



**BioZone**



# PART B: BIOZONE INITIATIVE & PROJECT FISH and WILDLIFE

## General Discussion

In this Part B document, we will separate the Wildlife aspect of the BioZone Project apart from the combined Wildlife and Healthcare Summary Report.

During the early development stages of my BioZone Project, I studied the intricacies of microbiology, epidemiology, cytology, fundamental processes of 'Cytokine Storms', zoonotic transmission, and spill-over contagions to better understand what needed to be attended. As the pandemic evolved, I integrated many of the technologies I had previously planned on working on with the new effort to respond to the pandemic manifestations. I was amazed with the correlation of my planned work with the pandemic and essentially all of the individual technologies merged seamlessly. Everything made sense for the first time.

At this time, I started to realize and better understand the interconnectivity of environmental, wildlife and fish, and public disease. I started to recognize a potential underlying cause and effect relationship and strategic address potentially being the microbiome of the gut.

The BioZone Project thereby expanded to integrate my pandemic responses with postulates inclusive of unifying the approach of pandemic preparedness with the environment, with fish and wildlife, and with public health and wellbeing. During my research, I found that there remains a distinct compartmentalization of environmental agencies only dealing with environmental issues, wildlife and fishery personnel concentrating on wildlife and fish, and of course, public healthcare providers only considering traditional medical teaching. The integration had been touched upon but the common denominator was inadequately attended.

Over the past several Covid-19 mutational years, I have put together what I believe to be a high impact meaningful comprehensive approach to combat the multitude of current issues presented herein. In this section, we will further dissect the overall global concerns into the respective components and better define what the BioZone Project can provide in regard to providing countermeasures and mitigant solutions to those concerns. We will identify urgent environmental and wildlife problems requiring prompt coordinated actions by the governments of the planet as well as collective innovative responses from the scientific communities.

Unfortunately, in my opinion, we are not afforded the luxury of taking one problem at a time and working to secure proficient mitigation and or remediation before moving to the next problem. Instead, the planet is currently facing a dire complex and integrated set of environmental and health concerns that are deeply entrenched and codependent. We must therefore further strive to develop solutions that can simultaneously address a multitude of intercalated global concerns and the solutions brought forth must somehow merge environmental concerns with wildlife concerns with public concerns.

In this regard, the BioZone Initiative and Project is derived to accomplish this formidable task which will take coordinated participation with governmental agencies and the scientific community and critical adequate funding being an essential mandate for success.

The basics and fundamentals will need to be addressed and established initially with the advanced technologies planned for given time yet having a common modulus to be applied. In this manner, the accumulated progress will perpetually improve and modify the project according to the inevitable unforeseen issues forthcoming. After reading the document, the **BioZone Initiative and Project** will be shown to **provide the high impact and essential fundamentals** necessary to prepare the United States for the next pandemic while at the same time, mitigating other critical issues detrimental to the health and wellbeing of the natural environment and biodiversity of life as we know it.

## Background

As mentioned in the summary document, I derived the 'Bio-Zone' name referencing all 'life' (Bio) interactions to various 'Zones' of the planet whether spatial or geographical, elemental (land, water, fire, air, and space), and or catalytic wherein our action(s) bring about specific reaction(s) in a measurable sense. In this unique fashion I was provided a single descriptive term with applications to a multitude of disciplines needing address. The essence of my work is to help provide an overall Biodefense Plan which will provide the complement integration of Human Biodefense with Environmental Biodefense. In my opinion it would be essentially impossible to separate the two and still formulate a reasonable Biodefense program that will work.

It is now readily apparent that near term and permanent solutions to the environmental issues at hand are existential given the detrimental and rapidly approaching consequences of civilization onto our planet's environment. In this aspect my work applications will be of similar content except I will be applying the related technologies I have been developing in the Healthcare aspect toward the Ecological and Environmental sectors. In this phase of my work, I intend to better merge the 'Healthcare of Mankind' with the 'Healthcare of Nature and Wildlife' especially with the cause-and-effect relationship.

The full scope of this phase of my work involves the intercalation of the health and welfare of wildlife and the environmental with existing and emerging zoonotic disease transmission among species. It is here wherein prevention, detection, early warning and alert mechanisms, containment, cooperative management and intervention, data analysis and accumulation, and policy reform will be instituted. Additionally, a major objective will address wildlife and environmental wellbeing in regard to the perpetual manmade toxins being deposited within our ecosystems and environment, and the consequences thereof.

I am a true believer that things happen for a reason and during my thousands of hours of relevant research I have come to better appreciate a different perspective of 'dys-ease' (the precursor to disease) as a prevalent and major manifestation of unintentional consequences. For example, we

are just now correlating the microbial biota of the intestinal tract of humans to have direct correlation with specific diseases and disorders. The discussion of the mechanisms in which this specific cause-and-effect relationship occurs is beyond the scope of this narrative abstract but simply put, in an expanded manner, we are truly what we eat and what we eat directly affects our health and wellbeing as it also does the health of wildlife in similar fashion. With this better-informed recognition, I have added additional focus areas to the BioZone Project to address the diet and immune defenses of wildlife and domesticated animals.

Before getting involved with the details of the BioZone Project I feel it is important to discuss the background influencing the BioZone environmental component for a better understanding of an urgent need for an aggressive approach to wildlife disease as a potential contributor to the next pandemic.



## **National Biodefense Strategy and Implementation Plan**

### **Threats and Consequences**

According to the 2022 US Biodefense Strategy & Implementation Plan report, there are three kinds of Biological Threats that we need to be concerned about and each one can cause a similar

devastating outcome. The three areas of threat involve **Natural** occurring events, **Accidental** occurring events, and **Deliberate** Biological Threats.

