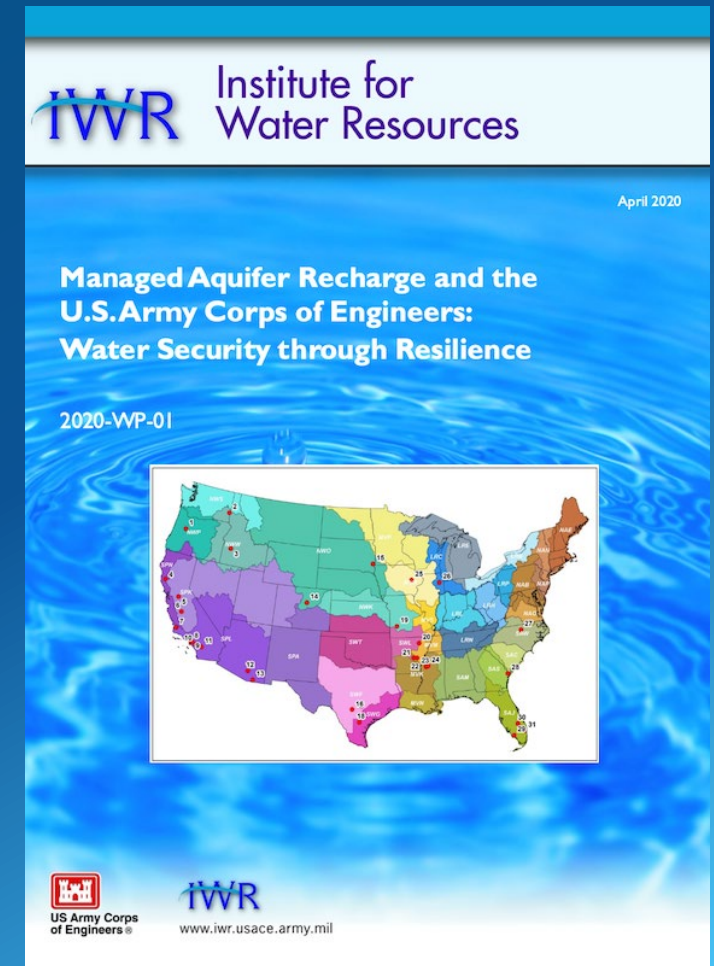


Integrating Surface Water Management & Managed Aquifer Recharge: Case Study from a USACE-OCWD Partnership”

Will Logan (USACE Institute for Water Resources) & Adam Hutchinson (Orange County Water District)

Moderated by: Andy O’Reilly (National Sedimentation Laboratory, USDA ARS)

