

Hello My Name is Donny Nelson, I'm a third generation farmer and rancher from Keene ND and the founder of the Salted Lands Council. I did so because of my experience and concerns for the 1 time use of fresh water and the extreme amounts of salt water that are produced in the Bakken. I have seen Bottineau County's salted lands and do not want my home to look like that. My family has 70 years' experience with the oil industry. When the oil industry is booming and profitable they tend to spend it on more exploration and harvesting of oil. When there is no money (such as now) they say we have no money to reclaim and beg to be excused from the obligations of North Dakota's statutes and rules. Unfortunately, both the Health Department and the Oil and Gas Division under the guidance of the Industrial Commission have accommodated them. They do so leaving the surface estate damaged and if we do nothing else, we must all, at least admit it has been damaged and have an accounting of those acres.

From the point of wildlife, my operations and my neighbors operations support wildlife. Day by day in the development of the Bakken we have contended with an oil industry which does not immediately think of wildlife.

Our proposal is an HONEST LONG TERM reclamation plan provided by the advice of Kerry Sublette and numerous other science based colleagues, not what fencing crew or excavating crew they can hire cheapest. We are offering a 10 year reclamation model and during that 10 year period for reclamation of lands in the interglacial zone of Bottineau County time we propose to reestablish native plants. Our model will provide water that will welcome micro-invertebrate and believe it or not, ducks. That in itself will be a breakthrough for the farm and ranch community of Bottineau County which is not famous for its welcome of Ducks Unlimited.

Help us make sure that the entire Bakken doesn't look like the oil fields in Bottineau County. Many which contain wells which are totally depleted and which have no prospect of ever yielding an economic profit.

At this time we do not have new money to match the grants you might award us. If you grant us money we will drive forward to match it and any amount is greatly appreciated. In my view, we have created something unique, which no one else in the USA is doing and that's according to the people we have worked and met with in oil fields across the country.

We in the agricultural community, within the confines of oil fields, are of the opinion someone needs to match us. We have given our time, money, quality of life, and loss of production and wealth for over 7 DECADES and 3 to 4 GENERATIONS. If not started NOW, will we just take this forward for the next generation to deal with, or ANOTHER 7 DECADES. Who will pay for it then and how much more will it cost.



Kerry Sublette 11:00am May 6, 2020

Thank you for this opportunity to talk to you. I am an environmental engineer and for over three decades I have worked to restore soil and groundwater impacted by oil and gas exploration and production activities. I have worked with my colleagues on this proposal, Bert Fisher and Ken Carlson, for many years. Most relevant for you, Ken and I worked with the Energy and Environmental Resource Center (EERC) at UND at Grand Forks analyzing contaminated soils of Bottineau County. Our proposal for comparative remediation of several sites was approved but not completed because of diversion of funds by EERC for other activities.

I'll focus my attention today on remediation of brine or produced water spills on soils. Remediation and restoration of these sites is not rocket science, it requires open soils, water, calcium, drainage, and time to flush, collect, and dispose of salt. Cody Hatzenbuhler, Pan Ag LLC, who was the general contractor on the most hopeful reclamation project in Bottineau County, has demonstrated deep tillage is required to bring fresh water into contact with the salt and incorporate amendments where they are needed. The next steps were to be installation of drainage and collection of salty leachate for disposal. However, as happens all too often in the oil industry, cost pressures forced a termination of this demonstration project in favor for what appear to be quick fixes but are just temporary Band-aids. Complete restoration of brine impacted sites has not yet occurred in ND. The Salted Lands proposal seeks funds to demonstrate true restoration of these sites, demonstrate the threat they pose to waters of ND, and establish local protocols for expanding restoration throughout Bottineau County and beyond.

The oil and gas industry has a worldwide reputation for transferring much of the cost of reclamation to individual landowners and the public in general. In effect, the industry is not paying the full cost of production of the product it sells. In my experience, you typically get only the remediation and restoration that state and federal regulatory agencies require. Unfortunately, there is a conspicuous lack of consistent enforcement by state and federal agencies due to strained budgets, lack of sufficient training, or conflicts of interest when the states both regulate and profit from oil and gas production.

