



Gold King Mine Spill **Diné Exposure Project**

HONORING TRADITIONAL KNOWLEDGE IN UNDERSTANDING SHORT TERM EXPOSURES OF NAVAJO COMMUNITIES AFTER THE GOLD KING MINE SPILL

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Partnerships:



Funded By:



National Institute of
Environmental Health Sciences



Agnese Nelms Haury Program
in Environment and Social Justice



Before



After



Before



After

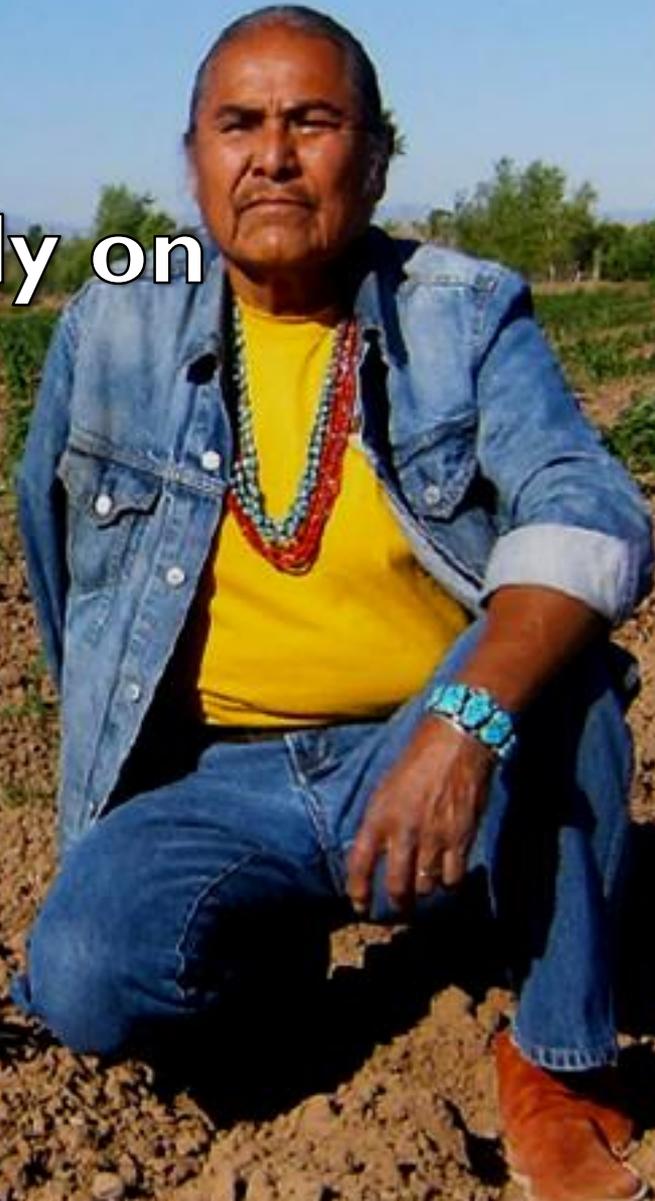


“...absolutely
devastating to our
agricultural families
because many do rely on
farming for their
livelihoods.”

