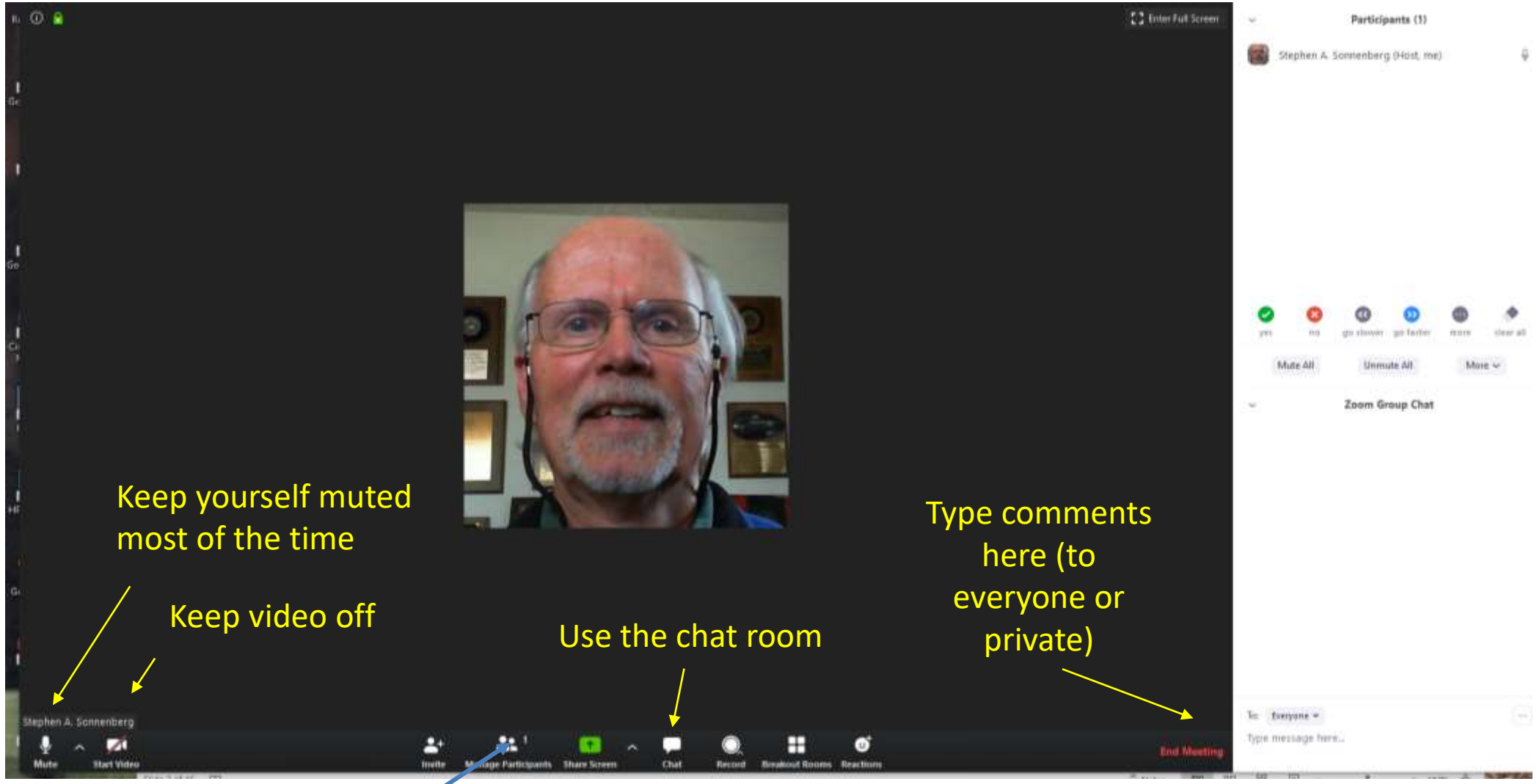
MUDTOC Consortium
Spring 2021

Dr. Steve Sonnenberg
Principal Investigator

ZOOM Suggestions



Keep yourself muted most of the time

Keep video off

Use the chat room

Type comments here (to everyone or private)

Participant's list

MUDTOC Advisors, Faculty & Committee Members

- Steve Sonnenberg, PI
- Kathy Emme, RA

Advisors:

