

Health and Well-Being Impact on Contamination of Traditional Foods and Water on the Navajo Nation

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Environmental Elemental Contaminants



Water & Soil

Navajo Homes

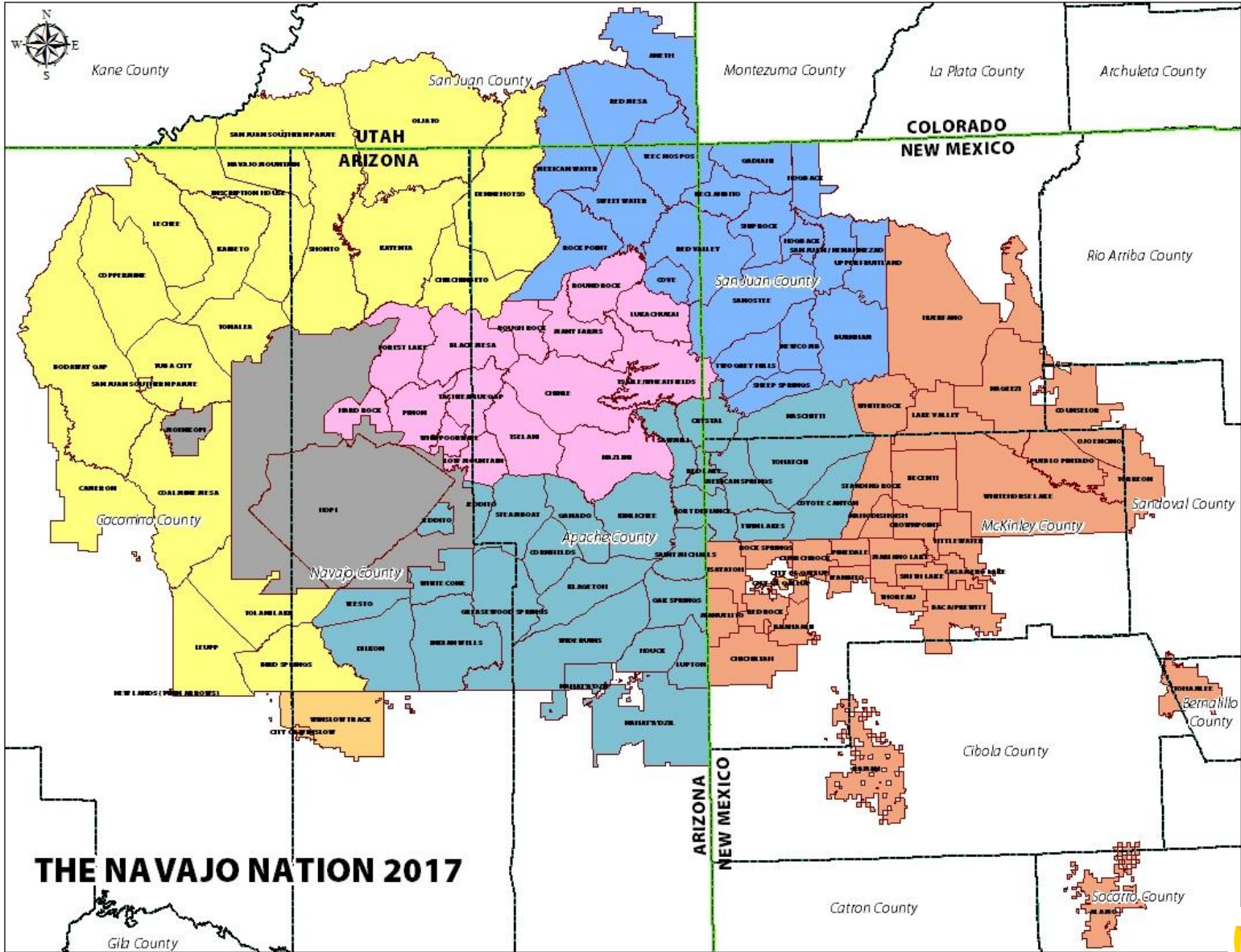
Livestock (sheep)



