 | 22.74 |
| | DO (mg/L) | 8.79 | 8.82 |
| | Cond (uS/cm) | 483.70 | 461.73 |
| | Hard Structure | n/a | n/a |

Brittle Naiad – Lake Susan

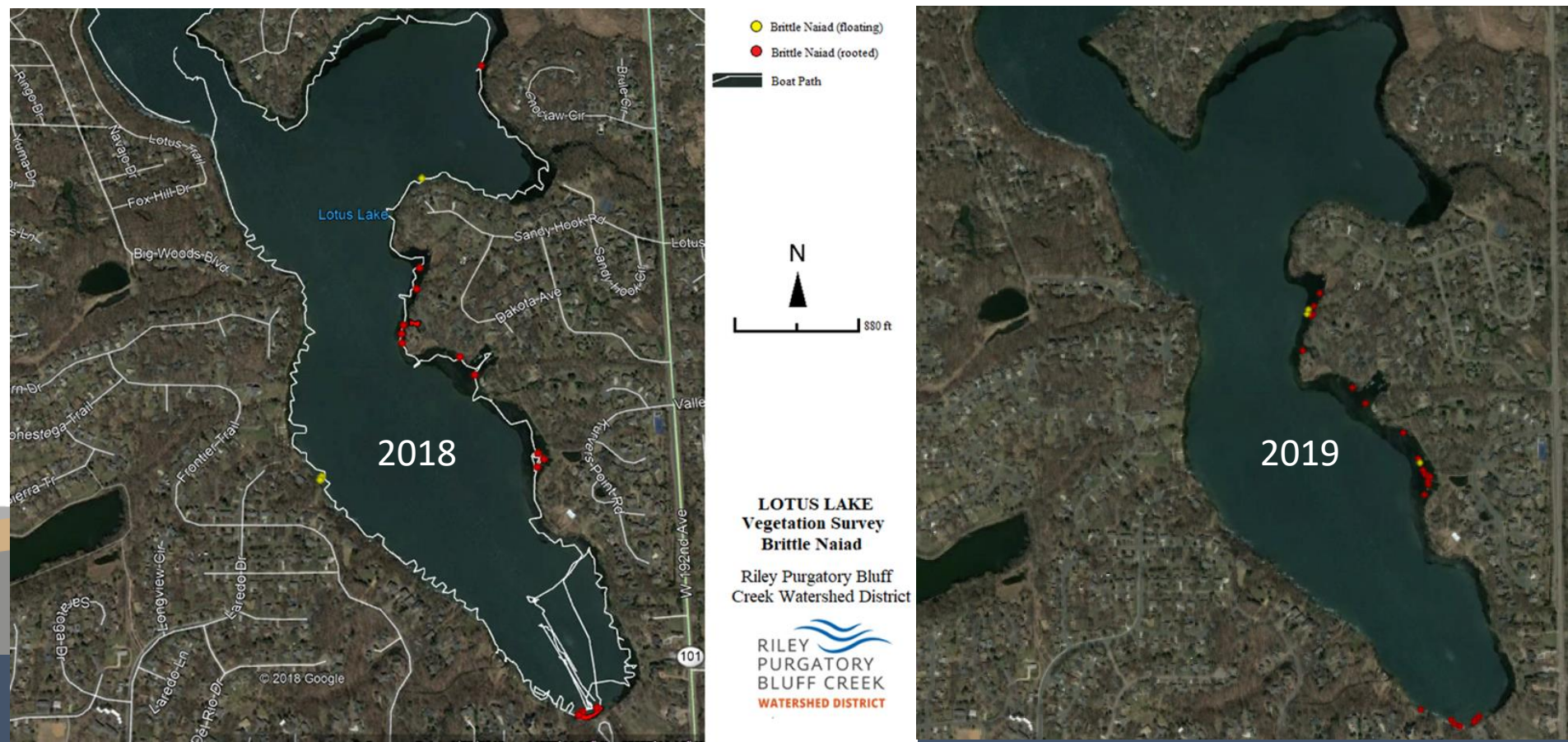


