BUREAU OF RECLAMATION

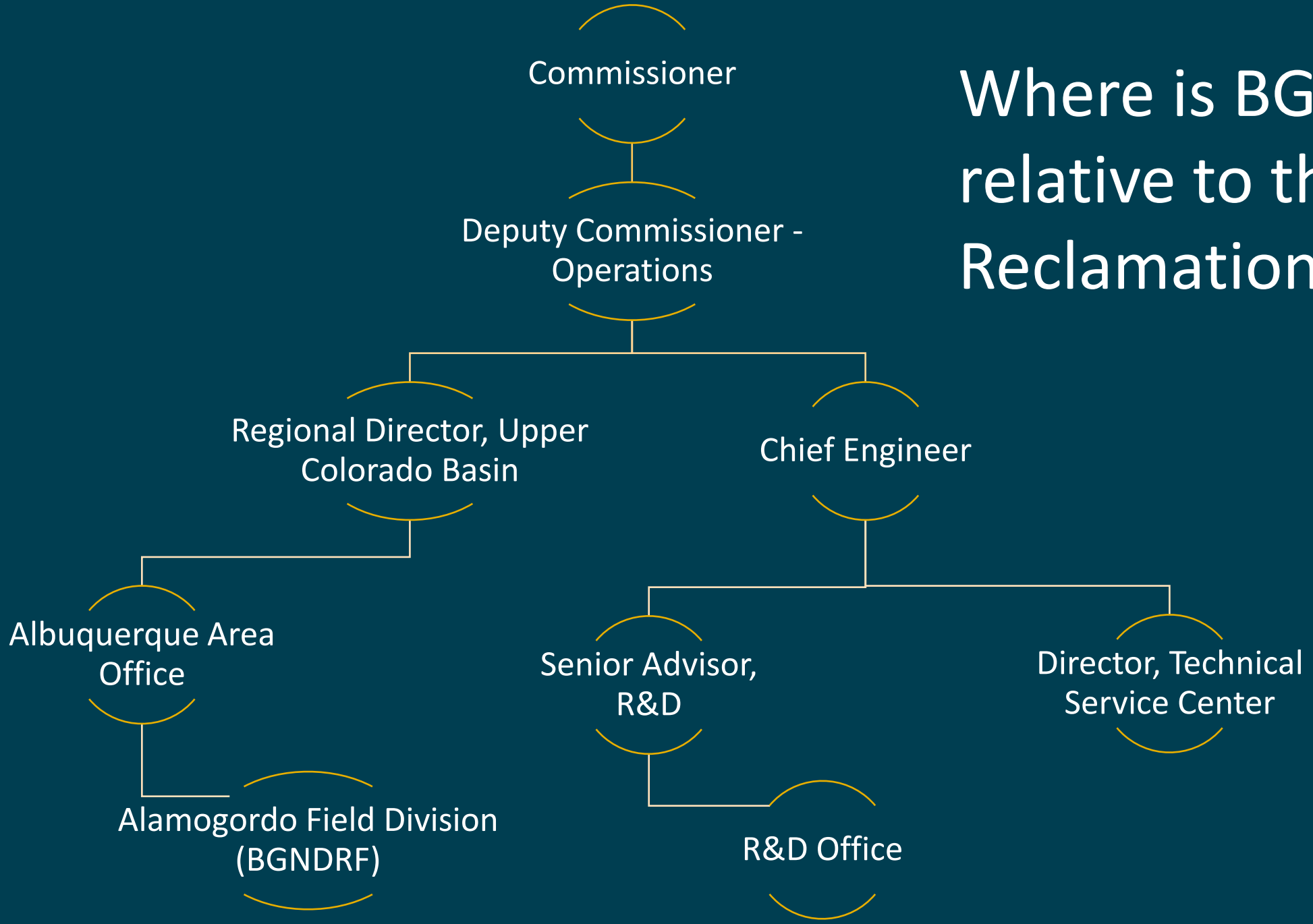
Desalination Research at the BGNDRF

New Water for New Mexico

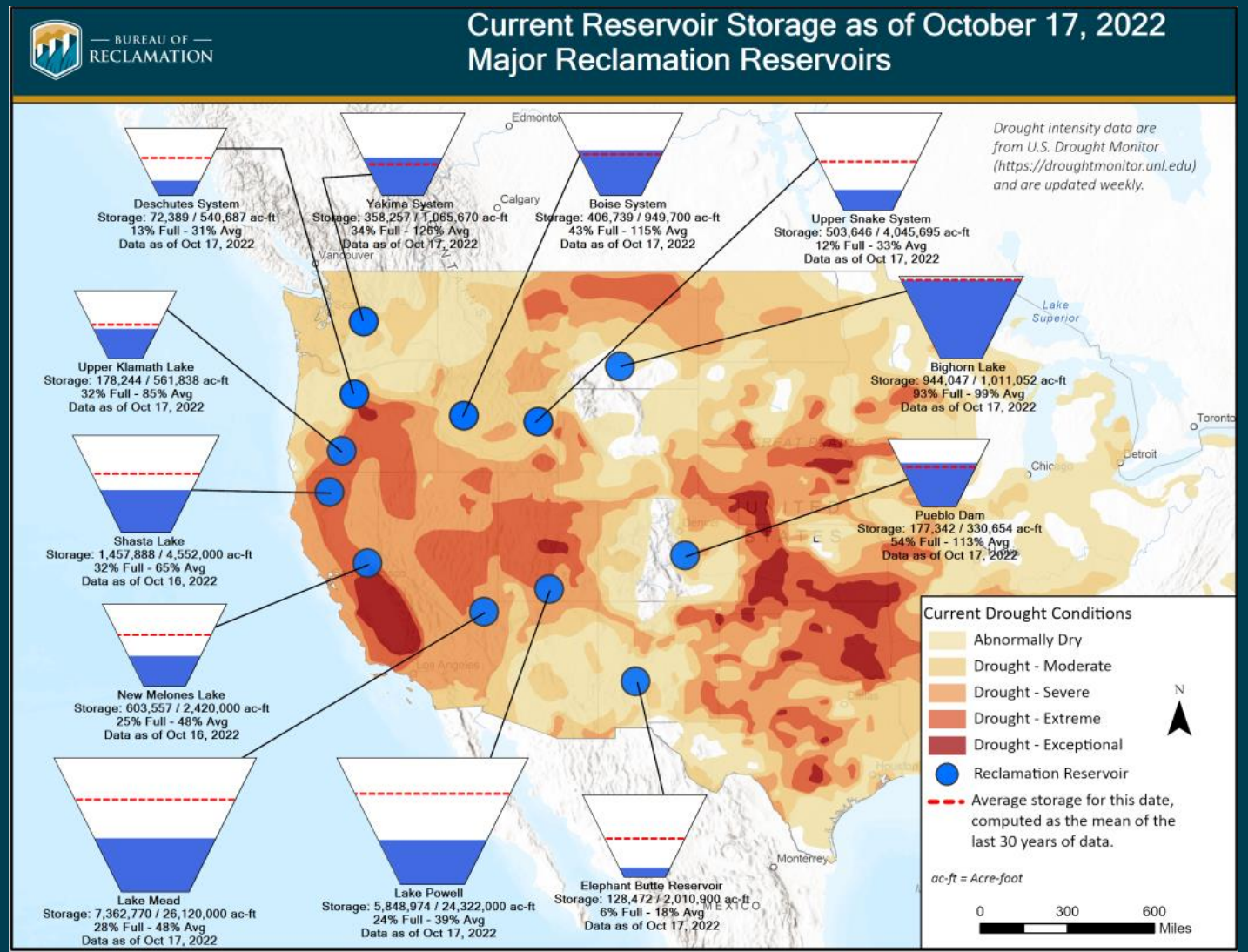
20 October 2022

Brackish Groundwater National Desalination Research Facility (BGNDRF) Grand Opening (August 2007)

Where is BGNDRF relative to the rest of Reclamation?



Recent Drought & Status of Major Reclamation Reservoirs

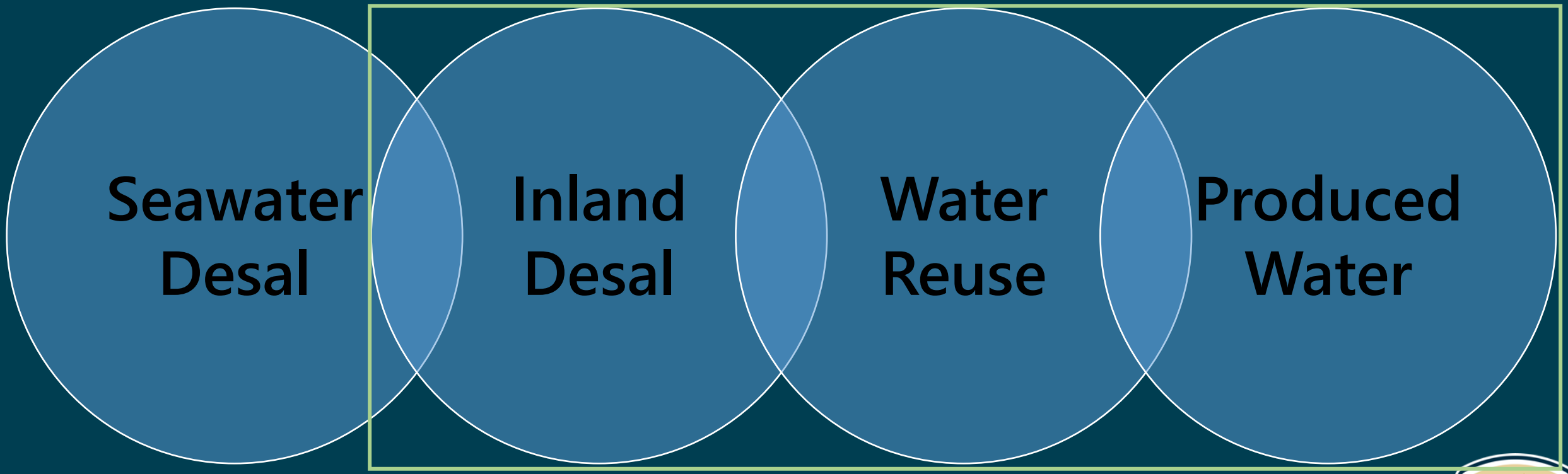


Can desalination be a new source of water?

