SAND2010-1911P

# University Partnerships within the SNL MHK Program

**SNL Marine Hydrokinetic Device Research Kickoff Meeting**
**27 January 2010**


**Matt Barone**
Aerodynamics and Acoustics Lead,
Wind & Water Power Technologies
Sandia National Laboratories
mbarone@sandia.gov
(505) 284-8686

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

NNSA National Nuclear Security Administration
Sandia National Laboratories

# University Partners


Sandia National Laboratories

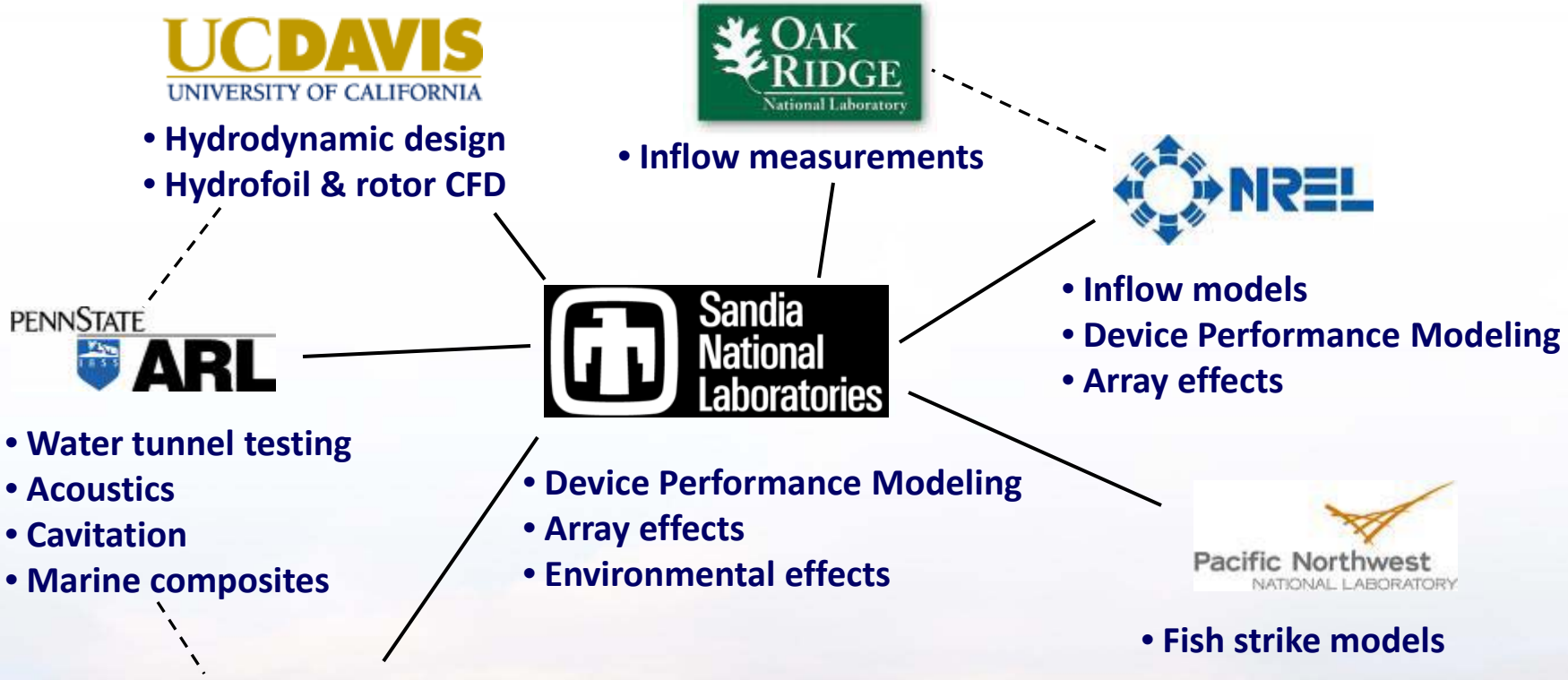
# *Why University Partnerships?*

- **Leveraging Expertise - Examples**
  - ARL Penn State brings 65 years of experience in naval R&D.
  - Montana State is a global leader in composite materials testing for wind energy applications.
  - UC-Davis has developed extensive wind turbine aerodynamic modeling capability over the past decade.
- **Unique Laboratory Facilities - Examples**
  - ARL Penn State's large water tunnel with advanced flow diagnostics.
  - Bucknell's large scale sediment flume and close collaboration with ARL instrumentation capabilities.
- **Workforce Development**
  - Training future engineers and researchers in MHK technology

