



Sandia
National
Laboratories

Algal research at Sandia National Laboratories: Partnering for success



October 4, 2021

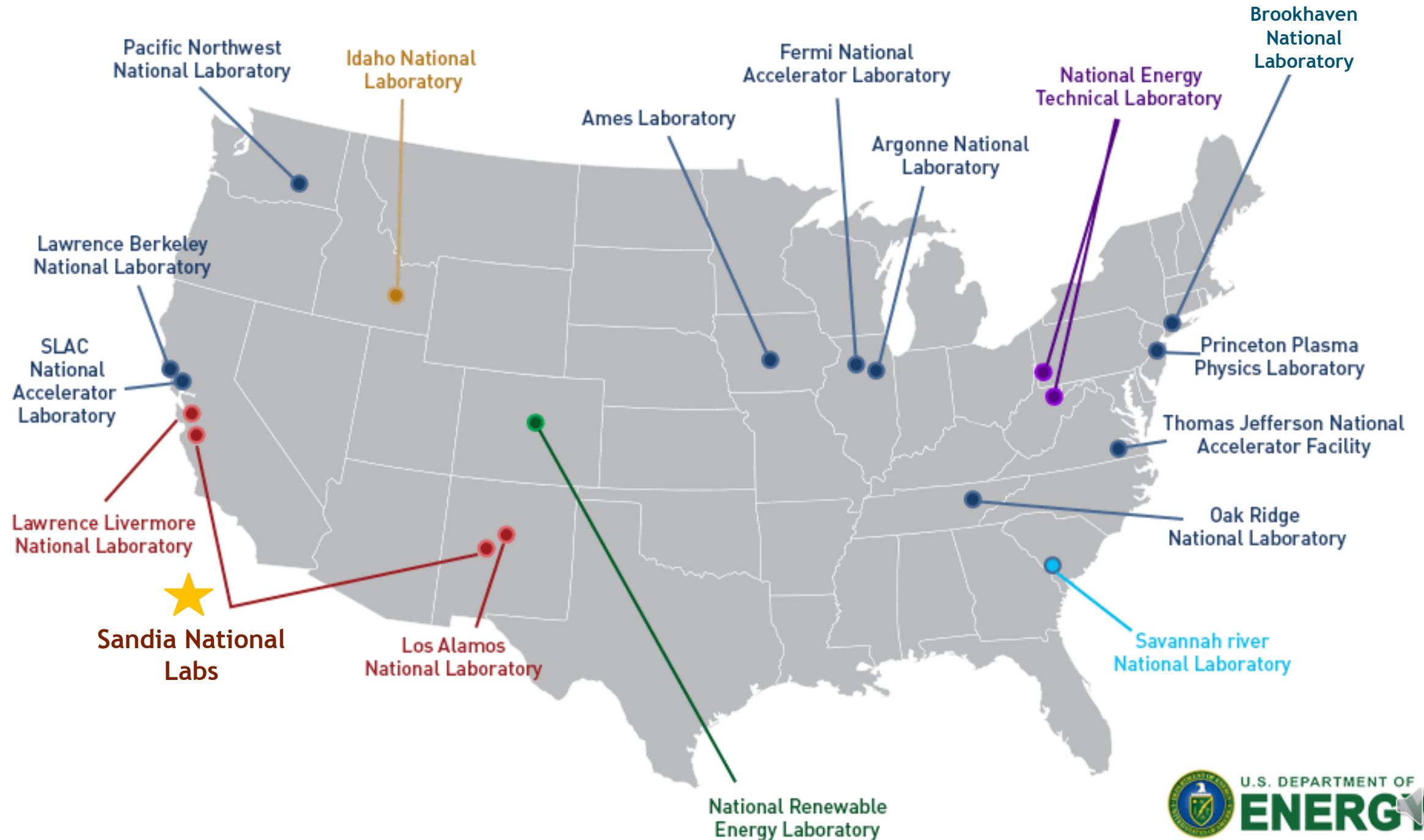
Amanda N. Barry
Sandia National Laboratories



