Onondaga Buffalo

Healing Land & Community

a native American experience

Early in 2005, I spoke to two elder chiefs at Onondaga Nation in central New York about strategy to improve the fertility and nutritional quality of the pasture where the Nation keeps its small herd of buffalo. For over 40 years, the Nation has kept as many as 40 head of American bison, and over the years, had learned to manage this native American herbivoire—quite a challenge, since this indigenous animal is accustomed an annual migration over hundreds of miles of open plains.

Each year, a few bison are sacrificed to provide meat for the Onondaga community. This keeps the herd small to reduce the herd's tendency to crash through the pasture fence and wander the countryside, startling citizens and disturbing dairy farmers.

The 160-acre pasture sits on an unusual geological feature—an alluvial outwash terrace laid down 12,000 years ago at the end of the last Ice Age at the south margin of the retreating continental ice sheet. A fast-flowing, west-to-east torrent of glacial melt water rushed into the wider, south-to-north Onondaga Valley. As the rapid eastward flow entered the slower, quieter waters of Onondaga Valley, its load of silt, sand and gravel was deposited as a delta at the mouth of the valley.

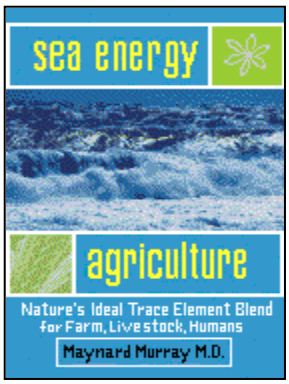
Recycle the Sea

"My research clearly indicates the reason Americans generally lack a complete physiological chemistry is that the balanced, essential elements of the soil have eroded to the sea. Consequently, crops are nutritionally poor, and the animals eating these plants are, therefore, nutritionally poor. We must alter the way we grow our food, the way we protect our plants from pests and disease, and the way we process our food.

From the start, my sea solids experiments produced excellent results, and it has now been conclusively proven that the proportions of the trace minerals and elements present in sea water are optimum for the growth and health of both land and sea life."

—**Dr. Maynard Murray**
Medical Research Doctor
Sea Energy Agriculture

The resulting thick bed of alluvial outwash is very stony, quite coarse soil, with a flat, gently rolling surface topography. This coarse sand and stone soil lacks clay, and is very well drained, with little capacity to retain water or nutrients. Soluble chemical fertilizers leach quickly though this coarse, boney blend, leaving behind poor soil with sparse vegetation.



In early April 2005, when pasture grass was only ankle-high, I scattered a 100-pounds of SEA-90 sea solid minerals on a test plot in the pasture behind the hay storage shelter. This was my first attempt to broadcast sea minerals by hand in an open field, and I fumbled with the re-calculation of the application rate from pounds per acre to cups per square foot.

Later, when I reviewed my arithmetic, I discovered errors, including how many square feet in an acre. The consequence of my numerical blunders was I

spread the sea minerals at twice Dr. Murray's highest dose. And **four times SeaAgri's highest recommended rate. Ooops!**

As a pioneer always exploring new ideas, materials and methods, I am accustomed to the inevitable failures inherent in a "trial-and-error" tradition of creativity. Often early errors become valuable, serendipitous lessons. But at double the highest dose, the hydrophilic salts suck water out of plant tissues, killing existing vegetation already growing in the soil. Most roots will survive, and quickly sprout vigorous, new growth to cover the soil thicker than before.

But killing vegetation wasn't the demonstration I wanted, certainly won't inspire my Onondaga friends, and might make them doubt the value of sea minerals. After all, farmers are programmed by conventional wisdom to believe salt will poison soil and inhibit plant growth.

Two months passed before I could return to inspect my test plot. Pasture grass was now knee-high, and from the pasture fence, I saw an obvious hole in the height of the forage. Approaching the test plot, I saw it was carpeted by a thin veneer of green, so I assumed my overdose of SEA-90 had killed the grasses, which had now just begun to regenerate.