### **Naturally Occurring Biological Threats.**

Biological threats can affect humans, animals, plants, and the environment, resulting in significant health, economic, social, and national security impacts. It is therefore important to address biological threats using a One Health approach that recognizes the interconnections among people, animals (domestic and wildlife), plants, and the environment.

Infectious disease threats do not respect borders. Urbanization, climate change, habitat encroachment, economic interdependence, and increased travel, coupled with weak health systems, increase the ability of infectious diseases to spread rapidly across the globe. Novel infectious diseases, the resurgence and spread of once geographically limited infectious diseases, zoonotic diseases, and antimicrobial resistance can overwhelm response capacities and make outbreaks harder to control.

As we have seen with the COVID 19 pandemic, an infectious disease outbreak even in the most remote places of the world could spread rapidly across oceans and continents, directly affecting the U.S. population and its health, security, and prosperity.

### **Accidental Biological Threats.**

The risk of laboratory accidents may be increasing with the rise in the number of laboratories around the world conducting high-risk life sciences research and research with potential pandemic pathogens without appropriate oversight.

While this research is important for developing countermeasures and understanding and predicting future outbreaks, laboratories with insufficient biocontainment or biosafety protocols and practices exacerbate the risk of an outbreak through laboratory-acquired infections or accidental release of a pathogen into the environment. Even with state-of-the-art equipment and standard biosafety protocols, laboratory accidents are possible due to human error or mechanical failures.

### **Deliberate Biological Threats.**

The use of biological weapons or their proliferation by state or nonstate actors presents a significant challenge to our national security, our people, our agriculture, and the environment. Multiple nations have pursued clandestine biological weapons programs, and a number of terrorist groups have sought to acquire biological weapons.

In addition, advances in biotechnology, including synthetic biology, are making it easier to develop and use biological agents as weapons. In many countries around the world, pathogens are stored in laboratories that lack appropriate biosecurity measures and could be diverted by actors who wish to do harm. Further, thousands of clinical samples generated during an epidemic can pose a biosecurity vulnerability if handled without appropriate security considerations,

potentially facilitating access to materials and information that could be used in the development of a biological weapon.

It has been postulated that if an alien species were to come to our planet with the intention of exterminating the human race it would be done most efficiently with lethal dissemination through birds. It is estimated that in the next several years over 3000 labs will at least have a capacity to modify viruses and perform gain of function and if a deliberate harmful act is forthcoming, it may well try to be disguised as an avian virus that spilled over. It is in this pretext that the BioZone Initiative and Project is being developed.

## What Can We Do to Prepare?

Recently experts who sat on the Scientific Advisory Group for Emergencies, known as the 'S.A.G.E' panel during the Covid crisis, were asked two questions. What will the next pandemic be and what, if anything, can be done to stop it? The following section is a summary of the twelve respondent replies.

Our first line of defense is **early detection** of a potential outbreak. Early detection is crucial for responding to a new pandemic, which means having **resources in place** to spot outbreaks, **ways to share data rapidly, share experiences, and present clear plans for how to deal with concerning signals**. There are some things that are essential to keep up in order to spot the next pandemic early, especially **international cooperation** around **detection of disease** and common **agreement about what the best steps are** in the early stages.

International cooperation is a hard one, but better international cooperation and sharing of data would be a great step forward. Lessons should be learned from our response to the Covid pandemic such as the need for international co-operation when responding to invading pathogens.

**Mathematical models** would help to inform outbreak responses and this **requires an effective global surveillance system. Surveillance is extremely important**, not just within humans but also **within wildlife and livestock populations**. Here we would gain a more detailed understanding of what pathogens are circulating and what the risk associated with them is. Surveillance is absolutely critical, especially on the veterinary side. **A better integration of infectious disease research with environmental change research** and understanding would also be an important transition.

Currently, a live debate in the global health community is whether we should **extend surveillance into animal and bird populations. Monitoring in domestic and wild animals**, as we do to some extent with influenza, **could give us even earlier warning of a potential threat**. The gaps are enormous in terms of our surveillance, and that's global. But such a **widespread surveillance takes money**, it's a lot easier to survey domestic animals compared to wild ones. While we have a little bit better surveillance in domestic animals, we have very little for wild animals which are reservoirs for various potential infections.

The World Health Organization has a Health Emergencies Program but they are reliant on reports from (usually) national governments. National surveillance capabilities are patchy, which is a concern. Internationally, to promote multi-sectoral responses to public health threats originating in



the animal-human-environment interface, WHO works with the Food and Agriculture Organization of the United Nations (FAO) and the World Organization for Animal Health (WOAH). The collaboration between these three organizations has been formalized in a Tripartite Commitment. **Throughout the Covid pandemic the WHO has advocated strengthening surveillance and sequencing capacity.**

Surveillance and **genetic sequencing** can help give situational awareness of how a pathogen is mutating in animal populations and identifying variants that may be of public health concern. This is exemplified by the genomic analysis associated with the two recent human infections of H5N1 influenza in Cambodia. The scientists performing the analysis went from receiving the original sample to full genome sequence in under 24 hours, swiftly identifying (and providing valuable information) that the virus belonged to an endemic clade. At least on that end it appears as if the evolution of Covid variants has become steadier during the pandemic's third year, with more gradual changes compared to the leaps we saw with Alpha, Delta and Omicron. Still, population immunity is at its highest now with most people having a combination of vaccine and infection induced immunity. Suggestions for preparedness would be **repurposing the infrastructure for SARS-CoV-2 sequencing for systematic genomic surveillance across a broad range of pathogens** across the world as part of an early warning system.

The '**One Health**' initiative approaches to be an integral aspect of pandemic prevention efforts and such approaches **involve designing and implementing programs, policies, legislation and research where multiple sectors communicate and work together to achieve better public health outcomes.** It is, therefore, important that such programs are sufficiently supported.