- John Curtis
- Jim Emme
- Mike Hendricks
- Bob Weimer
- Bill Zogg

Recent Committee Members

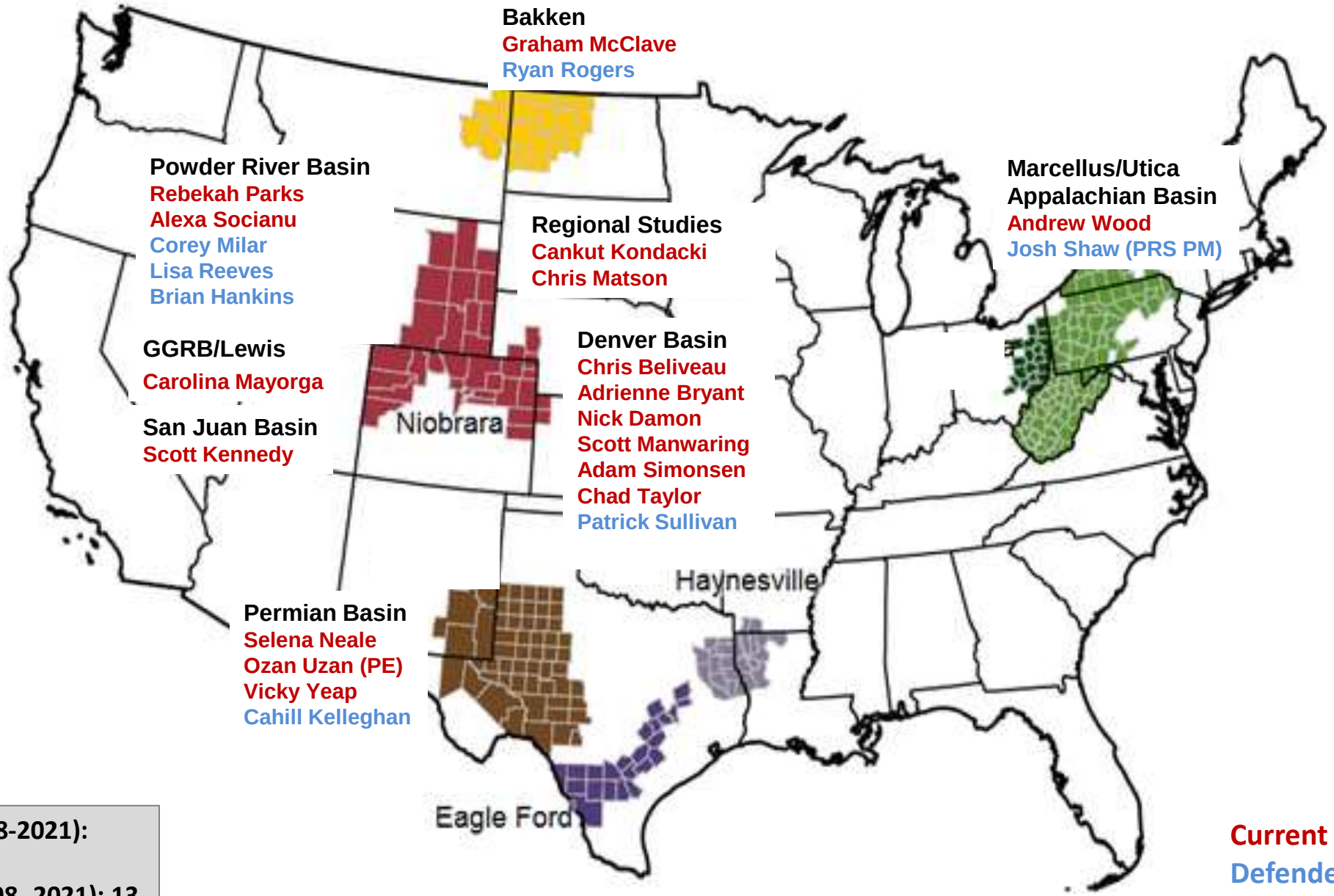
- Marsha French
- Donna Anderson
- Mary Carr
- Zane Jobe
- James Hagadorn
- Hossein Kazemi
- Jennifer Miskimins
- John Kaszuba, UW
- Mark Longman
- Keith Shanley
- Jeff May
- Ali Tura
- Terri Olsen

