Water Adaptation Techniques Atlas
WATA

Southwest Adaptation Forum Lightning Talk

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October 11, 2022

Purpose:

Tool to support adaptation to water scarcity across the Southwest

Collect cases at multiple scales from farm/ranch, to irrigation district, to river basin

Create easy reference for possible solutions ranging from irrigation technologies to crop choices to water banking, and more…

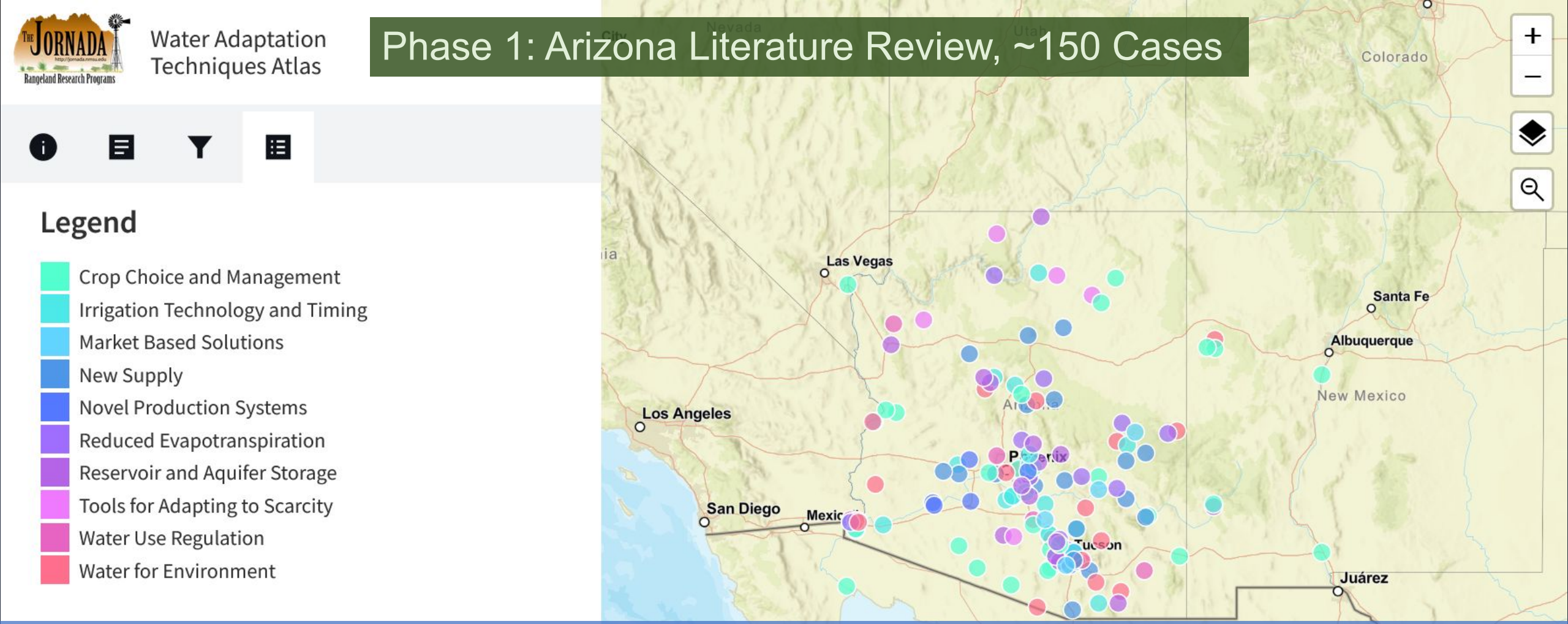
Identify techniques with potential for broader implementation

Adaptation is not always good, sometimes it's *mal-*

Which solutions are technically, economically viable, environmentally sound, culturally appropriate?