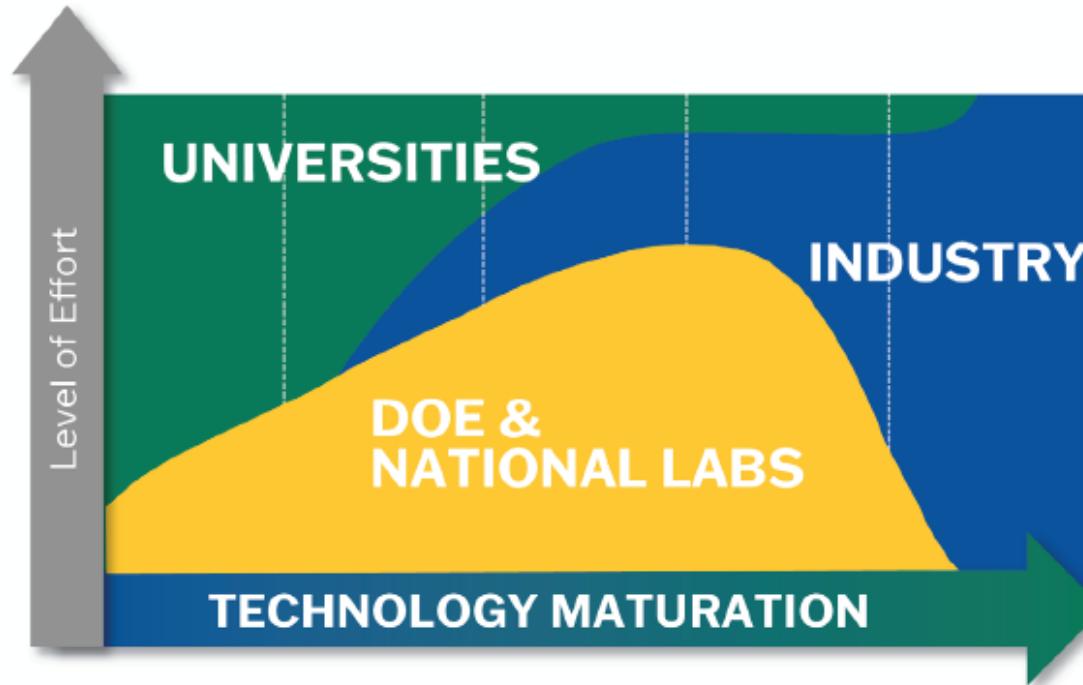
Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

This presentation does not contain any proprietary, confidential, or otherwise restricted information

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.



DOE NATIONAL LABORATORIES' RELATIONSHIP TO UNIVERSITIES & INDUSTRY IN THE INNOVATION SYSTEM



SANDIA'S **PURPOSE**



Render exceptional service in the national interest.

SANDIA'S **VISION**



On behalf of our nation, we anticipate and solve the most challenging problems that threaten security in the 21st century.

SANDIA'S **MISSION**



Our unique mission responsibilities in nuclear weapons create a foundation from which we leverage capabilities, enabling us to solve complex national security problems.

OBJECTIVE

Unleashed innovation and high-velocity engineering to counter global threats.

by...

- Anticipating future threats
- Applying revolutionary science and engineering
- Dramatically reducing delivery timelines
- Inspiring and including contributions from all
- Leading the enterprise
- Serving as an FFRDC with objectivity and independence in the public interest
- Taking appropriate risks

resulting in...

- ✓ Sustained US technical advantage
- ✓ An unstoppable team
- ✓ Breakthrough innovations
- ✓ Timelines cut in half
- ✓ Exceptional service in the national interest



RESPONDING TO CLIMATE CHANGE IS A STRATEGIC IMPERATIVE

ENVIRONMENTAL IMPACTS

SOCIETAL IMPACTS



DIMENSIONS OF CLIMATE CHANGE CHALLENGE

AWARENESS

Establish environmental and socio/political situational awareness to support risk analysis and prioritization of efforts



