The One-Guam Aquifer Monitoring Program

A program to provide basic hydrologic data needed for effective management of Guam's drinking-water resources

Collaborative effort between the
University of Guam
Water and Environmental Research Institute
of the Western Pacific and the
U.S. Geological Survey
Pacific Islands Water Science Center

Briefing for the One-Guam Water Meeting

July 28, 2017

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Presentation Outline

1. Current USGS water-resource monitoring in Guam
2. WERI's role and cooperative relationship with USGS
3. Reasons for expanded hydrologic monitoring
4. The One-Guam Well Install. and Rehab. Project (OGWIRP)
   - OEA grant to GWA, planned well-infrastructure improvements, and WERI-USGS technical assistance
5. The One-Guam Aquifer Monitoring Program (OGAMP)
   - Well ownership and custodial responsibilities
   - Hydrologic monitoring and technical support
   - Funding requirements and proposed cost share
6. MOU & MOA between DoD, GWA, RCUOG, WERI, and USGS

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Current USGS Water-Resource Monitoring

Funding in 2017

• NavFacMar	$150K
• WERI*	$154K
• USGS*	$ 80K
Total	$384K

Monitoring stations

8	Rainfall
6	Streamflow
1	Reservoir water level
8	Groundwater levels
7	Groundwater-salinity profiles

NavFacMar Public Works:

- 2 rainfall, 3 streamflow, and 1 reservoir water level monitoring station
- Semi-annual surveys of Fena Dam settlement markers
- Watershed modeling to provide quarterly predictions of reservoir storage based on 6-month ENSO rainfall forecast

*Comprehensive Water Monitoring Program: WERI administers this program with funding from the Guam Legislature and USGS

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Background

- Since 1998, WERI has administered with support from the Guam Legislature and USGS
  - Guam Hydrologic Survey: PL 24-247
  - Comprehensive Water Monitoring Program: PL 24-161
- In 2013, USMC funded groundwater modeling study concluded
  - Increased withdrawals from the aquifer may result in locally significant increases in salinity, especially during droughts
- In 2014, WERI and USGS recommended expanded hydrologic monitoring of the Northern Guam Lens Aquifer
  - Existing network of monitor wells is not sufficient and upgrades to existing wells are needed
  - Proposal submitted to DoD, USEPA, and GWA (update in progress)

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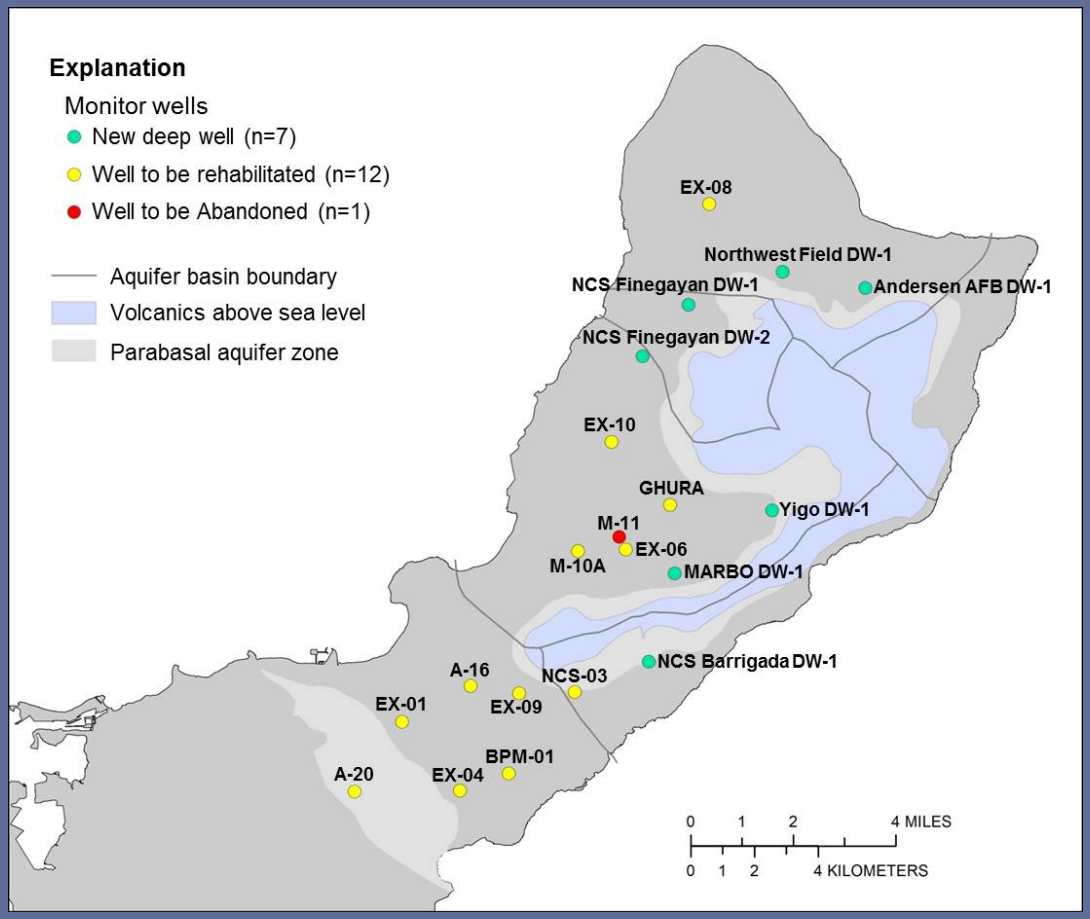
Background

- In 2016, OEA granted $3.7M to GWA for critical infrastructure improvements needed for expanded hydrologic monitoring
  - GWA has a Program Manager for execution of the grant
- In 2017, GWA will enter into a MOA with the University of Guam for WERI and USGS to provide technical assistance for the One-Guam Well Install. and Rehab. Project (OGWIRP)