I stepped into the test plot to look closely at the vegetation. The grasses were only an inch tall—not because they had died and were sprouting new leaves—but because the buffalo had clipped the crowns as close as they could. The animals ignored all surrounding forage, and chewed my test plot almost to the soil. In fact, I saw signs the buffalo had licked the soil to eat sea minerals directly, rather than wait for them to dissolve down into soil.

Delighted by my unexpected discovery, I decided to start a new test plot, and get it right this time. With another 100-pounds of SEA-90, and two 25-foot tape rules, I carefully scattered crystals on a new area along a tractor path, 200 feet from my first plot. Working methodically with 2-cup and tape measures, I created four adjacent test plots at applications rates of 1x, 2x, 3x, and 4x—where 4x was Murray's maximum recommended dose: **1-ton per acre**

Two weeks later, I returned to observe the results. The buffalo had already found the second plot. The 1x was nibbled on; the 2x was well chewed. But the 3x and 4x were both chewed as close to the ground as possible, just like my first test plot. But it seemed the buffalo were again licking the soil and eating the sea minerals directly. This wasn't the process I wanted to test, so I decided to try a third test plot.

On the opposite side of the tractor path, perhaps 100 feet away, with my two 25-foot tape rulers and 2-cup measure, I repeated my careful measurement and application, but this time only at 2x, 3x and 4x. Happily, a few minutes after I finished this chore, a thunderstorm came booming in from the west and saturated the pasture with a heavy rain. I knew from experience that this rain would thoroughly dissolve the crystals and wash the sea mineral into the soil, out of reach of salt-hungry buffalo tongues.

Two days later, I stopped back for an inspection. To my surprise, the buffalo had already discovered this new test plot. Again, they chewed the 3x and 4x sections to the ground, leaving just one inch of green stubs. And they were still licking the soil.

As I stood scanning the well-grazed soil, I sensed the buffalo now knew something was up, and they were on the alert for more. They now could smell the SEA-90 sea minerals, and would be looking for more. They had made their desire for these minerals emphatic and clear.

A few days later, I returned with my digital camera, hoping to capture a few clear photos of the test plots. To my surprise, the buffalo were standing around the farm equipment parked right of the gate. Before, they always were out of sight over the hill. I had never seen them so close—only 50 to 100 feet away.

Now, for the first time, they were right at the gate and I had to walk in the pasture within only a few feet in full sight of these large, semi-wild, horned animals. I am disabled, have difficulty walking, and unable to run. And I don't speak buffalo. I doubted it was wise to wander alone into their domain, so I called Chief Vincent Johnson on my cell phone.

Vince drove right over in his 4-wheeler. We went into the pasture and visited each of my three test plots. We hadn't talked in months, so I explained each of the test plots, and described the buffalo's response. The results were still clearly visible: the buffalo continued to graze each test plot to the ground. The buffalo's interest in SEA-90 sea minerals was as visible as the thin grassy stubble in all three test plots. No blade of grass inside any test area was higher than an inch, while forage only inches away was uneaten at 12 inches tall.

Chief Johnson revealed that two calves had died already that year from undiagnosed infections. We talked about the Nation's lack of veterinary assistance for buffalo. The best was send calf corpses to Cornell for autopsy by the large mammal veterinarian.

My reply was this is a sure sign of trace element deficiencies—precisely what SEA-90 sea minerals supply.

We agreed the buffalo had made their preference perfectly obvious, and SEA-90 sea minerals should be spread on the entire pasture—or as much as possible. The pasture is a quarter section—nearly 160 acres. A minimum dose of 500 pounds per acre will require a full 22-ton tractor trailer load, and would cost over $6000, likely more with rising fuel costs to truck dense crystals 3,500 miles from northwest Mexico.

Chief Johnson was certain the Council would approve the funds required, but the Council had big issues on its mind these days, including Onondaga Nation's lawsuit against New York State, Onondaga County, City of Syracuse and six corporations. It might take some time to get discussion and complete agreement on the soil restoration project.