MITIGATION

Decrease the anthropogenic sources contributing to climate change



ADAPTATION

Accommodate climate impacts affecting both human and natural systems



INTERVENTION

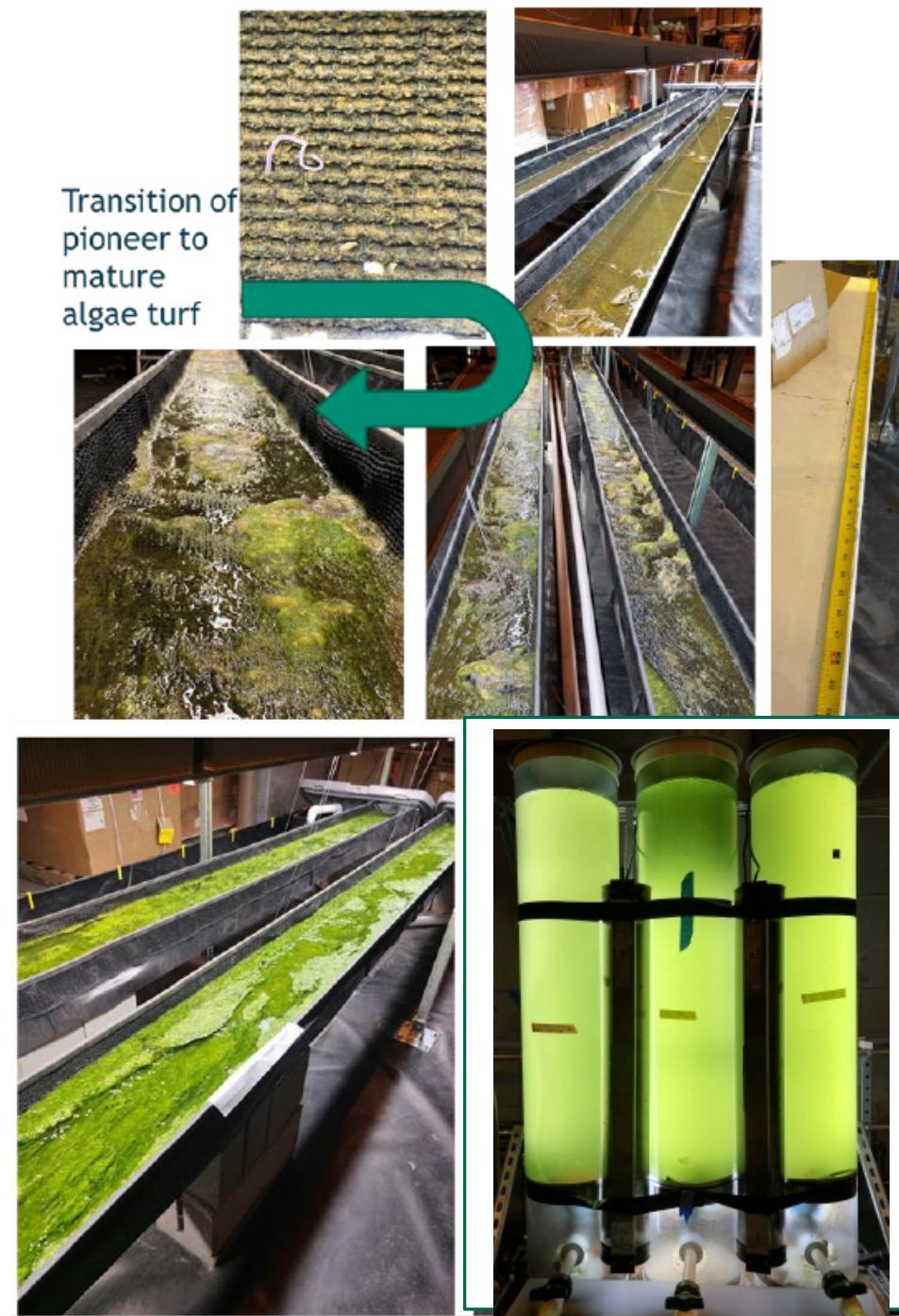
Undertake deliberate, large-scale actions to modify the Earth's climate system