Chili Yazzie

Navajo Farmer

Shiprock Chapter President



Regulatory Perception

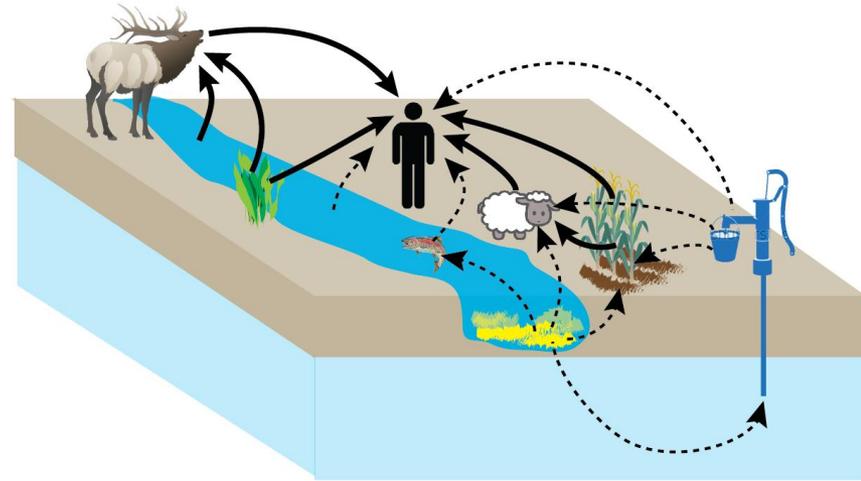


Regulatory Perception



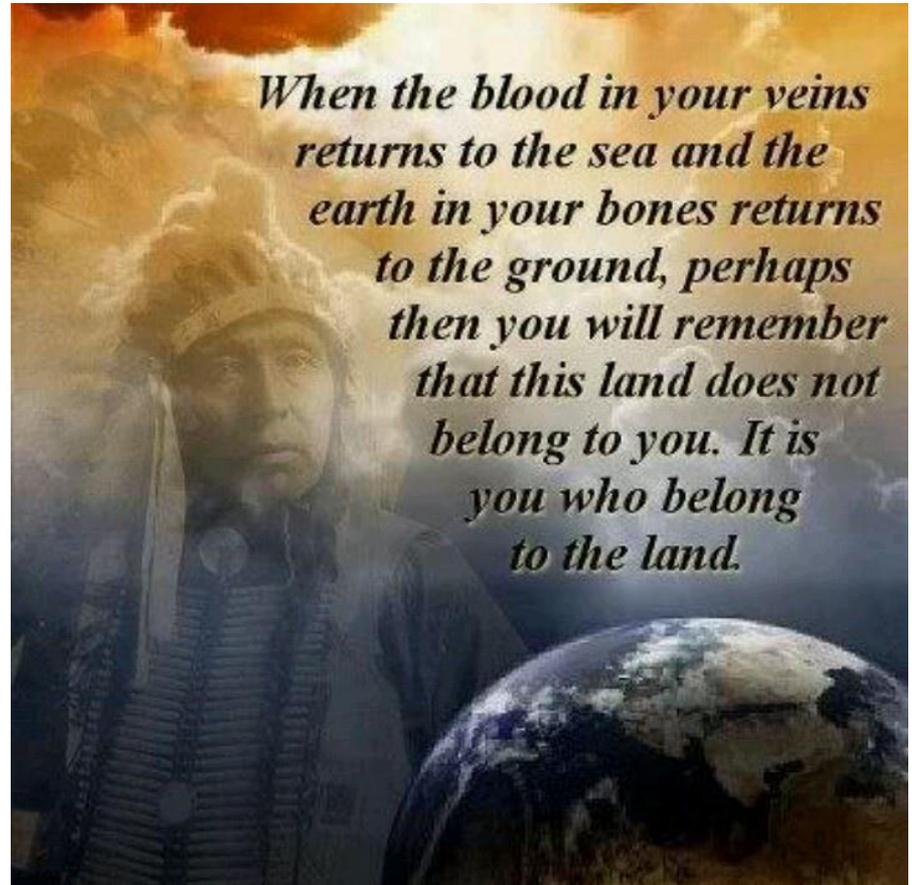
vs.

Diné (Navajo) Reality



TRIBAL PRESENCE NEEDS TO BE RESTORED ON THE LAND

Tribal worldviews and wisdom will be vital to the future of humanity.



THE PROBLEM



- EPA contractors released 3 million gallons of acid mine drainage into the Animas and San Juan Rivers, which flow through the Navajo Nation
- EPA hauled in water contaminated with oil for crop irrigation and live stock
- The result?
 - Very high community concern about human exposures, but also their crops, livestock and the wildlife for which there is a strong connection
 - Much community debate about using the river water again. Many are still without water and have lost their crops.
 - Very high perception of risk
 - Very high lack of trust in outside entities



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NAVAJO COMMUNITY HEALTH REPRESENTATIVES (CHRS)

- Established in 1968
- Goal: improve the general health status of the Navajo people through direct home health care, community health care and health education in coordination with tribal and IHS programs
- CHRs are paraprofessional staff.
- Paid employees of the Navajo Nation
- Previously conducted a biomonitoring and drinking water study with CDC
- During the Spill were engaged in emergency response going door-to-door to warn residents along the River



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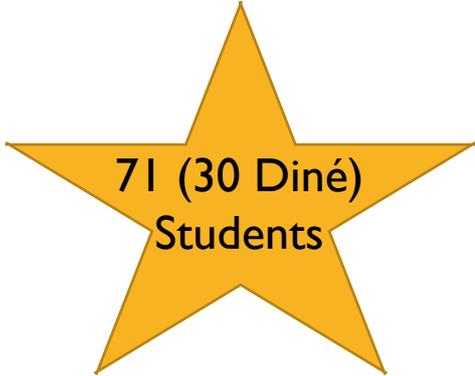
PROJECT GOALS

- 1. Understand human exposure to the Spill**
 - Household environmental samples for arsenic and lead
 - Personal samples of urine for arsenic and blood lead tests
 - Survey on activities involving the River
- 2. Find out levels of arsenic and lead in environmental samples from 3 Chapters for one year**
- 3. Survey what people think about risk from the Spill and report back measured risks**





TIMELINE & MILESTONES



Jan: Navajo IRB Approval

Feb: Focus Group Prep

Feb: 3 Listening Sessions & Teach-In

Mar: R2I Funded!

Mar: 2nd Env. Sampling

Apr: Haury Funded!

May-Jun: Focus Groups

Jun: 3rd Env. Sampling

July: Survey & SOPs

Aug: Household Sampling

Lab and Data Analysis

12 Teach-Ins in 2017!

Cross-watershed Teach-In

Mar: Water Results Reported

Aug: Individ. Household Report back

NM Testimony

Nov: Visit GKM

Dec: Community Household Report back

2015

2016

2017



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METHODS



BUILDING TRUST IN THE COMMUNITIES



“I need to know people are taking action to do something together for the water because we need to ...”