Phase 1: Arizona Literature Review, ~150 Cases

Water Adaptation Techniques Atlas



- Practices that (might) reduce water ***demand*** – drip irrigation, deficit irrigation, “new” crops, soil moisture conservation techniques
- Efforts to “augment” ***supply*** – desalination, rainwater harvesting, aquifer recharge
- ***Market-***based solutions for reallocating water between users
- Regulatory tools
- Drought planning and decision-support tools (“Tools for Adapting to Scarcity”)
- Efforts to conserve or restore water for the environment

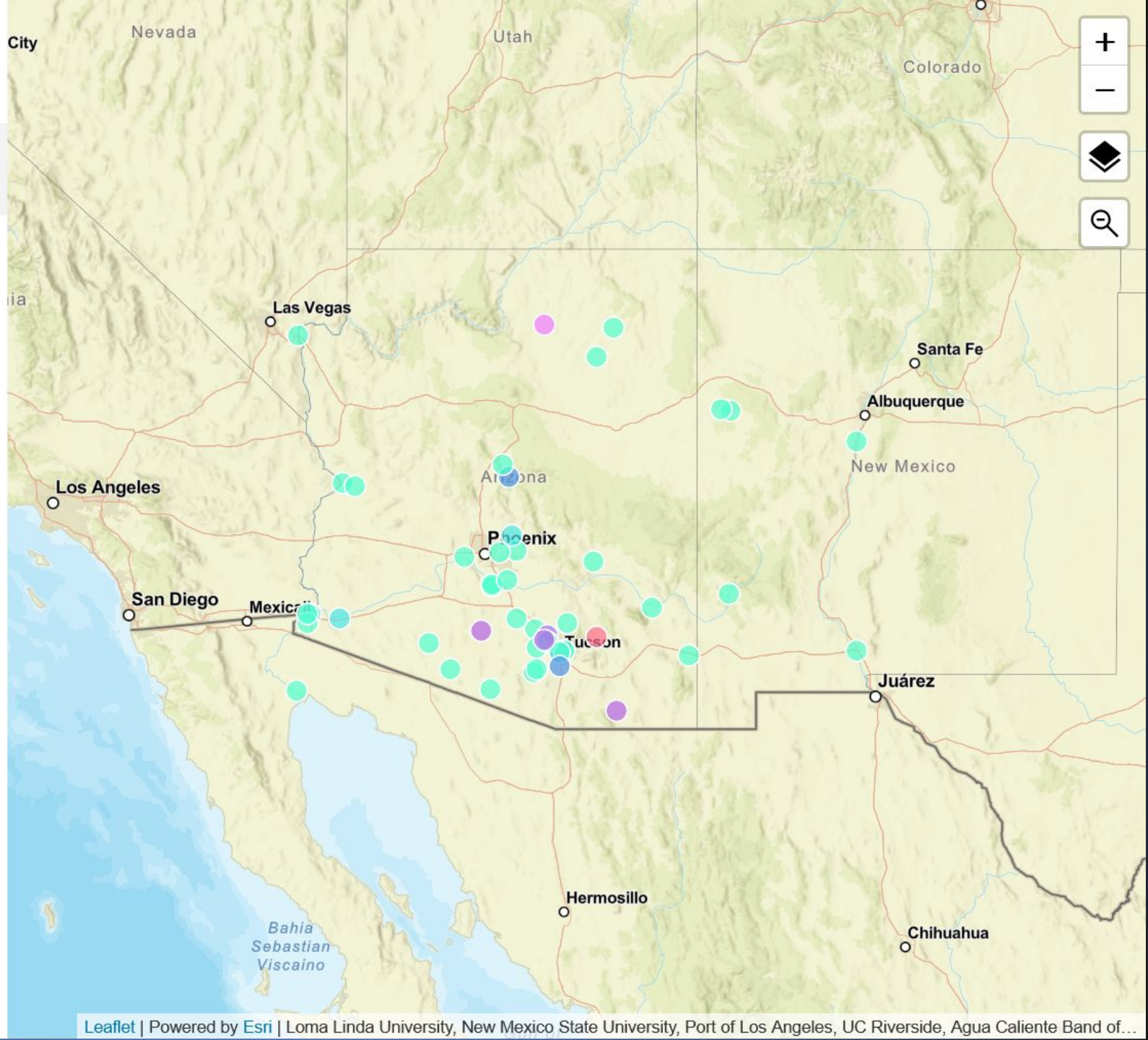
Water Adaptation Techniques Atlas

Filters

Search

Category

- [ ] Ancestral/Indigenous Techniques
- [x] Crop Choice and Management - Alternative Crops
- [x] Crop Choice and Management - Crop Shift
- [x] Crop Choice and Management - Dryland Farming
- [x] Crop Choice and Management - Fallowing
- [x] Crop Choice and Management - Heritage Crops for Arid Lands
- [x] Crop Choice and Management - Inter-Cropping
- [x] Crop Choice and Management - Plant/Harvest Timing
- [ ] Food Sovereignty/Security
- [ ] Indigenous/Ancestral Techniques
- [ ] Irrigation Technology and Timing