Well-Infrastructure Improvements

1. Install 7 new deep-monitor wells in areas with little or no coverage (4 of 6 groundwater basins)



2. Rehabilitate 12 existing wells, including repair of deteriorating steel casing

3. Abandon 1 well (M11)

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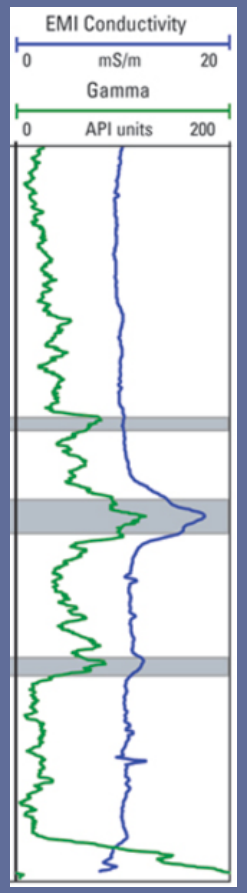
WERI-USGS Technical Assistance for One-Guam Well Install. and Rehab. Project

August 2017 – December 2020

1. Well construction, rehabilitation, and sustainment specifications
   - Consultation and on-site support before, during, and after construction
2. Geophysical logging to determine
   - Water-bearing zones
   - Extent of vertical flow in the well
   - Salinity distribution in the well and aquifer formation



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Current Status and Next Steps

- GWA and RCUOG: MOA for WERI-USGS technical support drafted for execution by August 1st
- WERI-USGS: Locations for 7 new wells identified and specifications for 12 existing wells and 7 new wells discussed with GWA Project Management Team
- GWA Project Management Team: Facilitate charrette to refine well infrastructure design requirements with input from GEPA, GWA, DoD, WERI, and USGS
- DoD: Approve locations for new deep-monitor wells
- GWA Project Management Team: Develop well infrastructure specifications for review by GEPA, GWA, DoD, WERI, and USGS
- USEPA: Prepare NEPA documentation for new deep-monitor wells

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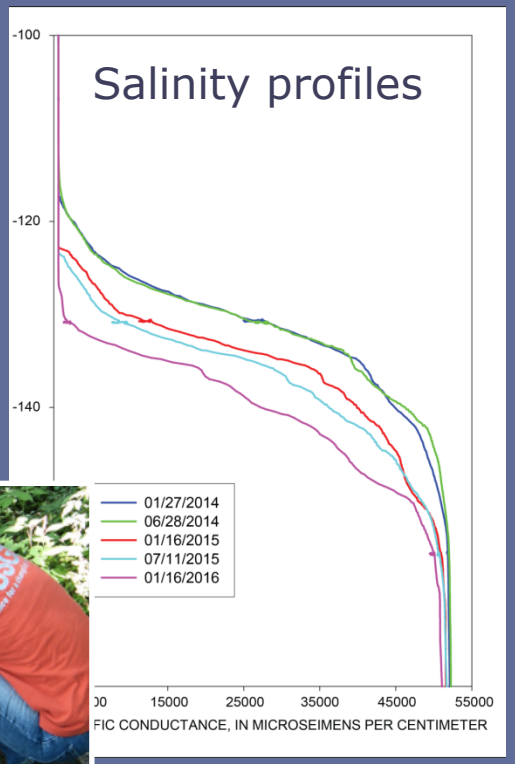
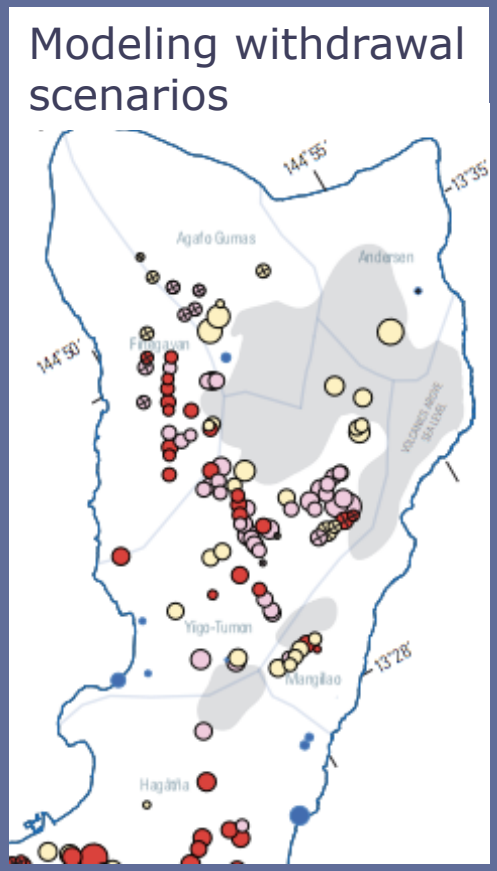
The One-Guam Aquifer Monitoring Program (OGAMP)

Provide long-term hydrologic data and information needed for effective management of Guam's drinking-water resources

Quarterly site visits





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Operation and Maintenance Needs

1. Well ownership and custodial responsibilities
   - Security fence and wellhead maintenance
   - Landscaping to control vegetation growth
   - Right-of-entry agreements
   - Well owner must determine these costs

2. Hydrologic monitoring and technical support
   - Data collection, management, and sharing
   - Data interpretation, analysis, and reporting
   - Groundwater-model updates and withdrawal-scenario testing
   - Briefings at quarterly Technical Experts Working Group meetings
   - WERI-USGS has determined costs estimates for this effort