Part 1: USACE and MAR From Past to Present



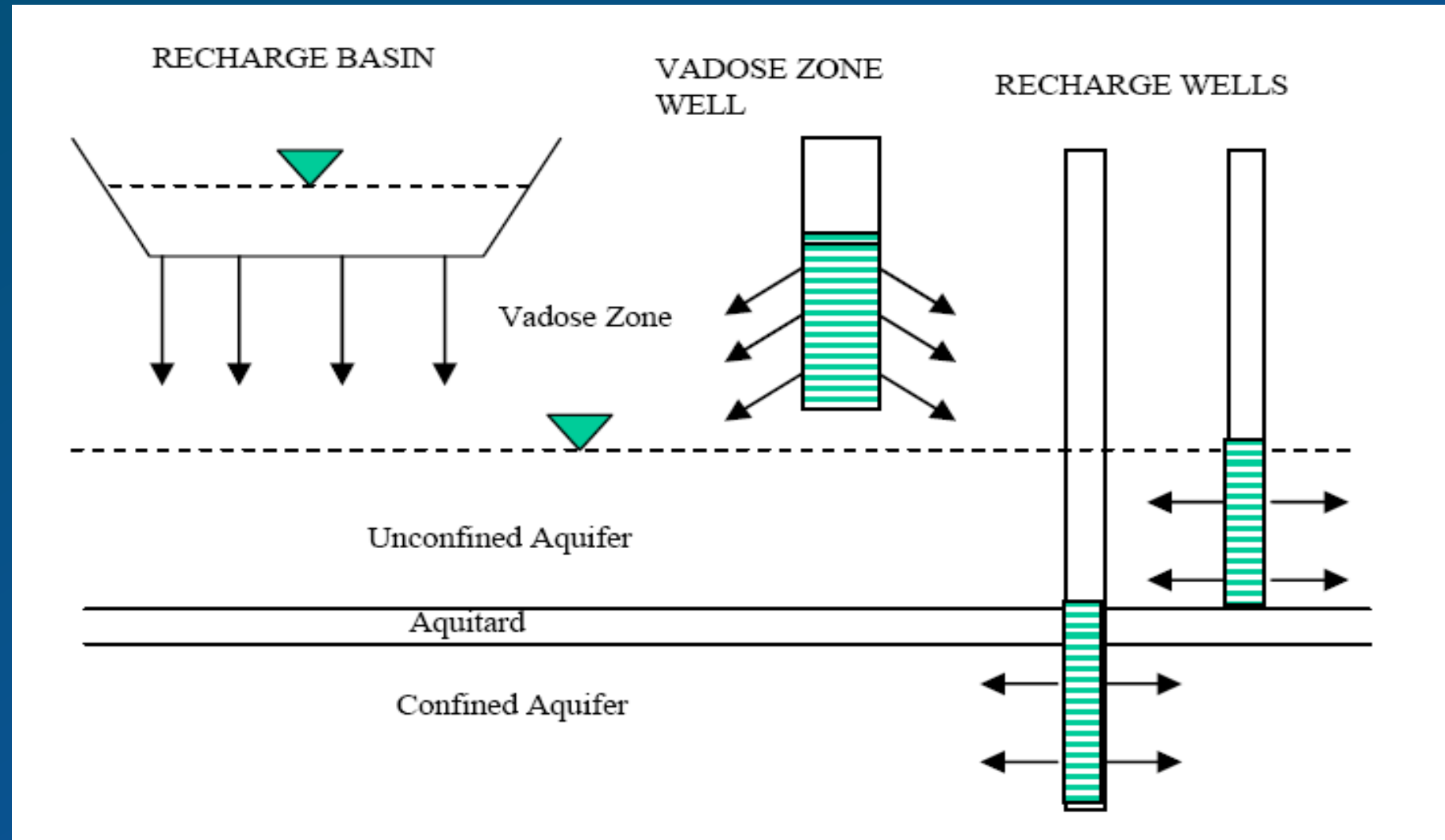
14 Aug 2023



Quick definition of MAR:

Intentional recharge of water to aquifers for subsequent use or environmental benefit.

(CSIRO; similar to NGWA and IAHR)



Also dry washes, ephemeral stream beds, alluvial fans...

Aquifer Storage and Recovery in the Comprehensive Everglades Restoration Plan

AGENCY TECHNICAL REVIEW REPORT

TECHNICAL DATA REPORT

FOR THE

COMPREHENSIVE EVERGLADES RESTORATION PLAN
CERP AQUIFER STORAGE AND RECOVERY PILOT PROJECT
OKEECHOBEE AND PALM BEACH COUNTIES, FLORIDA

JACKSONVILLE DISTRICT

REGIONAL ISSUES IN
AQUIFER STORAGE
AND RECOVERY
FOR
EVERGLADES
RESTORATION

A Review of the ASR Regional Study
Project Management Plan of the
Comprehensive Everglades Restoration Plan

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES



Review of the Everglades
Aquifer Storage and Recovery
Regional Study

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES



US Army Corps
of Engineers

IWR

October 2007

Prospects for Managed Underground Storage of Recoverable Water

Growing demands for water in many parts of the nation are fueling the search for new approaches to sustainable water management, including how best to store water. Society has historically relied on dams and reservoirs, but problems such as high evaporation

“The report concludes that [MAR] has a generally successful track record in a variety of environments.”

“Given the growing magnitude and complexity of the nation’s water management challenges, [MAR is] one means to satisfy the demand for water and cope with water scarcity.”

“[MAR] should be considered a valuable tool in a water manager’s portfolio, although it poses its own unique challenges.”

Driving Force for MAR: Storage

- **Pressure on freshwater supplies** to meet anticipated needs
 - Desalination, water recycling
 - Conservation, improving water efficiency
- **Need for short- to long-term storage** of water during times of abundance and recovering that water in times of need (e.g., drought)
- **New opportunities for above-ground storage are limited**
 - Large footprints, best sites have been taken
- **Disadvantages of above-ground storage**
 - Evaporative losses (limits long-term storage), ecological impacts (connectivity, altered flow regimes), and sediment accumulation.

Congressional Research Service (2020) noted the relative lack of groundwater vs. surface water at USACE and other agencies

“USACE authorities...do not restrict nonfederal entities from using water stored or released from USACE reservoirs for groundwater recharge.

“Historically, the federal government...has played a prominent role in constructing infrastructure related to surface water resource management.

“At the same time, the federal government has played a comparatively smaller role in creating infrastructure to develop groundwater storage...

“The reasons...are complex, tied to the long and complicated history of common law water rights, state water law, legal adjudication, federal deference to states...”

Intersections of MAR and USACE (and our Partners):

- **Flood risk management** – e.g., recharge of floodwaters, in combination with surface storage, can dampen the flood peak.
- **Aquatic Ecosystem Restoration** – e.g., discharging stored groundwater may help maintain timely environmental flows.

- **Drought resilience (with partners)** – e.g., MAR can provide back-up storage for multi-year droughts when reservoir levels drop.
- **Multi-purpose urban environmental restoration projects (with partners)** – e.g., project that combines wastewater reuse, wetlands restoration, recreation, education, and MAR.
- **Salt-water intrusion prevention (with partners)** – e.g., replenishing coastal aquifers.