Crop Shift –
e.g., replacing alfalfa with barley

Plant/Harvest Timing –
e.g., planting sorghum later to avoid early summer heat

Dryland Farming (*ak-chin)*

Alternative Crops –
agave, buffalo gourd, camelina, guayule, guar, jojoba, jujube, lesquerella, nipa, salt bush, teff, etc…

Heritage Crops for Arid Lands –
highlights indigenous and heirloom varieties, e.g., tepary bean

Inter-Cropping –
Includes agroforestry practices

Fallowing

“Crop Choice and Management” Category

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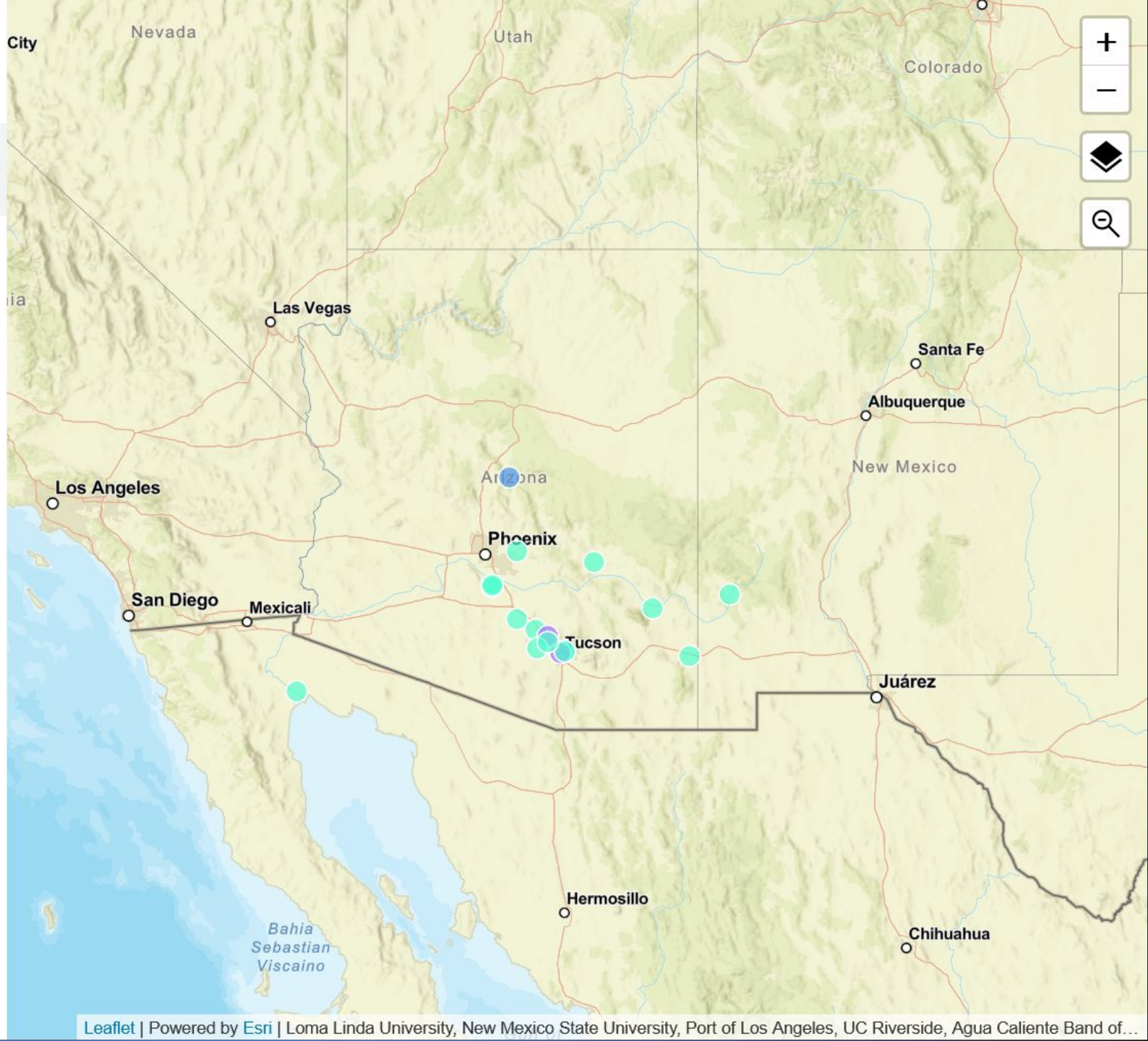