Plants & Crops

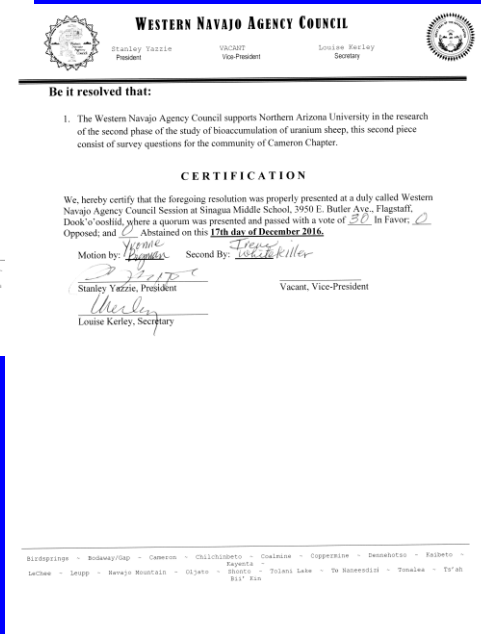
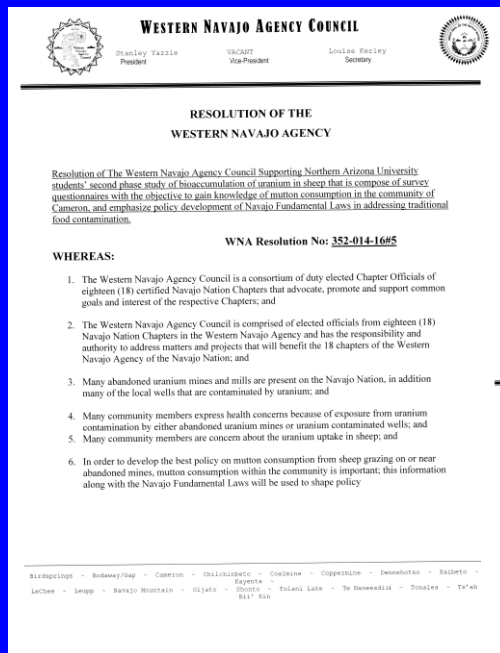


HEALTH RISK



Working on Navajo

Resolutions of support are required prior to research.



