Is a precautionary approach to permitting too conservative?: Quantifying the impacts of oyster aquaculture on SAV

Erin Shields

In collaboration with: M. Lisa Kellogg, Jennifer C. Dreyer, Mark W. Luckenbach, David J. Wilcox

SAV Workgroup Meeting

November 1, 2022

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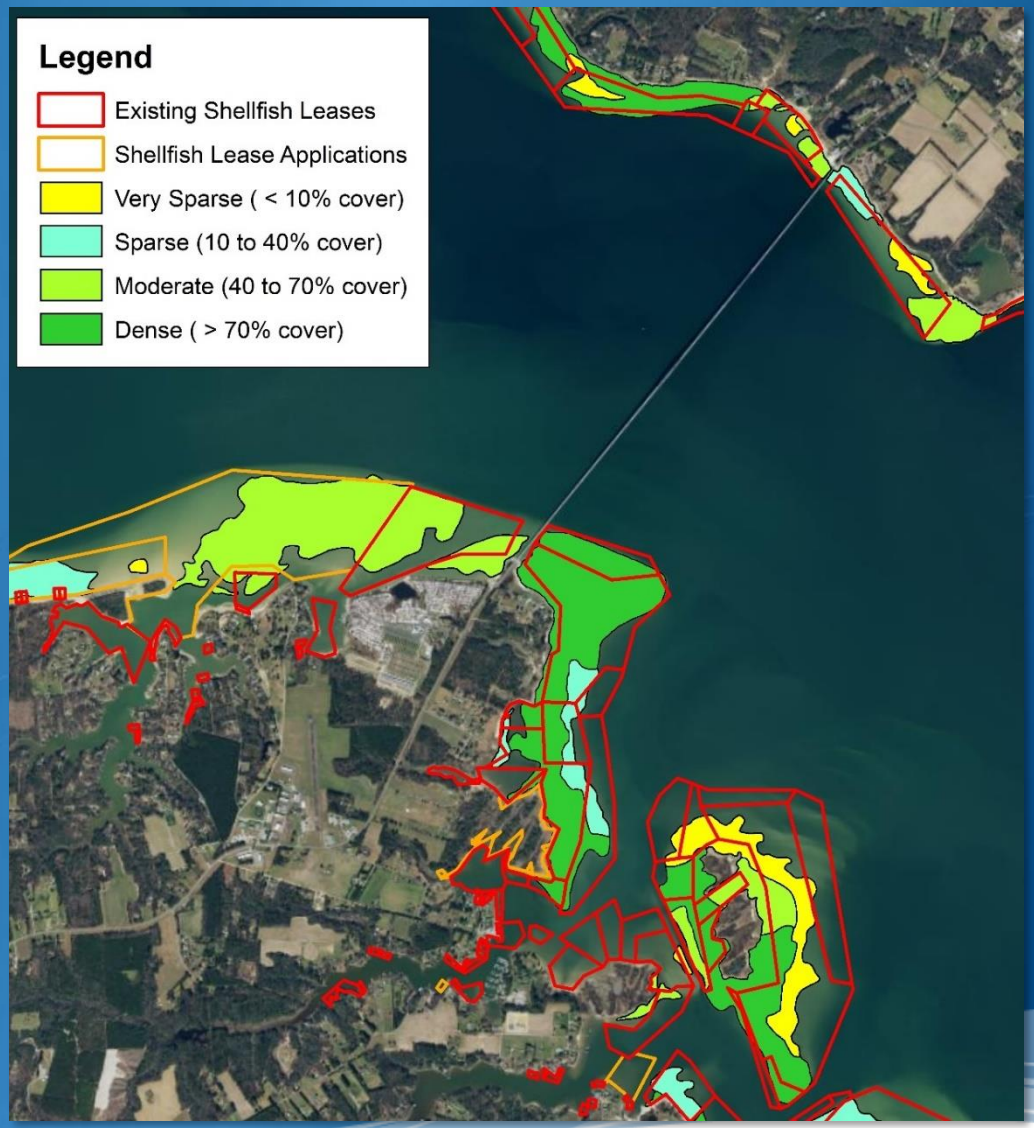
Background

Current situation in Virginia:

- New leases/permits are not granted in areas with SAV beds in previous 5 years
- Significant overlap between existing leases and SAV
- If SAV can successfully establish in existing leases, is the current precautionary approach to permitting too conservative?



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Approach

- Identified commercial growers using floating gear that were willing to collaborate
- Special research permits allowed growers to place floating gear over existing SAV beds
- Growers were asked to install a fully operational “farm block” and to use all of their usual stocking, maintenance and harvest practices
- Agreed that, if negative impacts are observed, growers and researchers would collaborate to develop and test approaches to eliminate or reduce impacts