Desalination & Water Purification Research

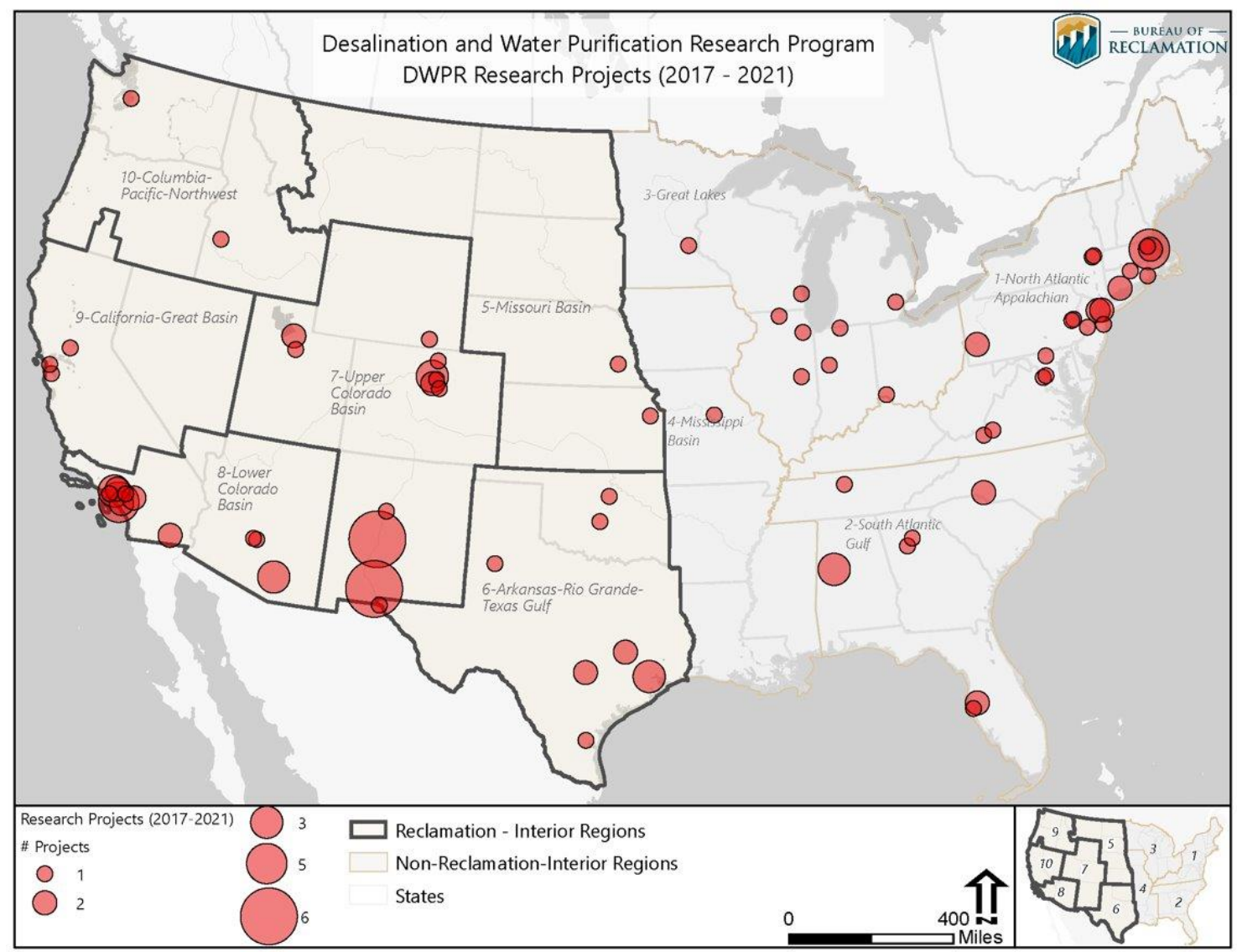
Fund projects with various types of impaired water sources to treat for a specified end-use