Lindsey Jones, grad student presenting at the Western Agency Meeting June 2018



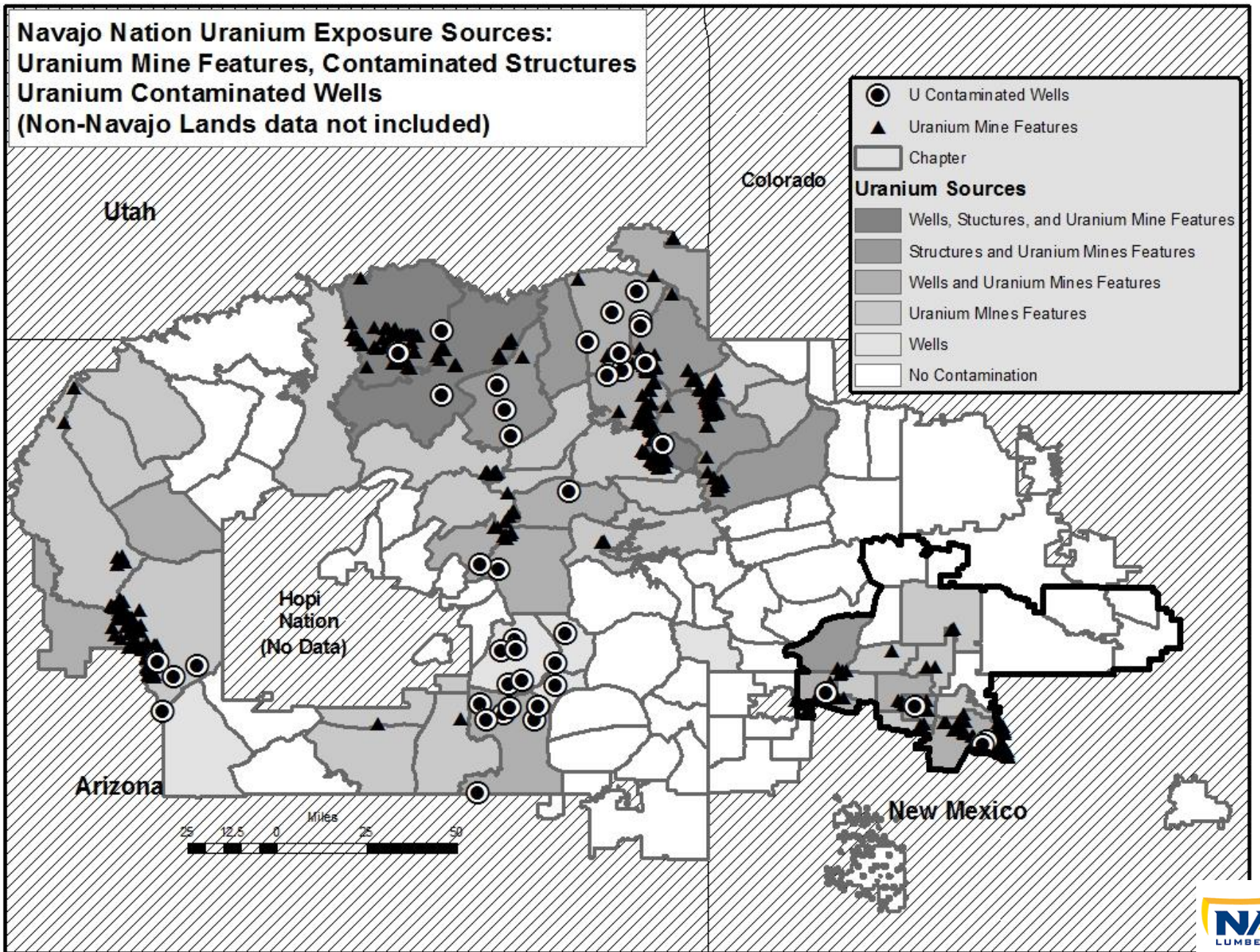
Uranium Mining

- Approval of Manhattan Project
 - 1942
- Uranium mining boom
 - Mid to late 1900's
- Mining activity on Colorado Plateau
 - Near Four Corners area, in AZ, NM, UT, and CO
- Large amounts of radioactive waste
- Navajo people facing serious health consequences



[http://buffalopost.net/?tag=radiation exposure compensation act](http://buffalopost.net/?tag=radiation%20exposure%20compensation%20act)

**Navajo Nation Uranium Exposure Sources:
 Uranium Mine Features, Contaminated Structures
 Uranium Contaminated Wells
 (Non-Navajo Lands data not included)**



Elemental Contaminants

- Uranium
 - Radioactive
 - Chemical
- Arsenic
 - Systemic
 - Synergistic
- Lead
 - Nervous System

Element	Organ(s) Effected
Uranium (U)	Kidneys, Lungs
Arsenic (As)	Rapid Dividing Cells
Manganese (Mn)	Kidney, Liver, CNS
Cadmium (Cd)	Kidney, Lungs
Copper (Cu)	Liver
Lead (Pb)	Brain, CNS
Mercury (Hg)	Brain, CNS



<https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems/diabetic-kidney-disease>



<http://www.abc.net.au/science/articles/2013/11/13/3890003.htm?site=science/drkarl&topic=latest>