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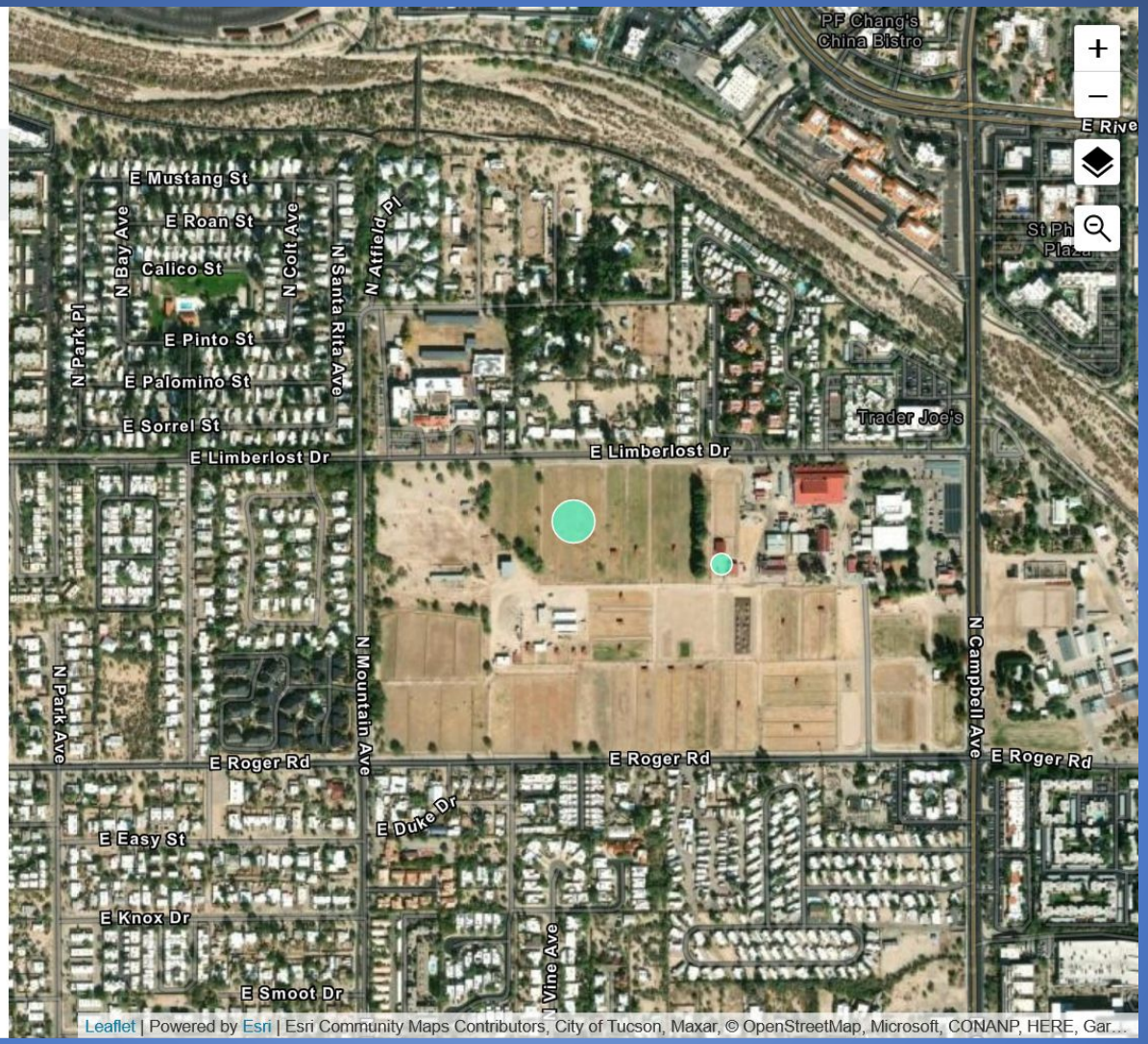
Water Adaptation Techniques Atlas