Brittle Naiad – Staring Lake



Brittle Naiad – Lotus and Ann

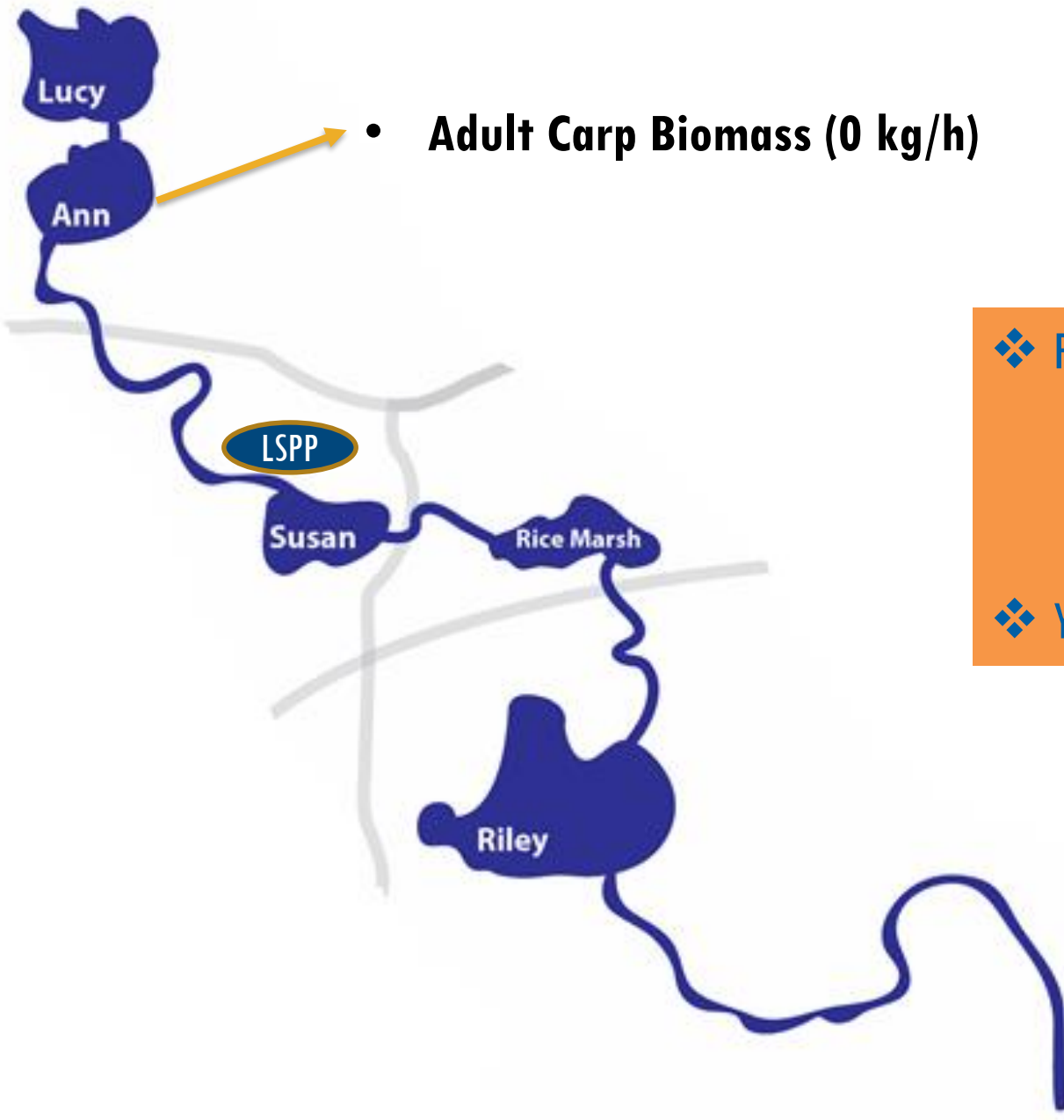
- LOTUS - Overall density decreased
- ANN – Full survey 2020