-Teach-In



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METHODS: OVERVIEW

- Study Population:
 - Families with children 1-11 years
 - Living in Aneth, Shiprock, Upper Fruitland Chapters
- Data Collection
 - focus groups used to identify potential exposures and activities that involve the River
 - Navajo Community Health Representatives
 - Recruitment
 - Data collection
- Household samples:
 - Blood (adult, child)
 - Urine (adult, child)
 - Drinking Water
 - Dust wipe
 - Yard Soil
 - Questionnaire about activities with the River, changes in dietary habits, risk perception, and potential other exposures



HOUSEHOLD SAMPLING

Aug 8-12, 2016

✓ Worked with Navajo CHRS

→ Delivered results in August 2017 to participants, then community in Fall 2017



Researchers measuring effects of mine spill

BY DONOVAN QUINTERO
NAVAJO TIMES

SHIPROCK — Community Health Representative Shirley Cisco has lived by the San Juan River all her life in Hogback, New Mexico. Before the Gold King Mine spill a year ago, she says her family used the river to water their farm, water their livestock, and her grandkids played in it.

After the spill, it all came to a crashing halt.

Now Cisco says her work, as a community health worker has become more important to her since she was given a chance to help assistant professor and extension specialist Karletta Chief with the De-



NAVAJO TIMES | DONOVAN QUINTERO

Associate professor at the University of Arizona Paloma Beamer, right, has her blood drawn and checked by CHR Corena King with the Shiprock office (left), for any lead contamination Friday in Shiprock, New Mexico.

have all different levels of risk." Added Pine, "As a consumer, and community member, I still believe in their planting, in their way of life, how they were raised traditionally. That's how I support them."

Pine said while driving to work, she made a stop at a food stand where an elderly farmer was selling kneel down bread. She said she stopped and spoke to him about his harvest and how the spill had affected him and his selling.

After she bought four pieces from him, Pine said, he was very thankful.

"He told me I was one of the first persons to actually stop by, she said. "He started crying. I told him 'It's not a



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RESULTS



HOUSEHOLD SAMPLING

	<i># of Samples by Chapter</i>			
	Upper Fruitland	Shiprock	Aneth	TOTAL
Questionnaires	18	20	21	59
Adults				
Blood Lead Test	18	21	22	61
Urine	18	21	21	60
Children				
Blood Lead Test	11	14	6	31
Urine	11	11	5	27
Soil	18	17	15	50
Water	18	17	15	50
Dust	18	17	15	50

- This does not reflect the total number of duplicate samples taken from each home, which varied from 2 to 4 water samples. Numbers only reflects individual homes.