Algae Testbed in Livermore, CA



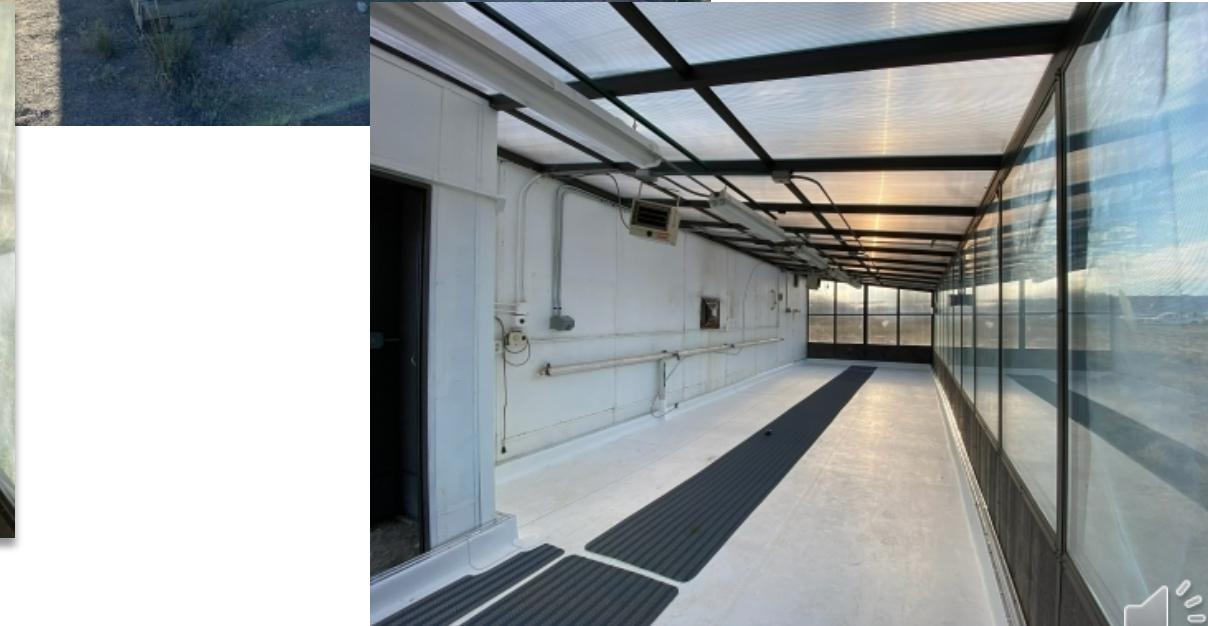
Sandia Contacts: Todd Lane twlane@sandia.gov
Ryan Davis rwdavis@sandia.gov



Algae Raceway Pond Greenhouse in Albuquerque, NM



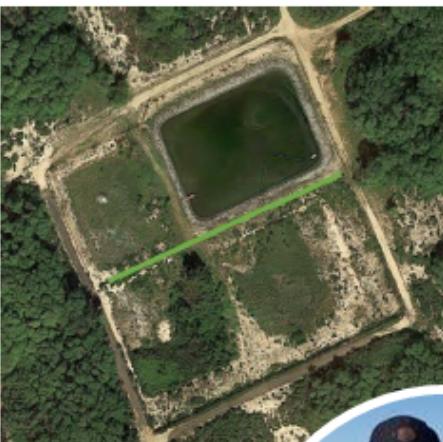
- Greenhouse facility updated in Albuquerque
- Six 100 L raceway ponds for algae experiments
- Coupled with our existing pond facility in California, this now enables us to do paired experiments across sites/environments.



Sandia Contacts: Chuck Smallwood crsmall@sandia.gov
Amanda Barry anbarry@sandia.gov



Kauai Facility



Eric Monroe

- FY21 Deployment - home of Sandia's Modular Attached Algae System
- Navy base with independent waste-water treatment facility
- Facultative pond discharges to the Pacific Ocean
- *These waters are associated with local coliform & avian botulism of local concern*
- *Kauai-local stake-holders and project partners*

Algae Production Economics - Finding the Sweet Spot
Thursday, October 21, 10:00 am - 11:30 am
Carlos Quiroz-Arita