MUDTOC Research

Mudrock and Tight Oil Characterization Consortium (includes Carrier Bed / Halo Plays)

- Denver Basin:
  - Skull Creek, Niobrara, Codell
- Powder River Basin:
  - Mowry, Niobrara, Frontier/Turner, Shannon
- Permian Basin (Midland & Delaware):
  - Wolfcamp
  - Avalon, Bone Springs
- Appalachian Basin:
  - Marcellus
  - Utica
- Williston Basin:
  - Bakken Petroleum System (Bakken & Three Forks)
- GGRB
  - Lewis Shale
- San Juan Basin:
  - Niobrara & Semilla SS
- CCUS: Niobrara, Bakken

MUDTOC Research Consortium Spring 2021

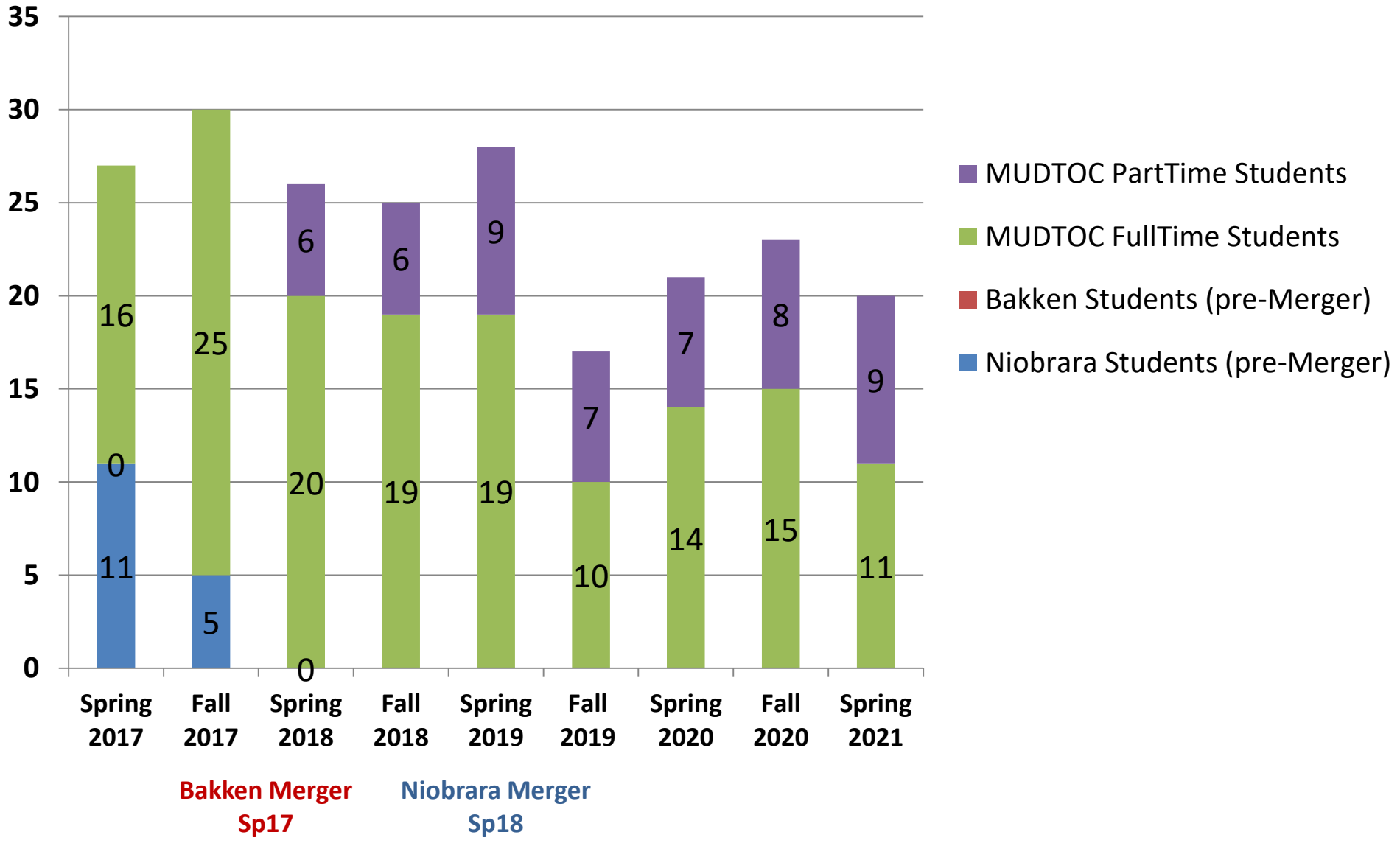


- MS Completed (2008-2021): 102
- PhD Completed (2008 -2021): 13

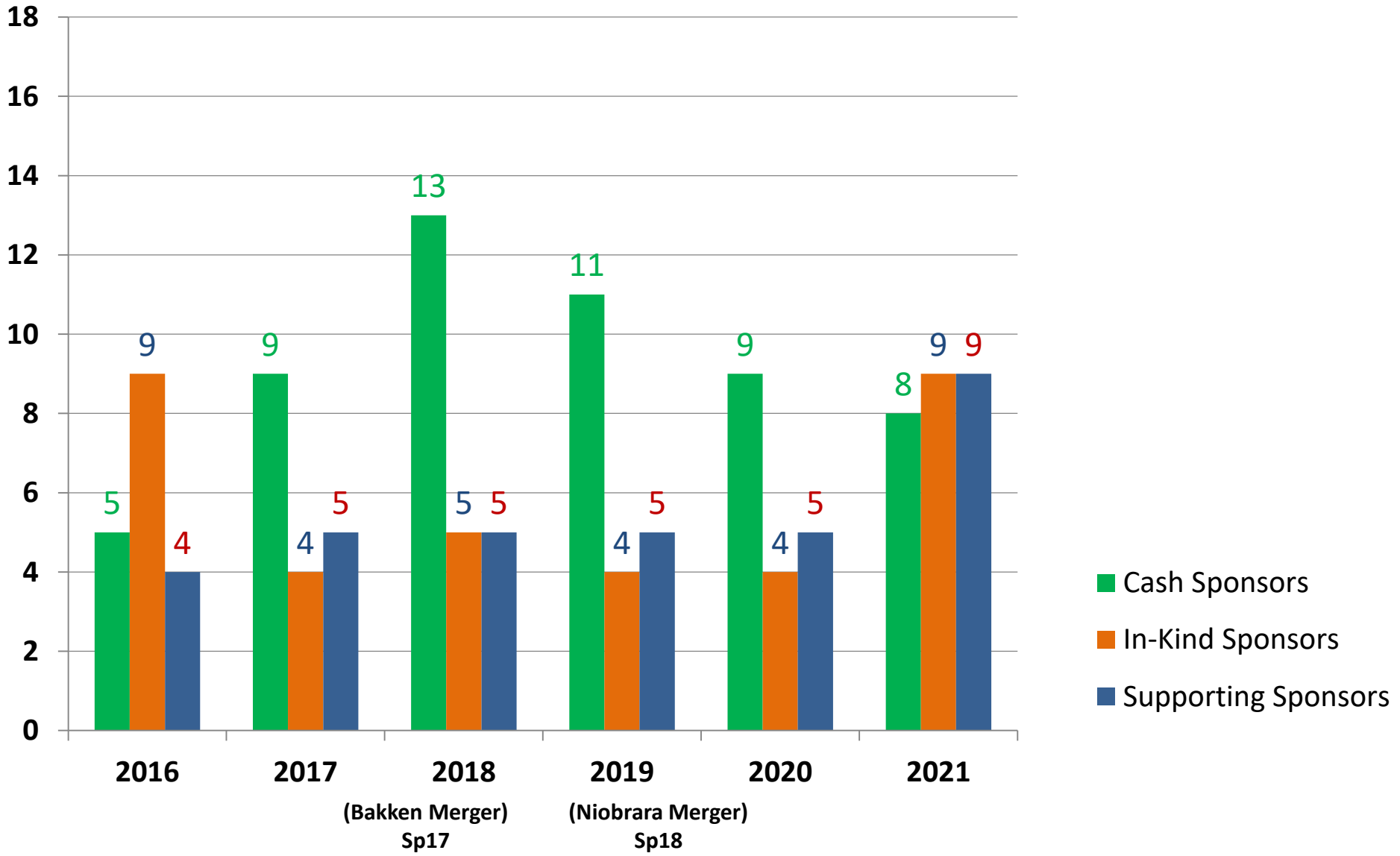