SUMMARY

Overall Household Study Results



← BEWARE

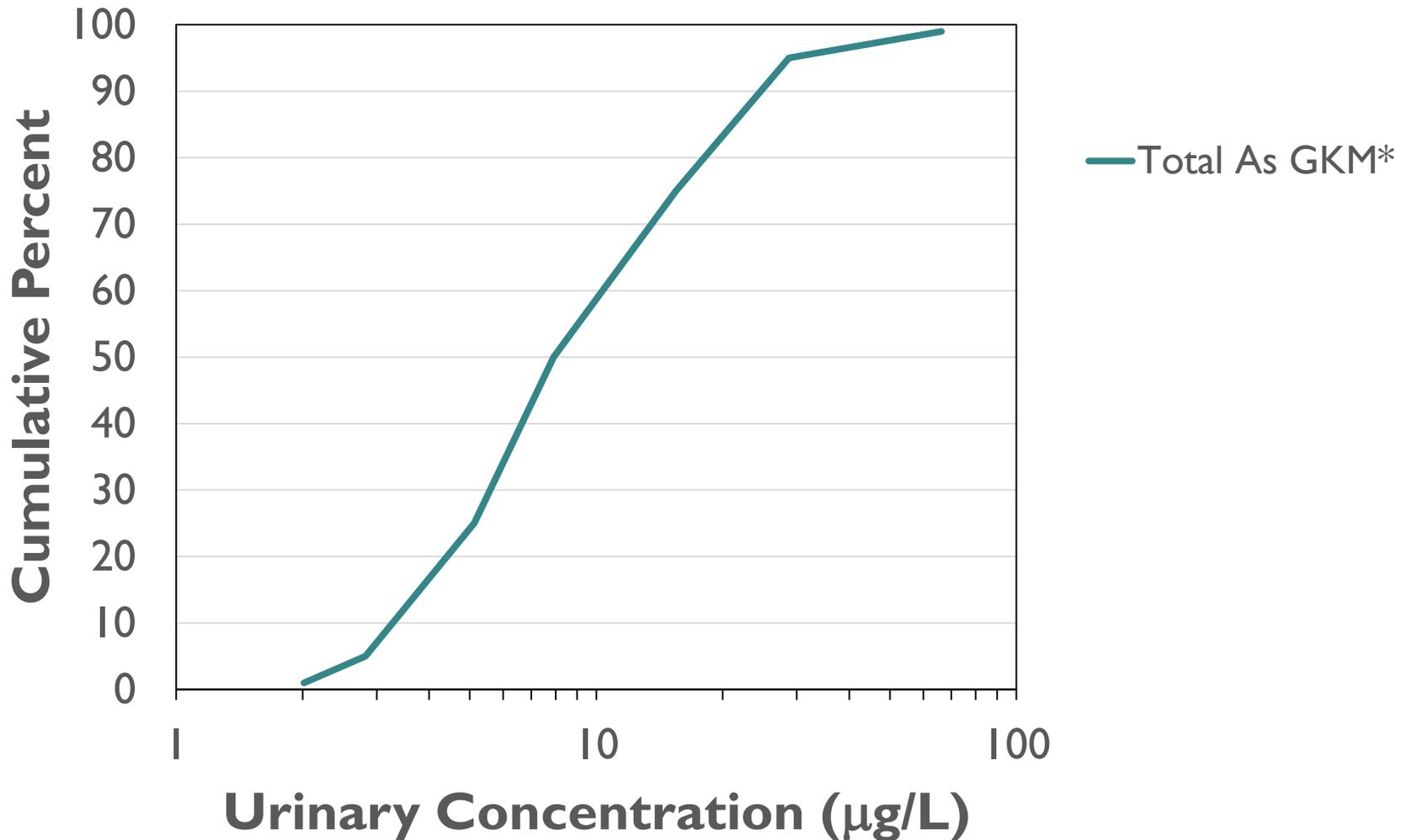
← NEED MORE INFORMATION

← OK

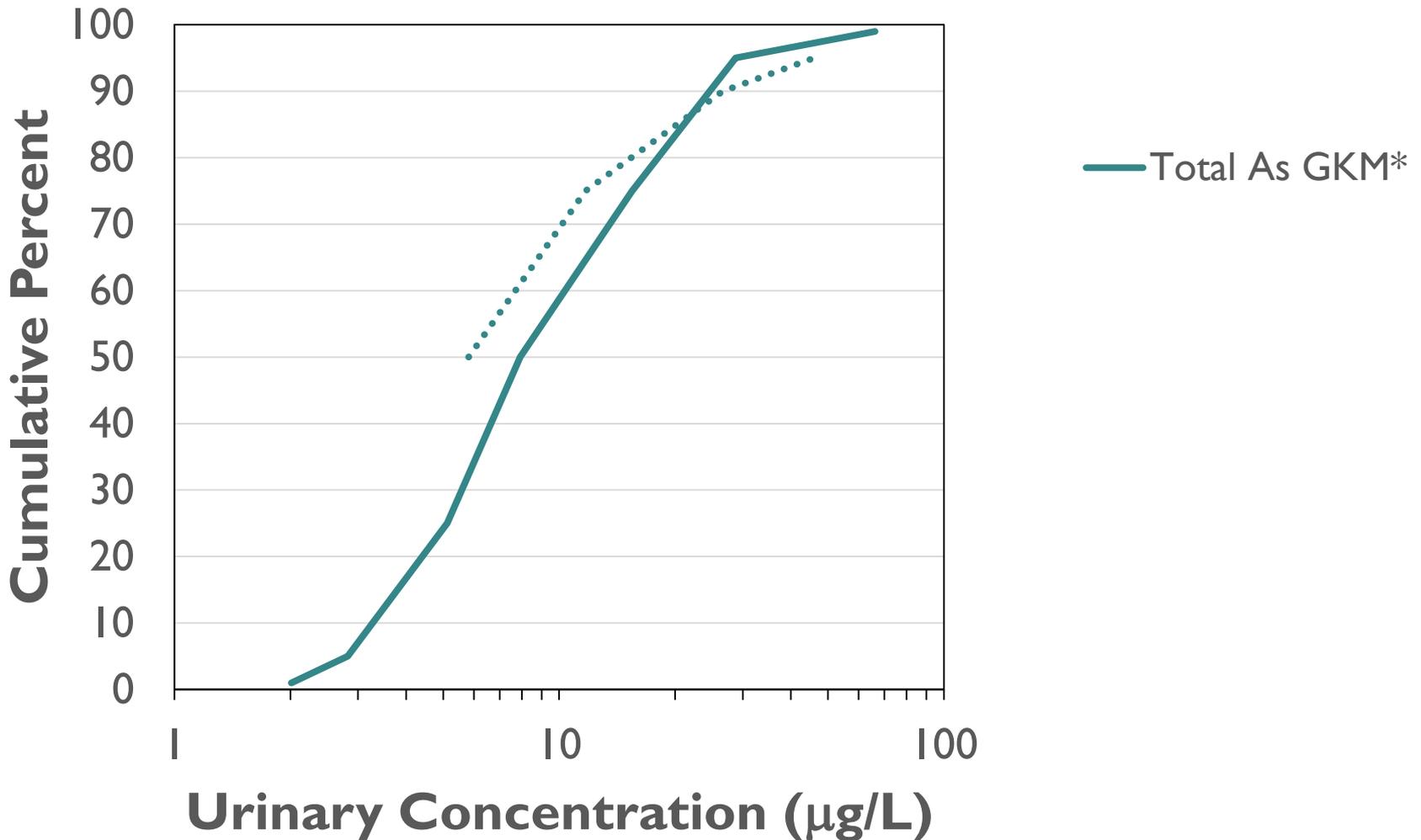
	Main Finding for Arsenic (Béésh tábáhá)	Main Finding for Lead (Béésh dílyíhí)	Compared to:
Blood	<i>Not tested</i>	Almost all (85 out of 87) met guideline except for 2	CDC Action Level
Urine	Slightly more exposed to arsenic than other people in the US (about 5 out of 100 people are over the level)	<i>Not tested</i>	NHANES 98 th Percentile (2 out of 100 people in the US are over this level)
Drinking Water	Almost all (60 out of 62) met regulation (except 2 water samples in Aneth, UT hauled from Bluff Water Works)	All 62 samples met regulation	EPA Maximum Contaminant Level
Yard Soil	Almost all (46 out of 48) samples met regulation (except for 1 in Shiprock, NM and 1 in Upper Fruitland, NM)	All 48 samples met regulation	NM Soil Screening Level
House Dust	All 49 samples met guideline	Almost all (48 out of 49) met guideline (except for 1 in Upper Fruitland, NM)	Arsenic: HUD Minimum Lead: HUD Lead Dust Hazard Action Level – Interior Floors