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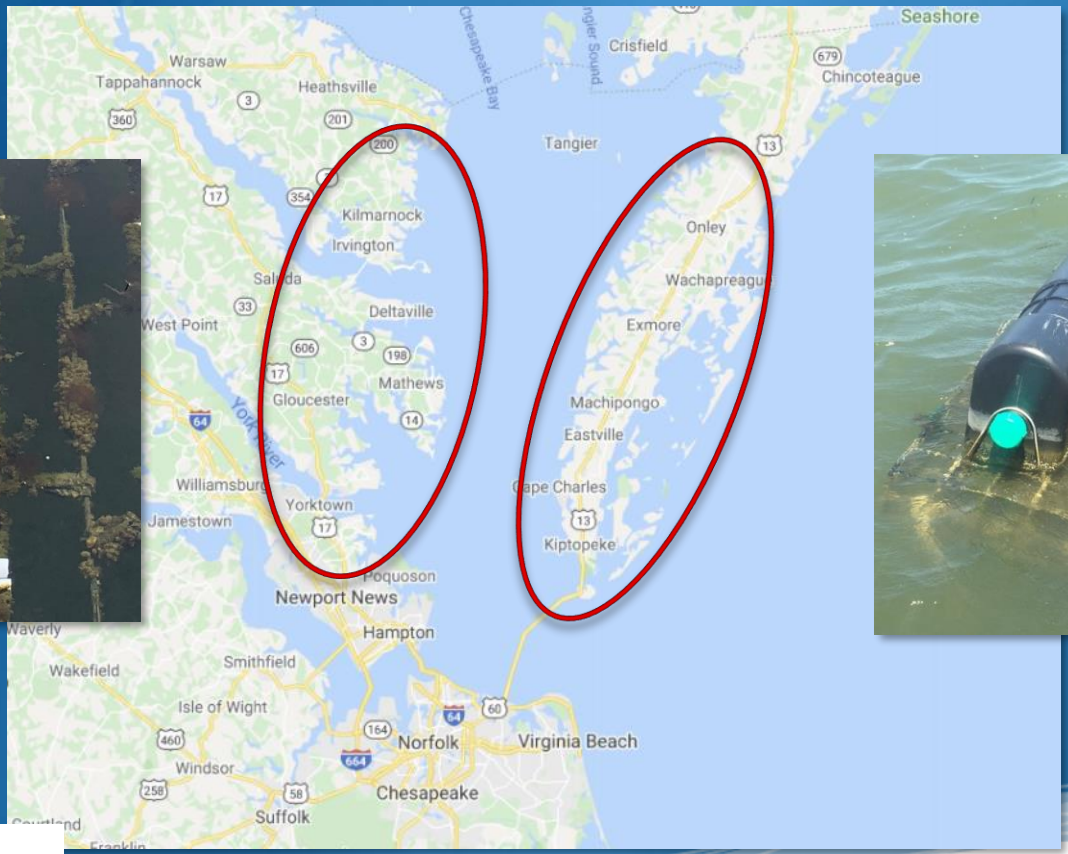
Location

Western Shore

- Single floating bags attached to line
- No spacing between bags on line
- Lines relatively close together

Eastern Shore

- Floating cages with 6 bags/cage
- Spacing between cages on line
- Lines relatively far apart



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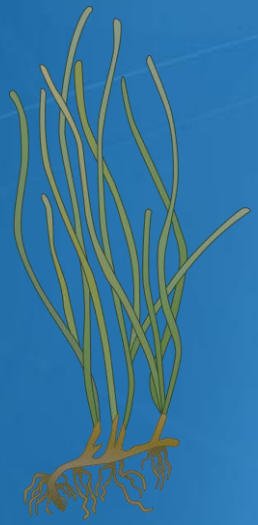
Eastern Shore Experimental Design

- Identified site for farm establishment and adjacent control site and sampled both areas
- Farm established June/July 2019
- Farm and control sampled in
  - 2019 - August & October
  - 2020 - June, August & October
  - 2021 – March, May, August & October
  - 2022 – April, June & August



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Data Collected

SAV
- SAV % cover
- Macroalgae % cover
- Canopy Height
- Reproductive shoot counts/presence
- Aboveground biomass per shoot
- Belowground biomass per shoot
- Epibiont : SAV biomass

Sediments
- Grain size (% sand, silt, clay)
- Organic content
- Ammonium/phosphate concentration

Water Quality
- Inside vs. outside farm YSI transects (temp, salinity, DO, pH, chl and turbidity)

Macrofaunal community
- Mobile epifauna
- Infauna

Oyster biomass density
- Size and abundance self-reported by farm manager
- Length to biomass relationships

- Drone Surveys

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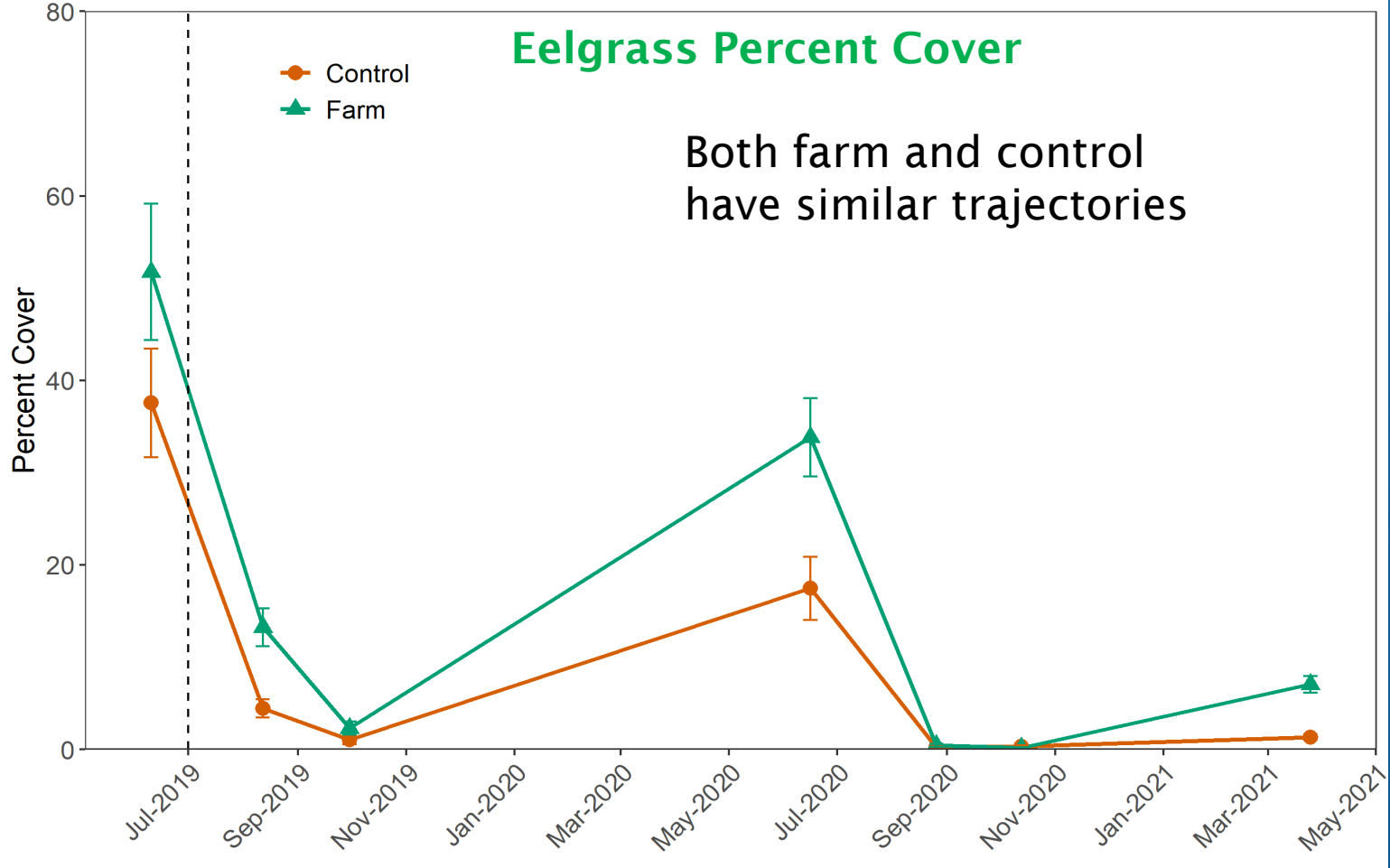
2019 - 2020 Results