Carp Monitoring Results



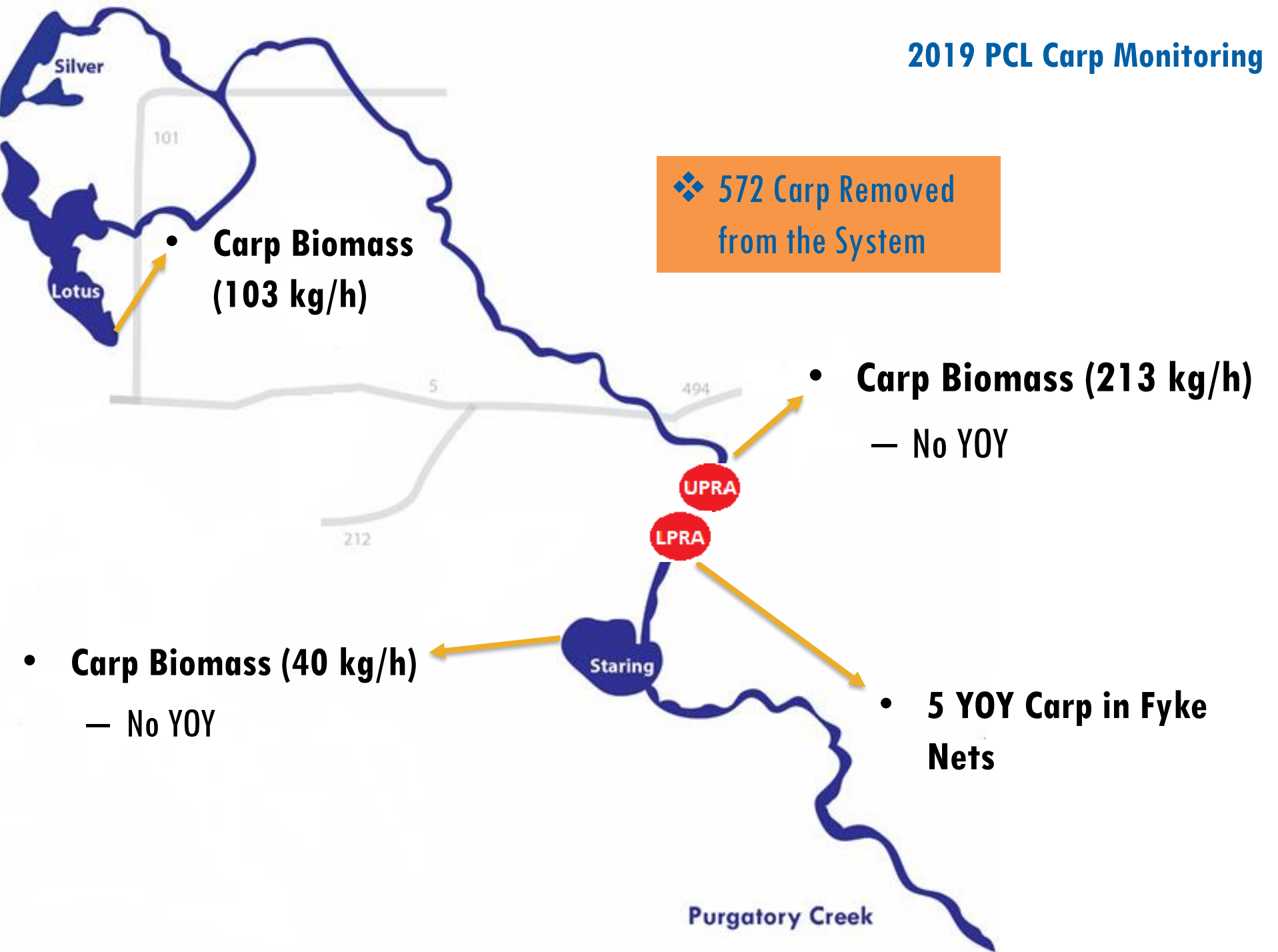
- **Adult Carp Biomass (0 kg/h)**



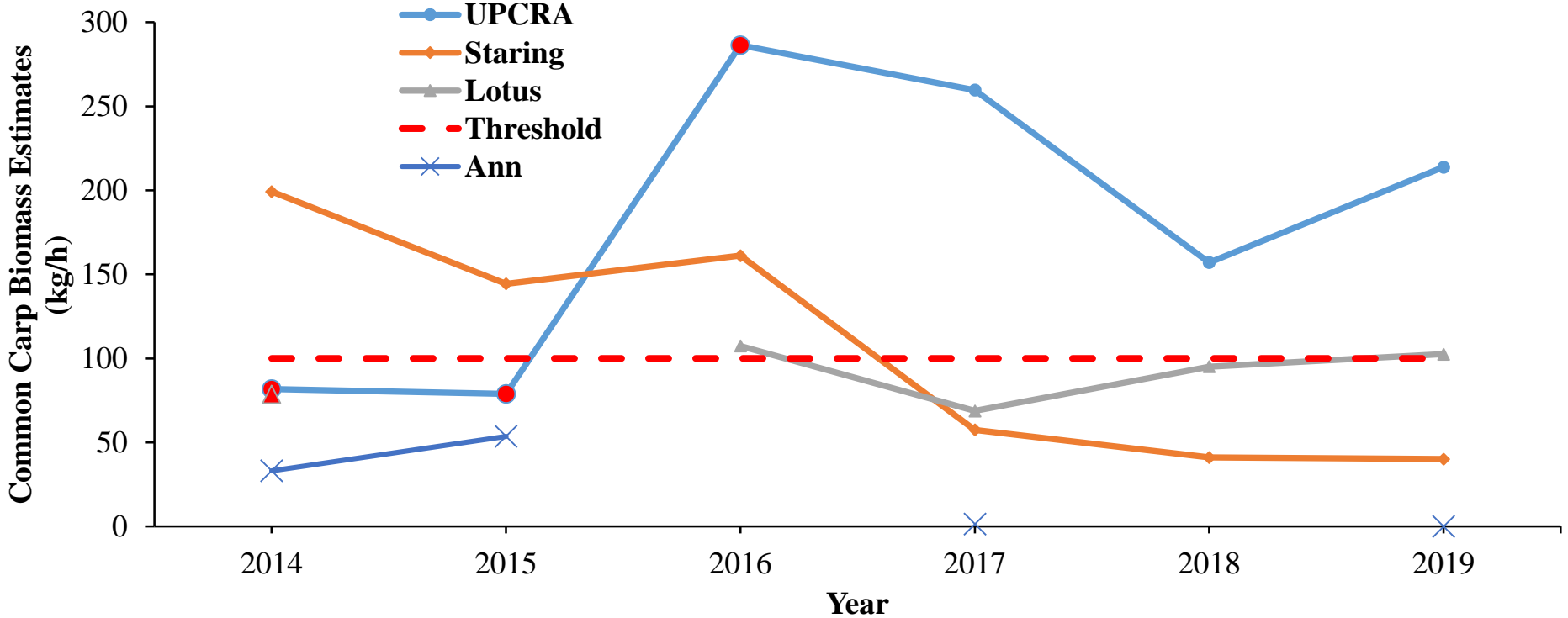
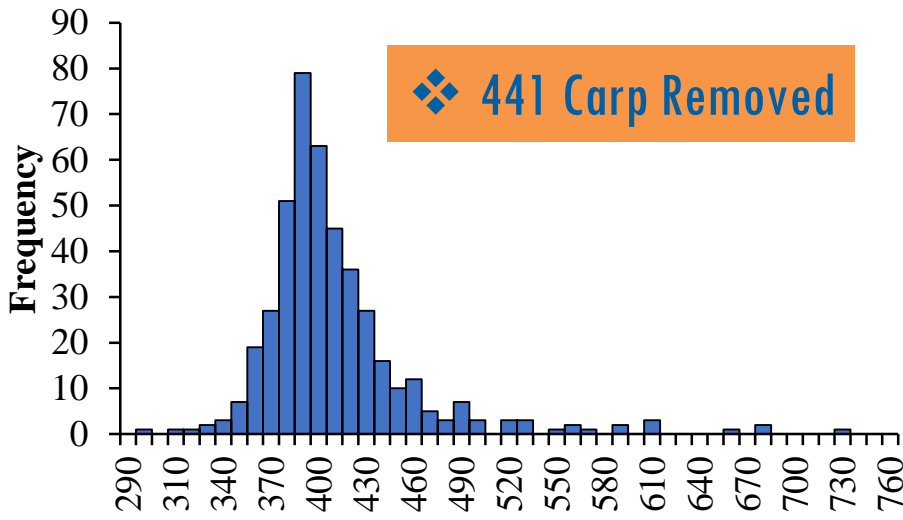
- ❖ Fyke Net Surveys
 - ❖ Lucy
 - ❖ Rice Marsh
 - ❖ LSP
- ❖ Yielded No YOY Carp

Riley Creek

2019 PCL Carp Monitoring



2019 Common Carp Removals



PARTNERSHIPS

| Water Resource | RPBCWD | Three Rivers Park District | EP | UMN | METC |
|-----------------|--------|----------------------------|----|-----|------|
| Duck Lake | ■ | | | | |
| Hyland Lake | ■ | ■ | | | |
| Lake Ann | ■ | | | | |
| Lake Idlewild | ■ | | ■ | | |
| Lake Lucy | ■ | | | | |
| Lake Riley | ■ | | | ■ | |
| Lake Susan | ■ | | | ■ | |
| Lotus Lake | ■ | | | | |
| Mitchell Lake | ■ | | ■ | ■ | |
| Red Rock Lake | ■ | | ■ | | |
| Rice Marsh Lake | ■ | | | | |
| Round Lake | ■ | | ■ | | |
| Silver Lake | ■ | | | | |
| Staring Lake | ■ | | | ■ | |
| Bluff Creek | ■ | | | | ■ |
| Purgatory Creek | ■ | | | | ■ |
| Riley Creek | ■ | | ■ | | ■ |