We returned to an older conversation on glacial gravel dust from the nearby aggregate quarry. We agreed to get a truckload of

quarry crusher screenings—their rockdust by-product—to spread on pasture test plots at different rates. Next year we observe any effects, and learn about interactions of rockdust and sea minerals with each other, and the pasture soil and plants. I talked about test plots for various microbial inoculants, and seeding native forage plants, such as buffalograss and fireweed.

We left the pasture in twilight—too dim for sharply focused photos of the buffalo standing around the farm machinery. Vince and I sat outside the gate to discuss other issues and share stories. After 30 minutes, I climbed out of his 4-wheeler to depart. I looked over my right shoulder, but I didn't see any buffalo. Turning left, I saw they had wandered to my test plots, and were standing right on all three, looking right at us.

I laughed out loud, and pointed out the herd's new, attentive posture. Chief Johnson laughed, too, and we agreed these indigenous herbivore are both very instinctual and highly intelligent. They had watched us talk at the sea mineral plots. They understood we were doing this. They were stating their consensus for more SEA-90 sea minerals. They voted 100% for full scale treatment.

Opening Statement
of
The Onondaga Nation
Land Rights legal paper

The Onondaga People wish to bring about a healing between themselves and all others who live in this region that has been the homeland of the Onondaga Nation since the dawn of time.

The Nation and its people have a unique spiritual, cultural, and historic relationship with the land, which is embodied in

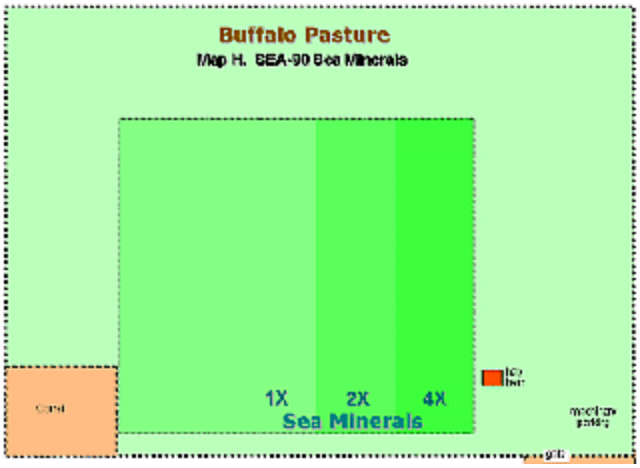
Gayanashagowa
The Great Law of Peace

This relationship goes far beyond federal and state legal concepts of ownership, possession or legal rights. The people are one with the land, and consider themselves stewards of it.

It is the duty of the Nation's leaders to work for a healing of this land, to protect it, and to pass it on the future generations.

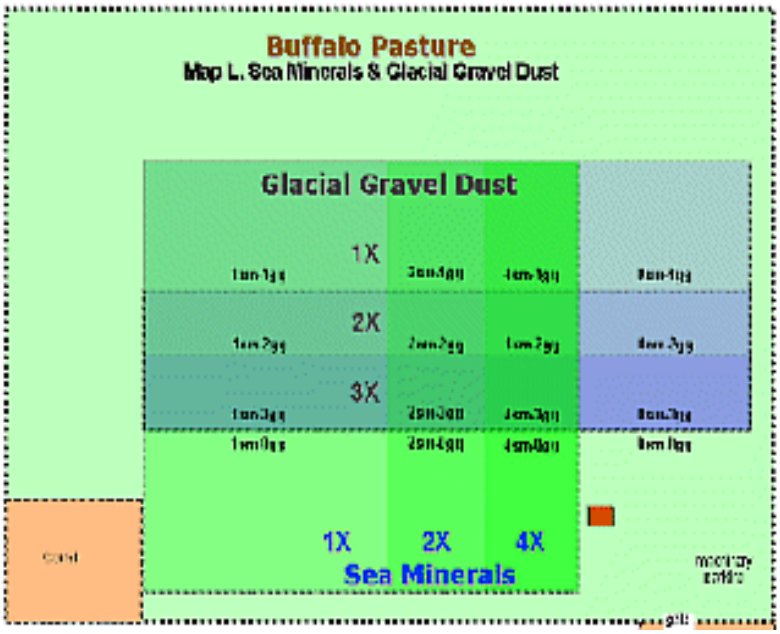
The Onondaga Nation brings this action on behalf of its people in the hope that it may hasten the process of reconciliation and bring lasting justice, peace, and respect among all who inhabit the area.

