A Traditional Ecological Knowledge Approach to Farming & Land management practices

Native Health Matters + Local Environmental Action Demanded

NOFA Vermont – February 18, 2023

Native Health Matters
and
Local Environmental Action Demanded

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Traditional Ecological Knowledge Technologies for
Remediation & Agriculture

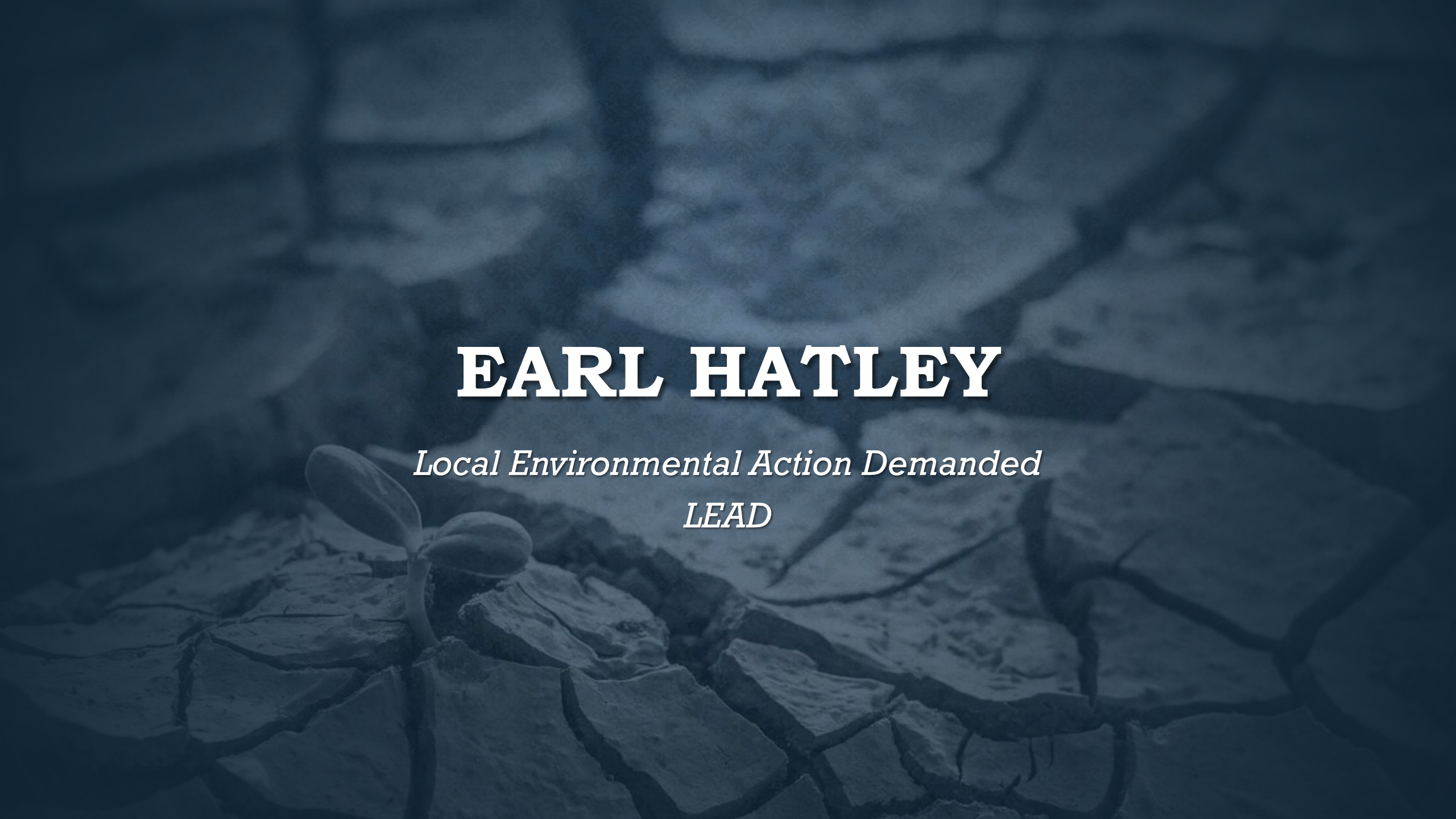
Tim Houseberg, American Indian President, Native Health Matters

Earl L. Hatley, MA/ABD (Abenaki Nation of Missisquoi), President

LEAD Agency, Inc.