BGNDRF Client Research & Demonstration Interests

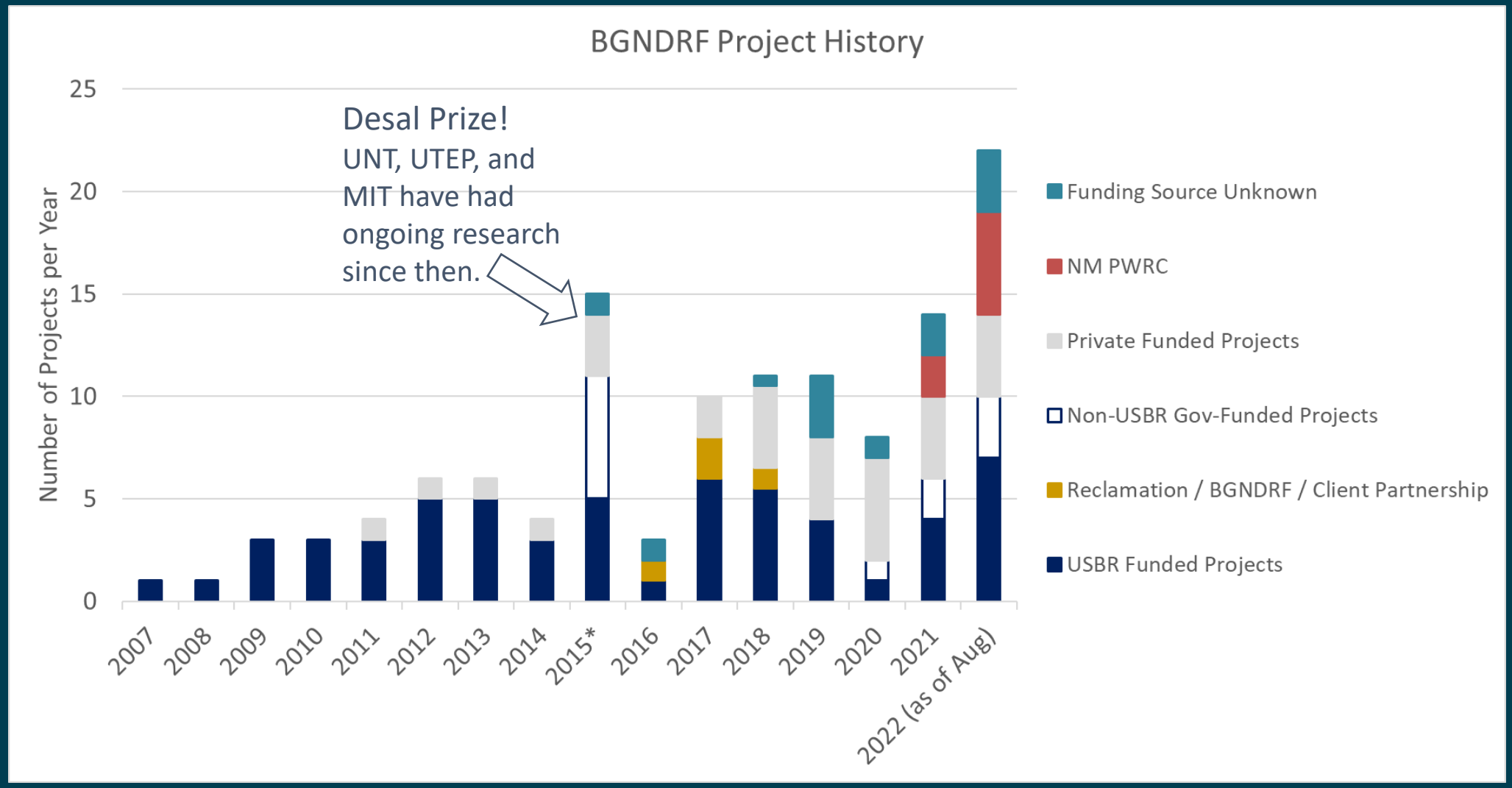


Fund technologies or processes that are innovative and will have an impact to the water industry