Lake Okeechobee Watershed Restoration Project Recommended Plan features



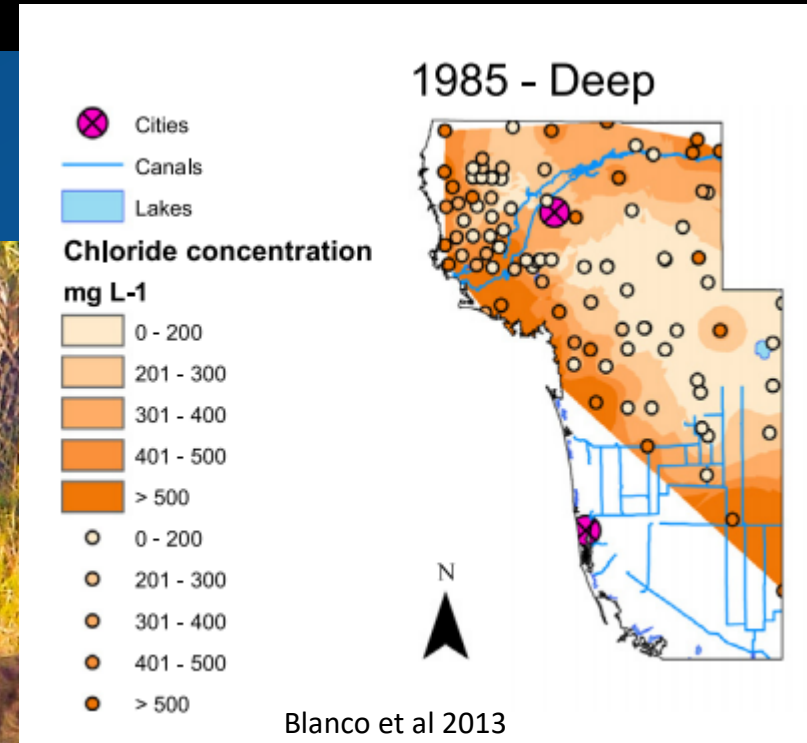
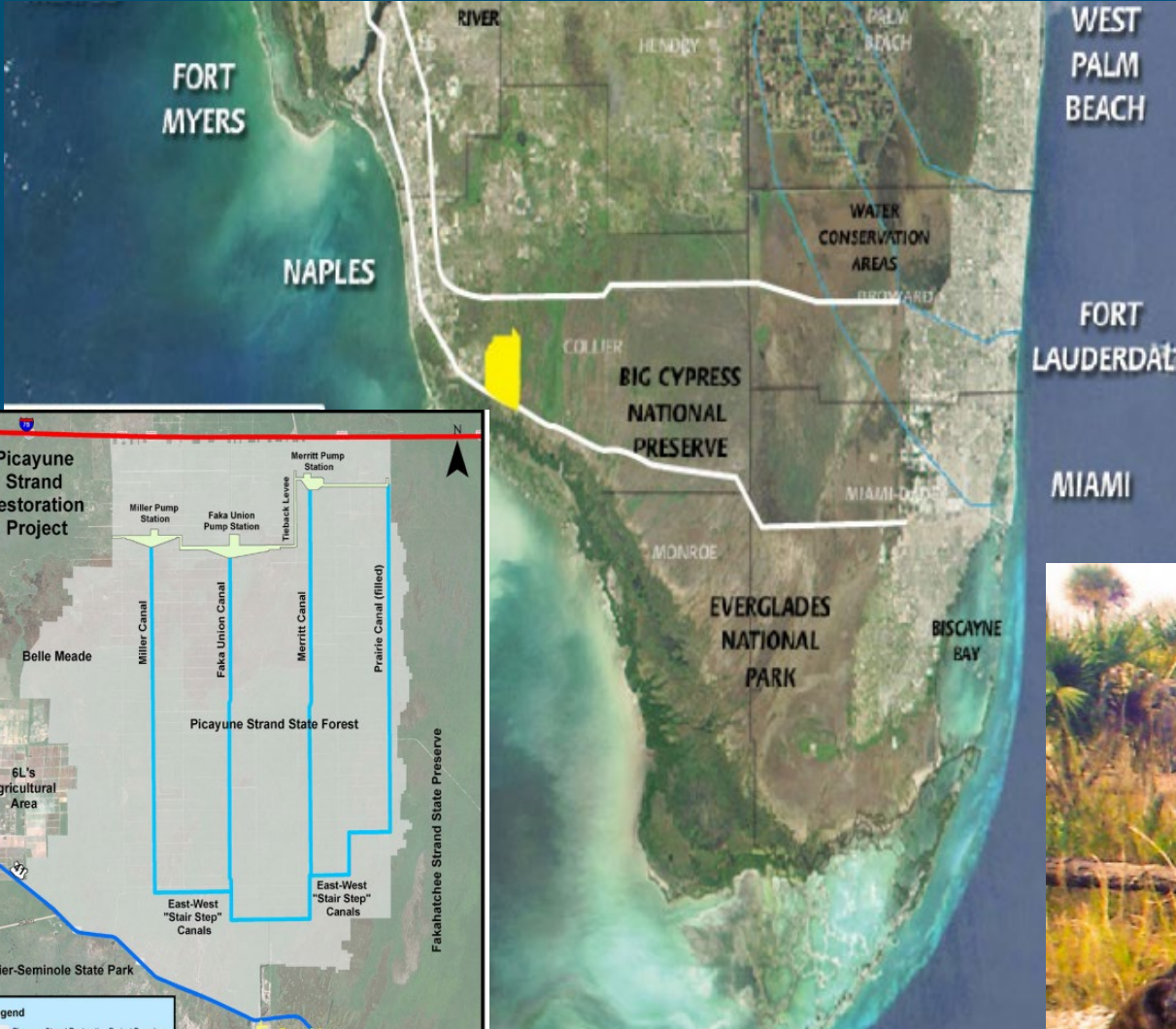
Figure 1-1. Lake Okeechobee Watershed Restoration Project Recommended Plan features