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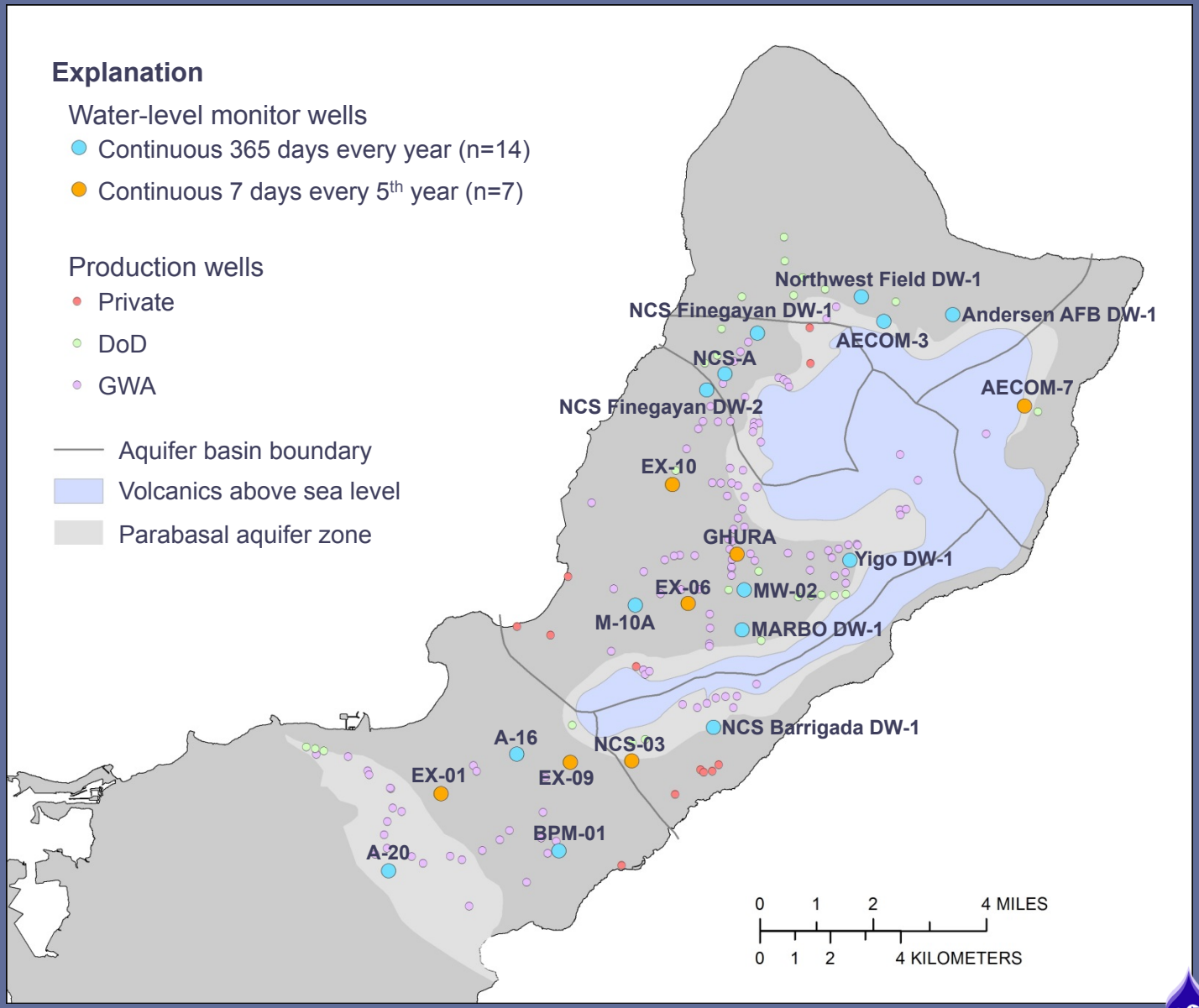
Water-Level Monitoring



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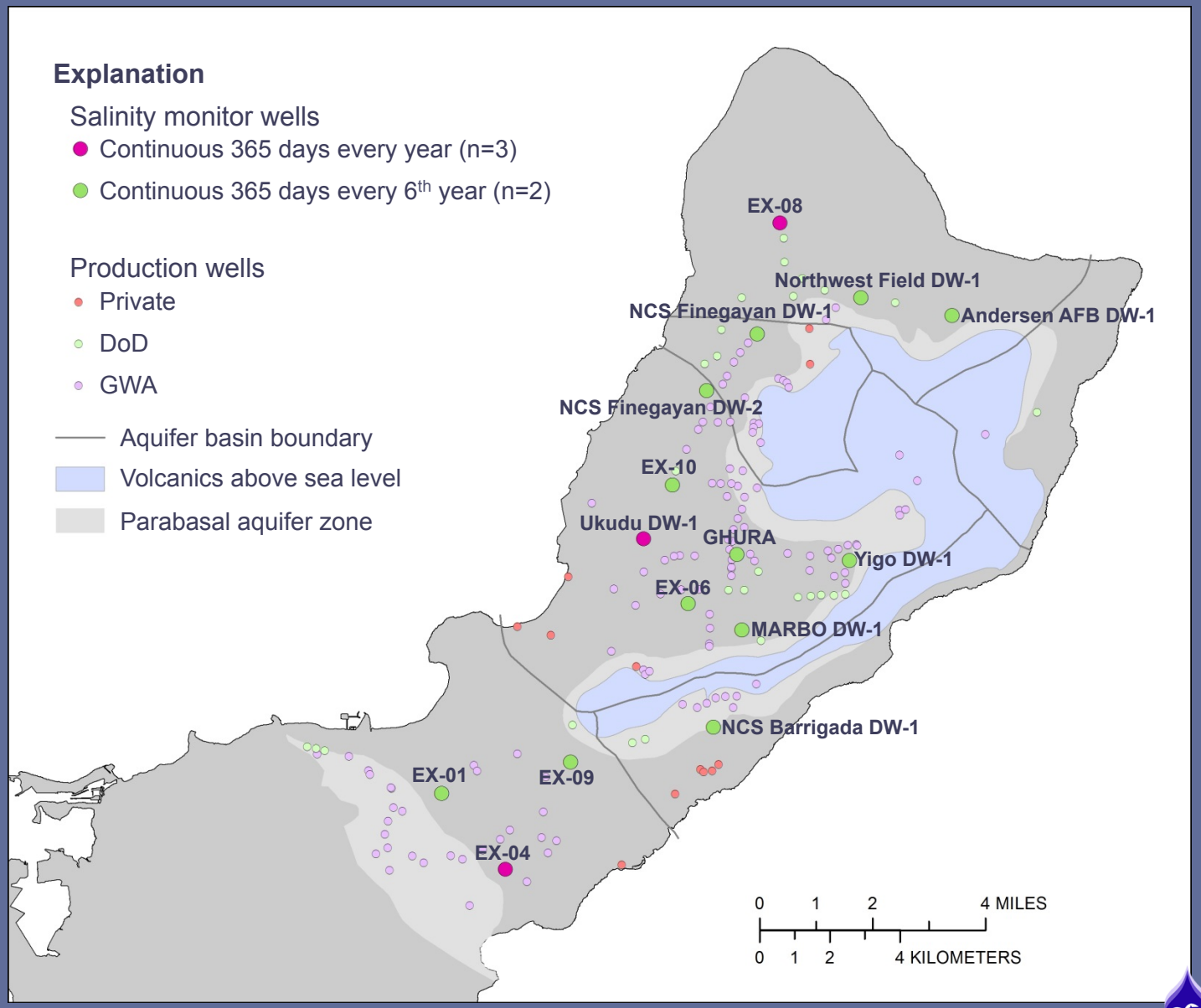
Salinity Monitoring – 2 Fixed Depths