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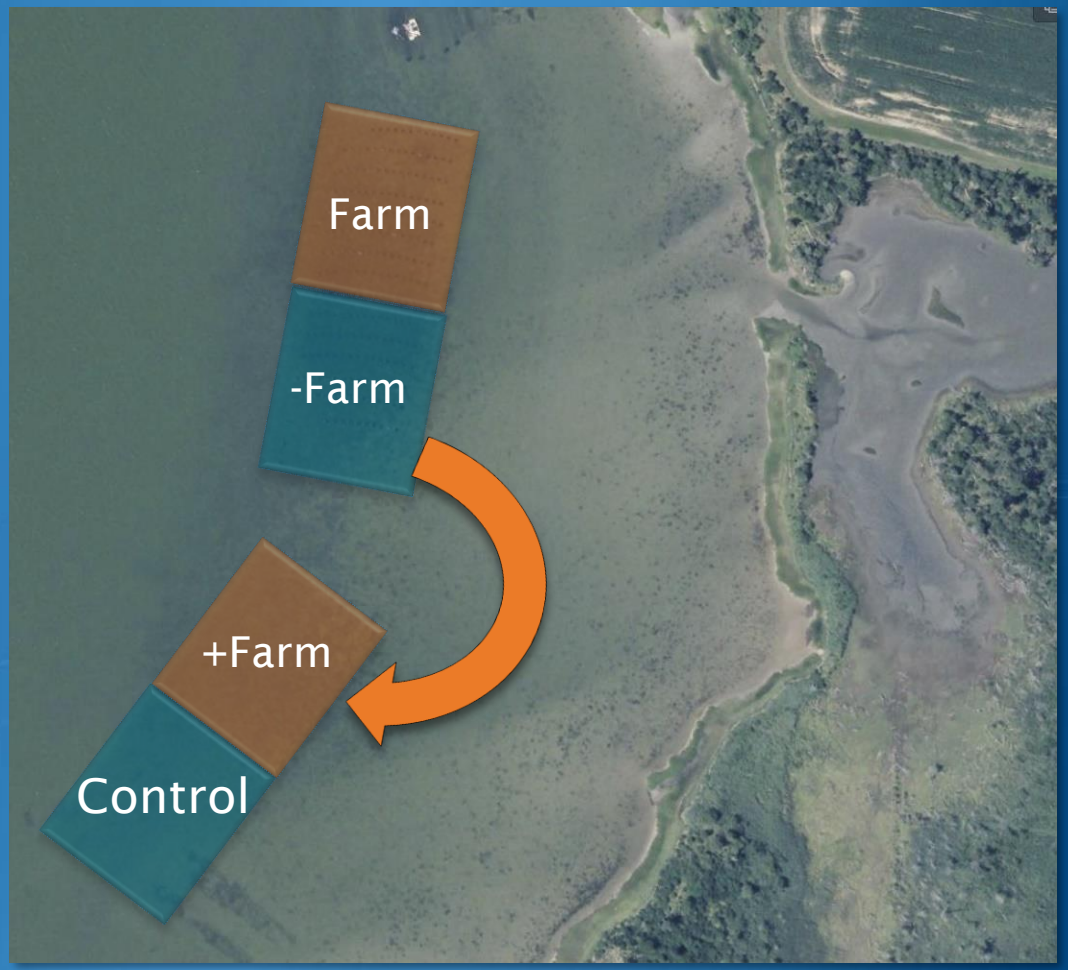
Eastern Shore Experimental Design

- Part of farm moved June 2021
  - Cover was significantly higher at the farm site than at the control site prior to farm placement
  - Moving a portion of the farm helps us tease apart effects of the farm on SAV from effects of farm location
  - Currently 4 “treatments”:
    - Farm → Farm
    - Farm → Control
    - Control → Farm
    - Control → Control
- “Before” sampling in May 2021
  - 2021 - August & October
  - 2022 – April, June & August