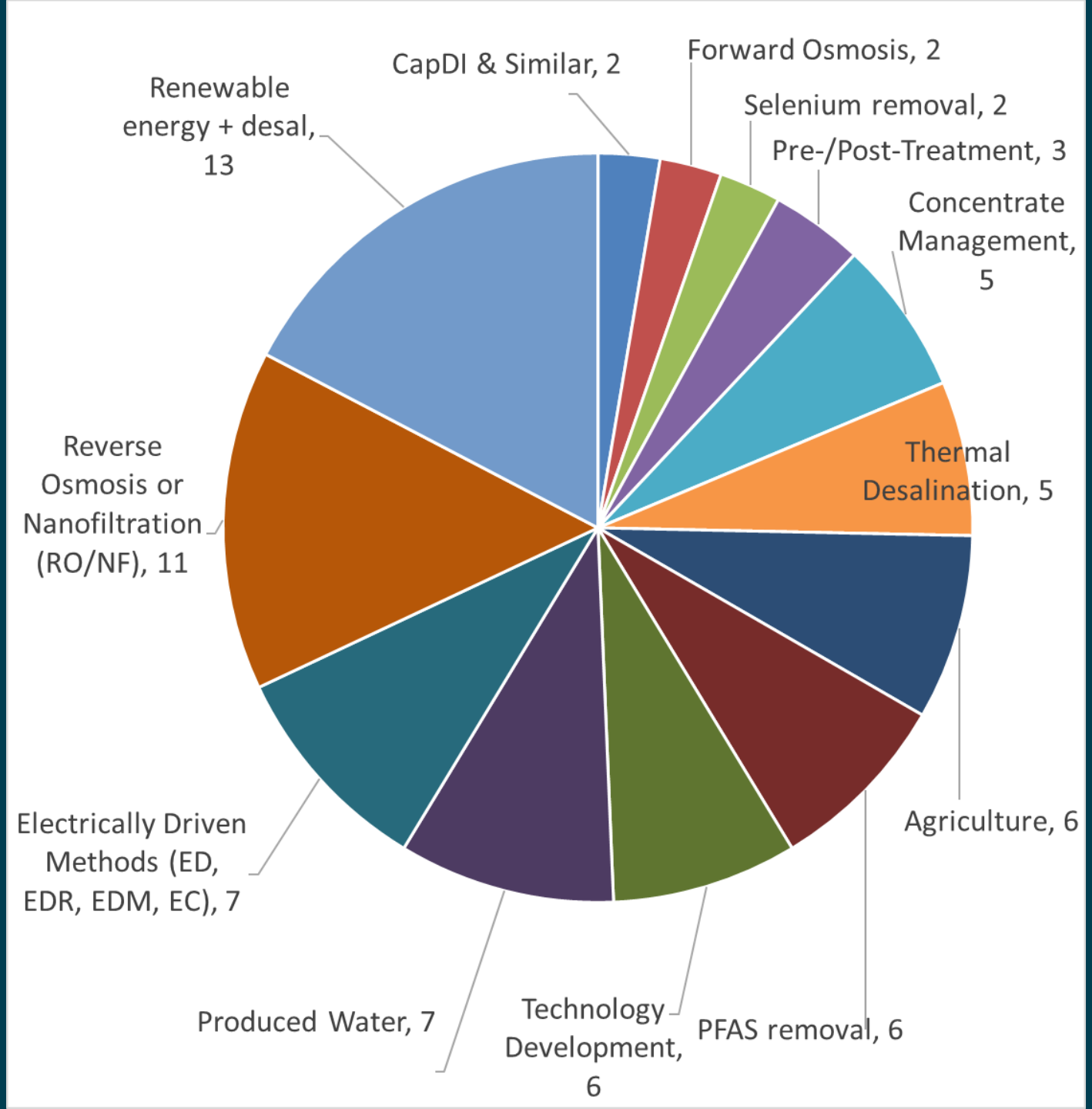
DWPR Projects 2017-2021



Research over the Years at the BGNDRF



Types of Desalination Research Performed at BGNDRF

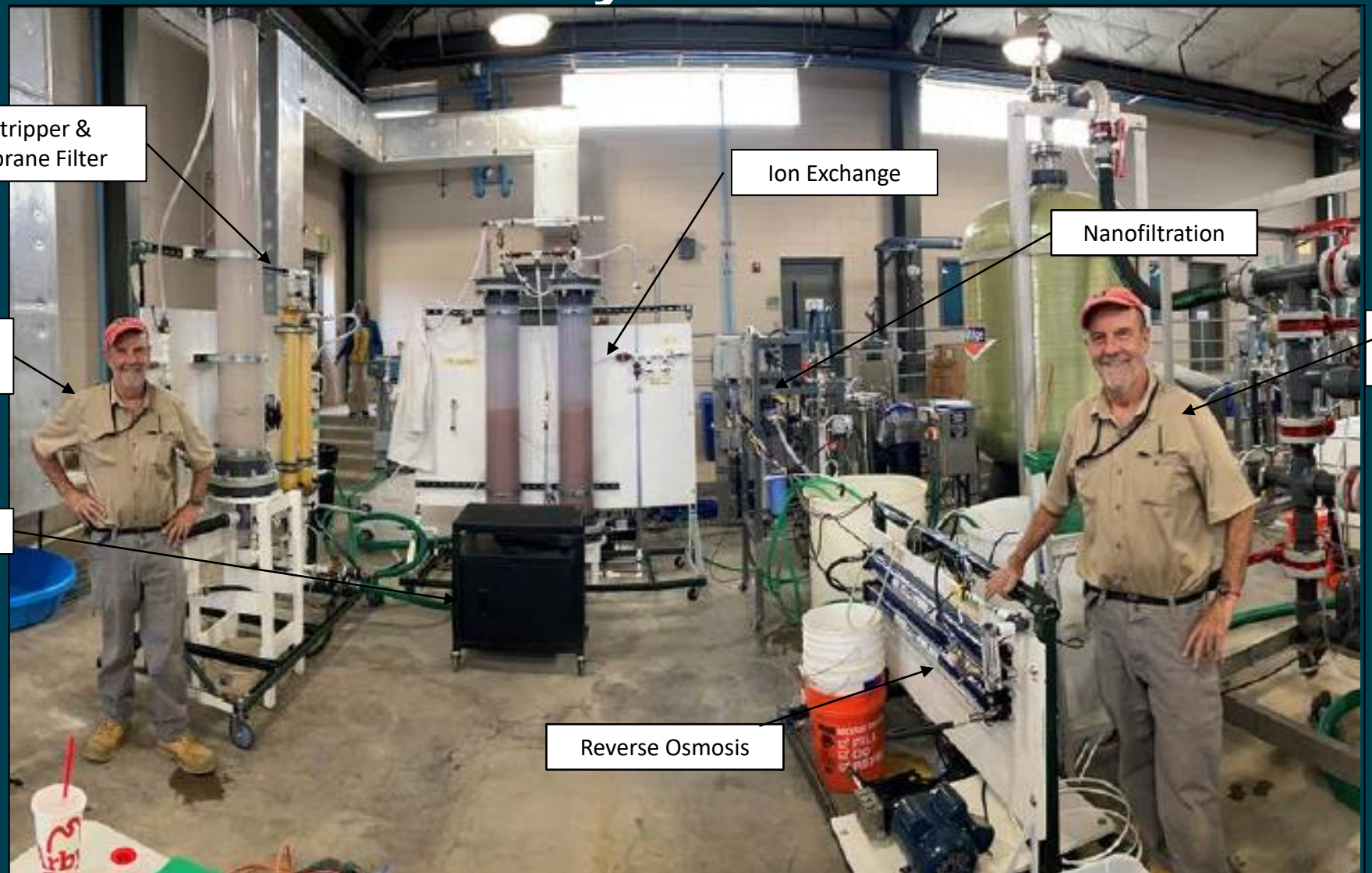


NOTE: Many of these include combine multiple categories

Select Recent & Upcoming Clients

- Ag/Renewable Energy Focus
  - University of North Texas
  - The University of Texas at El Paso
  - MIT
- NM PWRC (produced water)
  - ZwitterCo
  - Katz Water
  - HPOC, LLC
  - zNano
- Membrane Development
  - LG Chem
  - Toray
- Technology Development
  - Water Surplus
  - TDS Select
  - UNM
- Concentrate Management
  - Clear Creek Environmental Solutions
  - EcoVAP
  - Solar Multiple
  - University of Minnesota
- PFAS Removal:
  - University of Oklahoma
  - Aqua Aerobic Systems