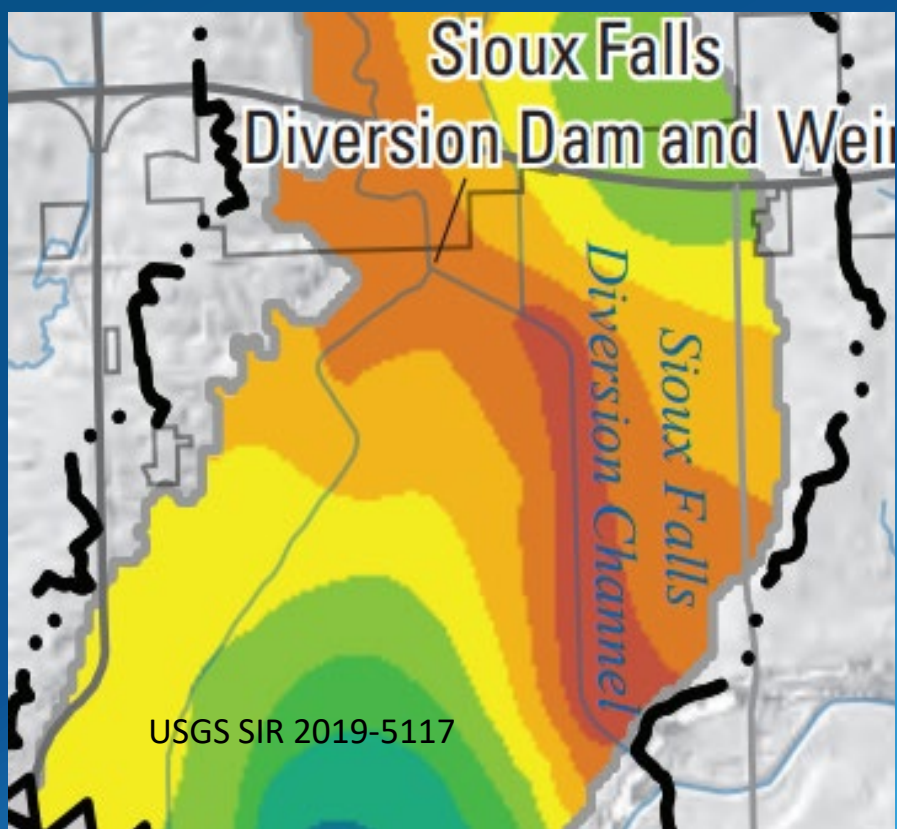
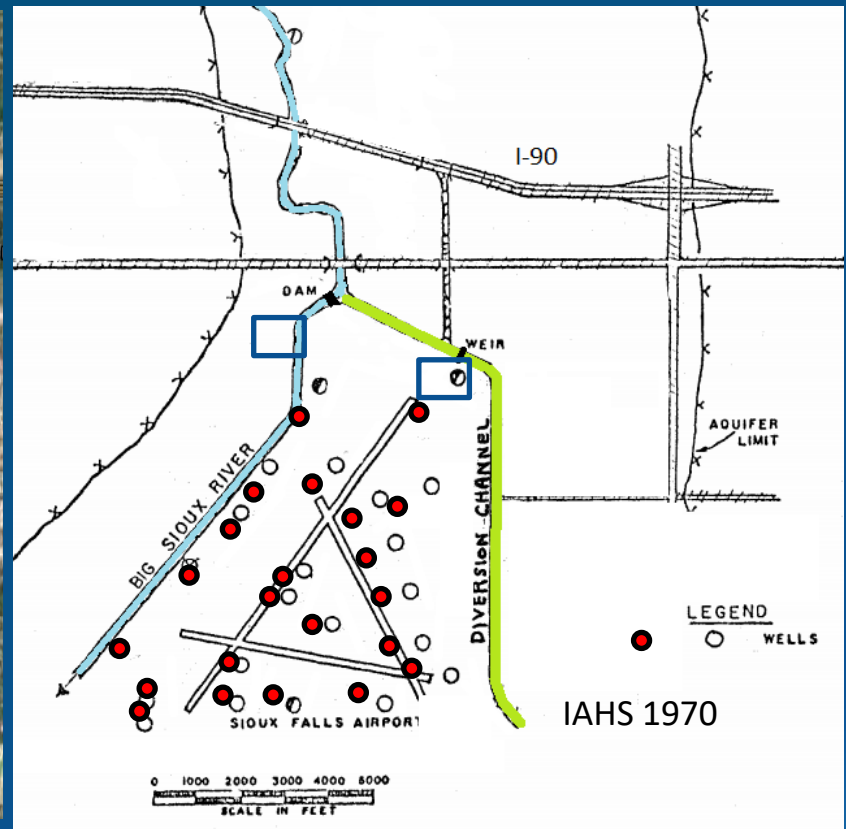
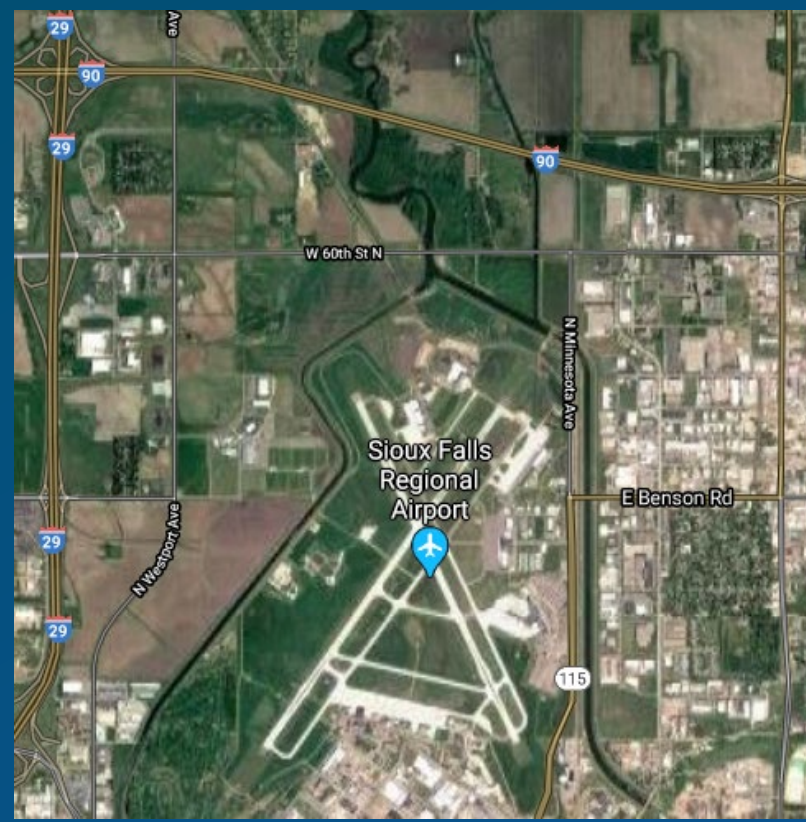
Picayune Strand Groundwater Recharge and Restoration Project, SW Everglades