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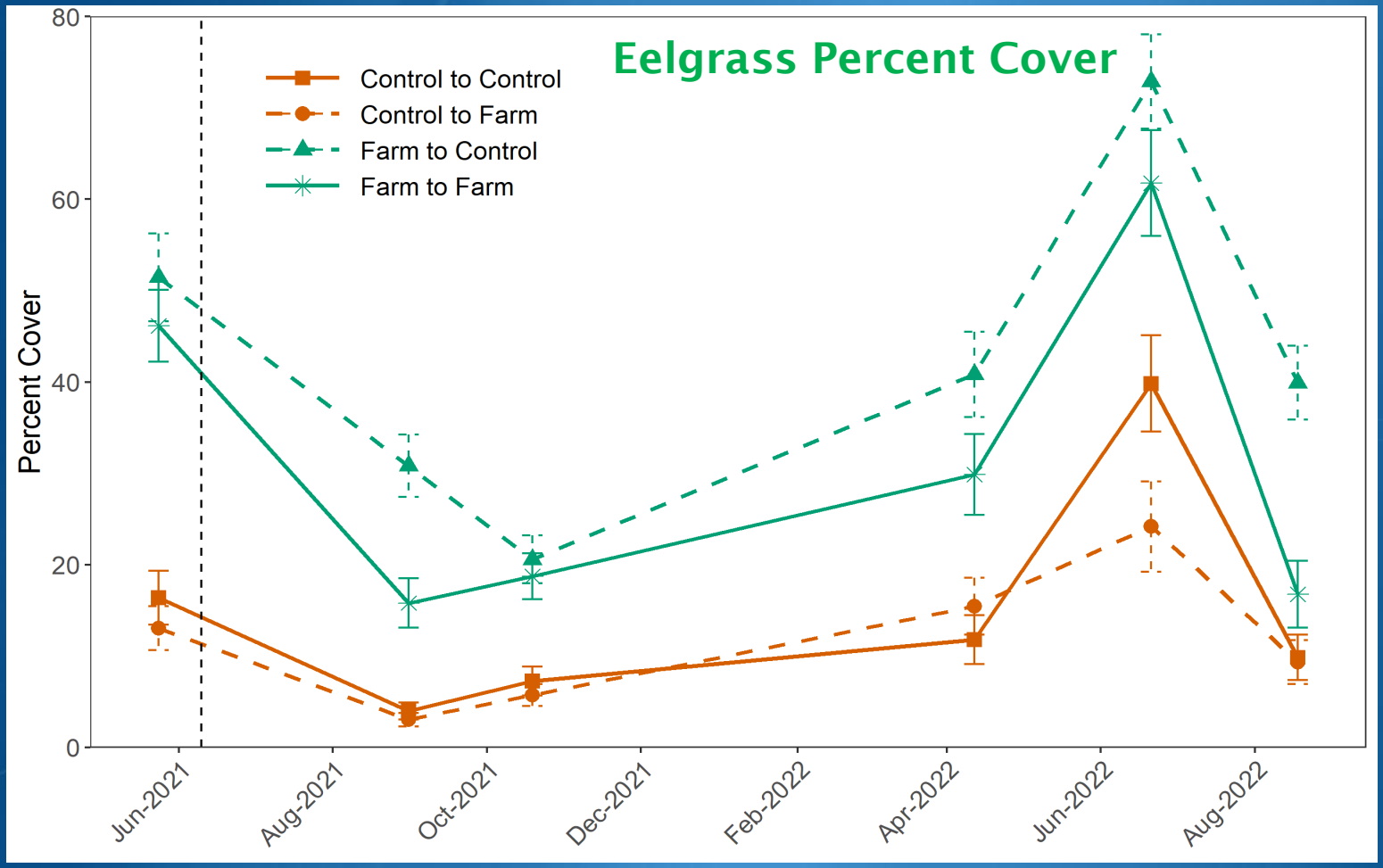
2021 – 2022 Results



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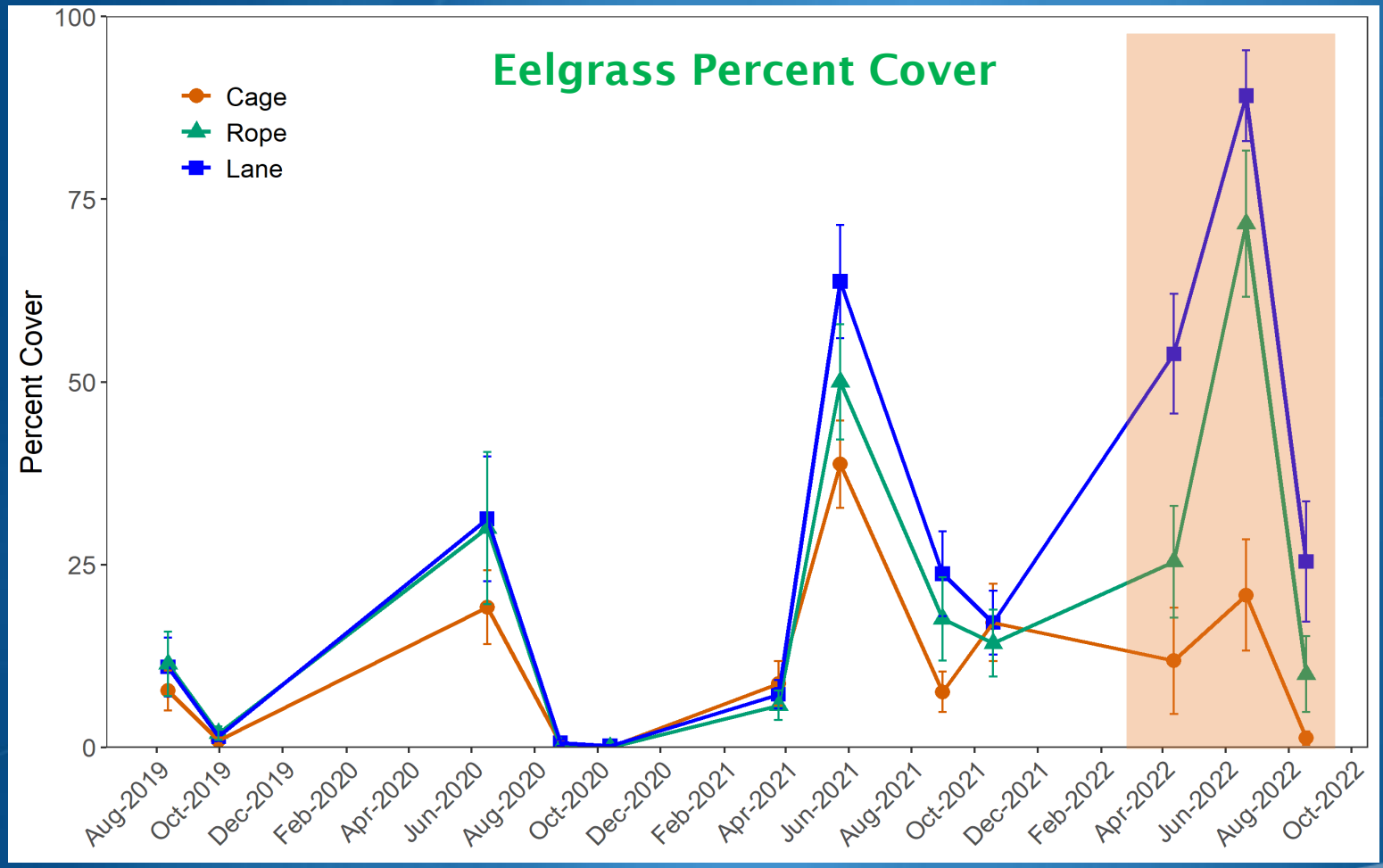
2019 – 2022 Results