For various reasons, nearly a year rushed past before a 24-ton shipment of **SEA-90 sea minerals** arrived at Onondaga Nation. More delay was imposed by busy travel schedules and other projects. Soon, the growing season would end. Most plants had set seeds and were preparing to enter dormancy.



To spread fully soluble sea crystals in the fall season, when plant growth is slowing into dormancy will risk that winter snow and spring rain will leach at least some minerals out of the reach of roots. The pasture soil food web was very weak and porous, with low levels of clay, carbon and biomass, and poor capacity to capture and hold nutrients.

So, we agreed to hold the sea minerals under tarps over winter, and broadcast them early in the spring. This will assure the minerals are available to soil organisms and plant roots when their spring rush of growth begins, and more of nutrients are retained as biomass in and on the soil.



In March 2007, drawing on conversations with Chief Johnson and Adah Shenandoah, the buffalo manager, I developed a plan, with maps, to spread sea minerals on one area covering perhaps 2/3 of the pasture. My suggestion was to adjust the equipment for a minimum application rate, and make one pass over the entire area, second pass on half that area, and two more passes on a quarter of the area. We could then watch effects of these three application rates over the next

growing season, and learn more about this soil enhancement strategy.

I also included a plan to spread rockdust over the area, overlapping in a direction perpendicular to the sea minerals, creating a two-way test grid. My plan called for rockdust to be applied in three passes, to leave deposits at 1x, 2x and 3x rates of application. This results in a grid of 16 test plots, each with a different application rate, ranging from a control with no treatments, up to a plot of 4x sea minerals with 3x rockdust.

Adah Shenandoah began crushing the crystals in a small hammermill to break up large chunks and crystals into smaller, more uniform particle size to assure the crystals spread smoothly and evenly from the spinner-spreader. Adah wanted to dissolve the crystals in water and spray them on in liquid solution, but the task to pump, blend, haul, and spray thousands of pounds of water was impractical.

In April, work began spreading sea minerals. Chief Johnson decided to plow the test area and re-seed it with a mix of grasses and clovers. After the sea minerals were spread, a 15-ton truckload of glacial gravel dust from the aggregate quarry in South Onondaga was broadcast on a test area.

Early in June, I inspected the buffalo pasture after 24-tons of sea minerals were spread on most of the land. Unfortunately, the pasture had been recently cut and baled the hay, so it was hard to make any effective observations from the ankle-high grasses just beginning to re-grow.

Walking across the entire area where the sea minerals had been spread, it seemed the grasses were thicker and darker in the areas that received the 4x application, but the difference was not distinct and obvious.

Blooming Mad

However, when I saw my first test plot from two springs ago—the one I had miscalculated, and overdosed at twice the highest recommended rate—I nearly leaped in the air. That entire area and an apron around it—especially the downhill edge—is now thickly covered with a dense growth of red and white clover in prolific bloom—a few times thicker than anywhere else in the pasture.

My joy was my recognition that a small area of pasture that was both carbon and nitrogen poor is now producing lots of high quality vegetable protein—a key nutrient for the buffalo. The reason is complex, but the keys are single trace element

and one micro-organism. Both are described in my talk on **Soil Fertility**, and in an article on my website:

Molybdenum

missing element in the climate change equation

Sea minerals are a unique and universal source of a rare, hard-to-find trace element: **molybdenum**. This trace element is the key co-factor in *nitrogenase* enzyme, which converts **nitrogen** in the air into **nitrate** in the soil.