Current Students

Defended or Graduated

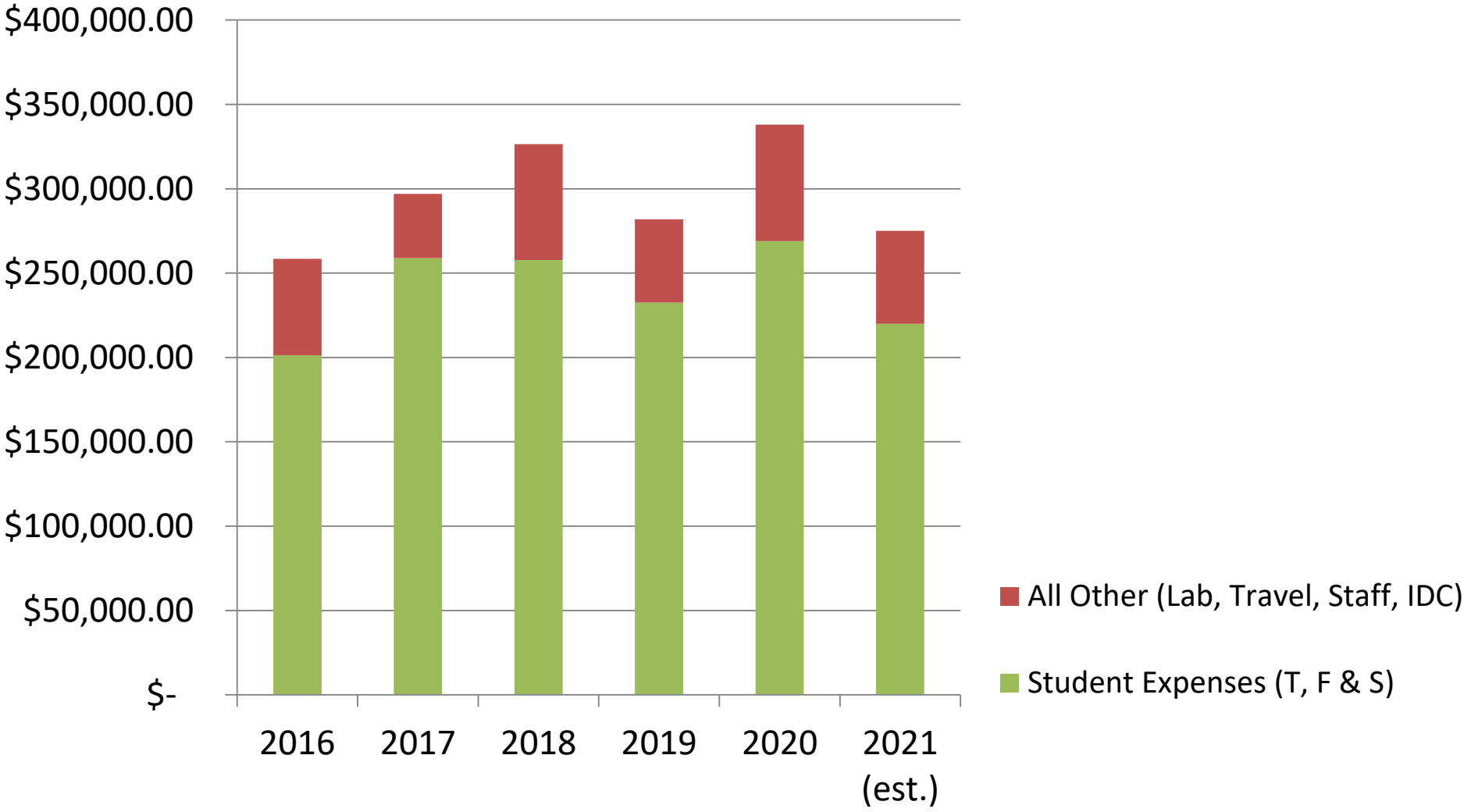
MUDTOC Supported Students 2016 – 2021



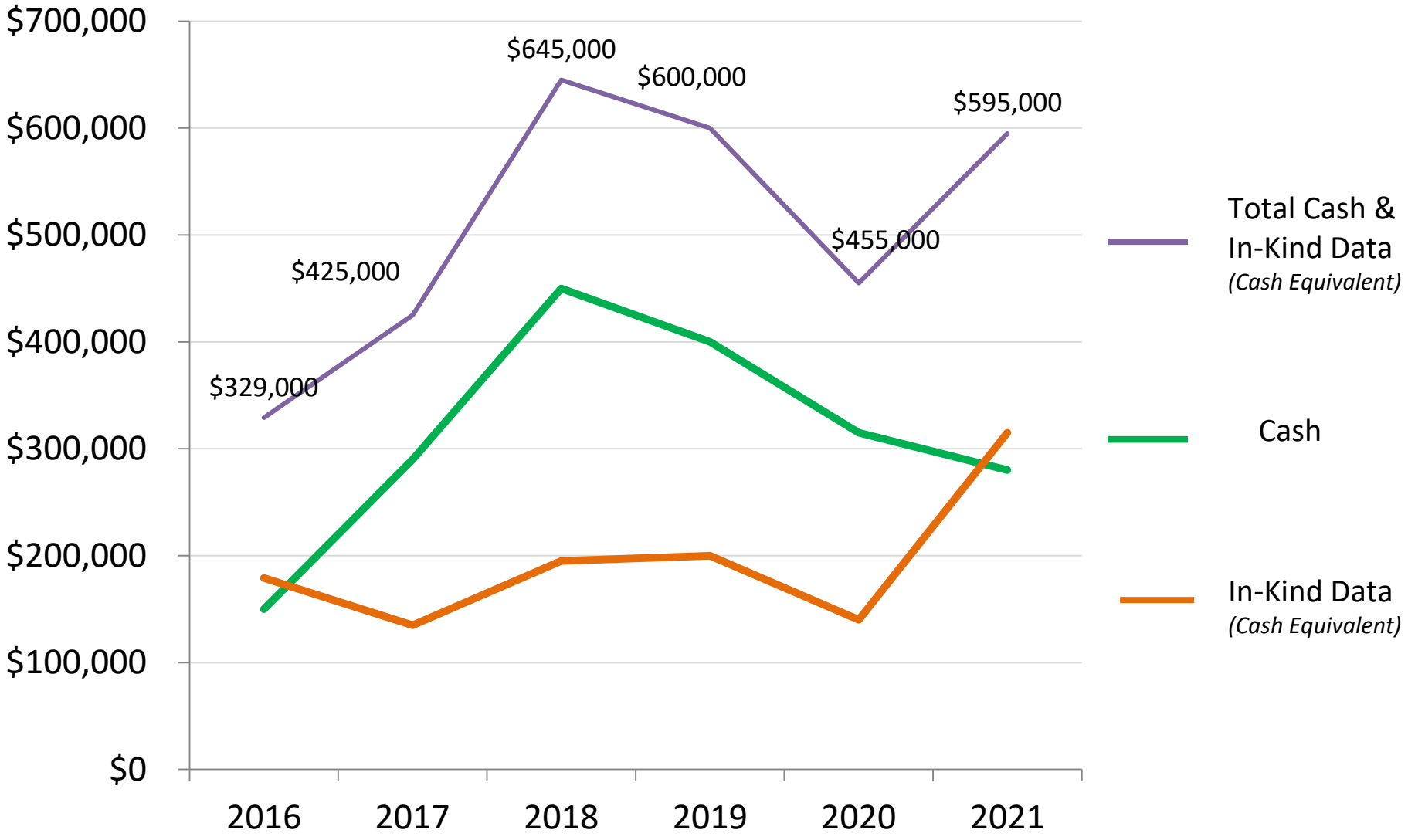
MUDTOC Cash vs In-Kind Sponsors 2016 – 2021