All data from "Farm to Farm" Treatment



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Preliminary Conclusions

- Based on data collected and analyzed to date, the Eastern Shore farm appears to be having little or no farm-scale impact on SAV cover
- Some evidence for reduced SAV cover directly under cages and lines

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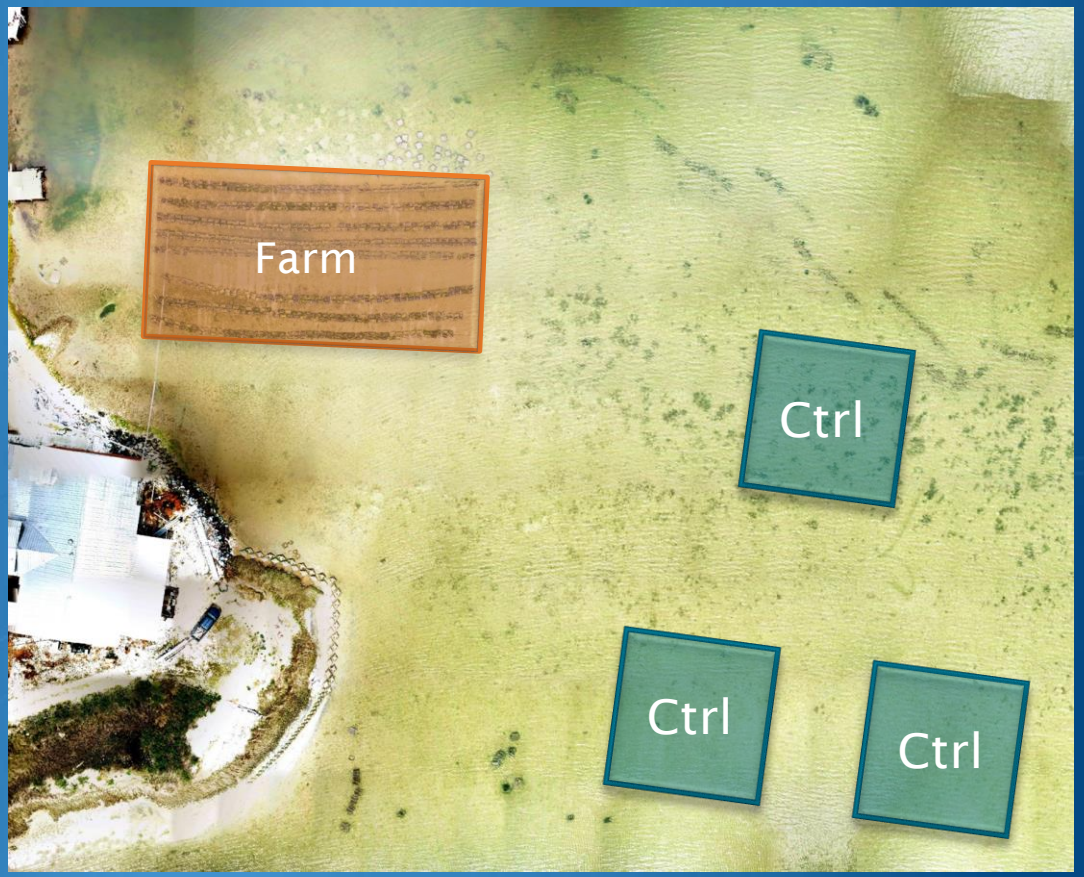
Western Shore Experimental Design

- Identified site for farm establishment and three adjacent control sites
- Farm established in 2019 but almost no SAV present
- Farm and controls sampled in
  - 2020 - June & September
  - 2021 – March, May, July and September
  - 2022 – April, June, August