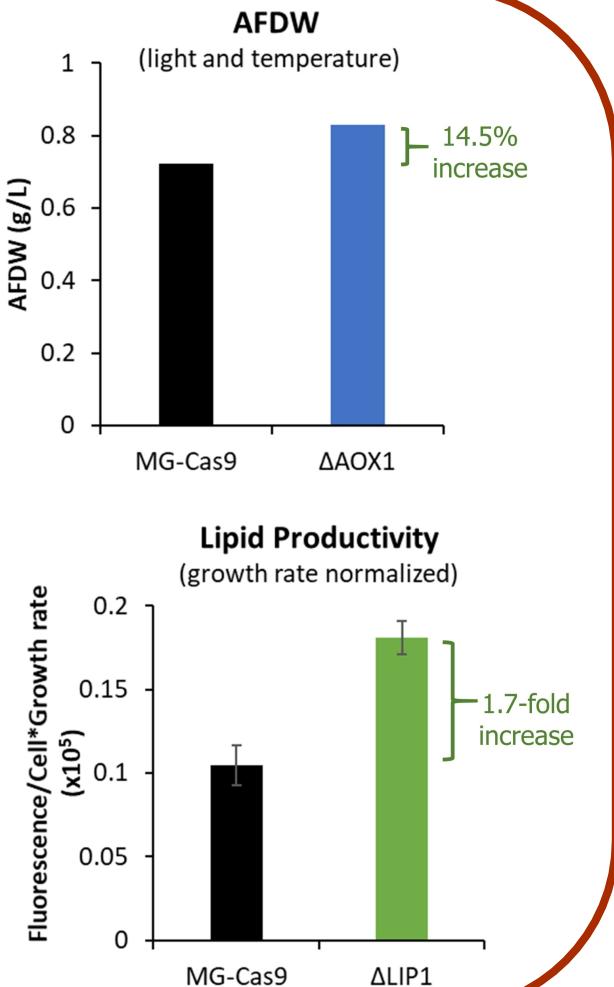
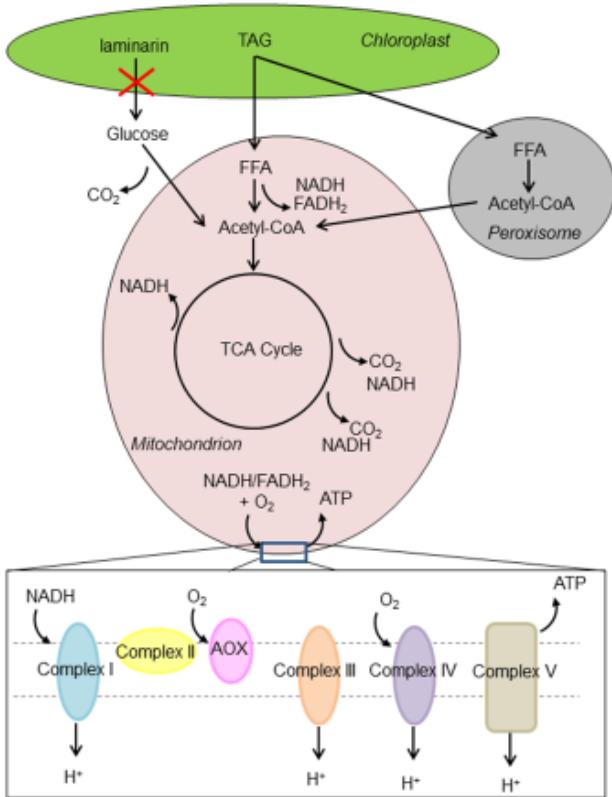
Sandia Contact:
 Ryan Davis rwdavis@sandia.gov



Engineering and Leveraging Algae Traits

10

CRISPR Engineering



Plant Substrate Utilization



Schambach, J., Finck, A., Kitin, P., Hunt, C., Hanschen, E., Starkenburg, S., Vogler, B.W., and Barry, A.N. 2020. Growth, total lipid, and omega-3 fatty acid production by *Nannochloropsis* sp. cultivated with raw plant substrate. *Algal Research*

Sandia Contacts: Anne Ruffing aruffin@sandia.gov
Chuck Smallwood crsmall@sandia.gov
Amanda Barry anbarry@sandia.gov

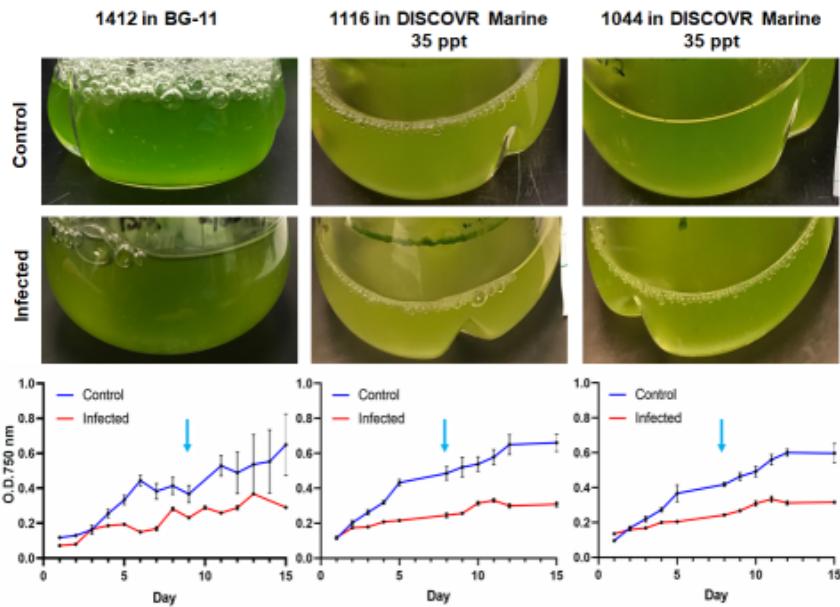
Nutrients: Is Utilization Efficiency Important?
Wednesday, October 6, 10:00 am - 11:30 am
Chuck Smallwood