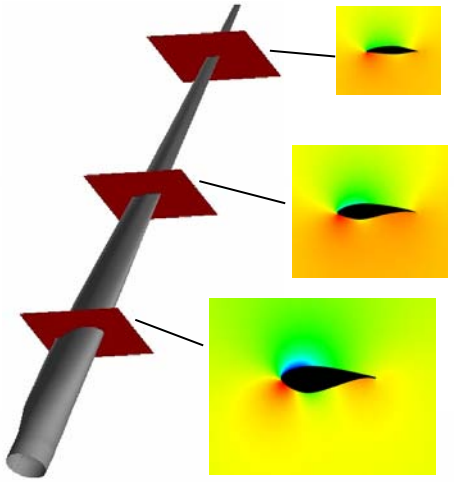
# Status of University Partnerships

- **Research contracts are being placed or in place with device modeling and hydrodynamics partners:**
  - ARL Penn State
  - UC-Davis
  - Bucknell
- **Partnerships focused on materials and coatings will be activated further along in the program.**
  - BYU
  - North Dakota State
  - Montana State

# SNL MHK Device Modeling Team



# UC-Davis



- **PI: Prof. Case van Dam**
  - Dept. of Mechanical and Aeronautical Engineering
  - Extensive experience in wind turbine aerodynamics, modeling and experiments
- **Goal: Develop, apply, and validate computational tools for MHK turbine rotor design.**
- **Project Focus: Hydrodynamic Design and Performance**
  - Hydrofoil analysis and selection
  - MHK turbine rotor design and Computational Fluid Dynamics analysis

# ARL Penn State

- **PI's: Dr. Arnie Fontaine, Dr. Bill Straka, and Dr. Michael Jonson**
  - ARL is a U.S. Navy University-Affiliated Research Center
  - Closely tied to educational missions of Penn State University
- **Goal: Apply ARL's expertise in naval systems testing and analysis to MHK technology.**
- **Project Focus Areas**
  - Laboratory water tunnel testing
  - Cavitation analysis and material erosion testing
  - Hydroacoustics modeling of MHK devices
  - Marine composite materials

# Bucknell University

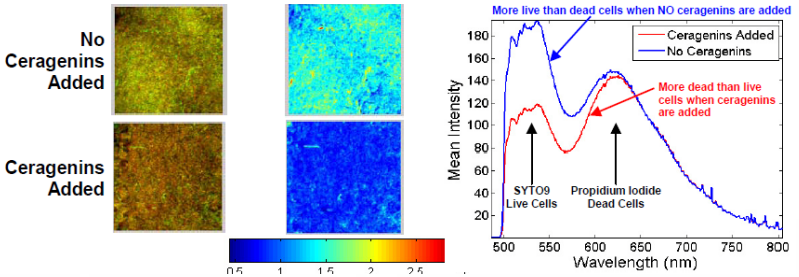
**Flume Facility at Bucknell University**

- **PI: Dr. Laura Beninati**
  - Dept. of Mechanical Engineering
  - Expertise in environmental fluid mechanics and sediment transport
- **Goal: Quantify the influence of energy extraction by MHK devices on their environment.**
- **Project Focus:**
  - Experiments in the Bucknell flume facility
  - Device wake interaction with free surface and sediment floor

# BYU, NDSU, and MSU

BYU

**Goal: Develop and assess antimicrobial coatings for prevention of biofouling on MHK devices.**




NDSU

**Goal: Apply biological screening methods to evaluate effectiveness of antifouling coatings for MHK devices.**

MONTANA STATE UNIVERSITY

**Goal: Provide fundamental tests of composite materials, adhesives, and coatings for the marine renewable industry.**

Sandia National Laboratories

# *Thank You*

Sandia National Laboratories