University of New Mexico (Bruce Thomson)
MRED = Mineral Recovery & Enhanced Desalination



Contact Bruce at
Bthomson@unm.edu

Green Desal – University of North Texas

Photo by: Ernesto Ibarra

Green Desal – University of North Texas

Five-year experiment: cover crops

Two plantings per year (spring and autumn)

32 plots (25m^2): 16 drip and 16 flood

Drip daily: 10 L/m^2 per day

- 34,000 m^3/ha or 28 ac-ft/ha per year

Flood weekly: 5 L/m^2 per day

- 19,000 m^3/ha or 16 ac-ft/ha per year

Flood irrigation Started July 2019

Drip Irrigation Started October 2019

Full factorial: 2 factors – 2 levels

Ag Water (A), Well Water (W)

Inoculation (I), No-Inoculation (N)

Four replicates, Latin Squares

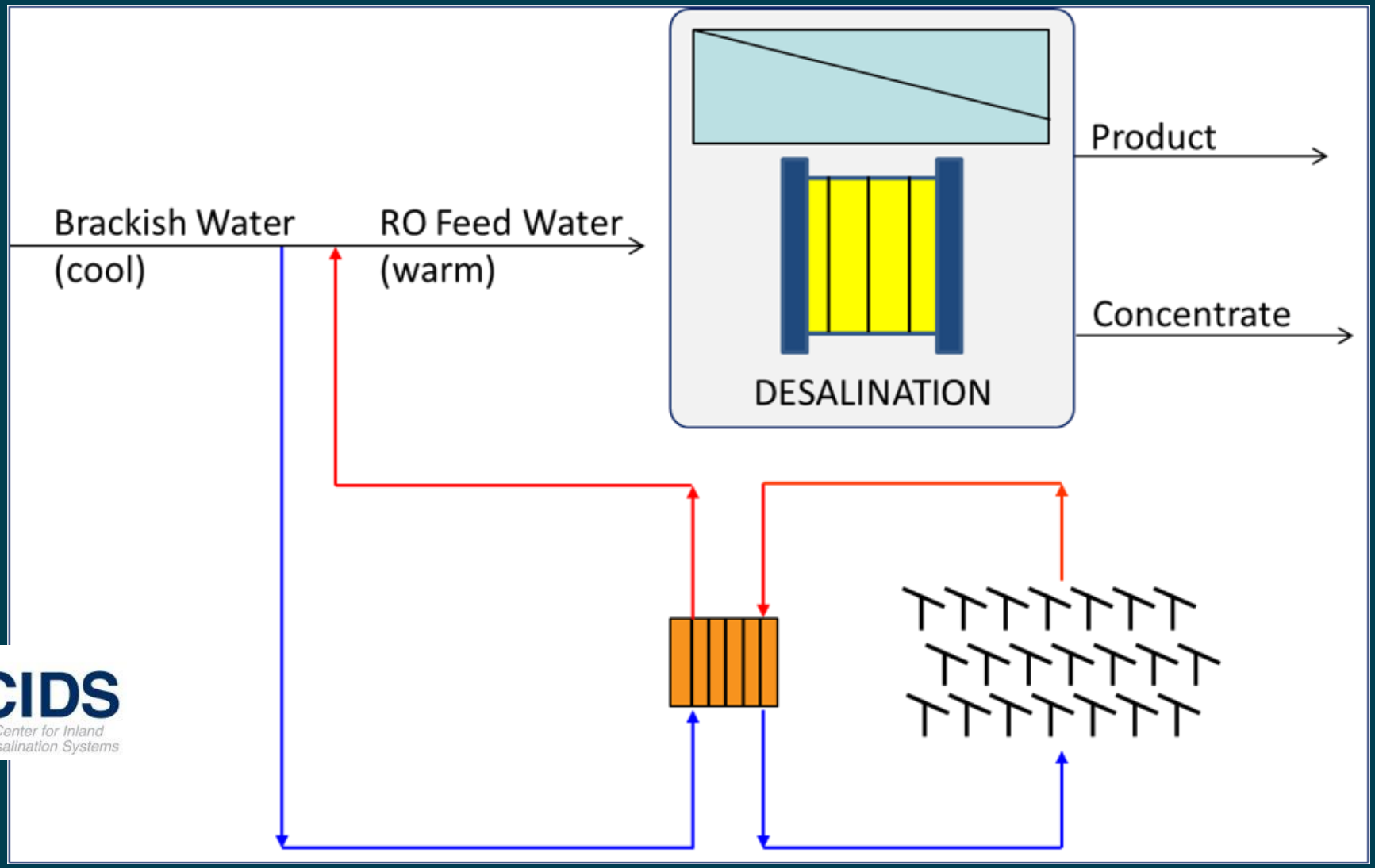
A-I	W-I	A-N	W-N
W-N	A-I	W-I	A-N
A-N	W-N	A-I	W-I
W-I	A-N	W-N	A-I

Contact Miguel at miguel.acevedo@unt.edu

UTEP Solar Desalination

- 3 kW PV/T array supplemented by a 1.5 kW array
- Small solar panel for venting of battery staging room
- 2-2.5 GPM desalination system with 140-gal feed tank
- 2.5 GPM glycol heat exchange system