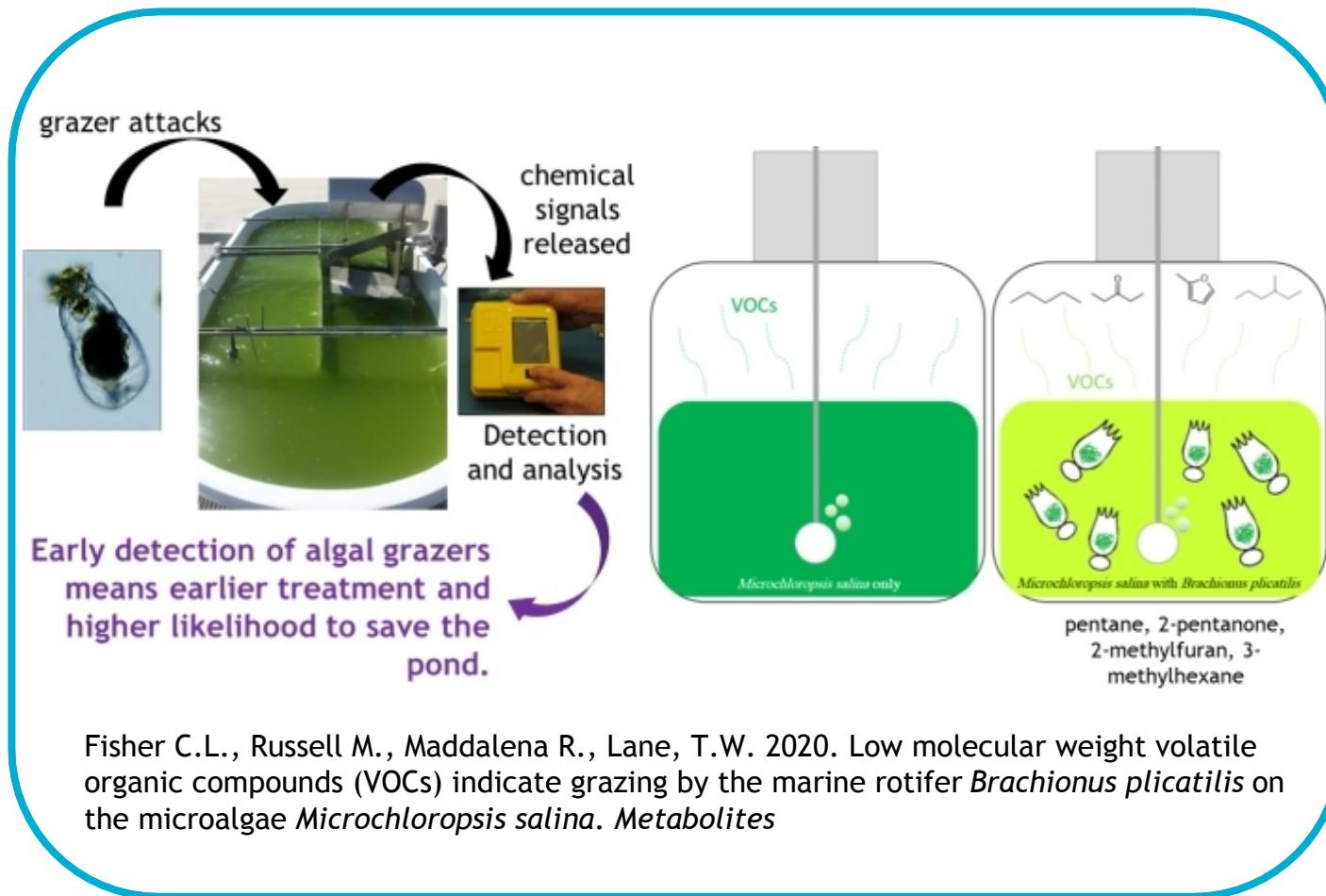
Understanding Predation and Crop Protection



11



Atencio, Lauren C, Maes, Danae, Hippel, Tyler, and Timlin, Jerilyn A. 2021. Susceptibility of Two Saltwater Strains of *Chlorella sorokiniana* to *Vampirovibrio chlorellavorus*. Journal of Applied Phycology