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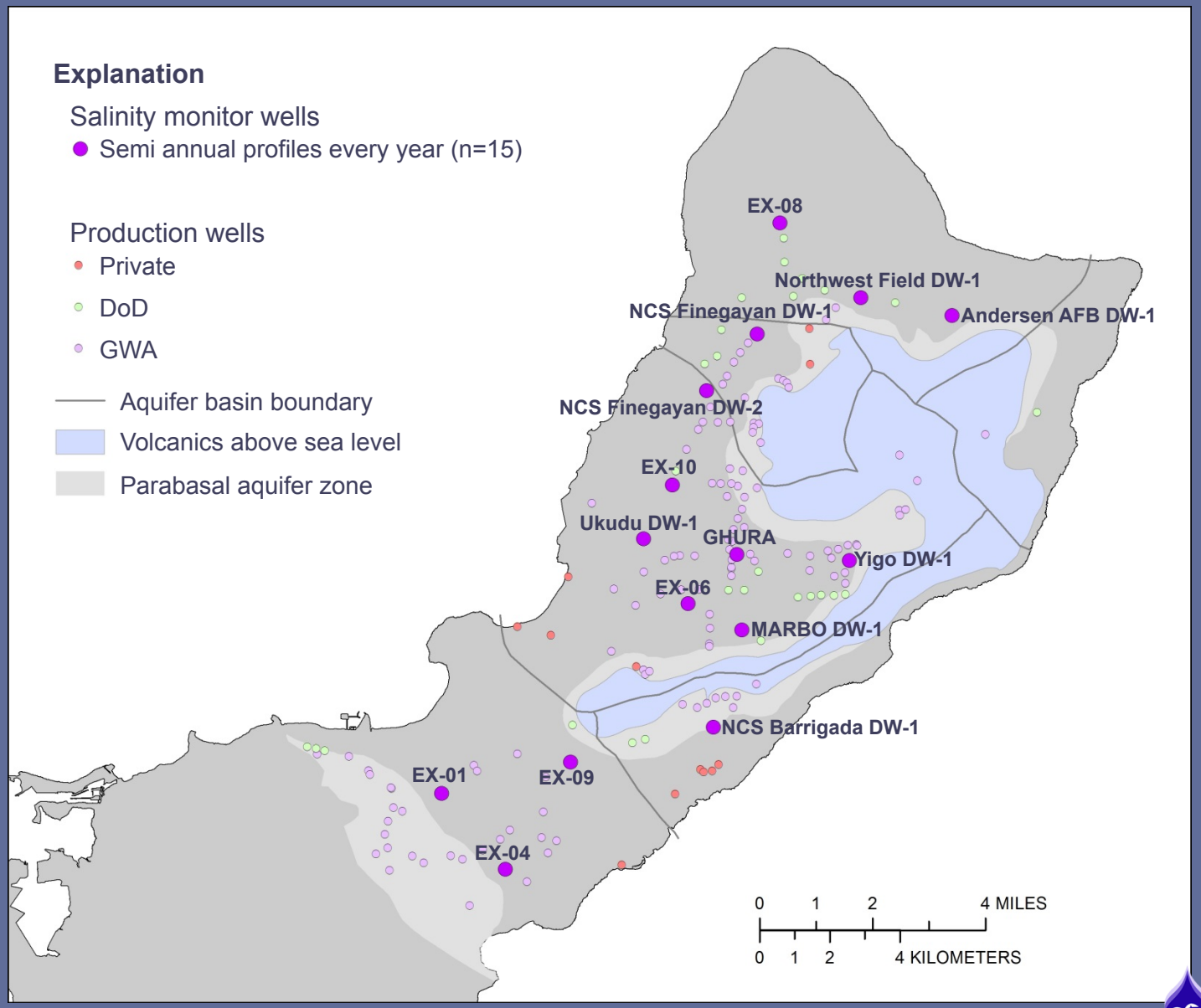
Salinity Monitoring - Profiles