Research Goals

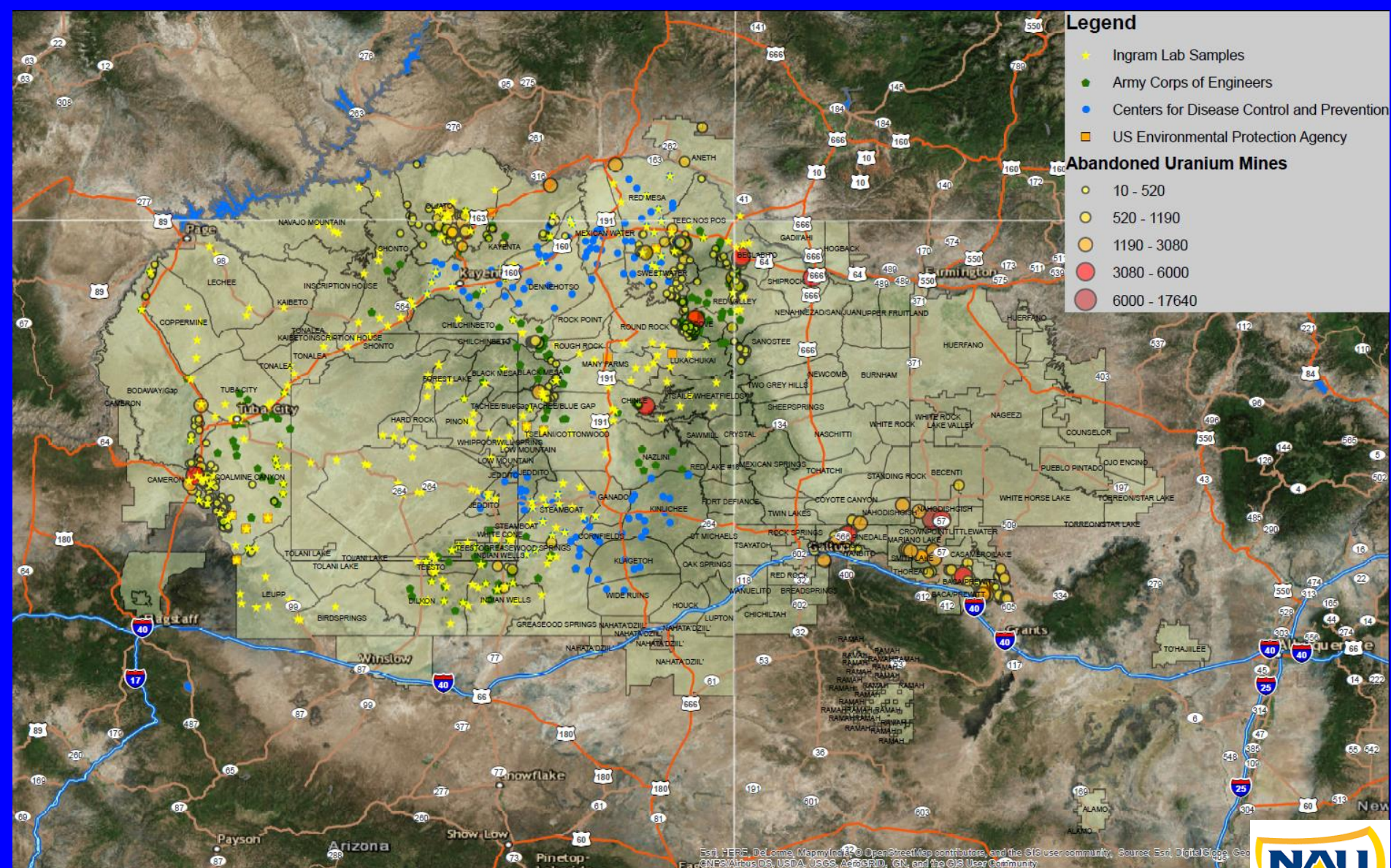
- To determine environmental contaminant information specific to the Navajo Lands.
- To bridge the gap between environmental science and health research by providing our results to our collaborators including Tribal leaders and community members.
- To provide a research experience for Native American students that is both scientifically challenging and of interest to them and their communities.