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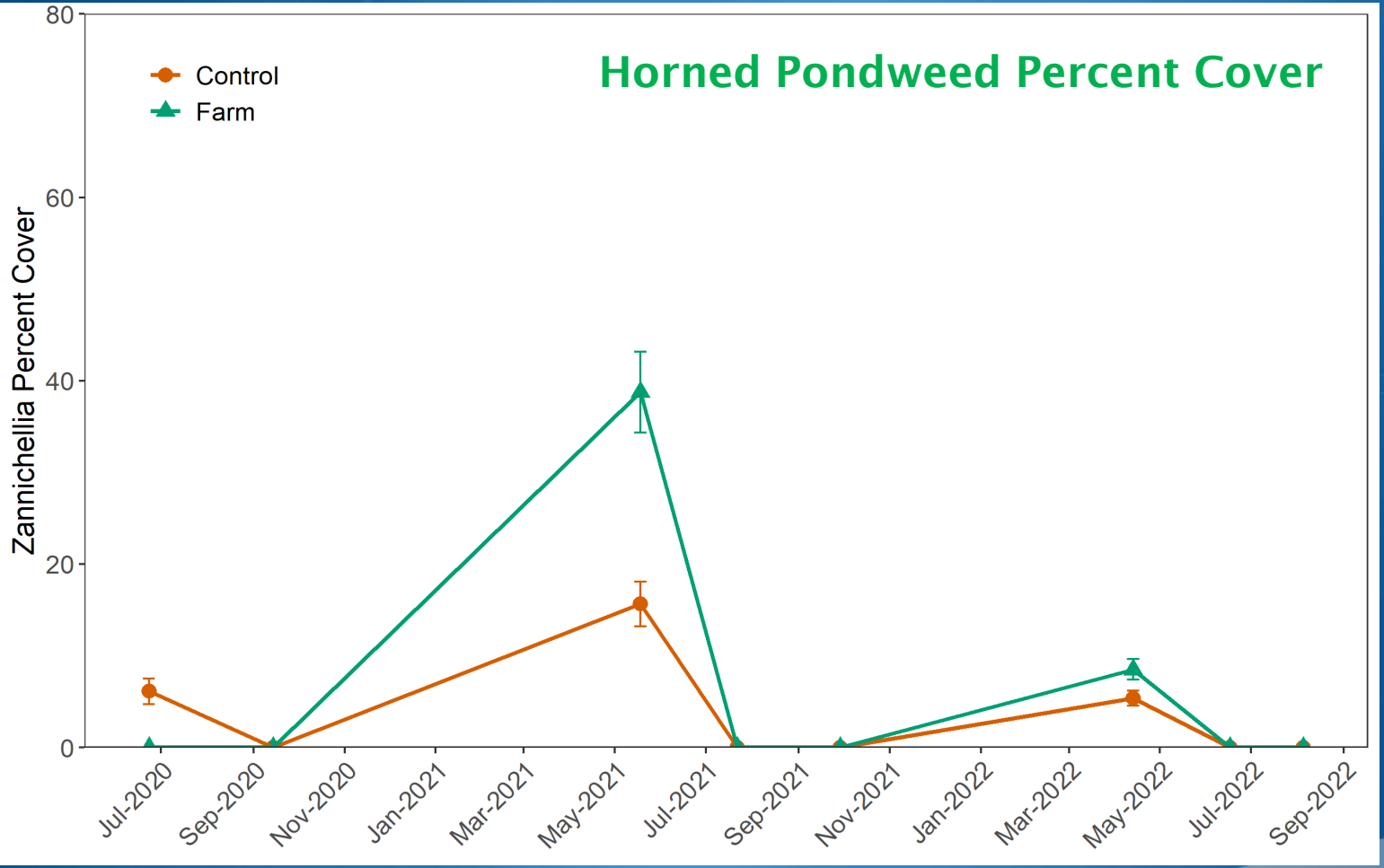

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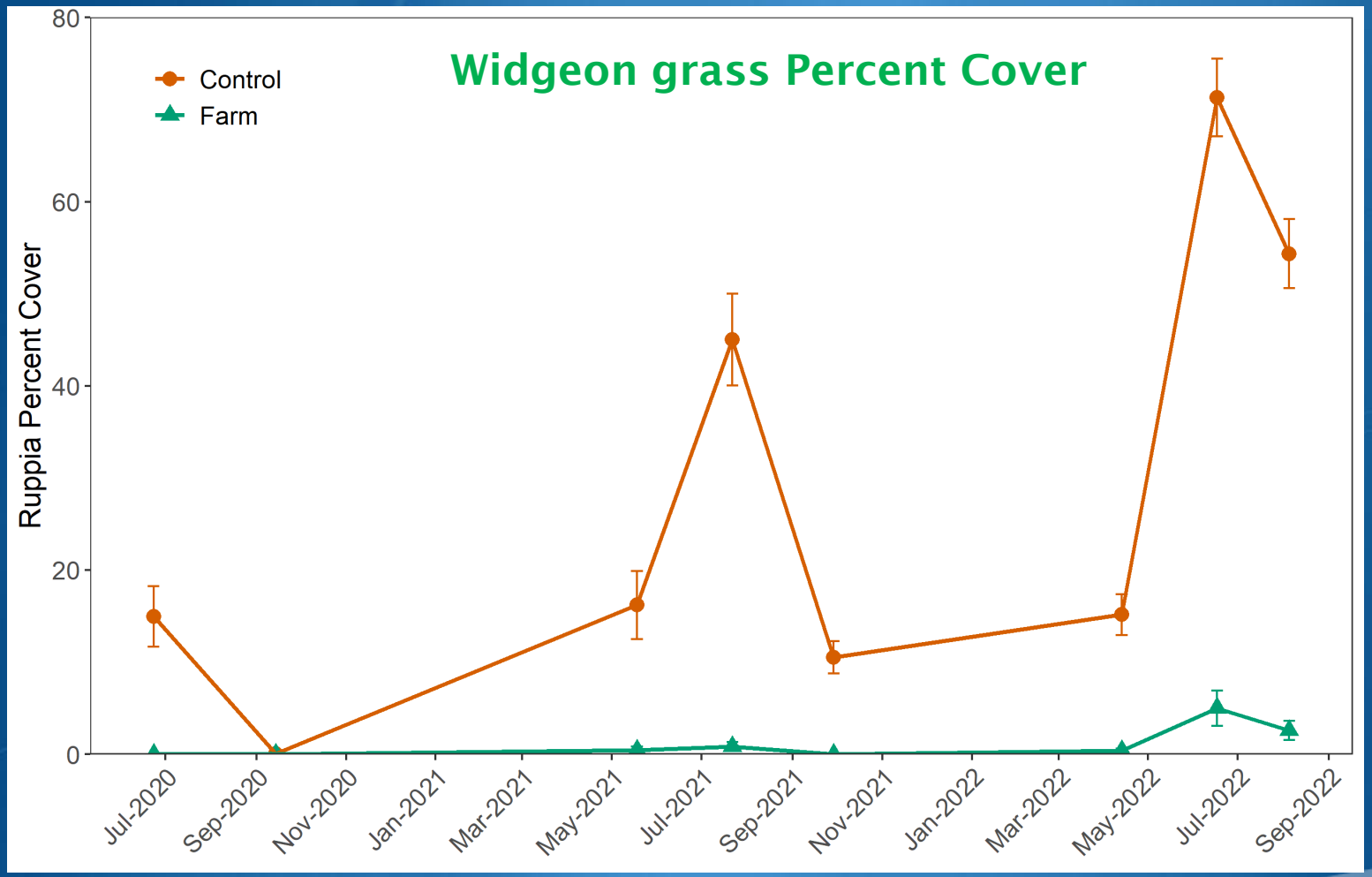