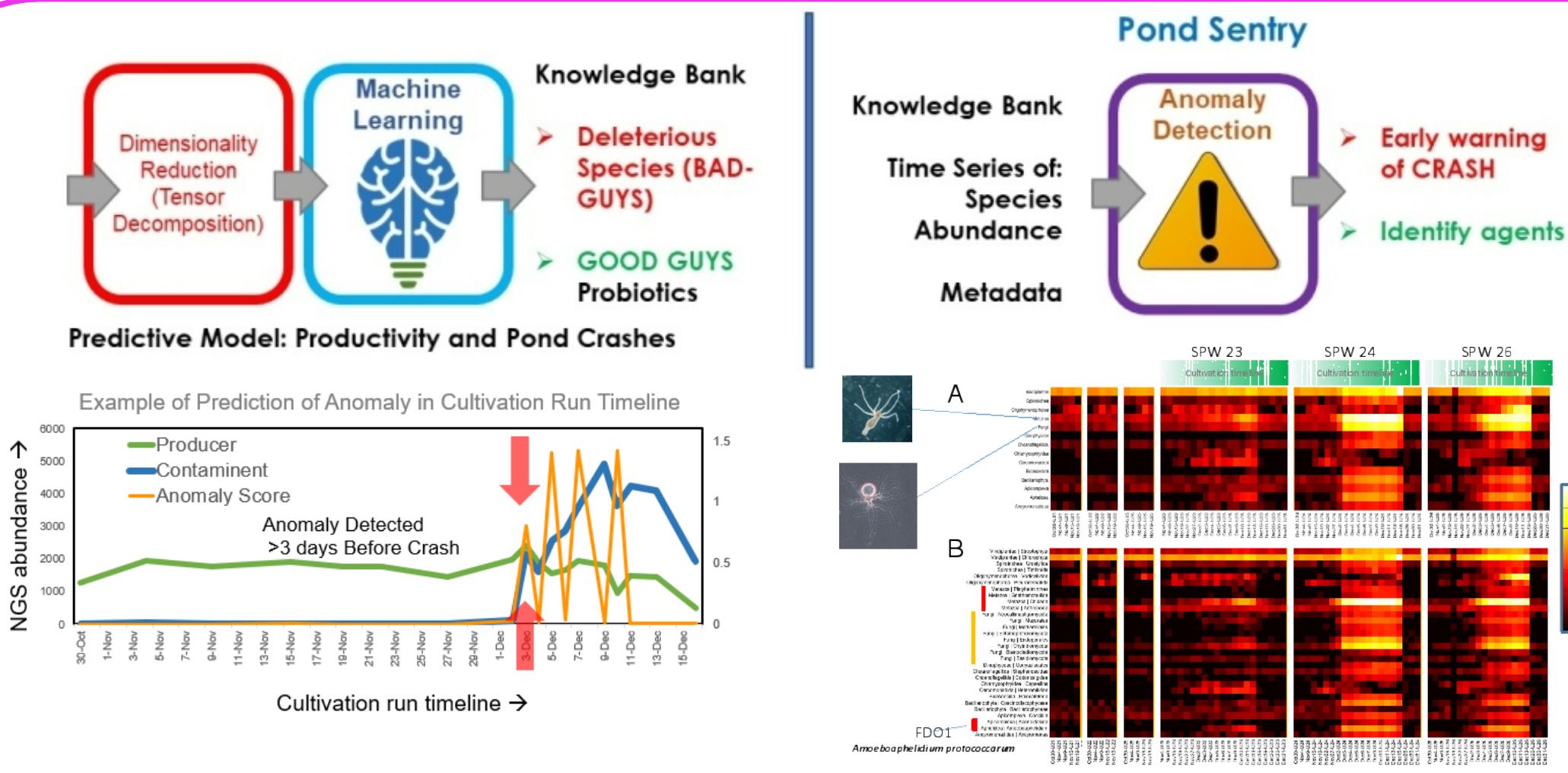


Sandia Contacts: Jeri Timlin jatimli@sandia.gov
Todd Lane twlane@sandia.gov

Algal Culture Monitoring: What Am I Looking For?
Wednesday, October 13, 10:00 am - 11:30 am
Todd Lane



Machine Learning Tools for Improved Pond Management



Sandia Contacts: Kunal Poorey kpoorey@sandia.gov
 Todd Lane tdlane@sandia.gov



Spectroradiometric Monitoring of Algae Biomass & Algae Predators



Sandia Contacts:

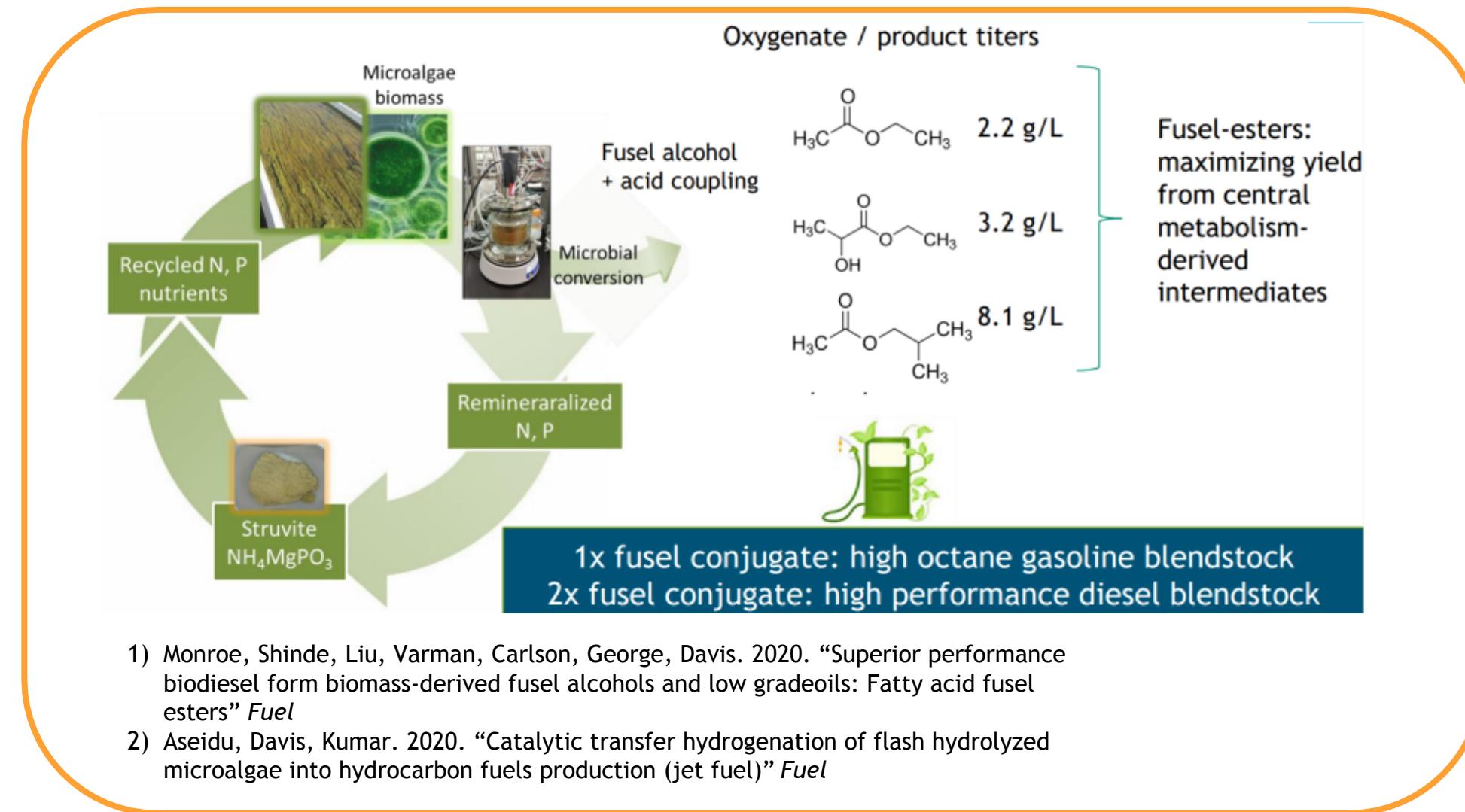
Jeri Timlin jatimli@sandia.gov

Tom Reichardt tareich@sandia.gov

Better Together: Government-Supported Consortia for the Advancement of the Algae Industry
Tuesday, October 5, 11:45 am - 1:15 pm
Michael Huesemann, PNNL, DISCOVR Consortium

Bioconversion of Algae Proteins and Carbohydrates

14



Collaborate with us!



Development of Integrated Screening, Cultivar Optimization, and Verification Research



Energy Efficiency & Renewable Energy
BIOENERGY TECHNOLOGIES OFFICE



GLOBAL ALGAE
INNOVATIONS



BLOOM™
BLOOM Foam™ Algae Shoe