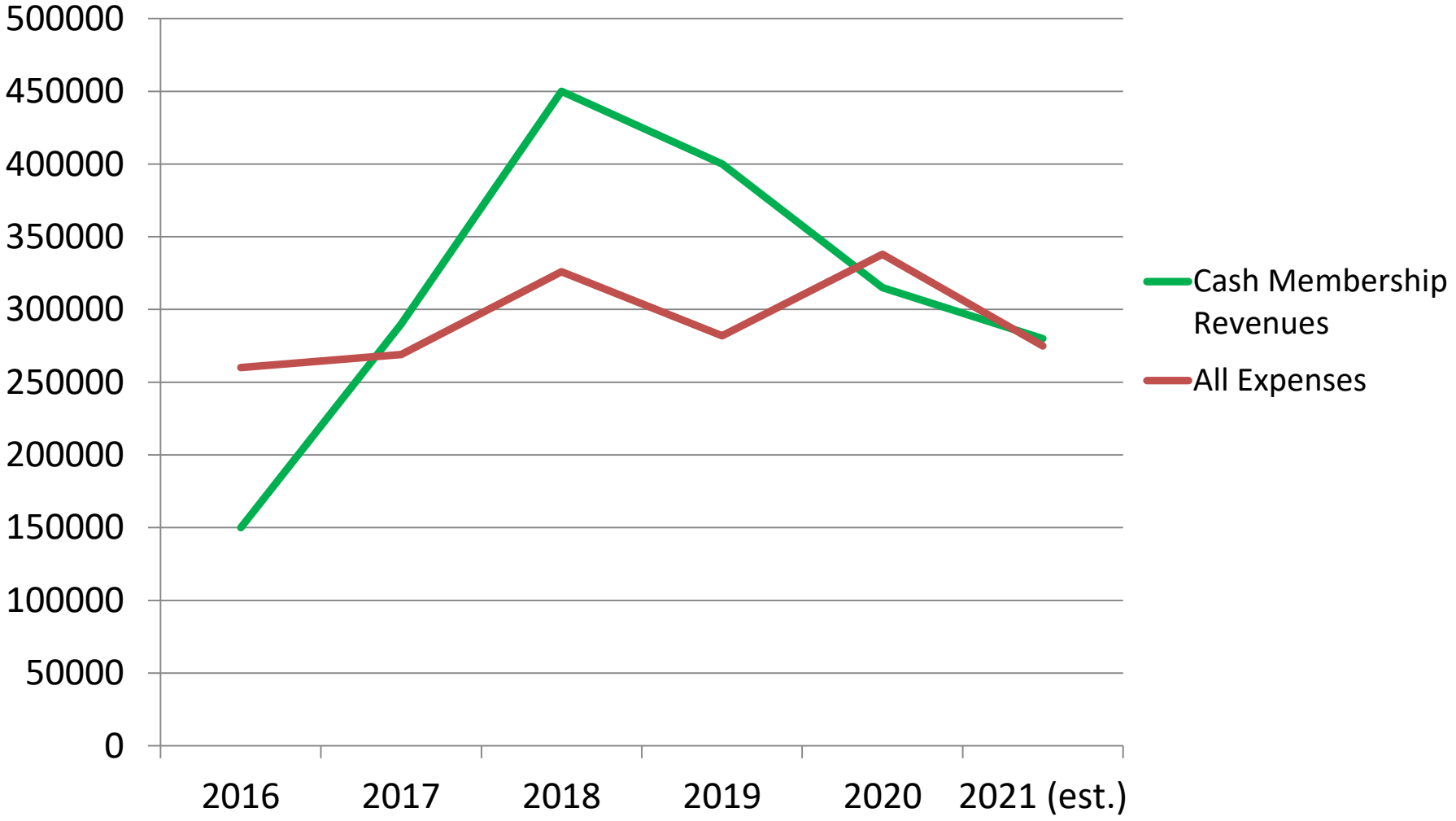
MUDTOC Expenses 2016-2021 (2021 projected)



MUDTOC Revenues
2016 – 2021 (2021 projected)



MUDTOC Expenses vs Revenues 2016 – 2021 (2021 projected)



3 Consortia pre-2017 -> Merged Bakken -> Merged Niobrara = Financial Stability

All Consortia Sponsors 2008 – 2021 (alphabetical)