**Different diseases will need different interventions.** Pandemics are a global problem, and one country on its own can do very little. It's important to enable low- and middle-income countries to do this as we have seen that pandemics affect the whole world. In addition, countries need to have tools like **vaccines and treatments in development ahead of potential pandemics**, alongside agreed control measures for keeping transmission down while these tools are finalized and rolled out. Improving this and preserving the means to quickly **develop vaccines against emerging pathogens seems important.** We have come a long way in developing new vaccines using mRNA technologies but have seen inequitable access.

**Overall priorities** for prevention must include: (a) **Better biosecurity at the human-animal interface;** (b) Continued **improvements to international cooperation on surveillance;** (c) **Funding of more basic science to improve technologies like vaccines, treatments, use of surveillance data etc.**

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## What will the next pandemic be?

In September 2022 the United States disseminated the Biodefense Strategy and Implementation Plan in order to prepare for the next pandemic. It is no longer a question of will a new pandemic come in the future but a matter of how soon and what will the next pandemic consist of. The world was caught off guard having predicted that a novel Flu virus would give rise to the next pandemic and out of a 'black hole' came the Sars-Covid-2 Virus from China. Could bird flu spark the next pandemic? Or could it be drug resistant gonorrhoea? Or could a feared 'pathogen X', a virus

completely new to science, devastate the world? Earlier in March, China reported two human cases of bird flu in a man and woman more than 800 hundreds miles apart. This followed two other cases in Cambodia, one of which was fatal.

Avian flu as we know is a big problem right now - no obvious direct zoonotic risk, but it highlights that as much as any virus, flu viruses have the opportunities presented to it, to evolve into human adapted forms. And, of course, it's done it many times already in the past hundred years. We've had three major coronavirus events (SARS-CoV-1, MERS-CoV, and, of course, SARS-CoV-2), and there are many other pathogens out there which regularly cause concern. Most are viral, but certainly longer term, and especially with anti-microbial resistance being a problem, issues with bacterial diseases, on an international scale, aren't impossible. Although, they represent a very different kind of threat.

There is a wide range of possibilities, and that's the most important point. If our planning is too narrowly focused on a small number of potential threats then we risk preparing for the wrong pandemic. That's because as with Covid it is too often the case that by the time we detect a pathogen with the potential to cause an epidemic, the epidemic has already begun. If our surveillance system is working well then it's worth pointing out that most of what it detects will be false alarms. In a best-case scenario, false alarms are the only thing we encounter but if we look at the past couple decades, we see quite a different story. On the average, approximately every 2.7 years we encounter a potential Biocontagion having the potential to become epidemic if not pandemic. Thankfully, we have skated a high mortality pathogen such as is the case with the bird flu with a death rate that could approach 40%. Such a scenario with zoonotic spread of bird flu to the human population would be catastrophic and result in hundreds of millions of deaths.

So far we have been fortunate considering the case with bird flu in Cambodia (that infection turned out not to be a new strain) yet has already killed at least one person and before that a pneumonia cluster in South America turned out to be a familiar hantavirus and not a novel strain. The challenge then is to decide, and decide quickly, whether what we've detected is the start of the next pandemic. It is crucial that we invest in pandemic preparedness now because by the time the next pandemic has started, it is too late to prepare. One thing for sure, Mid-pandemic is not the time to be debating the basics of how to respond.

The World Health Organization (WHO) has a list of priority pathogens (of epidemic and pandemic potential) for research and development in public health contexts. The priority list is generated and published based on an independent, open and multidisciplinary prioritization process. To update the list (which includes the likes of Covid, Marburg virus and Ebola) of priority diseases and pathogens, a prioritization exercise is currently in progress.

Antimicrobial resistance (AMR) is a silent pandemic and this is only likely to get worse as resistant pathogens become more widespread. It's also overwhelmingly man-made and caused by overuse of existing antibiotics, particularly in farmed animals. Another major concern is that if the spread of antimicrobial resistant gonorrhoea that was untreatable with antibiotics would occur, this would be a major problem. What is important to remember is that each pandemic is unique and the next one will be very different from Covid.



Influenza is almost always overwhelmingly the most likely disease to cause a future pandemic. We don't know exactly which 'H' and 'N', although people have, of course, been worried about H5N1 for some time, but influenza pandemics have been a part of human history for centuries. Avian flu strains have caused a lot of isolated human cases in the past couple decades, with little onwards spread, but there is always potential for these viruses to evolve to get better at transmitting among humans. There simply will be another flu pandemic, we just don't know when, and what strain it will be.

Coronaviruses were always the one that many of us were worried about, apart from flu. They have quite a wide host range, so they can infect a number of different species. There have been a number of near misses with coronaviruses over the past 10-15 year. SARS was one as was MERS. Just because it's caused one pandemic doesn't mean it's never going to cause another. We know have a total of five endemic coronaviruses in human populations. Can another, completely different, coronavirus emerge and cause a pandemic? Yes.

However, we shouldn't just focus on respiratory diseases like pandemic flu and coronaviruses. It may well be that the next pandemic has a non-respiratory route of transmission, like HIV or Zika did. The other great pandemic that people keep forgetting about is the HIV pandemic. That started being picked up in the 1980s and has caused tens of millions of deaths, a huge amount suffering, costs and so on. That's not respiratory, its sexually transmitted and so we can't always assume pandemics are going to be respiratory spread. Dengue and Zika are others, mosquito-borne viruses, that have caused a sort of half-pandemic. We need to be aware that it's not just respiratory viruses, other things can adapt and spill-over into humans. We haven't done sufficient planning for other sorts of pandemics, and hopefully that's being rectified now and we are widening our field of vision.