Let's look at just one example. The original innovator of fracking was George Mitchell, a Texan who when developing fracking techniques out of sight of regulators caused the destruction of drinking water resources in Wise County, TX. Although Mr. Mitchell was found at fault, the Texas Supreme Court excused him from his damages in the vicinity of \$300 million following his support of the election of two justices. North Dakota's fracking experience is renowned. Donny Nelson warns that the entire Bakken must not become another Bottineau County. Without real regulation and real responsibility in the industry Donny's nightmare can come true.

Fintan asked me to be the Old Testament Prophet spreading the gospel. The good news is that despite what you might hear, salted lands can be restored and it's not rocket science. It just takes know how and sufficient funding and enough pressure on the industry to do the right thing.



Dear Outdoor Heritage Fund Panel Members,

May 6, 2020

This is the first screen of several in support of Grant Application 16-11 (B) set for a brief presentation on May 8.

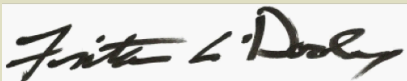
The title of our grant application is *Salted Lands and Water Inc. Bottineau's Big Four Salted Townships*. The names of the townships are Bentinck, Hastings, Renville, and Sherman. In fact there are many more townships because there are 40 oil fields in Bottineau County. Bottineau County is ground zero for brine damaged lands in the entire Williston Basin.

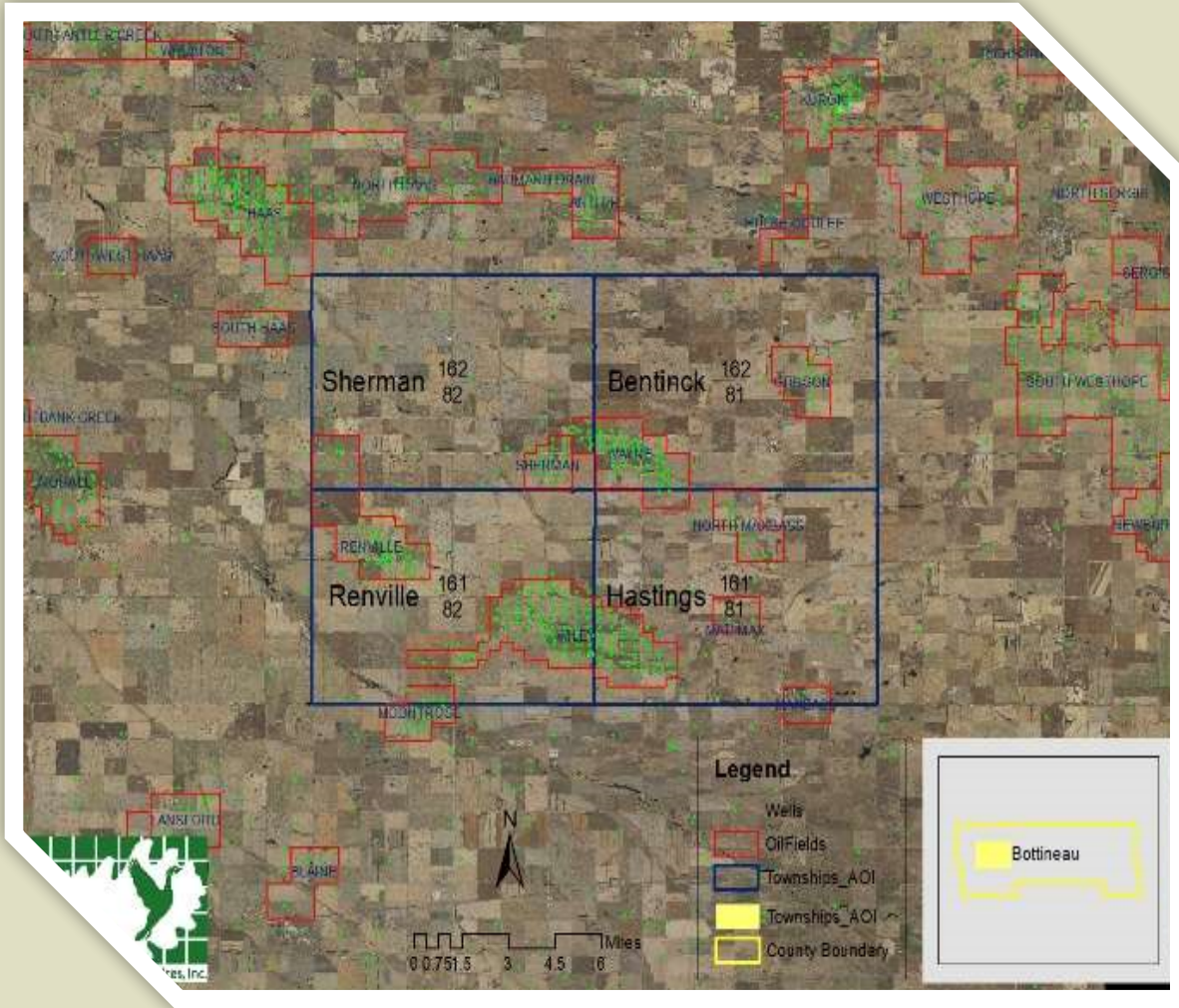
Our founder, Donny Nelson, of Keene, North Dakota visited the dead soil in Bottineau County and somewhat more emphatically than was said by David Glatt of the Health Department, "Over my dead body the entire Bakken will never look like Bottineau County." The nation's most senior expert, Kerry Sublette, sent this January 2000 photo of a gentrified oil field in Los Angeles County. You should heed his warning as if he were an Old Testament Prophet. Our tours will show isolates of death rather than vast contiguous devastation. The good news is contaminated acres, even the old ones, can be fixed and wildlife will return.