Quantification of metal contamination in water



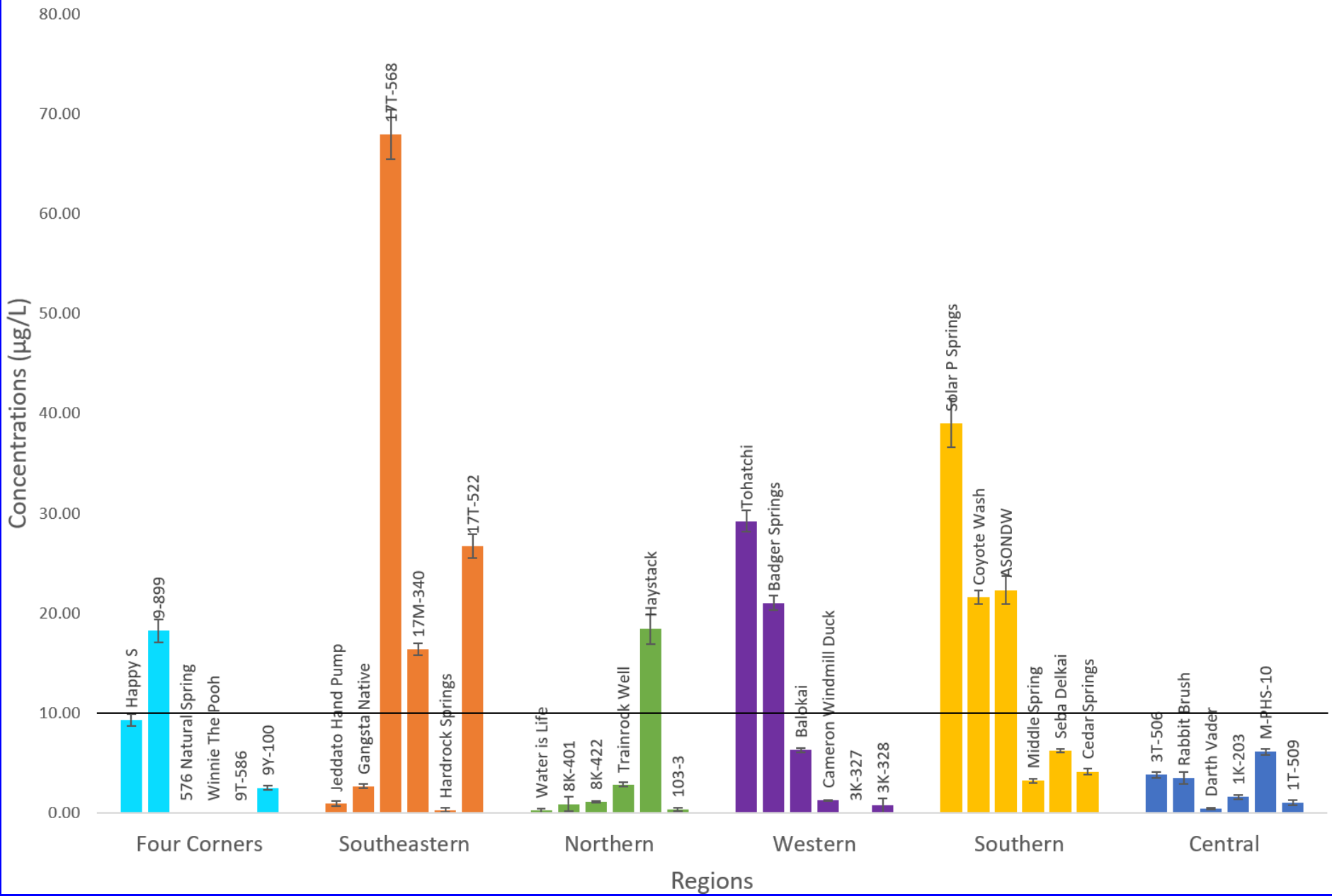
Water Research – Over 300 wells sampled



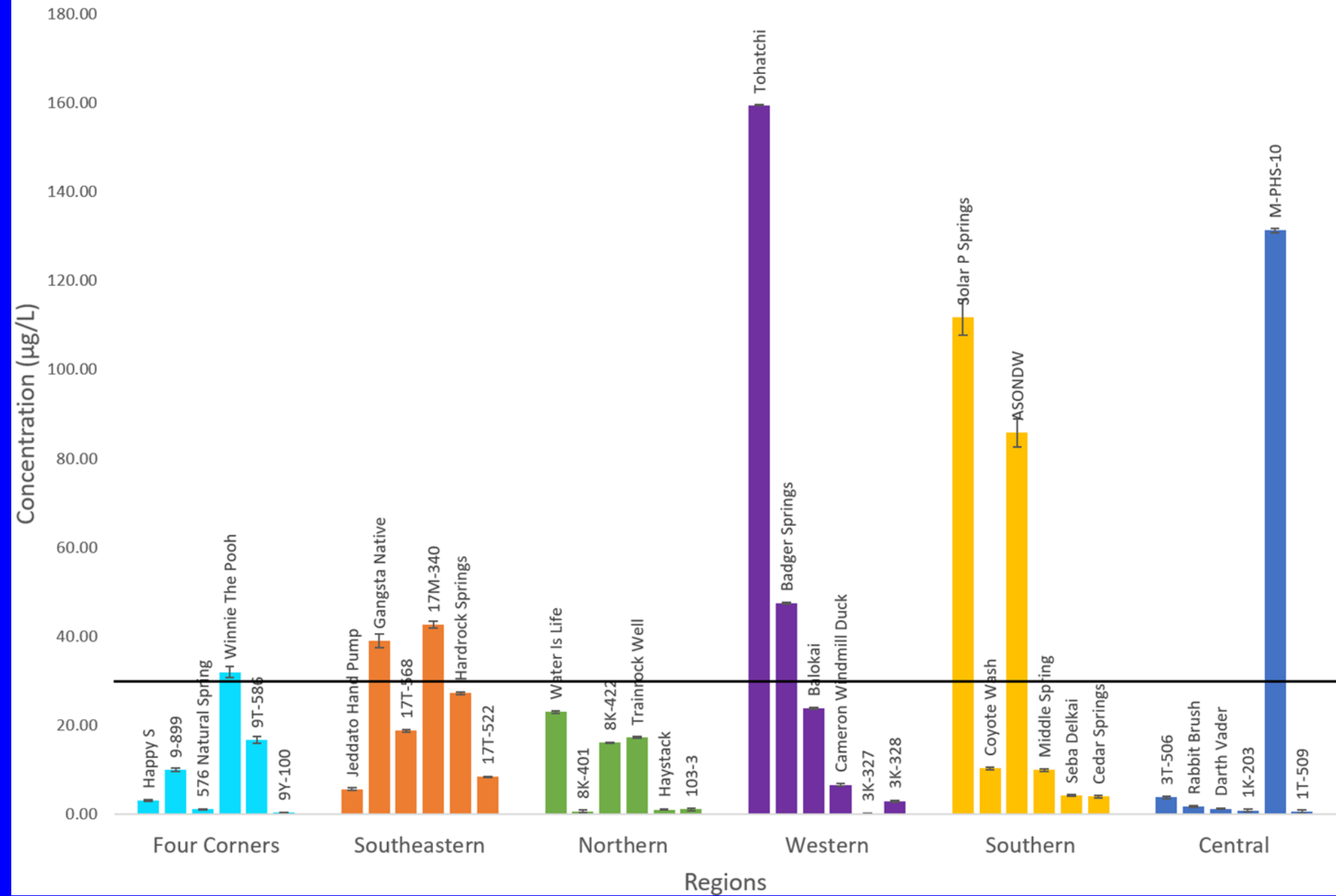
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community. Source: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Arsenic