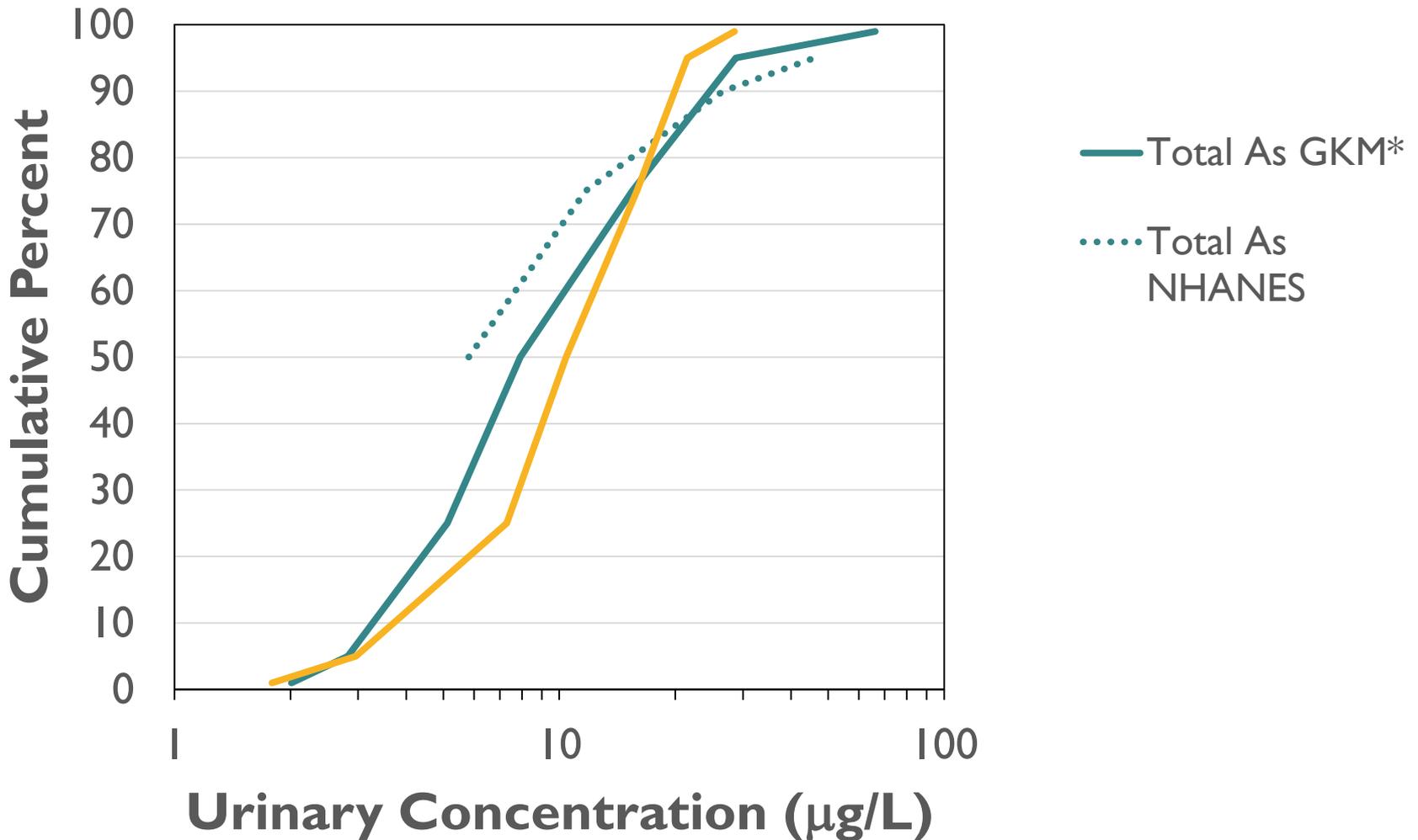
RESULTS: AS SPECIES URINE CONCENTRATIONS (N=85)