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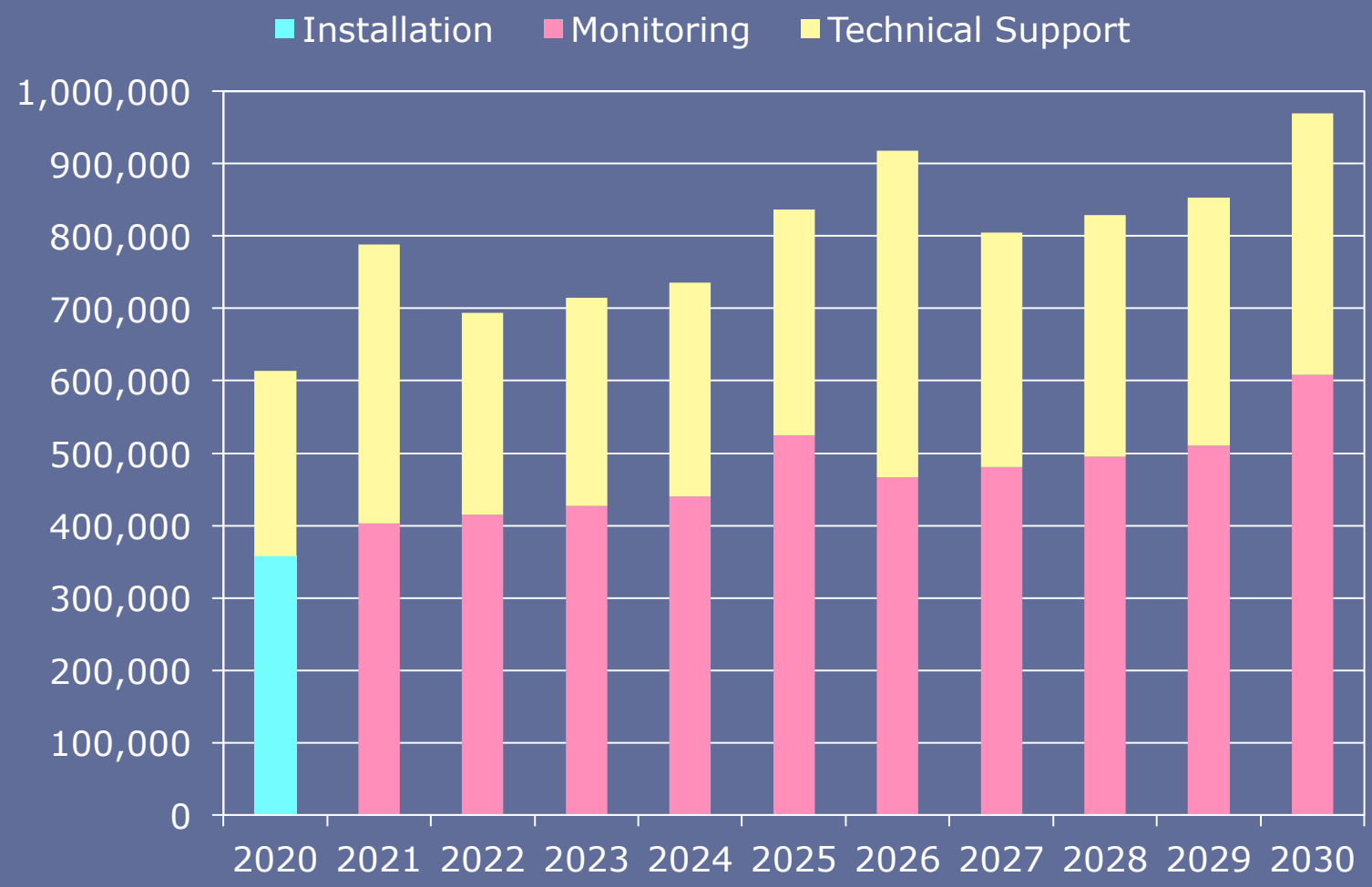
Funding Requirements by Federal Fiscal Year



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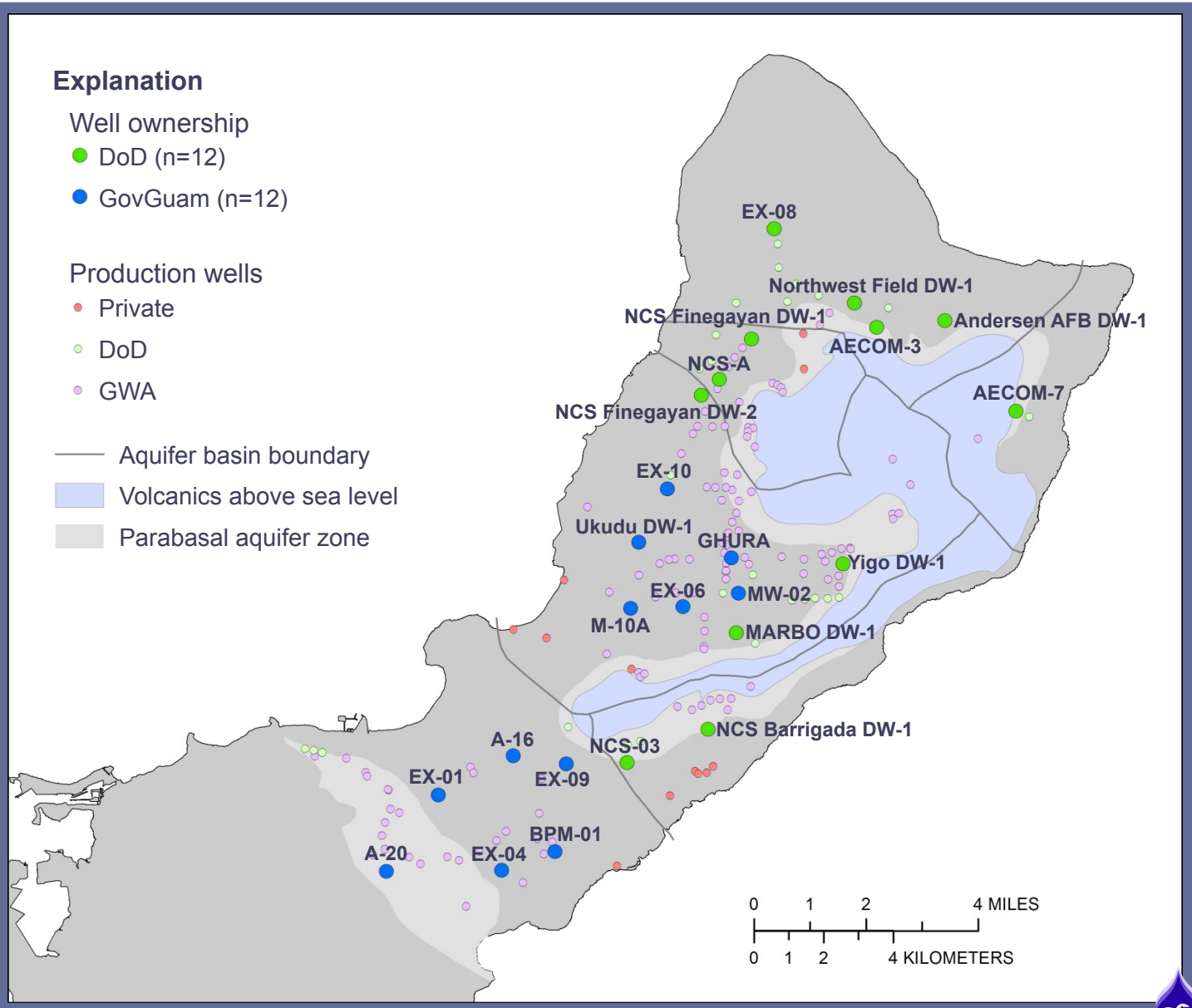
Well Ownership – Basis for Cost Share