Donny Nelson will address our funding prospects. Our costly undertaking will demonstrate the honest cost of the remediation that Karlene Fine, Executive Director and Secretary NDIC promised the Bottineau County Commissioners on December 31, 2013. To good science and best engineering we add time, 10 Years in the intensive care ward. Ducks, deer will return to sites which now are so poisonous that there is not a single micro invertebrate. Ms. Fine promised what surface owners deserve reclamation accomplished under the "Statutes and rules currently exist that require impaired lands to be reclaimed to their original conditions.

Dr. Sublette warns us about governance and oil companies, "Complete restoration of brine impacted sites has not yet occurred in ND." Is this true?

Sincerely,





16-11 (B)

*Salted Lands and Water Inc.*

Bottineau's Big Four Salted Townships

OHF – 5/8/2020





**Bottineau County, ND--- Demonstration Project  
Identification and Quantification of Salt Contaminated Lands  
in Four Townships 144 Square Miles Using Satellite Images and Field  
Verification with a 40 Acre Reclamation Demonstration Project**

**Cooperating Entities**

**Applied Ecological Services, Inc  
Brodhead, WI 53520**

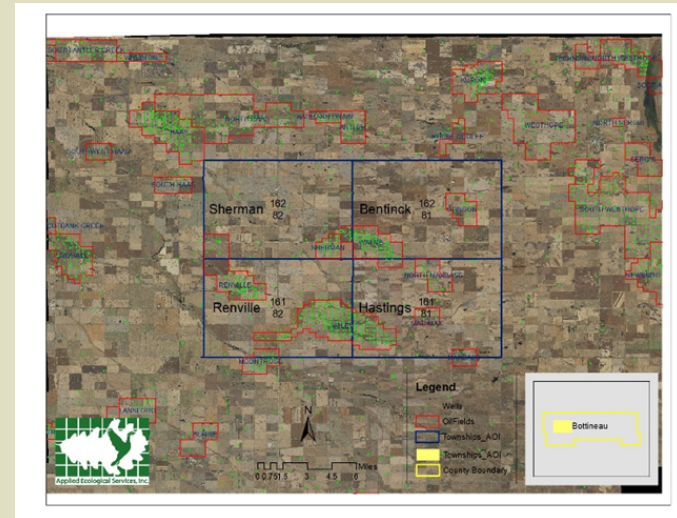
**Salt Contaminated Land and Water  
Council (SCLWC), Inc**