## BIRD FLU

In the midst continuing SARS-COVID pandemic, we now have another virus to worry about, the H5N1 influenza virus now blamed for death in mammals. We are all familiar with the flu virus, this is the same virus that causes typically mild illness during the winter months, with the most common versions we normally encounter being the H1N1 and H3N2 subtypes. Subtypes for the flu are somewhat similar to the different variants of SARS-CoV-2; when a new variant or subtype starts spreading, chances are that previous vaccination or infection will no longer be as protective. The same is true for flu, previous infection or vaccination with an H3N2 subtype will likely not offer much protection against infection with an H5N1 subtype.

However, the H5N1 flu virus is quite different from the types of flu we normally think of. First, these viruses usually spreads between birds, where it is often lethal, giving them the name Highly Pathogenic Avian Influenza Viruses (HPAI), which includes H5N1 and other similar flu subtypes. The mortality rate of H5N1 is in the Ebola neighborhood being about 16 times more lethal than Covid. Outbreaks of this virus has had devastating effects on both wild and farmed bird flocks. Thankfully though, the H5N1 virus doesn't spread to people very easily and even then, further person-to-person transmission is quite rare.

In the 26 years since the H5 N1 flu virus first emerged, there have only been 868 cases of human infection. However, the concerning part is that of these 868 cases, 457 have died, giving an estimated case fatality rate of 53 per cent, which makes the H5N1 virus one of the most lethal that we know. The critical concern here is that in recent years, H5N1 and other HPAI viruses have been spreading around the world, with repeated outbreaks in many countries, including the United Kingdom, which recently saw its first human case of H5N1 infection. The more cases of bird flu that we have in any region, the more chances that it will spread to people or other animals.

In 2022, the virus jumped from birds to farmed minks in Spain whereby the last toll on the minks will lead to the destruction of about 50,000 deaths. There the virus caused severe illness and death in the minks, but also began to spread from animal to animal, something that hadn't been seen before and may have been facilitated by the close confines the farmed animals are kept in. The flu virus evolves quickly and so there were fears that rapid evolution of the virus in minks would result in a virus that could easily infect people. Thankfully, hasn't happened yet, but we are seeing more and more cases of mammals infected with H5N1, from seals to bears, with some of these infections showing evidence of mutations that enable better growth and transmission in mammals.

With the growing number of H5N1 outbreaks in birds, and the large scale of the farmed animal industry, there are more and more chances for adaptive mutations to occur, raising the possibility of a human transmissible H5N1 virus emerging. If a human transmissible version of H5N1 does emerge, there is a good chance that it would rapidly spread, as most people have no immunity to this subtype of flu, which could potentially result in a new pandemic. The big unknown though, is that if this H5N1 pandemic did arise, would the virus still be as lethal?

A pandemic of H5N1 with a 53 per cent fatality rate would be unimaginable; however, some studies have suggested that when the virus switches hosts and adapts to mammals the lethality drops down significantly. This is a glimmer of hope, but as we've seen over the past years, it is impossible to predict exactly what a virus will do or how it will evolve in nature. The good news is that this evolution to a human-transmissible version of H5N1 is not a sure thing. We've been tracking these viruses since 1996 and despite many chances, the virus has never made this jump. Even with the significant increase in avian H5N1 outbreaks in recent years, the number of human cases has remained very low. It's very possible it will never happen, that the virus is too well adapted to birds and that limits its ability to infect people but what if the assumption is wrong.

Hope is simply not a strategy to control the spread of an infectious disease. As such, we have a robust H5N1 monitoring network and many governments around the world respond rapidly to any outbreaks of bird flu, in order to minimize the chances for human spread. In addition, we have two antivirals that would likely offer some benefit against H5N1 infection and there are several licensed H5N1 vaccines. Unfortunately, just like with SARS-CoV-2, the virus keeps evolving and so our existing H5N1 vaccines may not offer robust protection against the current versions of H5N1, though studies suggest they may still work very well and they also give us a very good starting point for making updated versions of the vaccines.

An additional wild-card in the emerging H5N1 situation is the SARS-CoV-2 pandemic. We know that even mild cases of SARS-CoV-2 can cause immune alterations that persist after resolution of the acute infection. We do not know how, and if, this altered immunity would affect human H5N1 infections or transmission, but it is an additional aspect that needs continual monitoring. At present, the situation poses very little threat for most people, but the situation needs careful monitoring and preparation, as it could change at any time with dire consequences.

The current epidemic of avian influenza has killed over 58 million birds in the U.S. as of February 2023. Following on the heels of the COVID-19 pandemic, large outbreaks of viruses like bird flu raise the specter of another disease jumping from animals into humans. This process is called spillover.

As this year's outbreak of bird flu grows, people are understandably worried about spillover. Given that the next potential pandemic will likely originate from animals, it's important to understand how and why spillover occurs and what can be done to stop it.

Viral spillover occurs when a virus spills out from an animal population into people. Spillover involves any type of disease-causing pathogen, be it a virus, parasite or bacteria, jumping into humans. The pathogen can be something never before seen in people, such as a new Ebola virus carried by bats, or it could be something well known and recurring, like Salmonella from farm animals. The term spillover evokes images of a container of liquid overflowing, and this image is a great metaphor for how the process works.

Imagine water being poured into a cup. If the water level keeps increasing, the water will flow over the rim, and anything nearby could get splashed. In viral spillover, the cup is an animal population, the water is a zoonotic disease capable of spreading from an animal to a person, and humans are the ones standing in the splash zone.



The probability that a spillover will occur depends on many biological and social factors, including the rate and severity of animal infections, environmental pressure on the disease to evolve and the amount of close contact between infected animals and people. Epidemiologists estimate that three-quarters of all new infectious human diseases originated in animals.

While not all animal viruses or other pathogens are capable of spilling over into people, up to three-quarters of all new human infectious diseases have originated from animals. There's a good chance the next big pandemic risk will arise from spillover, and the more that's known about how spillovers occur, the better chance there is at preventing it.