Local Environmental Action Demanded

www.leadagency.org, earlhatley77@gmail.com



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Local Environmental Action Demanded

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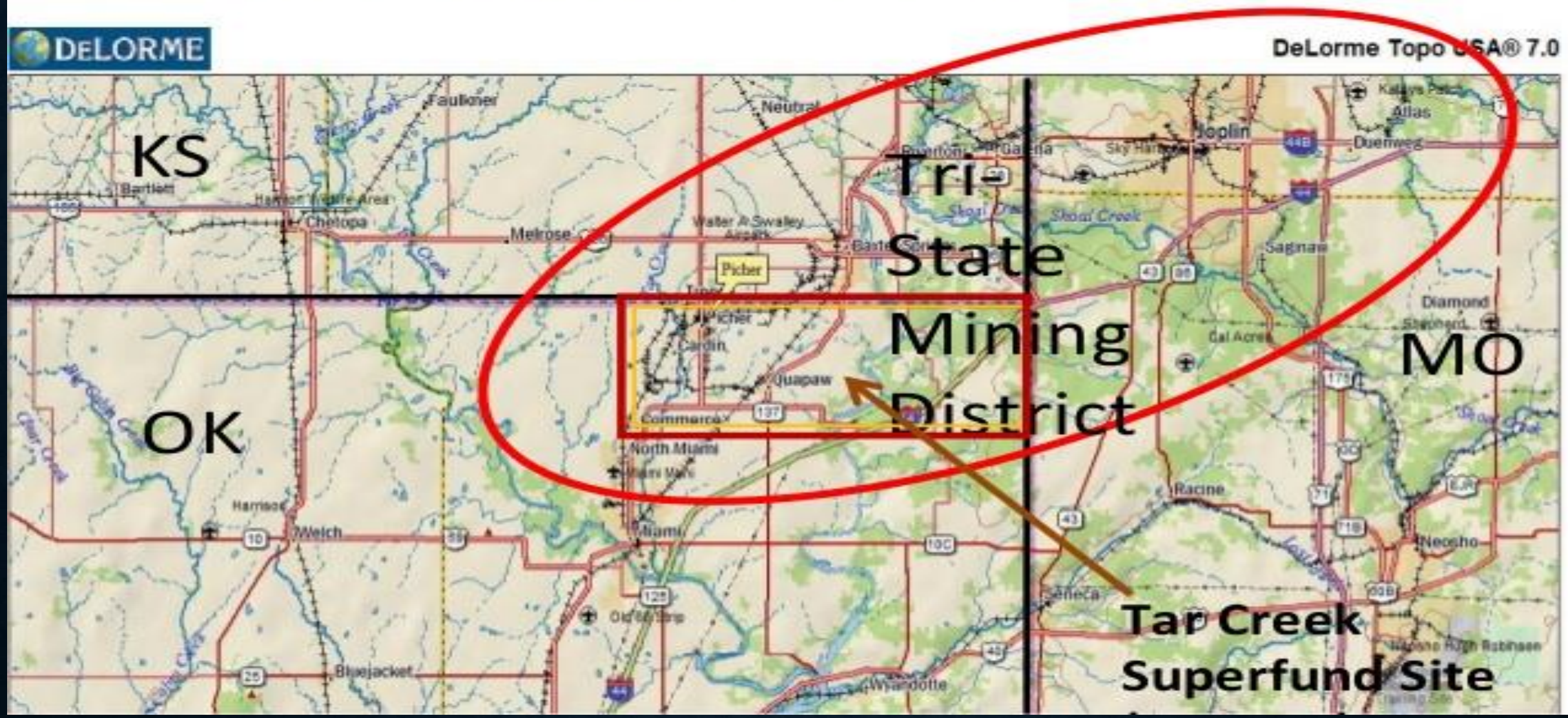
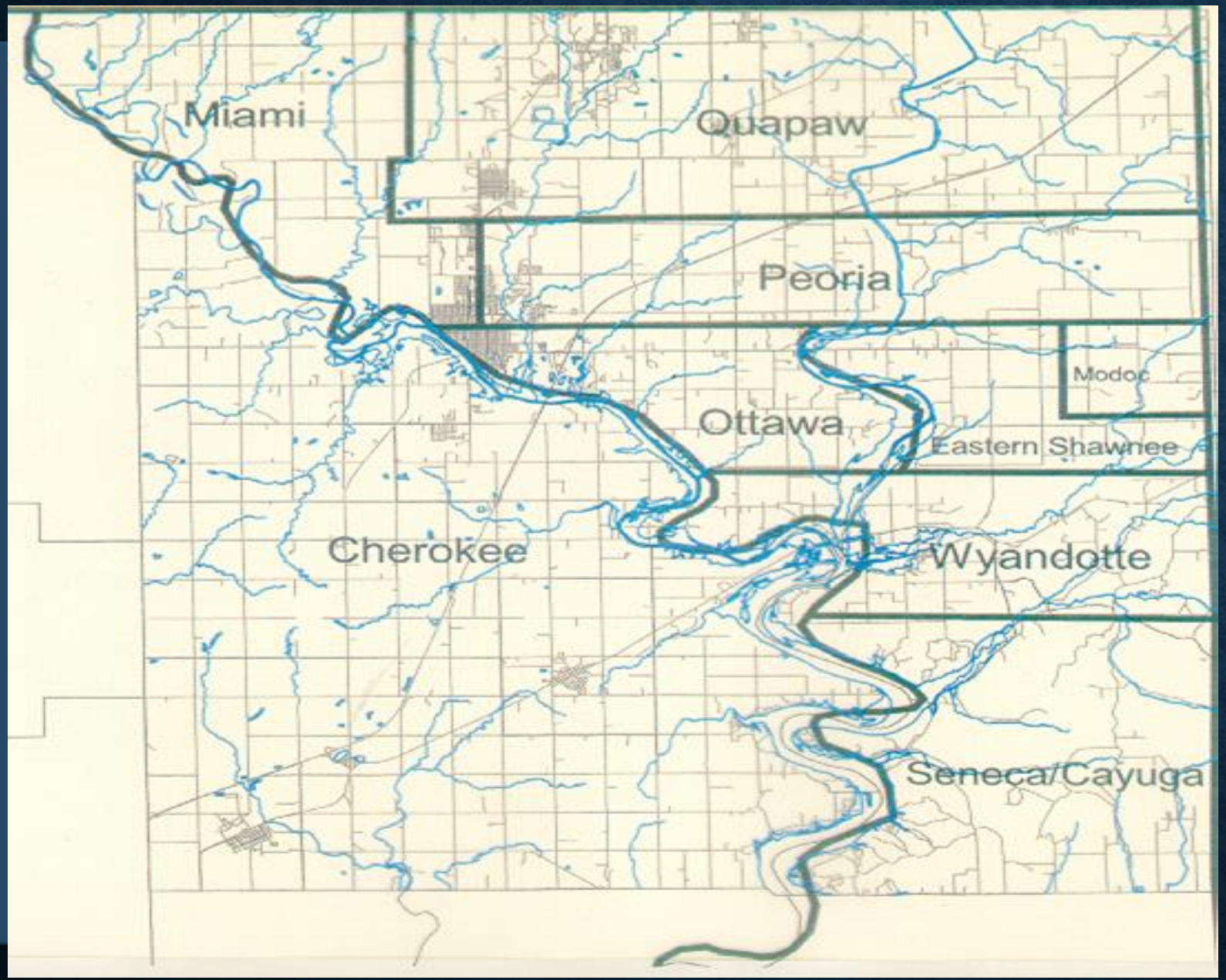
TAR CREEK