**Sublette Consulting, Inc**



## Project Goal and Areas of Interest

1. Demonstrate a pilot approach to 144 sq miles of four townships to identify and quantify the acreage of land that is contaminated with oil field produced water (brine).
2. Conduct a 40 acre demonstration reclamation project in one of the Bottineau's Big Four Salted Townships.
3. Integrate insights of landowners, state agency reports and satellite images to identify and predict extent of brine spills. Photos show vegetation, soil changes and plant growth anomalies across the years. Use artificial intelligence to predict lateral and vertical depth of brine. Use USGS insight to assess electro conductivity. Confirm predictions by field data truthed by farmers. Use QuickCapture App to uploaded photos and narratives. When possible use drones.
4. Reclaim surface estate in accordance with statutes and rules currently exist to original conditions and are based on sound scientific principles and engineering best practices.



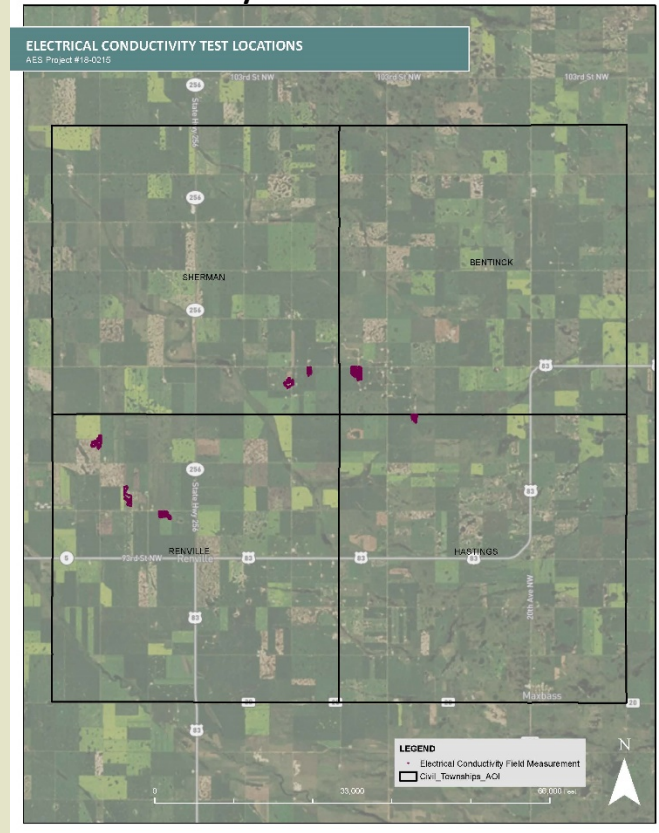


# Finding Brine Contamination on the Ground and Aerial Recognizance

Contaminated land delineated by owner **Daryl Peterson**



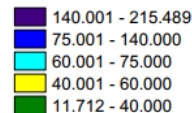
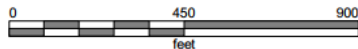
Electro Conductivity to be confirmed at 7 sites by **Marvin Nelson**





## Marvin Nelson Electro Conductivity Measurements

EC measurement at a site



- Below 40 where that's really normal conductivities and I would not expect any crop effects.
- 40-60 where that gets a bit high maybe some salt but likely not effect crops.
- 60-75 sensitive crops might start to be damaged, more tolerant crops likely not.
- 75-140 This is significant salt. Sensitive crops likely significant losses. Tolerant crops should get growth but likely yield losses.
- Over 140, significant effects on all annual crops.
- Usually around 180 to 200 no crop just tolerant weeds.