Most spillover research today is focused on learning about and preventing viruses including coronaviruses, like the one that causes COVID-19 and certain viral lineages of avian influenza from jumping into humans. These viruses mutate very quickly, and random changes in their genetic code could eventually allow them to infect humans. Spillover events can be hard to detect, flying under the radar without leading to bigger outbreaks. Sometimes a virus that transfers from animals to humans poses no risk to people if the virus is not well adapted to human biology. But the more often this jump occurs, the higher the chances a dangerous pathogen will adapt and take off.

Epidemiologists are projecting that the risk of spillover from wildlife into humans will increase in coming years, in large part because of the destruction of nature and encroachment of humans into previously wild places. Because of habitat loss, climate change and changes in land use, humanity is collectively jostling the table that is holding up that cup of water. With less stability, spillover becomes more likely as animals are stressed, crowded and on the move.

As housing and farmland expand into wild places, the risk of spillover increases. As development expands into new habitats, wild animals come into closer contact with people and, importantly, the food supply. The mixing of wildlife and farm animals greatly amplifies the risk that a disease will jump species and spread like wildfire among farm animals. Poultry across the U.S. are experiencing this now, thanks to a new form of avian flu that experts think spread to chicken farms mostly through migrating ducks. The new avian influenza virus is a distant descendant of the original H5N1 strain that has caused human epidemics of bird flu in the past. Health officials are detecting cases of this new flu virus jumping from birds to other mammals – like foxes, skunks and bears.

On Feb. 23, 2023, news outlets began reporting a few confirmed infections of people in Cambodia, including one infection leading to the death of an 11-year-old girl. While this new strain of bird flu can infect people in rare situations, it isn't very good at doing so, because it is not able to bind to cells in human respiratory tracts very effectively. For now, the Centers for Disease Control and Prevention thinks there is low risk to the general public. Active monitoring of wild animals, farm animals and humans will allow health officials to detect the first sign of spillover and help prevent a small viral splash from turning into a large outbreak.

Moving forward, researchers and policymakers can take steps to prevent spillover events by preserving nature, keeping wildlife wild and separate from livestock and improving early detection of novel infections in people and animals.

The BioZone Project intends to incorporate H5N1 monitoring at the BioZone Field Stations, again with an early warning detection notification and response protocol.

## Additional Concerns

### PRIONS

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During my medical career I have maintained a keen interest in rare infectious diseases due to the potential for transmission across species and or zoonotic transmission. Relative to our interest, ‘zoonotic’ transmission has become forefront for healthcare providers, biologists and microbiologists since variants of the Kuru infection in the eastern highlands of New Guinea spread through humans due to funerary cannibalism, and the disease was found to be in a class of pathogens termed ‘Prions’ and prion disease now include fatal infections of cows and white tail deer (Mad cow Disease and Chronic Wasting Disease respectively). Other prion diseases are outside the scope of our discussion.

Chronic Wasting Disease (CWD) is ‘spreading like crazy’ in North America. There’s no treatment, and the other huge problem with this disease is it’s very contagious, so its rapidly spreading. Animals spread the infection, shedding it in their urine, saliva and feces, and the result is the infection is almost everywhere in the environment. It’s not just in the animals’ brains, it’s in their muscles as well. It’s not only in the central nervous system, but also throughout the body. When an animal dies and decomposes in the environment, they are contaminating all the plants and the soil. So, when deer eat plants or get in contact with soil, the infectious protein gets inside the body. And the infectious protein can stay in the soil for many years.”



A Mississippi deer suffering from Chronic Wasting Disease

There are questions about whether CWD can jump the species barrier and infect people. That's what happened in another prion disease called variant Creutzfeldt-Jacob disease, the human form of mad cow disease. The potential of cross-species transmission into humans is an alarming issue and is still an open question. There haven't been any reported cases of CWD in people, but studies of squirrel monkeys have shown its transmissibility into non-human primates.

The next step is to work on an oral vaccine that can be used in wildlife. It would be a formidable task to vaccinate free-ranging deer by injection, so we must consider plant-based or food-based vaccines that can be eaten directly by deer and elk. An alternative would be to alternatively brandish hunting in a non-lethal manner whereby people could 'deer hunt' in another perspective being to vaccinate the deer and elk population instead of the traditional killing of the game.

These prions and prion diseases aren't caused by a virus or bacteria. The infective agent is a prion which is an abnormal form of a harmless protein found in the brain. Once prions are present in the brain, they multiply by causing normal proteins to refold into an abnormal shape. The immune system of the animal doesn't detect prions as an enemy, so there's no immune response against the disease. What needs to happen is to create an immunogen that induces an immune response in the animal. It's like a flu shot producing a response so your body recognizes and defends itself against the disease. The prion diseases are known for their "slow" infection processes (up to years) and the resulting manifestations are basically death sentences for all infected. It is very worrisome that these prion disease can go undetected for 18 months or so even though the animal is infected and according to the CDC of Atlanta and the World Health Organization (W.H.O.), it is currently unknown as to whether prion diseases can be transmitted to humans by eating the meat and or having body fluid contact during the dissection of the animal.

To make a very long and complex discussion short, these '**Slow Infections**' are caused by a group of agents containing both specific conventional viruses and unconventional agents that are not viruses. The latter include the Prions which are protein containing particles that are highly resistant to inactivation with ordinary means. Temperatures of nearly 1000 degrees are needed to destroy prions and brain specimens containing prions, having been within containers of formaldehyde for 2 years, can be removed and the prions are still found to be infective. Prion diseases have abnormal forms of prion protein (PrPc) develop and aggregate into filaments that disrupt neuron function and cause cell death. The abnormal and pathogenic prions are considered to be 'misfolded proteins' which are associated with five described diseases and are now thought to potentially be involved with several other diseases with similar clinical syndromes such as Alzheimer's Disease and Parkinson's Disease.