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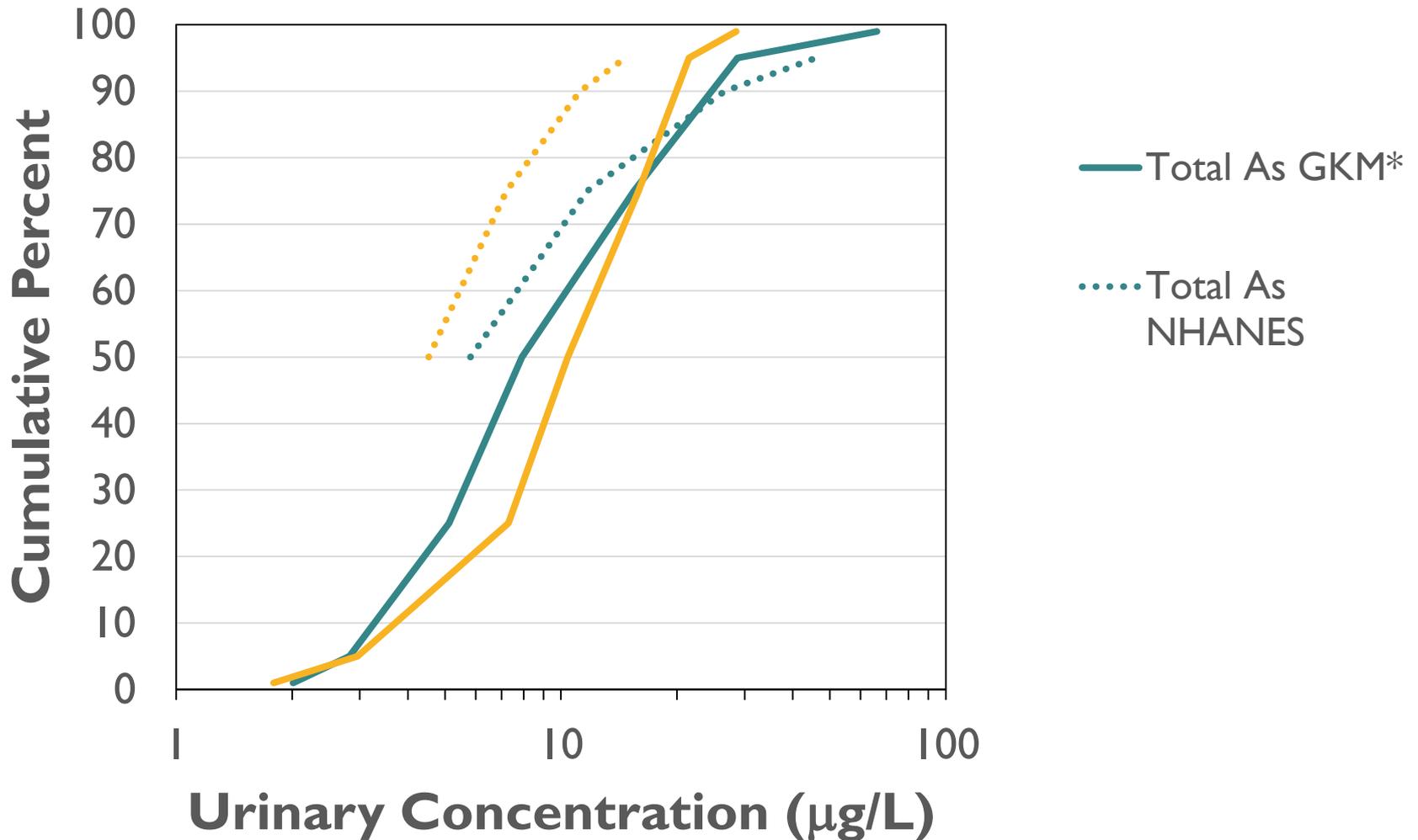
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* $p < 0.001$ from one-sided t-test values

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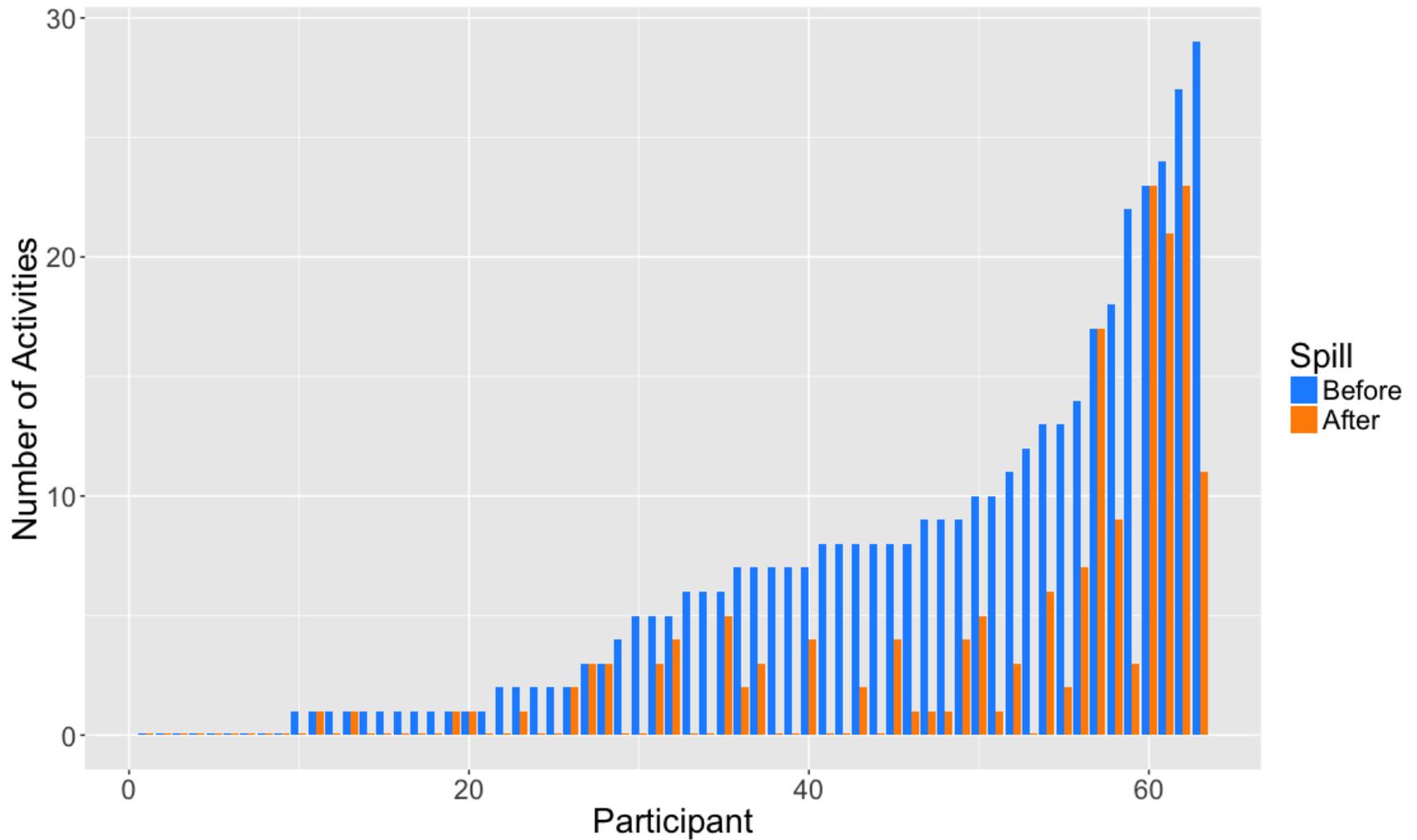
*p<0.001 from one-sided t-test values