Project Purpose and Benefits:

- Improve aquifer recharge to protect water supply and prevent saltwater intrusion
- Restore and enhance habitat for fish and wildlife, including threatened and endangered species
- Maintain existing level of flood protection



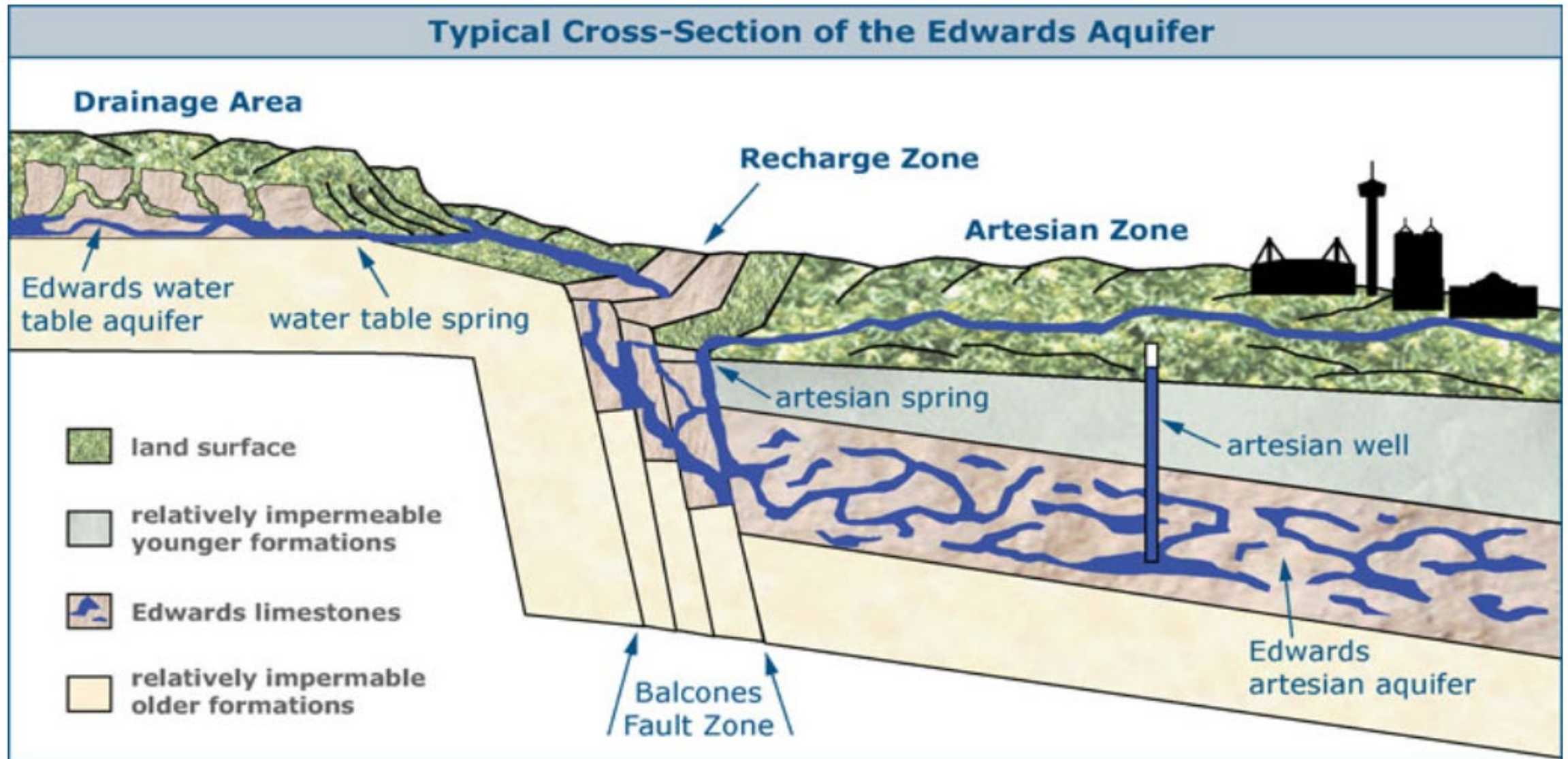
Accidental MAR: Sioux Falls Diversion Channel, South Dakota