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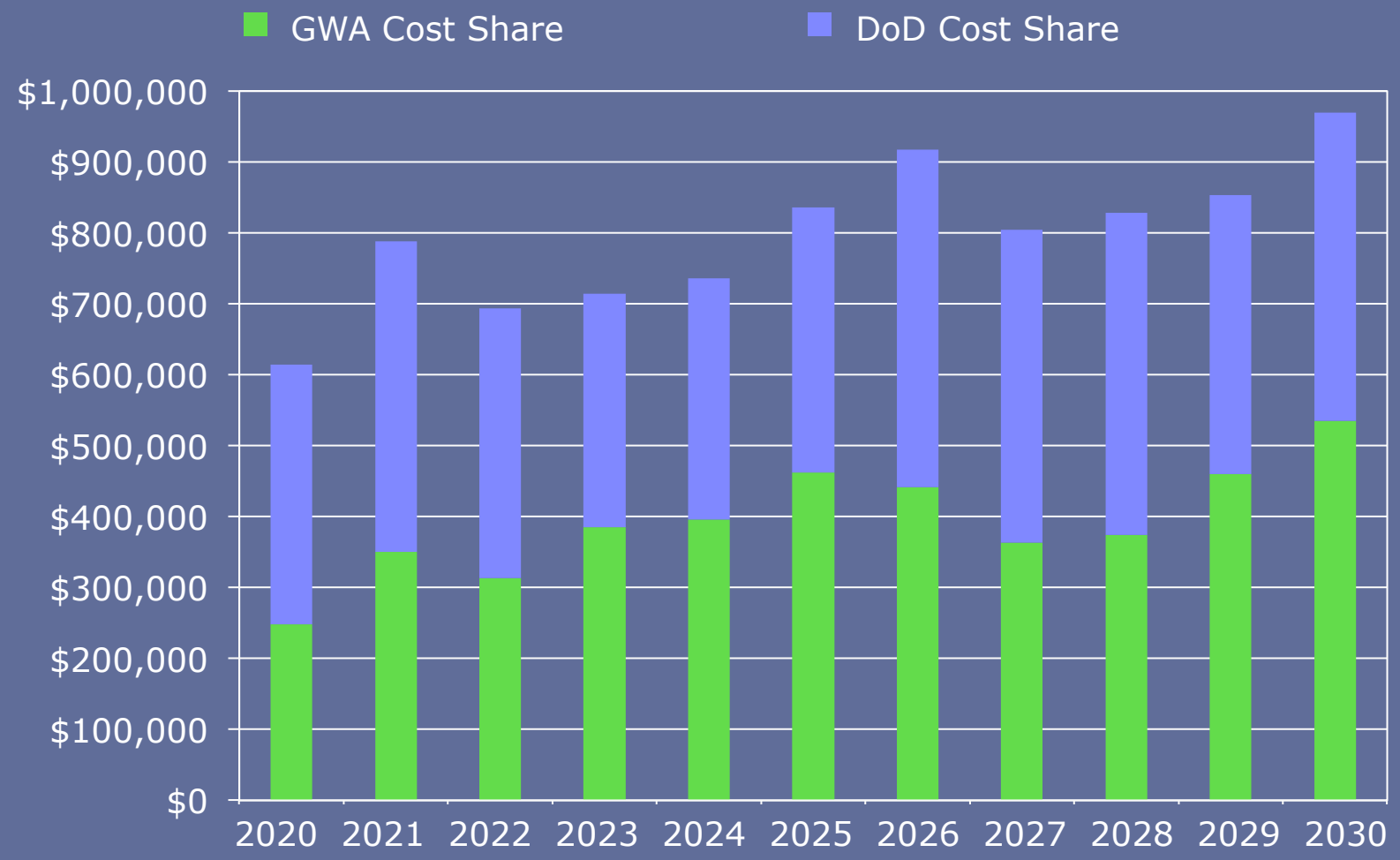
GWA and DoD Cost Share by Federal Fiscal Year



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Well Ownership – Basis for Cost Share