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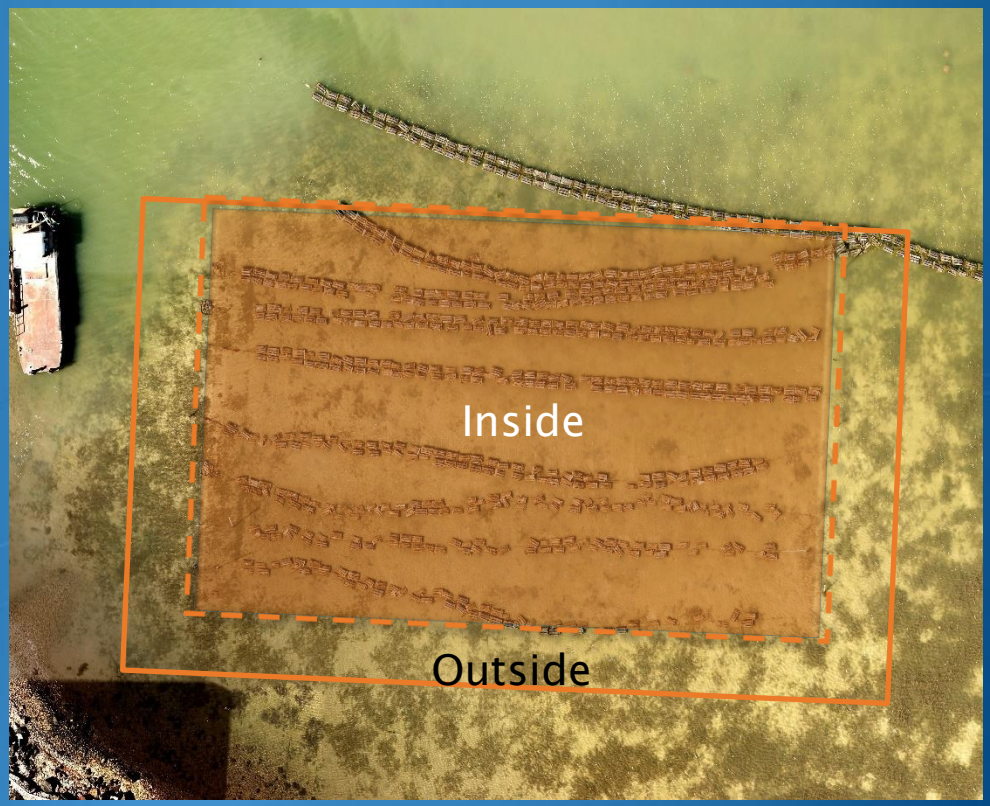
Western Shore Experimental Design

- Environmental conditions differ slightly between the farm and control sites
- Additional data collected just outside the edges of the farm to help decide whether reduced cover is due to farm or to other differences between sites
- Area “outside” farm sampled in:
  - 2021 – May, July and September
  - 2022 – April, June, August



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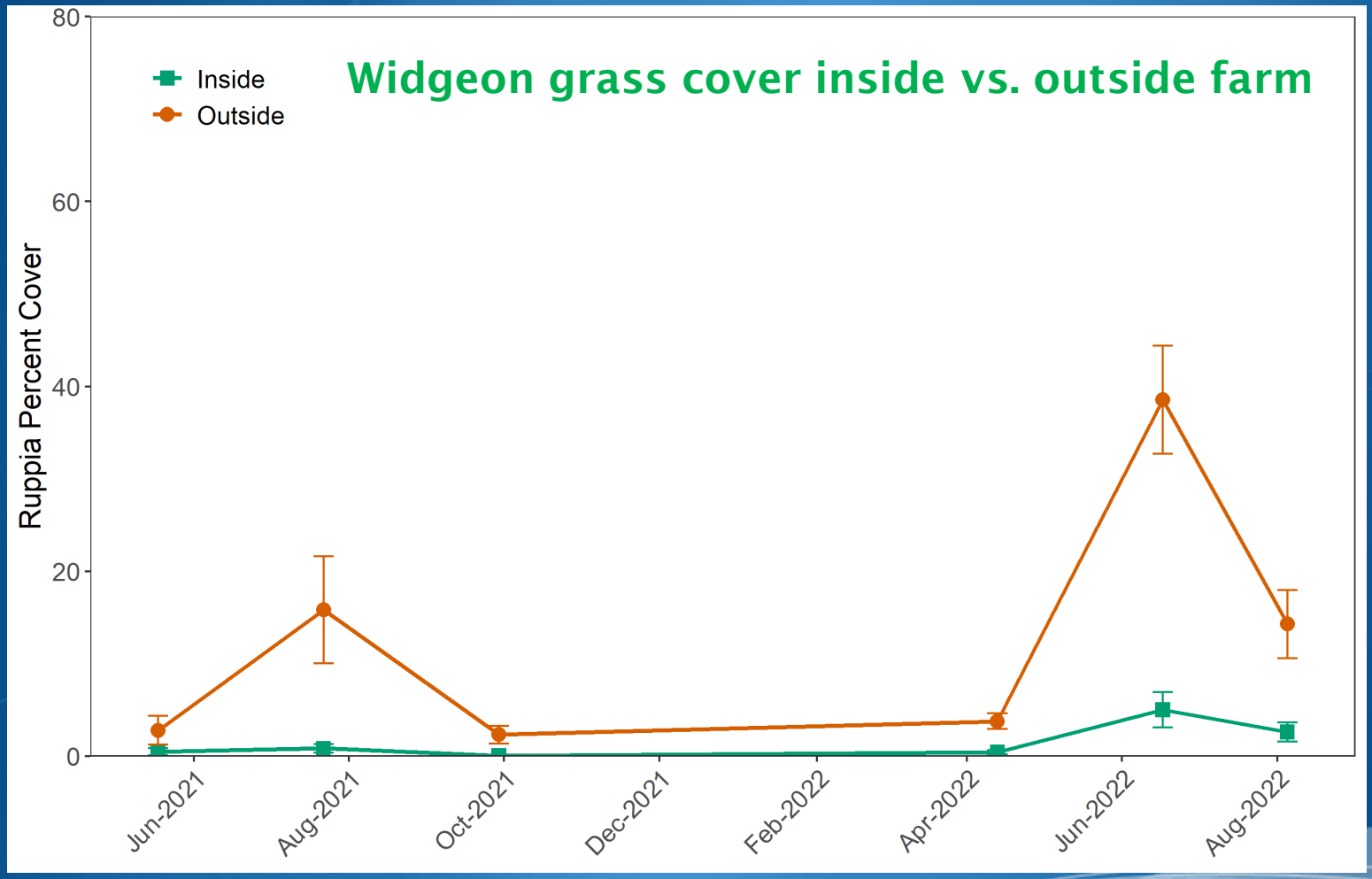
Results



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Preliminary Conclusions

Based on data collected and analyzed to date, the Western Shore farm appears to be having a negative farm-scale impact on widgeon grass.