- Built by USACE in 1961 for Flood Risk Management
- Soon apparent that it could be managed for recharge for water supply, especially during droughts.

- Dam/weir operations + dredging → high recharge (red zone along channel)

Accidental MAR, part 2: Central Texas



Combination Flood Control and MAR Dams

- From the mid-1960s to 1980s, USACE and regional cooperators identified potential dam sites near the Edwards Aquifer recharge zone for with a primary purpose of flood control but a secondary goal of recharging the aquifer.
- This dual purpose was discovered by accident in the case of a reservoir which while *“constructed [in 1913] and operated for irrigation purposes became virtually ineffective during periods of moderate to severe drought because of leakage.”*

Source: www.edwardsaquifer.org



Part 2: USACE and MAR From Present to Future

USACE has some Previous Authorities to do MAR

Project-Specific: First large-scale, *project-specific* authorization for MAR (ASR): WRDA 2000, for Everglades Restoration. Seven of the 68 original projects involved MAR—a watershed moment.

Regional: WRDA 2007—The Secretary may participate with non-Federal and nonprofit entities to address issues on managing groundwater as a sustainable resource *throughout the Upper Mississippi Embayment region* (TN, AR & MS)



First *general authorizations* explicitly addressing MAR: WRDA 2016, “Leveraging Federal infrastructure for increased water supply” included increasing the storage capacity or diverting water from the project to recharge groundwater, including ASR.



WRDA 2016 Authorizations

Section 1116

- ❖ Authorized to evaluate and carry out *water supply conservation measures* in states which declared a drought emergency in 2016*.
- ❖ Includes “ground water replenishment” and ASR.
- ❖ Non-federal interest has to pay the separable costs.

Section 1118

- ❖ Authorized to review proposals from a non-federal interest to *increase the quantity of available supplies* at a project.
- ❖ Includes diverting released water for recharge, including ASR.
- ❖ Non-federal interest has to pay the separable costs.

(Section 1117)

- ❖ In the same states as for 1116, authorized to prioritize *updating water control manuals for seasonal operations* for water conservation/supply.

WRDA 2022, Sec. 8108

“Managed Aquifer Recharge Study And Working Group”

(a) **ASSESSMENT.**—

(1) **IN GENERAL.**—The Secretary shall, in consultation with applicable non-Federal interests, conduct a national assessment of carrying out [MAR] projects to address drought, water resiliency, and aquifer depletion at authorized water resources development projects.