- Installation of monitoring equipment, 2020
  - One-time cost based on wells to be instrumented
  - GWA = $226K (12 wells)
  - DoD = $132K (7 wells)
- Long-term monitoring, 2021-2030
  - Variable cost based on wells monitored each year
  - GWA = $164K to $265K (12 wells, including 7 deep wells)
  - DoD = $196K to $342K (12 wells, including 8 deep wells)
- Technical support, 2020-2030
  - Variable cost associated with periodic modeling efforts
  - GWA = $128K to $225K (12 wells)
  - DoD = $128K to $225K (12 wells)

➢ All costs include annual adjustments for inflation

Timeline and Cost Estimate

Timeline assumes well installation and rehabilitation completed by Dec. 31, 2019

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
One-Guam Well Install. & Rehab. Project													
Well installation and rehabilitation													
Geophysical logging and reporting													
One-Guam Aquifer Monitoring Program													
Equipment installation													
Groundwater monitoring													
Data management, analysis, and interpretation													
Groundwater modeling													
Technical working group meetings													
Comprehensive Water Monitoring Program													
Rainfall, groundwater, and stream monitoring													

Cost share based on land ownership for monitor wells, in thousands of dollars

One-Guam Aquifer Monitoring Progam (OGAMP)											
	2020	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
DoD	354	381	303	375	321	385	478	386	362	447	447
GWA	260	407	391	340	415	451	440	418	467	406	523
Total	**$614**	**$788**	**$694**	**$715**	**$736**	**$836**	**$917**	**$804**	**$829**	**$853**	**$969**

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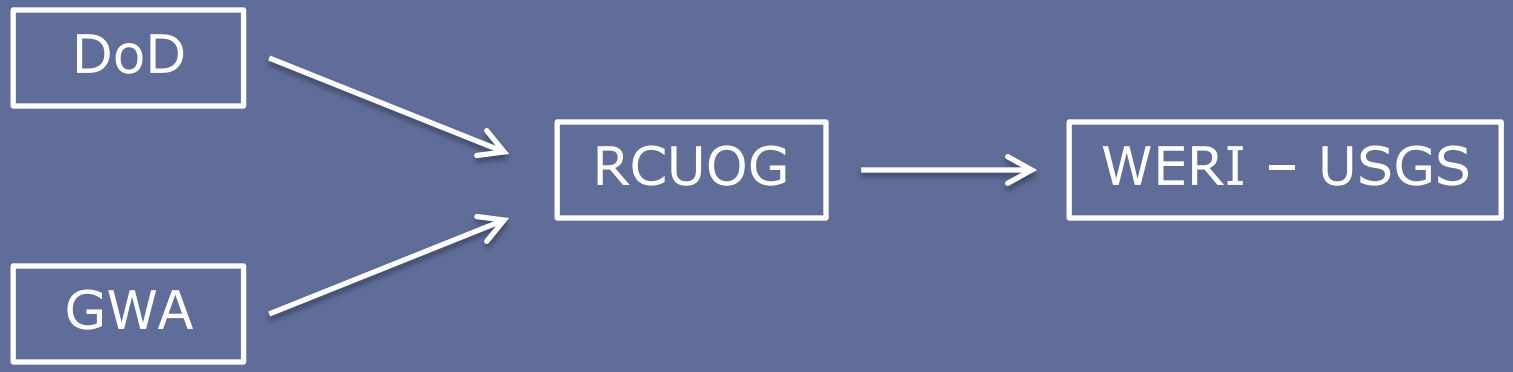
MOU and MOA between DoD, GWA, RCUOG, WERI, and USGS

- Memorandum of Understanding – Long-term commitment for the One-Guam Aquifer Monitoring Program (OGAMP)
- Memorandum of Agreement – Funding for the OGAMP, initial 5-year term
- Funds flow



Questions?

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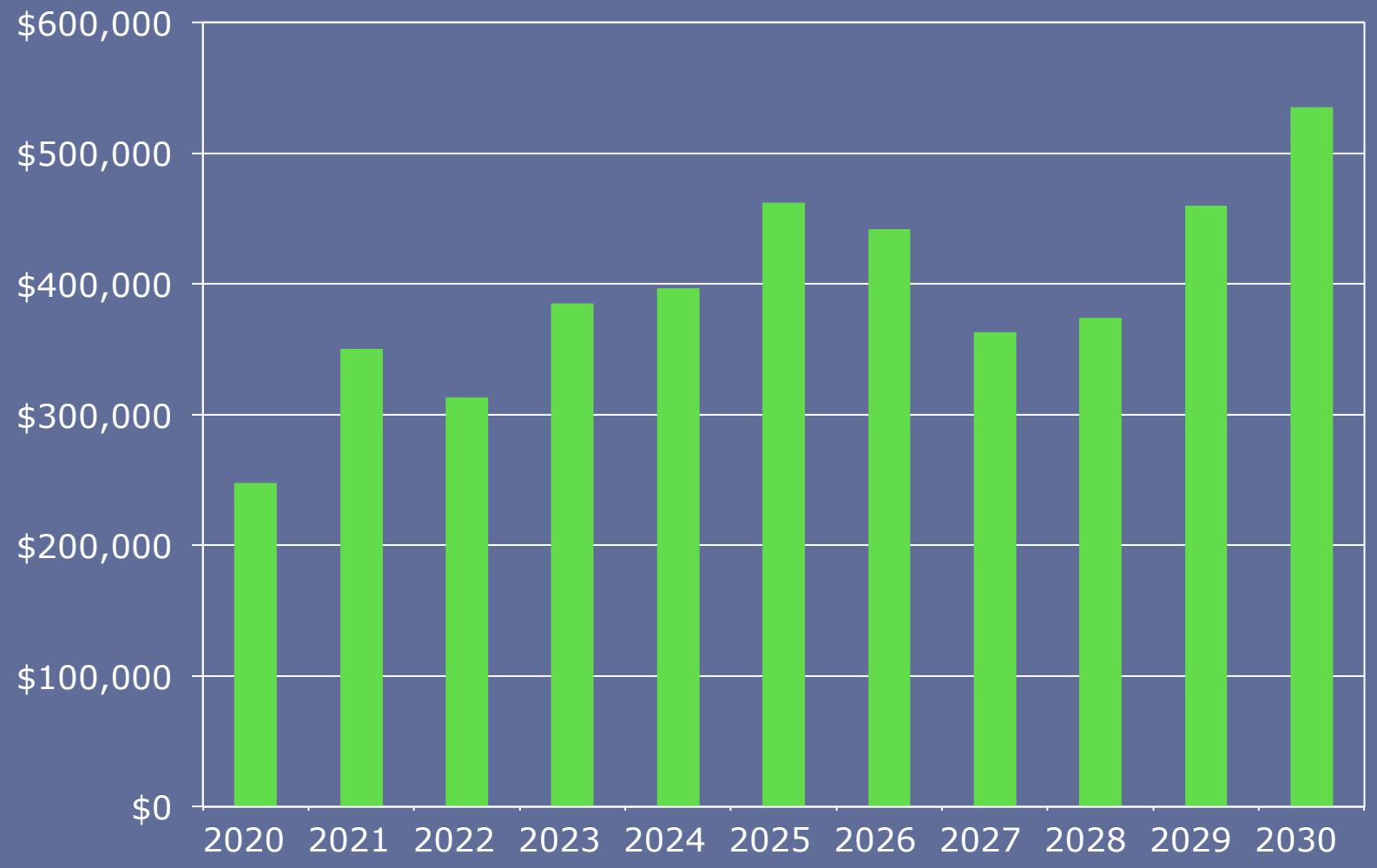
EXTRA SLIDES