UTEP Solar Desalination Technology



Contact Shane at
wswalker2@utep.edu

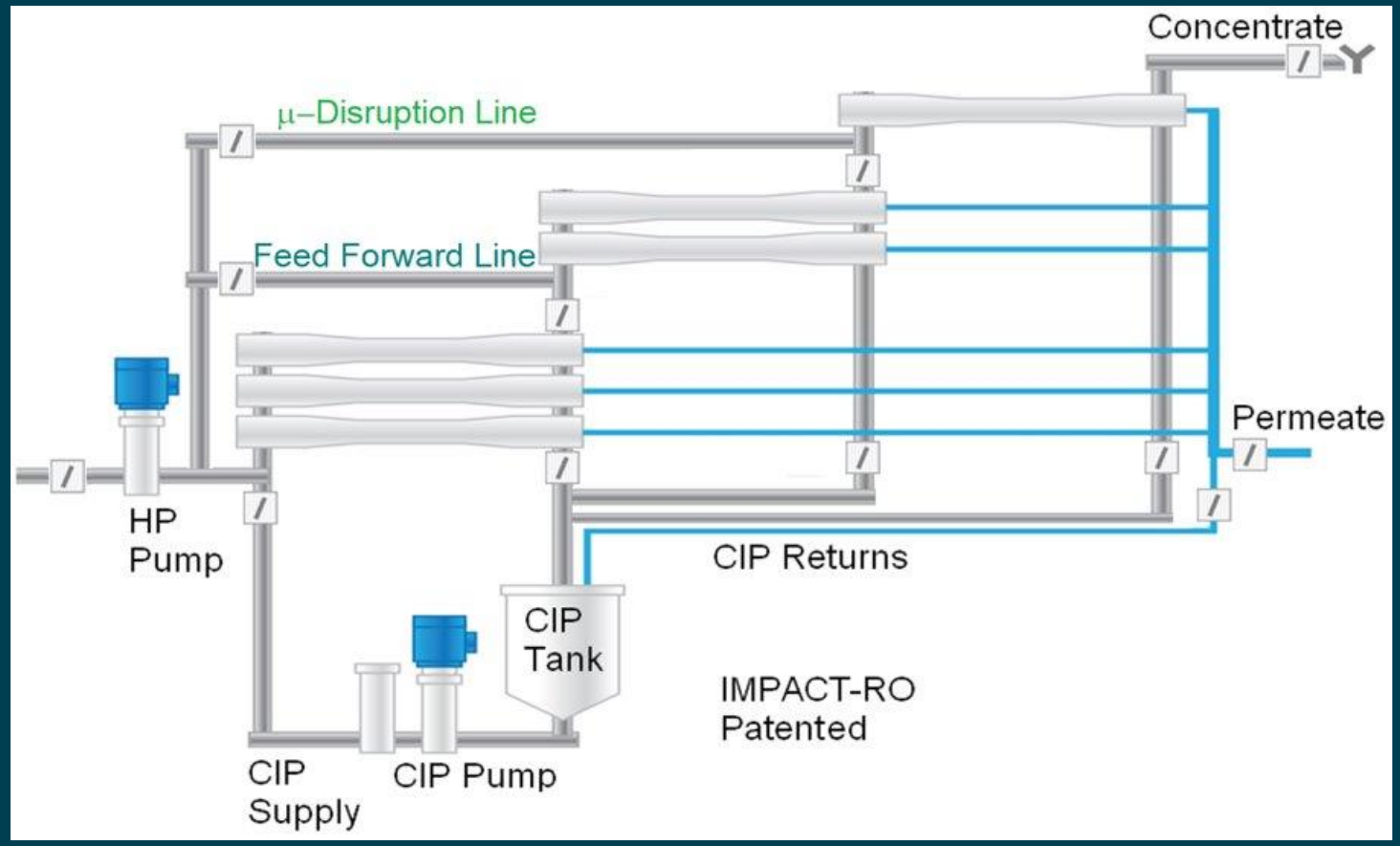
CIDS
Center for Inland Desalination Systems

DWPR Project at BGNDRF: Objectives

- Develop proof of concept data for NanoStack and ImpactRO with high salinity feed water
- Develop optimum operating condition for multiple water chemistries
- Polish/ improve design and control logic based on findings
- Build data-driven models to quantify the benefits

WATER SURPLUS®

Water Surplus: Patented IMPACT-RO™



- Continuous feed to 2nd stage: Balancing flux & Saving energy
- Intermittent feed to 3rd stage: Disrupting scaling dynamic
- Parallel CIP lines