Uranium



Uranium and Arsenic Results

Recently published:

Quantification of Elemental Contaminants in Unregulated Water across Western Navajo Nation

Jonathan Credo, Jaclyn Torkelson, Tommy Rock, Jani C. Ingram

International Journal of Environmental Research and Public Health, Volume 16, 2019, page 2727.

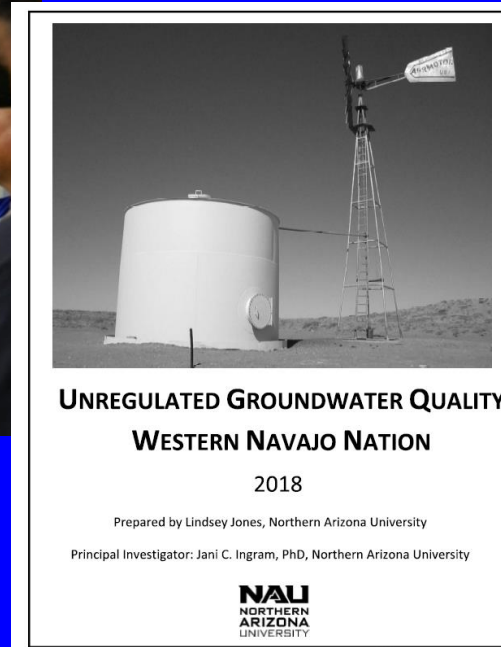
Element	Agency				Totals	
	Chinle	Fort Defiance	Shiprock	Western		
Arsenic	Exceeding	3	23	3	11	40
	Approaching	0	4	0	2	6
	Below	31	29	10	89	159
	B.D.	11	2	2	15	30
	Totals	45	58	15	117	235
Uranium	Exceeding	3	7	1	7	18
	Approaching	3	3	0	5	11
	Below	32	44	14	93	183
	B.D.	6	2	0	11	19
	Totals	44	56	15	116	231

Next Steps in Water Work

- Provide results to communities - Ongoing
- Evaluate changes in water quality over time.
- Relate water quality to well characteristics and hydrogeology.
- Work with University of New Mexico to combine data sets from Eastern and Western Navajo to provide Navajo Nation with complete water information pertaining to contaminants of concern.
- New project to investigate water issues and COVID-19 on Navajo



Dissemination and Policy Work



- **Traditional Ecological Knowledge Policy Considerations for Abandoned Uranium Mines on Navajo Nation**, T. Rock and J.C. Ingram, *Human Biology*, 92, 2020, 1-8.
- **Dissolved Uranium and Arsenic in Unregulated Groundwater Sources - Western Navajo Nation**, L. Jones, J. Credo, R. Parnell, J.C. Ingram, *Journal of Contemporary Water Research & Education*, 169, 2020, 27-43.
- **Traditional Sheep Consumption by Navajo People in Cameron, Arizona**, T. Rock, R. Camplain, N.I. Teufel Shone, J. C. Ingram, *International Journal of Environmental Research and Public Health*, 16, 2019, 4195, doi:10.3390/ijerph16214195.

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 - US Environmental Protection Agency (95437709)



QUESTIONS