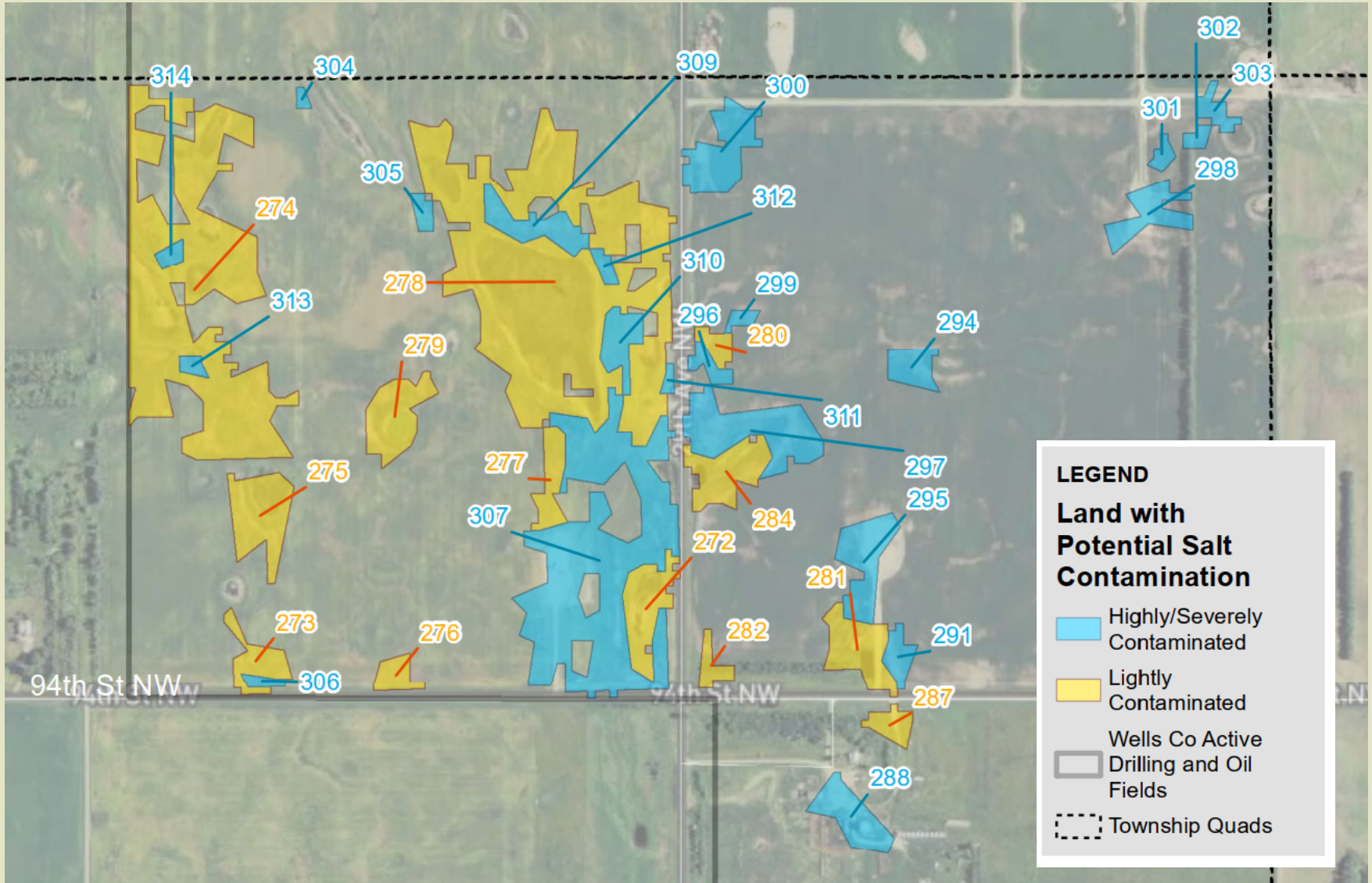


# Id of Contaminated Lands Artificial Intelligence Algorithm

- Satellite Images
  - July 28, 2019
  - September 16, 2019
  - July 23, 2018
  - July 13, 2017
- Modeled EC
- Image derivatives: NDVI, soil brightness index, vegetation chlorophyll index, etc
- Interoperated ground truth
- Random Forest
- Post processing