Superfund Site

Location: Tri-State Pb-Zn Mining District ca. 1850-1970 ~ 2,500 Sq. Mi.





APPROXIMATELY 1,500 ACRES OF LAND HAVE BEEN REMEDIATED UNDER OU-4.

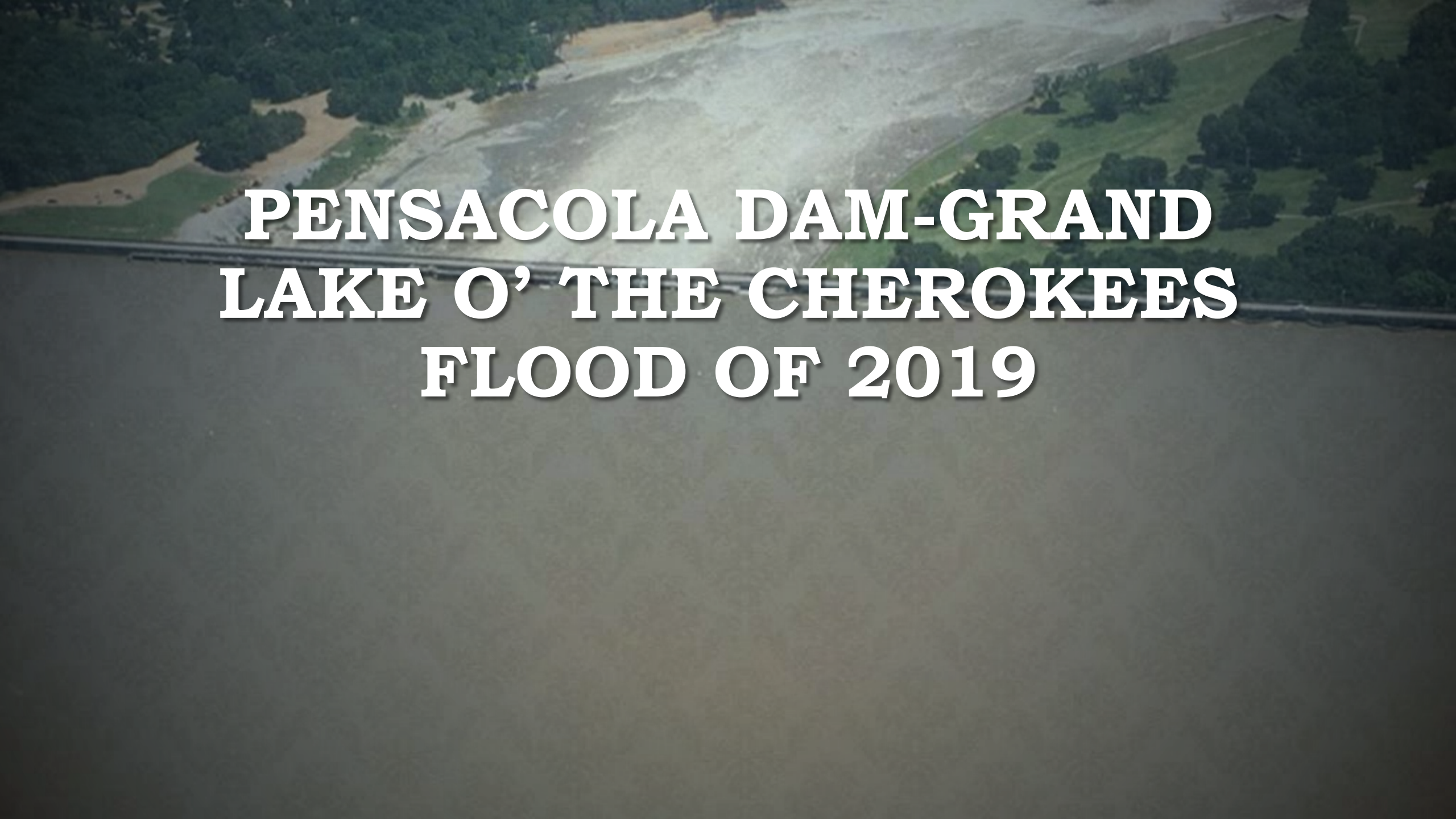
<u>THE TAR CREEK SUPERFUND SITE</u> IS DESCRIBED AS HAVING 'NO CLEARLY DEFINED BOUNDARIES," THE APPROXIMATE SURFACE AREA OF OU5 IS ABOUT 437 SQUARE MILES OR ABOUT 280,000 ACRES.

Tar Creek!

Metals of Primary Concern:

Lead, arsenic, cadmium, manganese, iron and zinc

- According to ATSDR TOX Profiles, 2003:
- Lead: long-term low level exposure (10 micrograms/deciliter and above) can result in pre-term birth, decreased IQ and growth in children, increased blood pressure in middle-aged males, impaired learning and reduced birth weight.
- Cadmium: Long-term low level (0.001 – 5 mg/kg/day) exposure produces renal or kidney damage and increased blood pressure, lung disease, diabetes, weak bones and cancer.
- Arsenic: Long-term low level exposure (50 – 500 ug/kg/day) causes skin or lung cancer, systemic effects and skin lesions.
- Iron: Chronic ingestion of high levels causes diabetes, liver disease, myocardial infarction, myocardiopathy and heart attack.
- Manganese: Exposure is associated with Parkinson's Disease, ADHD and nervous system problems.
- Zinc: At high levels can cause latent liver dysfunction, pulmonary fibrosis, lower levels of HDL (high density lipoprotein cholesterol).