Human prion-mediated diseases (e.g., Kuru and CJD) are called transmissible spongiform encephalopathies (TSE). The term spongiform refers to the spongy, Swiss cheese-like holes seen in the brain parenchyma that are caused by the death of the neurons. No virus particles are seen in the brain of people with these diseases. The term encephalopathy refers to a pathologic process in the brain without signs of inflammation. In contrast, encephalitis refers to an inflammatory brain process in which either neutrophils or lymphocytes are present. In TSEs, there are no inflammatory changes in the brain. The transmissibility of the prion agent of kuru



and CJD was initially established by inoculation of material from the brains of infected patients into the brains of primates followed by serial transfer to the brains of other primates.

Note, however, that both kuru and variant CJD (and bovine spongiform encephalopathy [BSE] ‘mad cow’ disease are acquired by ingestion. In this route, the prion protein must survive digestion in the intestinal tract and then penetrates the gut mucosa. The prion protein is then amplified within follicle dendritic cells in lymphatic tissue, such as Peyer’s patches. Prions then spread to the spleen, carried by migrating dendritic cells. From the spleen, prions spread to the central nervous system probably via the sympathetic nerves. It is also possible that prions reach the brain within lymphocytes, as there is a documented case of CJD that was acquired by transfused blood. In addition, CJD has been transmitted iatrogenically (i.e., in a medical context, via corneal transplants, dura mater grafts, implanted brain electrodes, and growth hormone extracts made from human pituitary glands).

**Note:** The mention that prion proteins, subsequent to being ingested, must survive digestion mechanisms in the intestinal tract and then penetrate the gut mucosa. It is here whereby the **BioZone Project with the project’s associated scientists will determine as to whether the gut microbiome and mucosal lining defenses will provide a novel and adequate interventional means to deter transmission and absorption of prions in mammals, wildlife, and game.** Also remember the second route mentioned as a pathway to become infected with prion disease being the exposure of the infected animal’s blood through a cut in the skin. **A second objective of the BioZone Project is the development of a suitable topical and or oral agent that prevents the absorption of prions through body fluid contact.**

Again, deferring lengthy technical discussions, northern Mississippi now has prion disease manifestations in the whitetail deer population and again, the extreme relevance is the fact that we still are not sure if our present consumption of meat of infected deer or any other game containing prions will be detrimental to the health of humans one day. In fact, as recent as December 2022 the World Health Organization stated that they are unable to confirm or reject the fact that prion diseases such as Chronic Wasting Disease (CWD) could pose a health threat to humans. The Atlanta based CDC even went as far as stating that CWD may soon spread to humans. Other experts are now warning that consuming deer meat containing prions will lead to the substantial disease transmission to humans within the next few years.

Also relative to what was mentioned is the fact that people don’t hunt the wasted sickly appearing deer and alternatively, rather harvesting well appearing deer. With the ‘well appearing’ deer having the potential to carry the CWD for 18 months before appearing abnormal one must worry about how many deer are being harvested and are presumed healthy but actually are infected with prions. **The early detection means for CWD is therefore an imperative mandate to combat CWS and another objective of the BioZone Project.** Is this our next pandemic and what are we doing about it, another essence of the BioZone Project to be discussed hereafter.

We are already able to confirm that eating the prion infected meat of certain beef that contained the bovine prion variant termed ‘Mad Cow Disease’ (a variant of the Creutzfeldt-Jacob Disease) was indeed transmitted to humans.

There is to date no approved treatment for CWS in mammals and as stated it is a 100% fatal disease. Perhaps soon we will have promising therapeutics with the introduction of Capton therapies. These are currently aggressively researched agents stemming from a relatively simple modification of the chemical structure of an old seizure medication. Through minor structural modifications of a few well-documented, bioactive compounds it was found that we had been accidentally gifted with an “on” switch that allowed dynamic control of drug activity at sites of neuropathology by the pathology itself. Drug empowerment through damage and disease-dependent oxidative functional group exchange, a consequential hypothesis for the future of neurology, began to take shape. The name of the shape of the new structure was deemed a “Capton”. The Capton agents are actually further developed at the site of structural injury of brain tissue subsequent to crossing the blood brain barrier and only affect the damaged areas of the brain sparing normal brain cells. This specificity markedly reduces the amount of drug needing to be administered which in turn reduces overall toxic side effects. Captons are promising in the fact that mitigation of prion diseases would finally have a treatment. Until that time it is imperative to deliver a better means of diagnosing and detecting CWD in the field other than subsequent to the animal being autopsied.

## Oxidative Stress

I decided to include this section subsequent to the discussion of prion diseases due to a possible correlation with the disease process itself. The next section will discuss yet another potential precursor cause and effect agent but to better understand the interplay it is important to first understand a process that occurs at the cellular level. For those not trained in cellular biology I will attempt to make a rather complex subject simplified. It is, however, ironic that this cellular mechanism may correlate with the cause of specific diseases while at the same time providing a pathway to finding solutions for the same diseases it causes.

### What is oxidative stress?

Oxidative stress occurs when there is an imbalance between the production of free radicals and the body’s ability to counteract them. Oxidative stress describes an imbalance between cells’ production and elimination of byproducts of the breakdown of oxygen. These byproducts, known as **reactive oxygen species (ROSs)**, are important for cell functioning but cause damage in high amounts. ROS belong to a larger category of highly reactive chemicals called **free radicals**. Because cells need ROSs to function, some researchers have described oxidative stress as a good thing in some contexts. Others say that oxidative stress, by definition, is bad.