'Solar' and 'Solum' - High-yielding One-Irrigation Barley Varieties

Zoom to feature

The same breeding program that developed Seco barley, led by R.T Ramage and R.K Thompson, resulted in the release of Solum barley in 1991. Solum was developed for use in rainfed farming systems in North Africa, but has also been shown to be valuable as a winter rotation crop in the Southwest. Demonstration plantings at four fields in Maricopa County in 1990-92 showed that Solum barley could be cultivated with minimal inputs - costing about $100/acre at the time - and with a total water application of 15-20 inches, including rainfall. Grain yields ranged between 4300 and 4700 pounds per acre, yielding a 150% net return on investment. Planting barley also increased water holding capacity and water intake rate by contributing organic matter to the soil (Husman and Ottman 1992). In 2006, the Solar variety - a descendant of Solum with higher yields - was released. A study completed in 2018 compared Solar and Solum to high-input varieties under low- and high-



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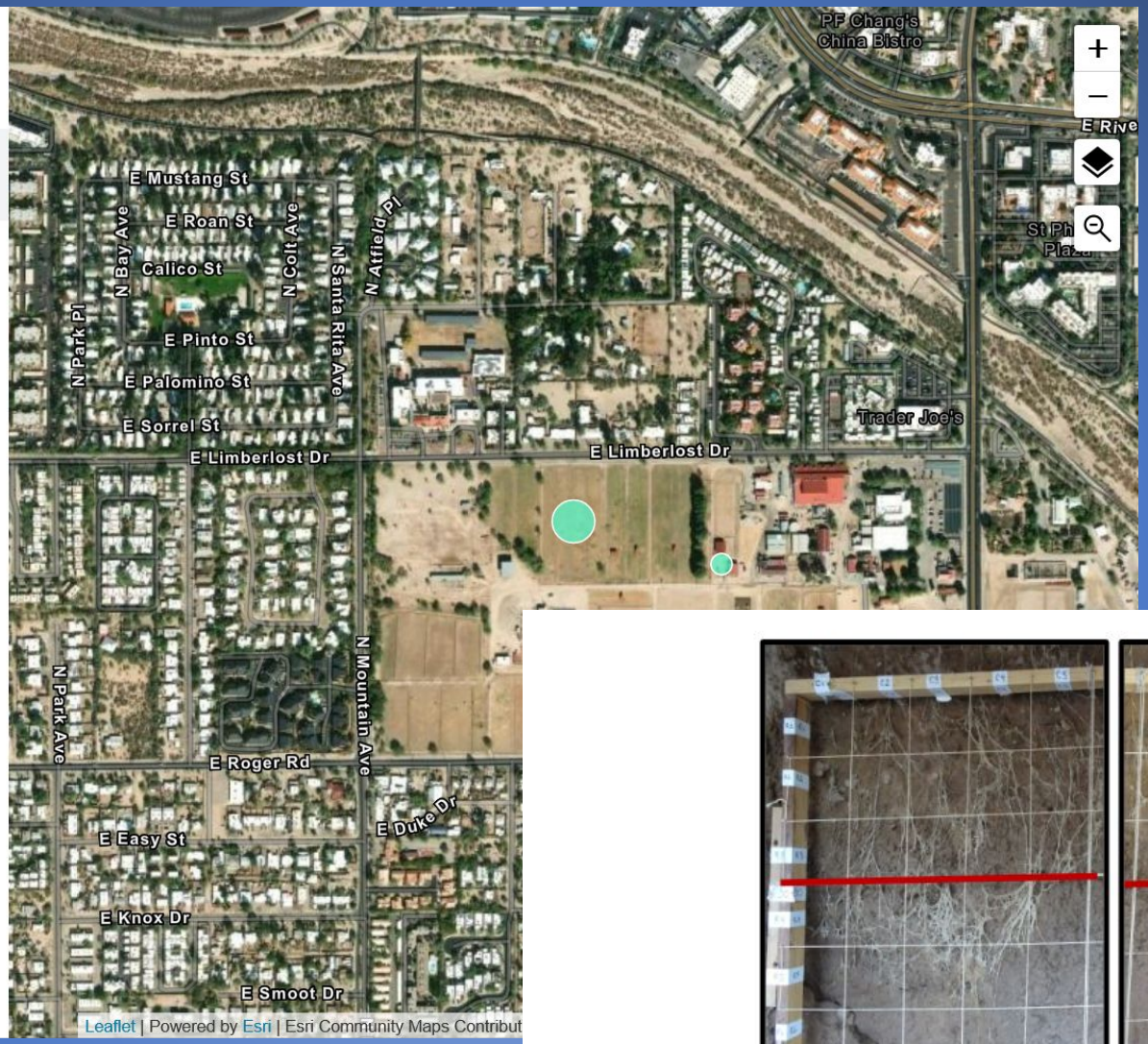
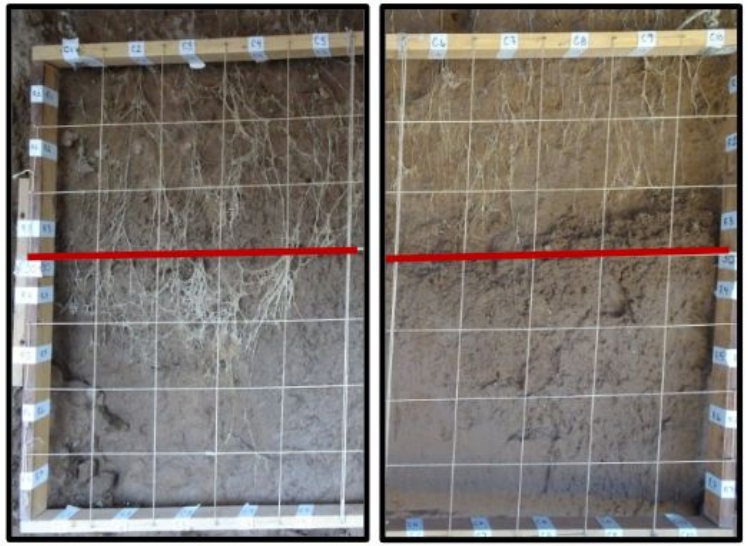