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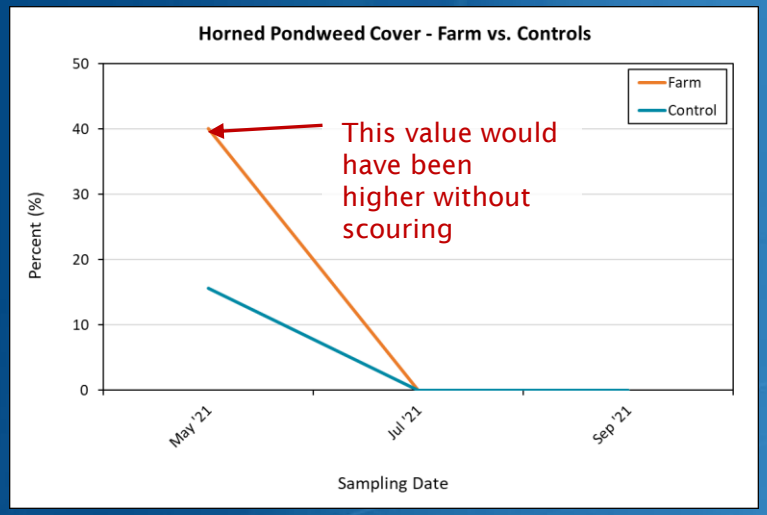
Effects of Bag Scouring

- If bags are allowed to drag on bottom, scouring can remove SAV
  - Within scoured areas, horned pondweed cover reduced by 70%



  - Area of damage can be much greater than the area of the bag if the line swings with the tides

- Grower was notified and quickly remedied situation shown in photo

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Next steps…

Eastern Shore site

- Continue using current experimental design and sampling approach

Western Shore site

- Consider moving or removing a portion of the farm
- Further investigation of cause of reduced widgeon grass cover within farm

Consider expanding scope of study by adding additional sites

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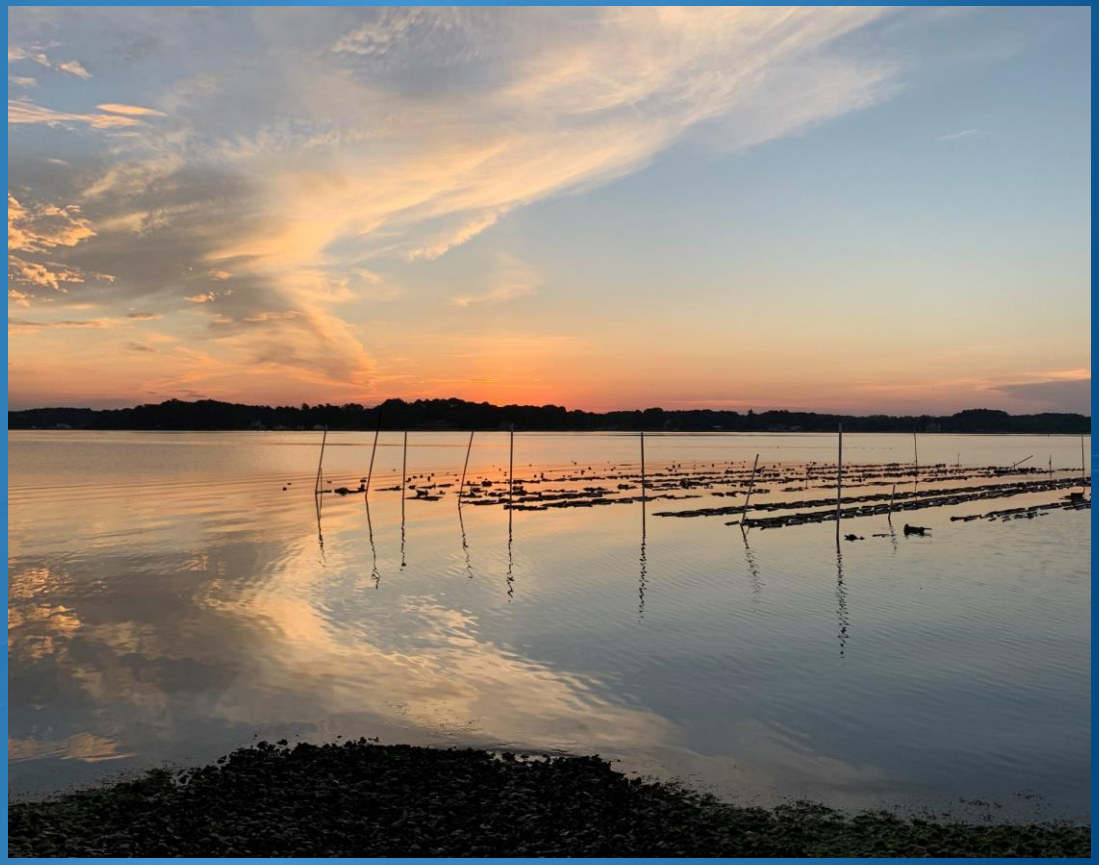
Thank You!

- Collaborating growers
- Other members of the aquaculture industry that have provided advice and suggestions
- Funding provided by the Commonwealth of Virginia

If you have questions, now or in future, feel free to contact me or Lisa at:

eshields@vims.edu or
lkellogg@vims.edu



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