Oxidative damage is involved in aging and in several diseases. Chemicals that inhibit oxidation and the production of ROSs are called **antioxidants**. Some research suggests antioxidants could help limit oxidative damage. However, it’s unclear how much or to what effect.

ROSs are produced naturally when the body breaks down diatomic oxygen (O<sub>2</sub>) as part of cellular respiration, the process of extracting energy from glucose (sugar). In organisms that have one, this happens in the mitochondria, the so-called powerhouse of the cell. As part of the last stage of **cellular respiration**, the cell separates electrons, or negative subatomic particles, from byproducts of glucose. This enables the cell to make a molecule called **adenosine triphosphate**

(ATP), its main power source. The cell needs oxygen to accept the electrons at the end of this process, and most oxygen molecules are finally transformed into water.

However, some oxygen molecules receive fewer electrons and are instead transformed into free radicals, specifically ROSs. These substances' missing electrons are what make them extremely reactive, and they will react with many substances in the cell to gain electrons and become more chemically stable. Some common ROSs are peroxides (such as hydrogen peroxide), superoxide and the hydroxyl radical. We constantly make those reactive oxygen species, as we call it, in every cell of the body. In addition to being a byproduct of respiration, ROSs are used in cell signaling, or sending messages within or across cells. Immune responses, exposure to radiation, and other cellular responses to pollutants can also generate ROSs.

However, production of ROSs doesn't cause damage on its own, as cells need some ROSs to function. Cells use antioxidants to get rid of excess ROSs, limiting potential damage. When the amount of ROSs overwhelms the cell's antioxidant system, ROSs accumulate, creating oxidative stress. That could be because of increased ROS production or decreased elimination from the cell.

Normally, cells use ROSs as part of their signaling processes sending messages to other parts of a cell or to other cells. However, excess ROSs cause oxidative damage, which is oxidation of parts of the cell. Just as the oxidation of iron forms rust, this process can transform and damage the molecules that make up cells, which includes mutations in DNA and RNA, misfolded proteins (remember Prion diseases), and other types of damage to sugars and lipids.

Cells can repair some amount of damage, but if it is too extensive it can trigger apoptosis (programmed cell death), a sort of self-destruct mechanism. In severe cases, it can also cause necrosis, which is when cells become so damaged that they are prematurely destroyed, leading to tissue death. Research suggests that oxidative stress plays a role in many conditions. Some of the most well-established of these are type 2 diabetes, cancer, and hardening of the arteries, or atherosclerosis.

Oxidative stress has also been associated with several different neurodegenerative diseases, including Alzheimer's disease, Parkinson's disease, amyotrophic lateral sclerosis (ALS), and multiple sclerosis (MS). This relationship was first observed in the late 1980s, according to a 2004 article published in Nature Reviews Drug Discovery, with mounting evidence that oxidative stress plays a role in neurodegenerative disease since then. A 2016 article published in Experimental Neurology reviewed evidence of oxidative stress's role in MS from as early as 1987.

The neurons that are at risk during Alzheimer's Disease are profoundly affected by every known type of oxidative damage. In Alzheimer's and some Parkinson's patients, signs of oxidative damage show up in the cytoplasm, or main body, of some neurons, which are full of "mitochondrial garbage", enzymes, along with molecules of copper and iron, that are usually found only in the mitochondria.

Oxidative damage is clearly a part of Alzheimer's. However, researchers haven't been able to pinpoint exactly how and to what extent oxidative stress throughout a person's life contributes to



the disease. It's also hard to say if it causes aging, an idea that has long been proposed by researchers. The jury's still out whether this is actually the case for aging.

Smoking can generate some of these reactive species, so then that can lead to damage. UV radiation, which can cause oxidative damage, is also linked to skin and other types of cancer, according to the American Cancer Society. Some weak evidence suggests that consuming foods that contain antioxidants could reduce oxidative stress, and therefore, a diet deficient in antioxidants could be a risk factor. Some common foods rich in antioxidants include broccoli, carrots, potatoes, spinach and many berries, among others.

However, the link between antioxidants and oxidative stress isn't clear. For instance, consuming supplements containing antioxidants did not decrease signs of oxidative stress in the brains of people with Alzheimer's disease in a 2012 clinical trial published in JAMA and was even associated with faster cognitive decline. However, a 2019 review article found some evidence that taking a supplement containing vitamin E, which is an antioxidant, may be helpful for people with Alzheimer's, including evidence from clinical trials.

Obesity may increase oxidative stress because free radicals can bind to and damage fat. Therefore, lifestyle changes such as exercise and eating a balanced diet could help limit oxidative stress. Obesity is a huge risk factor, and in a huge variety of model organisms, from yeast to primates, exercise and restricting calories is associated with less oxidative damage to cells. But it's not a straightforward effect. Though exercise and calorie restriction can actually increase oxidative stress, in a 2019 study published in Nature, researchers found that in a species of roundworm, increased oxidative stress early life can help protect against later oxidative damage. It was emphasized that this research was not in humans, which underscores the importance of ROSs, at least in controlled amounts. It's not like we're going to remove all the reactive oxygen species and be healthy, for in some cases, it's actually healthy to have some higher levels of reactive oxygen species.

**The BioZone Project intends to identify as to whether; oxidative stress is a precursor etiology for Prion Diseases, wildlife food is deficient in the nutrients and minerals needed to prevent toxic oxidative stress, whether a specific formulation of antioxidant supplements can better prevent wildlife from absorbing prion proteins across the mucosal membranes, and whether are not chemicals such as PFAS, PFOS, and VOCS are contributing to the oxidative stress disorders.**

## **PFAS**

Next, we will turn our attention to another environmental and public health concern being the topic of PFAS. We are all aware of and taught to eat healthy but the components that we aren't aware of are prevalent in the healthy foods too. For example, PFAS such as perfluoroalkyls and polyfluoroalkyls represent a group of nearly 4000 chemicals characterized by their strong carbon-fluorine bonds that have rightfully earned the reputation as being 'forever chemicals' due to the prolonged length of time required to degrade the chemical bonds and disintegrate. It is now recognized that rainwater has been designated as not potable according to EPA studies due to the level of contamination with PFAS. Additionally, it was recently reported that a single

freshwater fish in the United States has a greater PFA concentration than drinking thirty days of any PFA contaminated water source. Such are the unintentional consequences of mankind's conventional progress and profitability.