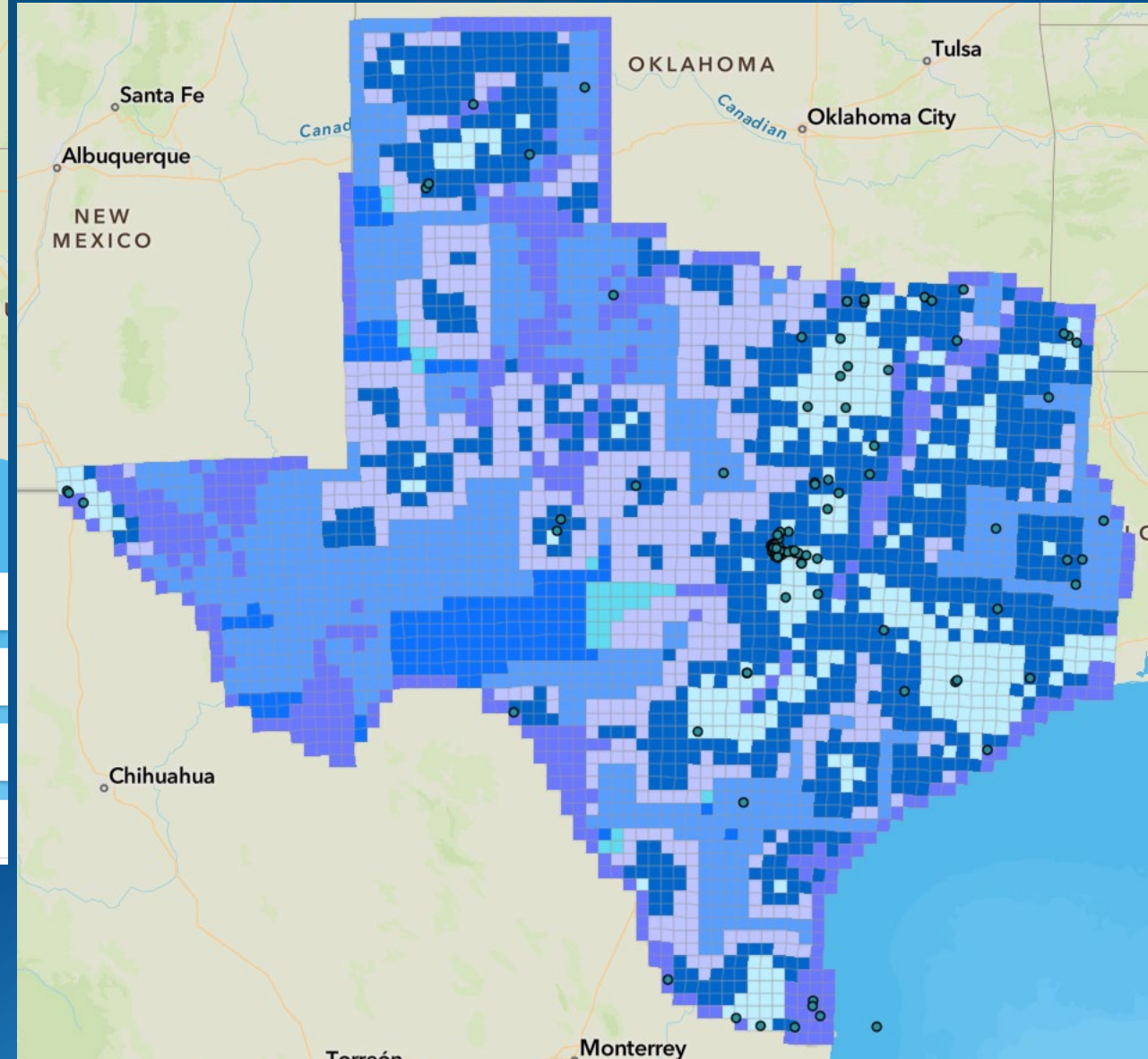
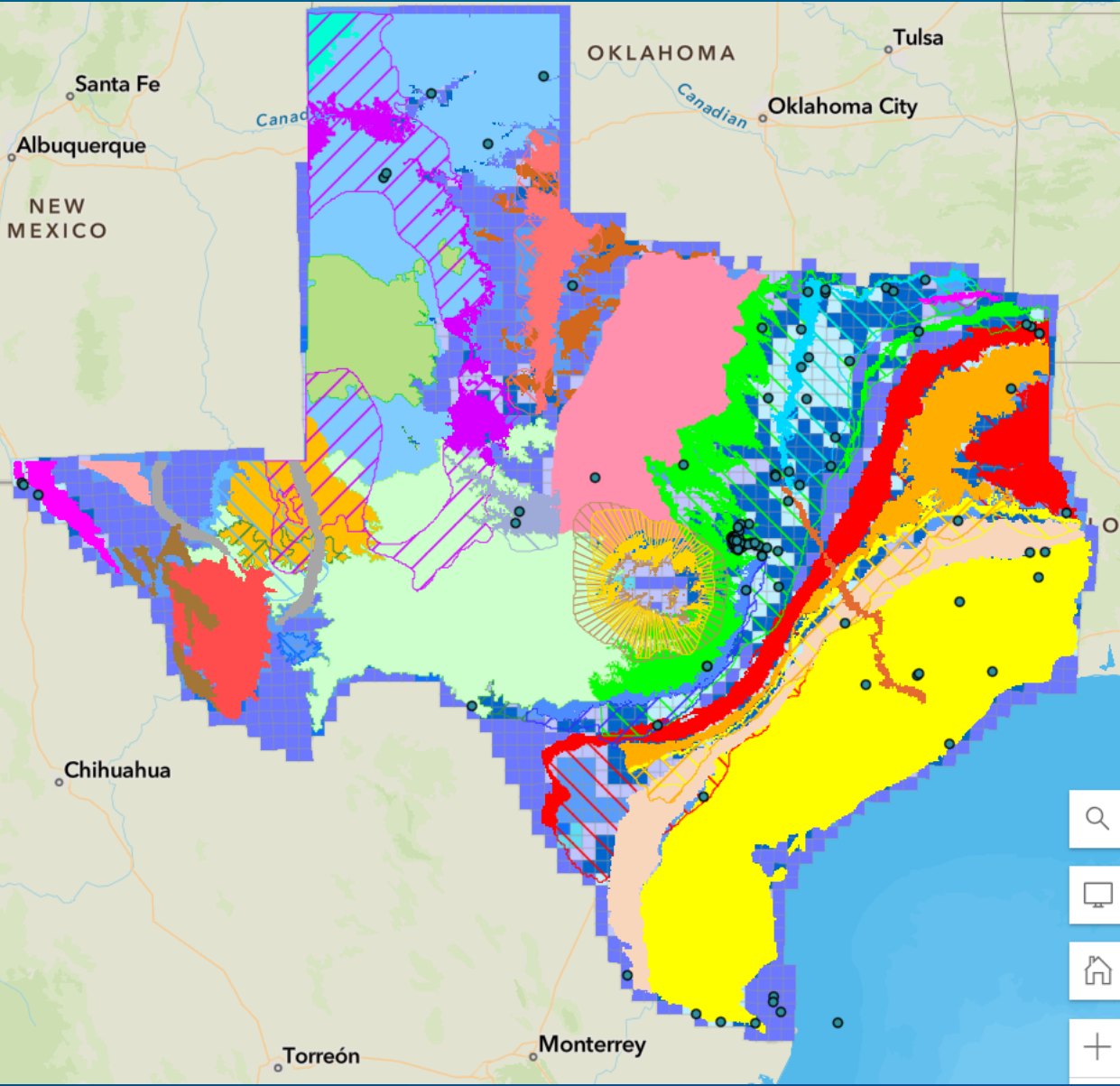
(2) **REQUIREMENTS.**—...the Secretary shall—