Anschutz Exploration Corporation
Anadarko
Antero Resources
Apache
Austin Exploration
Bill Barrett Corporation
Black Hills Energy
bp
Chesapeake Energy
Bonanza Creek
Chevron
Comet Ridge Resources
Cimarex
ConocoPhillips
Crestone Peak Resources
devon
DRI
Endeavour
The Energy of enerplus
EOG Resources
ep
Enverus
Fidelity Exploration & Production Company
Fleur de Lis Energy, L.L.C.
Global
GMT Exploration Company LLC
Halcón Resources
Halliburton
Helis Oil & Gas
Hess
HighPoint Resources
Husky Energy
ion Charged with Innovation
Kodiak Oil & Gas Corp.
Laramie Energy
Lario
Marathon Oil
NARP Canada
NETL
Newfield
noble energy
Oasis
Oxy
Paisano Energy Advisors, LLC
2M
Pioneer Natural Resources
pluspetrol
QEP Resources
rebellion Energy
Red Willow Production Company
Rosetta Resources
Samson Oil & Gas Limited
Samson
Savant
Shell
SM Energy
Statoil
Stratum Reservoir
swn Southwestern Energy
Texas American Resources Company
TGS
The Discovery Group Inc
Total
Tundra Oil & Gas Partnership
Ward Petroleum Corporation
Weatherford
White Eagle Exploration
Whiting
Williams
WPXENERGY
XTO Energy
Yates Petroleum Corporation

MUDTOC Characterization

- Outcrop & Core descriptions
- Petrographic thin sections
- FE SEM, EDS, EDS mineral maps
- QEMSCAN
- XRD
- XRF
- SRA
- Bambino
- MICP, Nitrogen adsorption, water (kerosene) immersion, etc.
- TinyPerm3 & other permeability measurements
- Petrophysics, NMR + ECS
- Core Scanning
- Carbon & oxygen isotope analysis
- CCUS
- Geothermal, Basin Modeling
- 3D seismic

Project Ideas

- NMR & ECS - Permian, Bakken, Niobrara, Mowry, etc.
- Niobrara & Greenhorn Regional (Cankut Kondacki, Chris Matson)
  - Ash beds, biostratigraphy, OAEs, etc.
- Niobrara Redtail area (Adam Simonsen, Scott Manwaring, Chad Taylor)
- Niobrara Newatt area (new core & data, HighPoint / Bonanza Creek)
- Codell Redtail area (Nick Damon)
- Codell Silo area (new Helis core & data)
- Pyrobitumen in Niobrara (Wattenberg)
- Denver basin-Skull Creek (Patrick Sullivan)
- Biogenic/authigenic silica-Bakken (Ryan Rogers), Mowry (Brian Hankins, Alexa Socianu)
- Three Forks Deposition model, Petrophysics, Dolomite, etc. (Graham McClave)
- Basin Modeling: Permian (Cahill Kelleghan)
  - Pressure & Temperature Anomalies
- Permian continued
  - Comparison of Wolfcamp from gas, gas-cond, oil windows
  - Water occurrences in Wolfcamp (Ozan Uzun)
  - Machine Learning (Selena Neale)
- Faults & fractures
- Carrier-Bed Plays (Codell, Turner)
- CCUS Wolfcamp, Niobrara (Chris Beliveau, Ozan Uzun)
- Lewis Shale, GGRB (Carolina Mayorga)
- 3D Seismic Powder River Basin
- Geothermal

MUDTOC Consortium Sponsors
Spring 2021

Sponsoring Member Companies

Chevron

Red Willow Production Company

Antero Reso

CRESTONE PEAK RESOURCES

OXY

WHITE EAGLE EXPLORATION

EOG Resources

WHITING

ENVERUS

HELIS OIL & GAS

STRATUM RESERVOIR

HighPoint RESOURCES

CIMAREX

devon

TGS

GMT Exploration Company LLC

Supporting Companies

GEOMARK

Mike Johnson & Associates

IHS

Schlumberger

MJ SYSTEMS

THE ENERGY OF enerPLUS

PlatteRiver ASSOCIATES INC.

Advisory Board Suggestions (Spring 2021)

- Silo area Codell study (new core from Helis)
- Wettability studies
- Fluid & rock interactions
- OAE II & III
- PRB & DJB – burial history & maturity studies northern part of basin
- Regional stratigraphic study Frontier to Turner
- Austin Chalk study
- Geothermal studies (with PE too)
- CCUS (HC gas & CO_2)

Congratulations to the New Graduates

- Brian Hankins
- Scott Manwaring
- Patrick Sullivan
- Vicky Yeap
- Ryan Rogers

Retirement News

- Kathy Emme, Research Associate
  - 10 years
  - Contracts, meetings, logistics, website, etc.