ACTIVITIES TALLIED FROM QUESTIONNAIRE

Activity Categories	Number
Livelihood	9
Recreational	12
Cultural and Spiritual	14
Arts and Crafts	7
Total	42



ADULT ACTIVITIES PRE- & POST SPILL





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**COMMUNICATING RESULTS
DATA → COMMUNITY**



CONCLUSIONS

- Navajo CHR Partnership allowed for
 - local capacity building,
 - increased trust, and
 - ability to collect sensitive samples
- Next Steps
 - Conduct risk assessment using the 42 activities with the River
 - Develop methods to communicate long-term health risks
 - Develop Spill Response Handbook for CHR



● Abandoned Mine

UT CO

Upper Fruitland, NM

Shiprock, NM

Aneth, UT

NAVAJO NATION

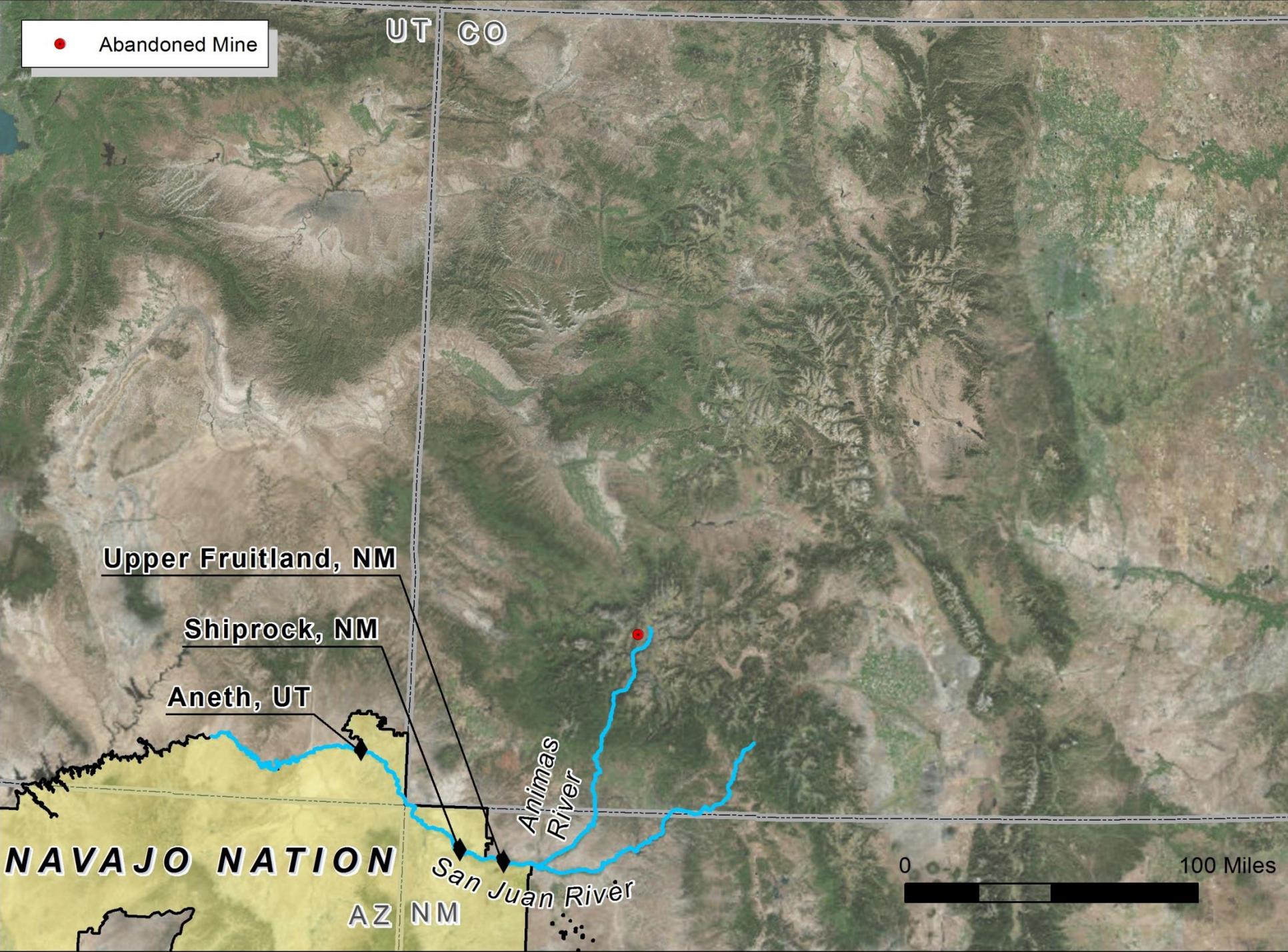
AZ NM

Animas River

San Juan River

0

100 Miles