(a) (b)

Figure 5. Root profile at physiological maturity (PM) from 50–10 cm under low irrigation treatment in 2018, red line indicates start of caliche layer at 70 cm: **(a)** "Solar" variety at PM with roots growing through caliche; **(b)** "Cochise" variety at PM showing root growth stops at the caliche layer.

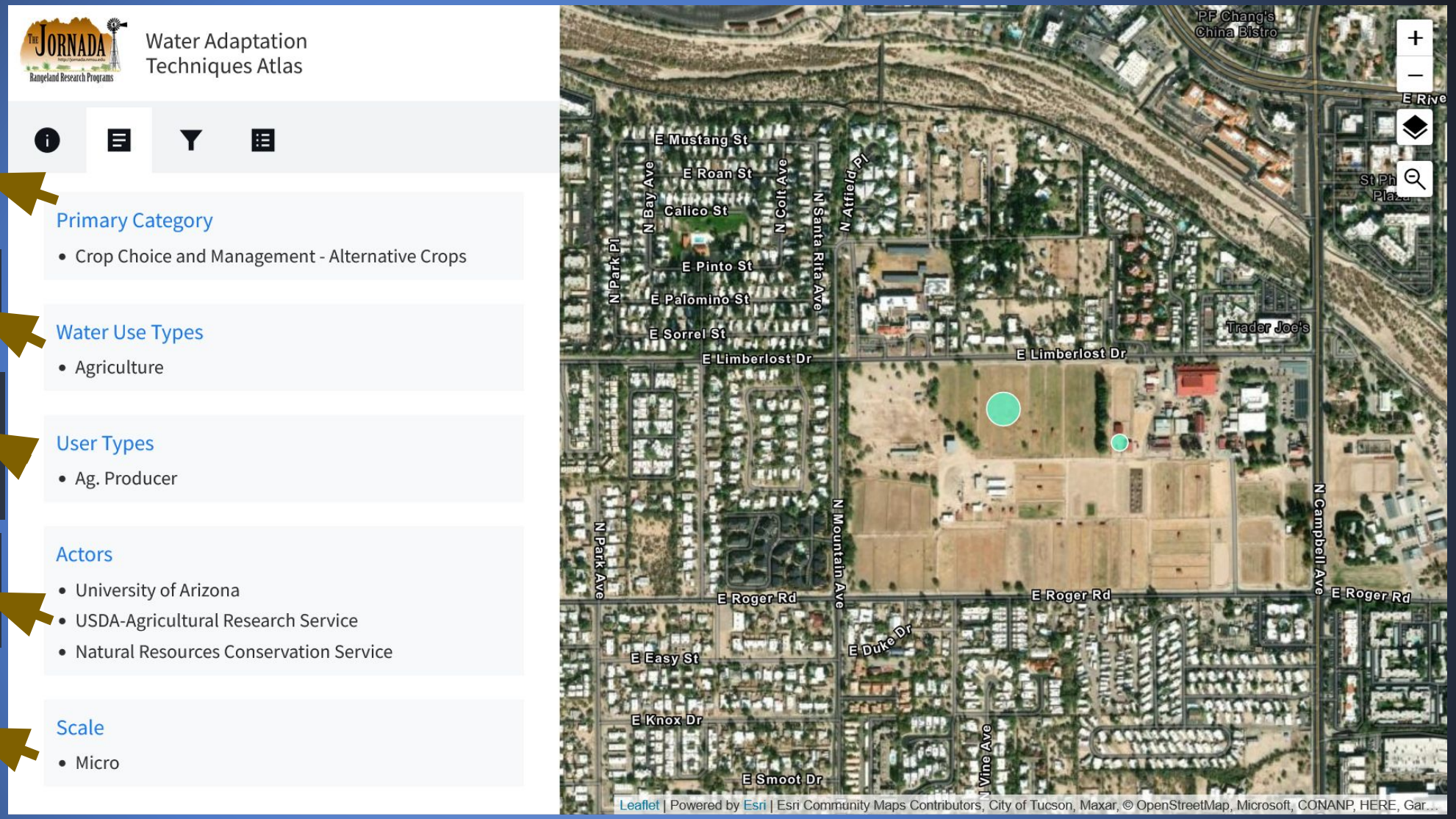
Each case can be assigned to multiple categories

Indicates Agriculture, Urban, Environment (can be multiple)

Allows search or filter by water user type, e.g. Farm/Ranch (producer), Tribe, Irrigation Organization

Lists specific organizations/institutions involved

Micro – e.g. farm or field-level
Meso – e.g. irrigation district, county
Macro – e.g. entire state or major river basin



Water Adaptation Techniques Atlas

- University of Arizona
- USDA-Agricultural Research Service
- Natural Resources Conservation Service

Scale

- Micro

Resource Library

References

- Carter, Andrea, Martha Hawes, and Michael Ottman. 2019. "Drought-Tolerant Barley: I Field Observations of Growth and Development". Agronomy. 9 (5): 221
- Carter, Andrea Y, Michael J Ottman, Gilberto Curlango-Rivera, David A Huskey, Brooke A D'Agostini, and Martha C Hawes. 2019. "Drought-Tolerant Barley: II Root Tip Characteristics in Emerging Roots". Agronomy. 9 (5): 220
- Husman, Stephen H, and Michael J Ottman. 1992. "'Solum' Barley as a Low Input and Profitable Rotation Option". Forage and Grain: A College of Agriculture Report. 1992

Next Steps:

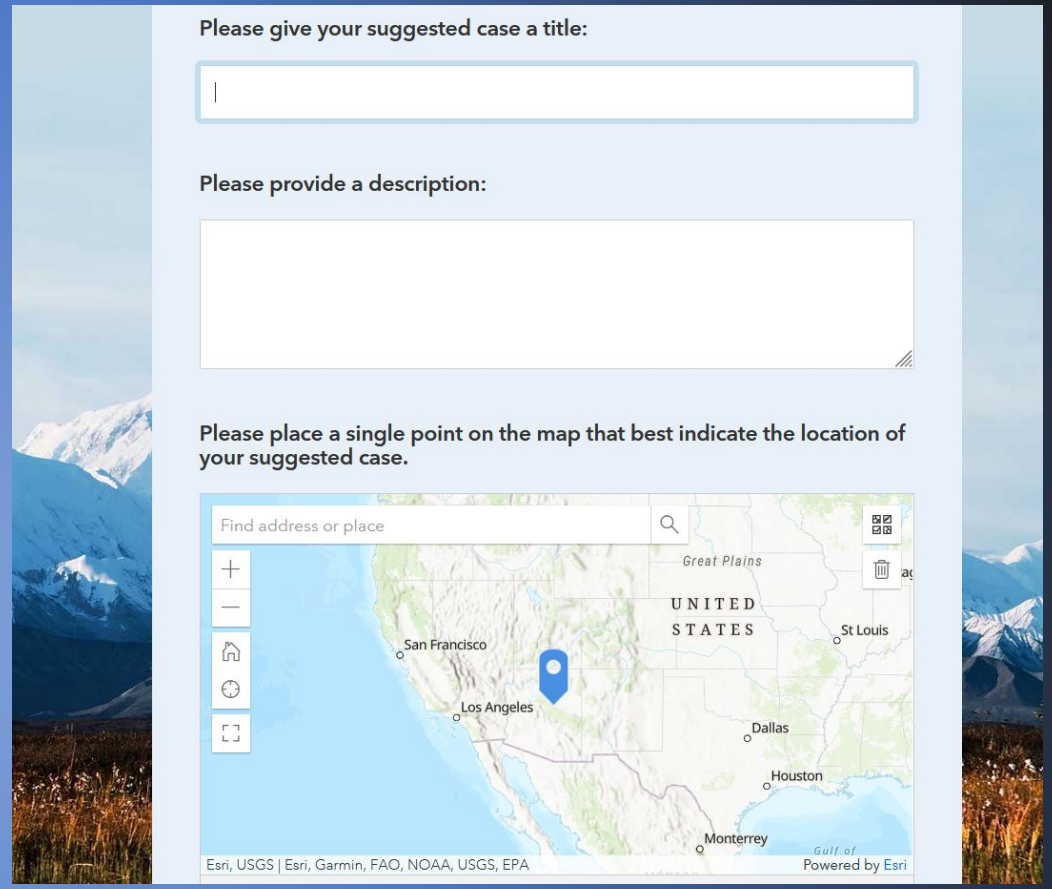
Public Launch – early 2023

Solicit feedback and suggestions

Develop thematic Story Maps synthesizing case studies

Expand across Southwest

Build conversation on identifying viable and actionable solutions



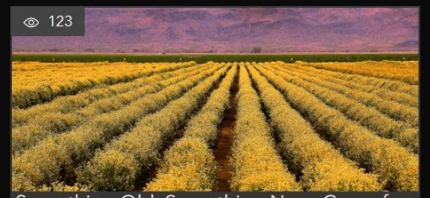
Featured Maps

Recharge and Restore: Water in the Gila River Indian Community

Akimel O'odham and Pima people historically farmed the Gila River Valley but lost access to water when dams were built upstream. A 2004 settlement brought water back to the Gila River Indian Community. Explore their efforts to restore farmland and riparian ecosystems, and recharge depleted aquifers in this Story Map.

With a Pinch of Salt: Desalination as a Solution?

Desalination - removing dissolved salts to produce fresh water - is seen by some as a promising solution to water scarcity in the Southwest. But high costs and adverse environmental impacts mean it is no silver bullet. In this featured map, we explore desalination technologies and their current and prospective uses at a variety of scales from micro to mega.



Something Old, Something New: Crops for an Aridified Future

Many of the principal crops grown in the Southwest are major water consumers, such as alfalfa and cotton. Ancestral indigenous crops and varieties offer a promising alternative, along with native desert plants seeing renewed interest as biofuel and industrial feedstock, and new varieties of established crops being developed to withstand drought and aridity.

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