Nitrogenase enzyme is synthesized and utilized by *rhizobia* bacteria that live in pink nodules on legume roots. The added molybdenum nursed a proliferation of *rhizobia* which synthesized far more *nitrogenase* enzyme, which is now fixing a lot more atmospheric **nitrogen** into **nitrates** in the soil.

Molybdenum

Missing Element in the Climate Change Equation

a single trace element in topsoil essential to one enzyme in a bacteria exponentially accelerates removing carbon from air, thus slows global warming and climate change

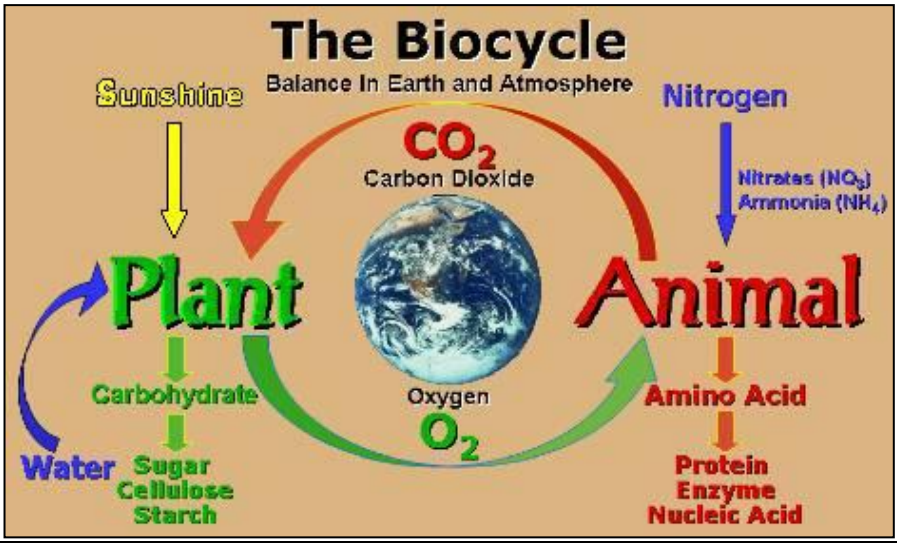
Clover then uses the nitrate to metabolize carbohydrate into amino acids, which are then built into proteins. The key to this transformation—the limiting factor—is the trace elements delivered by the sea minerals. **Molybdenum** is only one of a full spectrum menu of elements added by sea minerals, all of which play keys roles in biology and ecology.

So, my accidental overdose of sea minerals two years ago is now a dense, abundant bloom of clover—protein-rich plants into carbon and protein-deficient topsoil. A small section of buffalo pasture is now converted into a protein factory—important resource to feed a herd of massive herbivore anatomies.

I am certain this clover bloom is no fluke or oddity, because the other two test plots had similar, but less prolific, boosts in clover density. Those two test plots got successively heavier doses of sea minerals—1x, 2x, 3x, 4x—and sections with the heaviest doses had the thickest blooms.

And I believe this can happen in one year by properly timed delivery of sea minerals, clover seed and bacterial inoculants.

Once this enrichment and enlivening boosts the protein (and carbon) levels in soil, then a new, more permanent succession of plants can be established in the pasture to further upgrade the nutrition of pasture forage. This will greatly benefit the health and productivity of the buffalo—there should be no further death from infection.



Currently, half the hydrogen produced in the U.S. is used to synthesize nitrogen fertilizers—a chemical process that consumes lots of fossil fuel, releasing carbon dioxide into the air. Then significant amounts of nitrous oxide and ammonia are released as vapor from plowing and chemical fertilizers, while excess nitrates leach down

to pollute surface and groundwater.

The dense clover bloom in the buffalo pasture illustrates a natural, biological pathway to deliver a critical soil nutrient—nitrogen—and sequester a greenhouse gas —carbon—and sharply curtail greenhouse gases emitted into Earth's atmosphere.