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Upper Fruitland, NM

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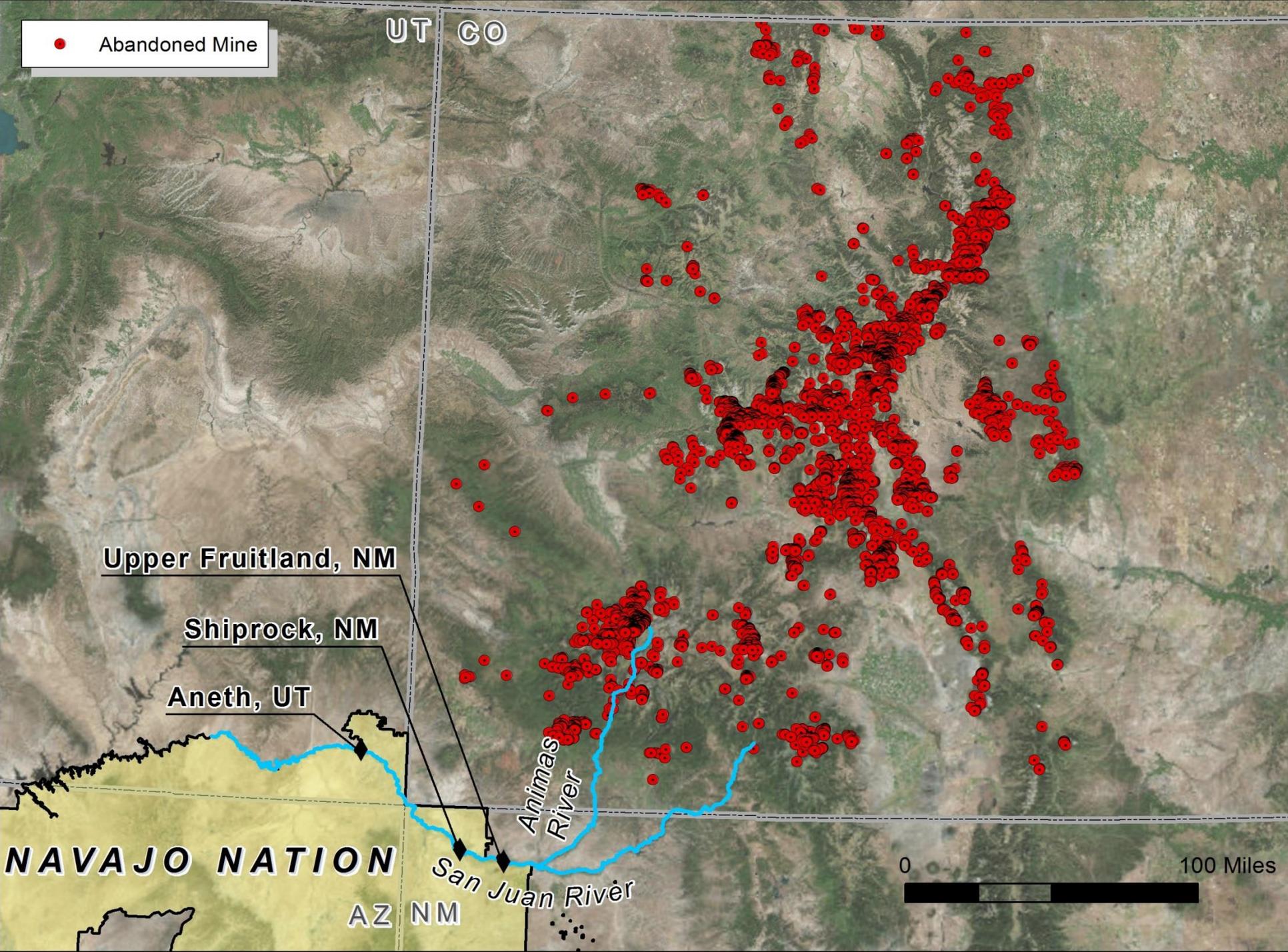
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FUNDING ACKNOWLEDGEMENT



National Institute of
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1R21ES026948-01



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Superfund Research Program
The University of Arizona



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NIH A National Institutes of Environmental Health Sciences Center at the University of Arizona.

SWEHSC Grant Number – P30 ES006694

Training Grant Number – T32 ES007091

1P20MD006872

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5P50ES026089-02

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