(A) assess and identify opportunities to support non-Federal interests, including Tribal communities, in carrying out [MAR] projects; and

(B) assess preliminarily local hydrogeologic conditions relevant [MAR] projects.

(3) **COORDINATION.**—In carrying out paragraph (1), the Secretary shall coordinate, as appropriate, with the heads of other Federal agencies, States, regional governmental agencies, units of local government, experts in managed aquifer recharge, and Tribes.

Texas Statewide MAR Assessment



WRDA 2022, Sec. 8108

(b) FEASIBILITY STUDIES.—

(1) AUTHORIZATION.—The Secretary is authorized to carry out feasibility studies, at the request of a non-Federal interest, of [MAR] projects in areas that are experiencing, or have recently experienced, prolonged drought conditions, aquifer depletion, or water supply scarcity.

(2) LIMITATION.—The Secretary may carry out not more than 10 feasibility studies...

(3) USE OF INFORMATION.—The Secretary shall, to the maximum extent practicable, use information gathered from the assessment conducted under subsection (a) in identifying and selecting feasibility studies to carry out under this subsection.

(4) COST SHARE.—The Federal share...shall be 90 percent.



WRDA 2022, Sec. 8108

(c) **WORKING GROUP.**—

(1) **IN GENERAL.**—Not later than 180 days after...the enactment of this Act, the Secretary shall establish a [MAR] working group made up of subject matter experts within [USACE] and relevant non-Federal stakeholders.

(2) **COMPOSITION.**—[expertise in water supply storage, regional water supply in drought; protection of groundwater supply, groundwater quality; ASR wells; recharge dams; groundwater hydrology; conjunctive use, and agricultural water resources].

(3) **DUTIES.**—...

(A) advise the Secretary regarding...the assessment...and any feasibility studies;

(B) assist Corps of Engineers offices...with raising awareness of non-Federal interests of the potential benefits of carrying out managed aquifer recharge projects; and

(C) assist with ... the report required to be submitted under subsection (d).

WRDA 2022, Sec. 8108

- (d) **REPORT TO CONGRESS.**—[Within 2 years], the Secretary shall submit [to Congress] a report...that includes—
- (1) the results of the assessment...and any feasibility studies...including data collected...and any recommendations on [MAR] opportunities for non-Federal interests, States, local governments, and Tribes;
 - (2) a status update on the implementation of the recommendations included in the report...entitled “Managed Aquifer Recharge and the U.S. Army Corps of Engineers: Water Security through Resilience...”; and
 - (3) an evaluation of the benefits of creating a new or modifying an existing planning center of expertise for managed aquifer recharge, and identify potential locations for such a center of expertise, if feasible.



Now what? – The bad news first

The working group will need many months to put together. It will likely be a “FACA” Committee, which would involve formal processes. So actions that require the working group’s input may not happen immediately.

- This includes a formal assessment of potential sites.

“Feasibility study” is a formal term involving the whole multi-year USACE planning process (study results and findings, formulation of alternatives, selection of a recommended alternative, costs and benefits...). They need to be funded and there was no funding in the appropriations bill for MAR feasibility studies. Perhaps we can get funding in the next bill.

Now what? – The good news

We can discuss and informally map out potential opportunities.

There is not, and probably will never be, a USACE “MAR Program”. It will be viewed as a water management tool. We may develop a community of practice or something similar.

But USACE programs & authorities exist that can be tapped quickly, typically at the district level:

- Planning Assistance to States
- Feasibility phase of the Continuing Authorities Program
- Flood Plain Management Services
- Environmental Infrastructure Program
- Tribal Partnership Program
- [WRDA 2016 sec. 1117 allows prioritizing updating water control manuals for seasonal operations for water conservation/supply]

The USACE/Partner cost-sharing ratios vary but can be very favorable.



Summary

- USACE does engage in MAR, scattered around the country.
- Much of this is through our county, state and federal partners.
- New authorities are bringing new opportunities.
- Some of these opportunities may take time to develop.
- But you can start talking with the people from the district where your project would be; there are opportunities to start fairly quickly through existing programs.
- Don't be surprised if the first person you speak with has no idea what you are talking about...



April 2020

Managed Aquifer Recharge and the U.S. Army Corps of Engineers: Water Security through Resilience

2020-WP-01



Thank you