PENSACOLA DAM-GRAND LAKE O' THE CHEROKEES FLOOD OF 2019

TRADITIONAL CLEANUP METHODS PROBLEMATIC

- *Chat piles are waiting to be sold on market as commodity;*
- *Chat covered soils are scraped down to acceptable level for metals the fresh soil backfilled, soil amendments applied and seeded.*
- *Running out of local sources for top-soil.*
- *EPA seeking alternatives for large site, i.e., soil amendments and seeding without scraping wherever possible.*
- *Using spent mushroom factory compost and poultry waste as amendments. Now turning Tar Creek green (new orange!)*

BIOCHAR & HEMP REMEDIATION PILOT PROJECT

Step One:

Use biochar to clean excess nutrient loading from Grand Lake;

Tar Creek Superfund Site Application:

Prepare approximately six pilot plots of varying contaminated areas of the site for introduction of biochar & hemp, just biochar & just hemp;

Continuous sampling during growing season;

Sample resulting soils of plots at varying depths and finished hemp crop for heavy metals of concern;

Evaluate results for EPA Feasibility Study.

EARL L. HATLEY, MA (ABENAKI NATION OF MISSISQUOI) PRESIDENT, LEAD AGENCY

- *Local Environmental Action Demanded (LEAD) Agency, Inc.*

- *www.leadagency.org*
- *earlhatley77@gmail.com*

WATERKEEPER® ALLIANCE
MEMBER

Native Health Matters

TIM HOUSEBERG

Native Health Matters

Indigenous-led soil water & air in-situ remediation via the application of biochar microbes and crop production

This process combines ancestral knowledge and innovative practices from Indigenous ecological knowledge, and uses bio char with a variety of native non-GMO microbes and Plants to remediate soil, water, & air.

Traditional Ecological Knowledge

The collective storehouse of human knowledge about the natural world is commonly called “traditional ecological knowledge” (TEK) and it can be defined as “the knowledge base acquired by indigenous and local peoples over hundreds of years through direct experience and contact with the environment.”

What are Microbes

Microorganisms (microbes) are organisms that are too small to be seen by the naked eye. Microbes have evolved a variety of enzymes to break down contaminants, using them as an energy (food) source. The role of a microbe is to recycle the seven million organic molecules of life. They are the greatest natural waste disposal workforce on the planet.

Bio Char

A developed, and patented a 'pyrolysis' technology which operates kilns at >1200 degrees Fahrenheit under a vacuum. The process produces clean emissions while generating pure organic carbon from the wood cellulose.

The process is unique in that it incorporates both “cation and anion exchange” properties into the carbon, which allows for the binding of specific deleterious impurities (toxins) and salts whilst permitting advantageous nutrients to be bio-available to flora.

Why are Microbes Important

Enzymes released by the microbes break the contaminant/organic matter down into digestible pieces.

The contaminant/organic matter is consumed as food by the microbes and ends up as a soil amendment. The remains of the hydrocarbons, such as carbon dioxide and water, are harmless to soil.

- Exist solely to recycle.
- Extremely versatile - breakdown a wide variety of materials including fossil fuel hydrocarbons.
- Extremophiles - thrive in extreme environments where other life forms cannot exist.
- Are found everywhere and make up an estimated 35% or more of our planet’s life.
- They represent the majority of soil microbes.

Phytoremediation Plants

Phytoremediation technologies use living plants to clean up soil, air, and water contaminated with hazardous contaminants. It is defined as "the use of green plants and the associated microorganisms, along with proper soil amendments and agronomic techniques to either contain, remove or render toxic environmental contaminants harmless".

Phytoremediation is a cost-effective plant-based approach of environmental remediation that takes advantage of the ability of plants to concentrate elements and compounds from the environment and to detoxify various compounds.

The concentrating effect results from the ability of certain plants called hyperaccumulators to bioaccumulate chemicals. The remediation effect is quite different. Toxic heavy metals cannot be degraded, but organic pollutants can be, and are generally the major targets for phytoremediation.

USDA/NRCS Assistance

- Racial Equity and Environmental Justice

NRCS Assistance

- Navigating the NRCS financial assistance program to benefit your conservation goals.
- EQIP - Core Conservation Practices
- Soil Carbon Amendment 336

https://www.nrcs.usda.gov/sites/default/files/2022-11/336-NHCP-CPS-Soil-Carbon-Amendment-2022-sm.pdf

- Nutrient Management 590
- https://www.nrcs.usda.gov/sites/default/files/2022-09/Nutrient_Management_590_NHCP_CPS_2017.pdf

- Indigenous Stewardship Methods Evaluation 222
- https://www.nrcs.usda.gov/sites/default/files/2022-10/FY23_CEMA%20222_Indigenous%20Stewardship%20Methods%20Evaluation.pdf

- Soil and Source Testing for Nutrient Management 217
- https://www.nrcs.usda.gov/programs-initiatives/eqip-environmental-quality-incentives/eqip-cpas-dias-and-cemas


The Indigenous Production Trade Alliance


nativehealthmatters.org
leadagency.org
info@nativehealthmatters.org