GWA Cost Share by Federal Fiscal Year



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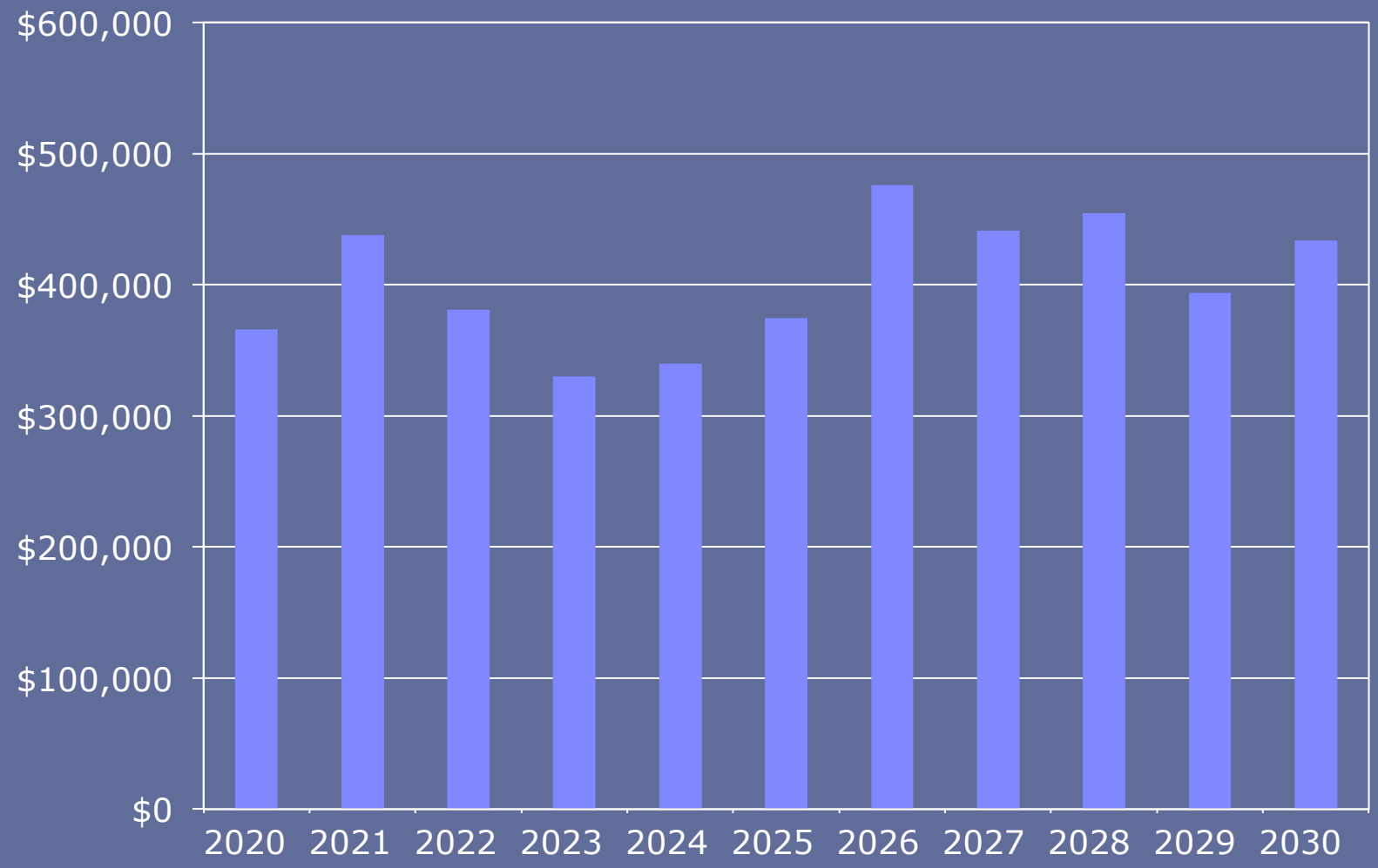
DoD Cost Share by Federal Fiscal Year



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