WATER SURPLUS®

Contact: masoud.aghajani@watersurplus.com for more information

Equipment Available at the BGNDRF

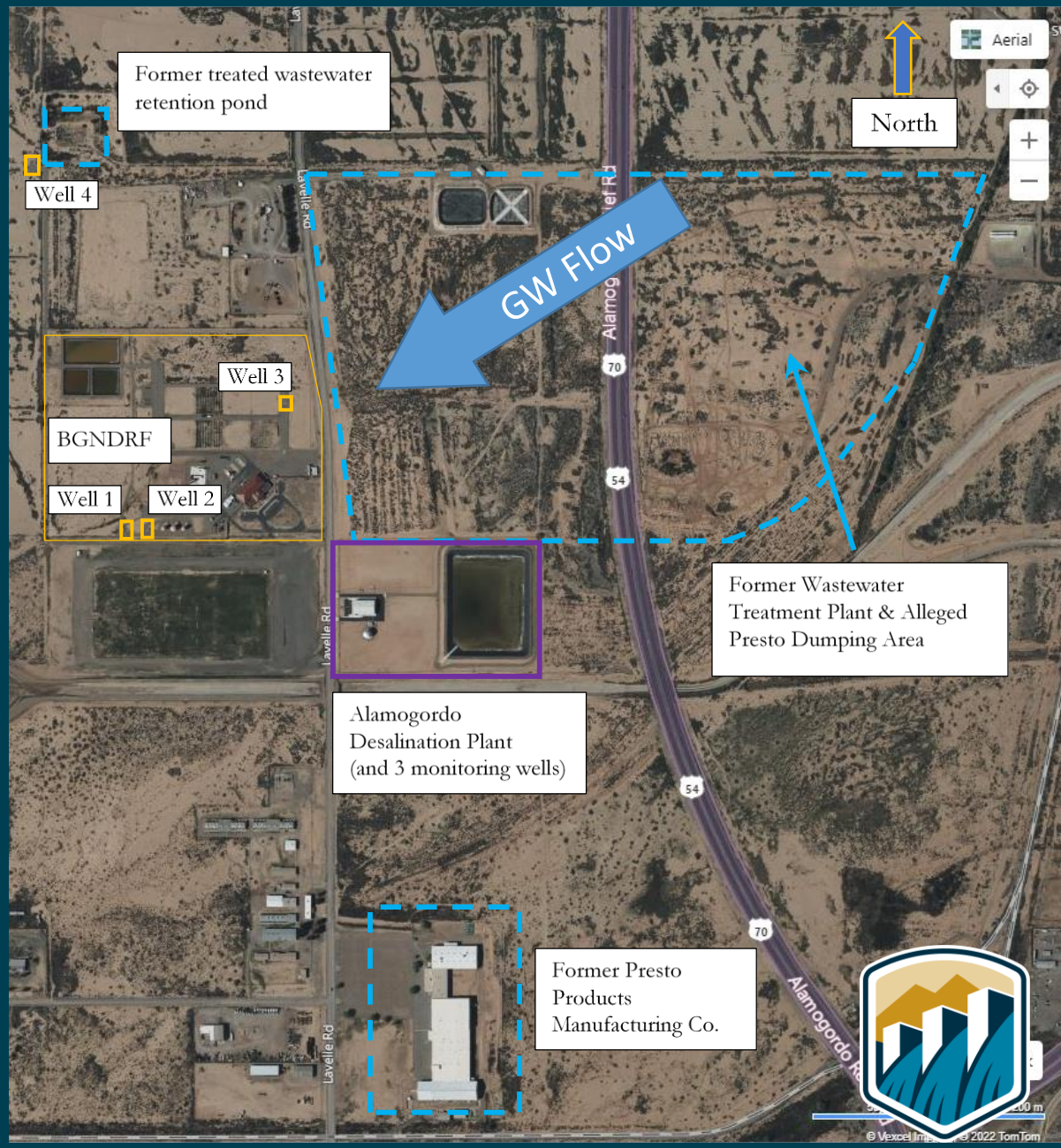
- 7 kW_{DC} Photovoltaic Array
- HPMES skid (a.k.a. Blue Skid) – test two types of membranes side by side
- WIGEN skid – test up to three stages of desalination
- Water storage tanks

Water Quality Options at the BGNDRF

- Brackish Water – 4 wells
  - 1,200 – 6,000 mg/L TDS
  - Well 1 (1,200 mg/L TDS) is warm (~100 ºF)
  - PFAS compounds in 3 of 4 wells
  - Well water chemistry, incl. historical data is on BGNDRF website
- Evaporation Ponds (concentrate)
  - 20,000 to >200,000 mg/L TDS
  - High biological load (algae, etc.)
  - Pond water chemistry, incl. historical data is on BGNDRF website
- Produced Water - variable chemistry
  - NM Produced Water Research Consortium

Possible PFAS Contamination Sources?

- PFAS = Per- and poly-fluorinated alkyl substances
- BGNDRF's PFAS different from HAFB
- Two possible sources:
  - Old Teflon plant's waste
  - Old Alamogordo landfill
- NMED Superfund report findings:
  - Upgradient: low/no PFAS
  - Downgradient: moderate PFAS
  - Monitoring wells SE of BGNDRF have similar concentrations



DWPR Research Funding Opportunity

Scope	Develop innovative, cost-effective, and technologically efficient ways to desalinate and treat water
Eligible Applicants	Individuals, Academic institutions, Profit organizations, State and local governments, Non-Profit organizations, Federally-funded R&D centers, Indian tribal governments and organizations
Cost-Share	Federal cost share is 50%
	Academic Institutions up to 100% Federal cost share
Funding Levels	Laboratory scale – up to $250,000
	Pilot scale – up to $800,000
Timing	September 13, 2022 - November 30, 2022
	Grants.gov search for DWPR

DWPR Pitch to Pilot Funding Opportunity

Scope	Solve water treatment industry challenges through innovative and disruptive technologies or processes
Eligible Applicants	Individuals, Academic institutions, Profit organizations, State and local governments, Non-Profit organizations, Federally-funded R&D centers, and Indian tribal governments and organizations
Cost-Share	Not required but encouraged
Funding Levels	Up to $200,000
Timing	Spring 2023
	Grants.gov search for DWPR

Any Questions?

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