# Predicted Contaminated Land at Two Levels of Severity

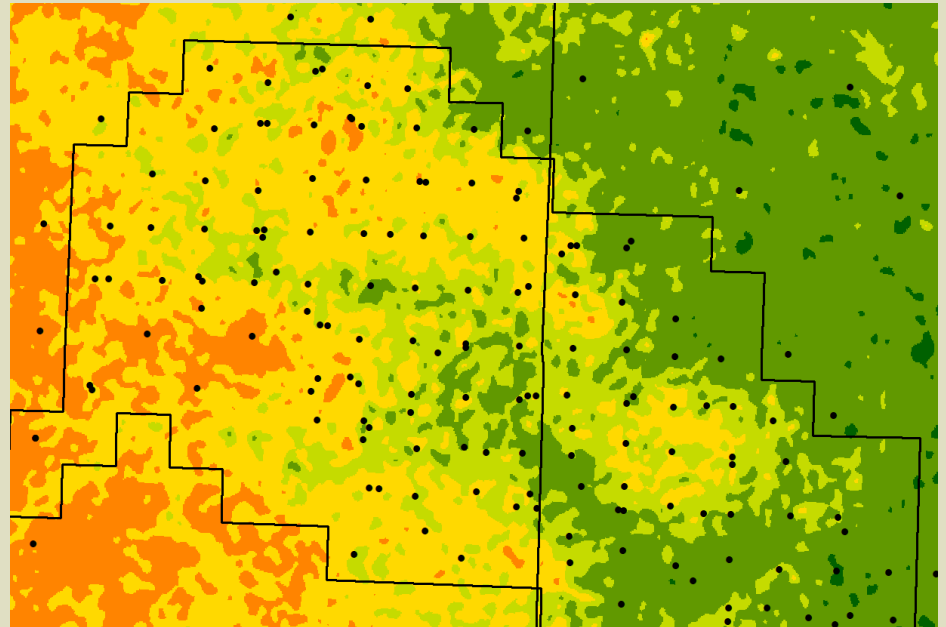


# Verification of the EC Modeling

- EC measurements from field was averaged per satellite image pixel. The measurements located close to the edge of the pixel were excluded from the average.
- 70% (965) of the measurement (1374) was used to develop a prediction model based on three dates of satellite images acquired in 2018 and 2019.
- 30% (409) of the measurement (1374) was used to verify accuracy of the predicted EC at unknow places.
- Ground truthing aided by QuickCapture App...then
- Do the work!

# Next Step: Distinguish Brine Spills from Natural Salinization

- Utilize Veteran Reclamation Scientist to Sort Photos.
- Use NDIC Oil and Gas Production Data to Map & Quantify Salt Spills to show Acreage of Contamination
- Test Water Movement to Predict Extent of Diminished Water Quality
- Use Lidar DEM to Simulate Flows from Geriatric Wells.





## Ten Components of Complete Restoration

1. Find the lateral and vertical limits of the brine contamination.
2. Design and complete a 10 year restoration program fit for the site.
3. Find the money.
4. Remove and bury surface crust of industrial salts.
5. Deep tillage
6. Integrate amendments
7. Establish cover crop then thereafter native plants.
8. Establish and use drain lines
9. Wash the soil if necessary establish irrigation system.
10. Dispose of brine down hole

Resurrect ND Legacy sites! The following slides show the phases.  
We can succeed because we have farmers, scientists and water.  
Use wetland ponds? Yes.



Brine sediments on typical  
Bottineau County Legacy site.

Test hole, oh do we need test  
holes!



This is not dig and haul. Skim off the brine crust. Bury it.





The crust of years of brine  
has been removed.





Reclamation Contractor/Owner Pan Ag Cody Hatzenbuhler finding the bottom of the hard pan.





Hard pan shattered about to be hit again.  
Cody's boots on right.





# Deep tillage after skimming off salt crust.





Farmers have manure and skill. They need other amendments and guidance from reclamation scientists.





Yup, that's manure, lots of it.



Wallboard gypsum reclaimed by Austin Bitz of Hangman Drywall and Dakota Gypsum Supply rather than buried in city dump.





# Deep tillage both ways





Drilling into a seed bed on a site that hasn't grown anything for decades.





A big duck nest. Successful hatch. We have not shown 10 years of soil washing, brine draining by tiling, down hole disposal or 10 years of testing to discover then incorporate missing nutrients.