The health consequences of the ubiquitous overuse of products that contain PFAS has only recently come to light. Briefly, PFAS are notoriously associated with thyroid disease, testicular cancer, and kidney cancer. Even more alarming and according to a study published 2/22/2023 in Environmental Health Perspectives, these forever chemicals are found to interfere with several critical biological processes, including the metabolism of fats and amino acids, in children. The study reports that the disruption of these processes can increase the susceptibility to a variety of developmental disorders, cardiovascular disease, cancer and metabolic diseases like diabetes. The focused study of children was particularly important since children and young adults go through key stages of development that may make them more vulnerable to toxic exposure. This stage in life is also the stage wherein many serious diseases that manifest in adults begin to take root.

The study goes on to say that PFAS change the way the body metabolizes lipid and amino acids - the building blocks of fats and proteins, respectively and altered thyroid hormone function as well. Changes in thyroid hormones can disrupt development during puberty and raise the risk of developing conditions like diabetes, cardiovascular disease and cancer later in life. The study also reports that a mixture of PFAS, rather than a single type, fueled the disruption of the biological processes even more. Studies such as this one are clear evidence that we are only at the tip of the iceberg regarding the understanding the range of effects that these PFA chemicals have on human health.

PFAS can also adversely affect the human intestinal microbiome and the gut microbiota affects inflammation and numerous disease processes in mammals. Note the use of the word mammals because we will soon correlate the same manifestations in humans of PFAS to all wildlife, fish, and game as well as in the domesticated animals. Although rarely studied, there has already been issued "Do Not Eat" warnings in certain areas whereby the deer were tested and were found to have dangerous levels of PFAs and PFOs (perfluoro octane sulfate). The findings were more worrisome when the organs were tested and found to have even more dangerous levels than the meat.

In essence, PFA containing products must be mitigated and remediated and given the lobby money system that we live with, this will certainly be a formidable process. Incidentally, I am comfortable in speculating other potential relationships of PFAS to potentially be a cause of decreasing testosterone levels over the past few decades and perhaps they might even correlate with the increase in autism. These are examples of what are imperative issues for the medical community to further investigate. **A major objective of the BioZone Project is to confront PFAS head on with environmental studies and projects designed to remove PFAS from the soil and water and eventually from mammals, birds, reptiles, and fish.** With long-term studies the effect of reducing and or eliminating PFAS from humans and wildlife will undoubtedly correlate with improved health and well-being. **Yet another BioZone Project objective will determine whether the gut microbiome and mucosal lining defenses will**

**provide a novel and adequate interventional means to reduce and or stop absorption of PFAS in mammals, wildlife, and game.**

We have succinctly discussed the PFA topic consequences and manifestations thereof so we must next address the dissemination of PFAS into the environment by mankind. The topics of PFA manufacturing, production, and incorporation into things like non-stick pots and pans and the gamut of PFA containing plastics and packaging and the introduction of PFAS into our land and water bodies by waste management and landfills is not within the scope of this document. What we can discuss is the introduction of PFAS into our land and water bodies by recreational activities and for content length concerns, we will only briefly allude to freshwater fishing practices and discard practices.

Plastics are some of the most damaging manmade products that are affecting marine wildlife. We need to recognize that the fishing lures we use are toxic to fish and need to be improved upon. When fishing, you are going to lose some lures in the lake. You'll break off on a giant, get stuck in a submerged brush pile, or maybe even accidentally lose some off the side of a boat. Since we are littering, even if by accident, thousands of lures across bodies of water per year we need to consider the effects they are having. Almost all of the materials used to make lures can cause some damage to the environment and are toxic to an extent. Fishing lures are not likely a main cause behind environmental distress – but could be a complicating factor.

Looking at hard baits, generally, they are currently made from plastic. This is because plastic is easily moldable and you can create the same shape, weight, and density every time. Which is really important for making a bait that has to run true out of the box every time and have the exact same action in the water. But plastic is known to be an extremely toxic material, which is why many people are turning away from its production when applicable. Plastic takes hundreds to thousands of years to degrade which means that crankbait you lost in a tree 15 feet below the water's surface will still be there when your great grandkids are fishing it a hundred years from now.

What makes that so bad for the fish and environment however is that plastics leach many harmful chemicals into water supplies. Phthalates and Bisphenol A are two commonly known toxins that exist in plastic that can damage the liver, kidneys, lungs and reproductive system in humans. Let alone the damage that it can cause to fish. So, these plastics sitting underwater for hundreds of years leaching harmful toxins into the lake is a serious problem. If you look at any of the common hard bait manufacturers like Strike King, Rapala, or Berkley you'll find all contain Prop 65 warnings meaning they all contain toxins known to cause cancer and reproductive harm. So, the good news is they are clearly marked for you to avoid. The bad news is we don't currently have other options.

If you take all of the issues above that are known for hard plastics they just grow whenever it comes to soft plastic lures. This is because all soft plastic lures contain phthalates which as mentioned above are known to be toxic, as well as polyvinyl chloride or PVC which has its own toxic side effects especially for children. Green Peace, a longstanding nonprofit organization meant to help the environment called PVC “the most environmentally damaging of all plastics”. This is because of the heavy use of chlorine in PVC.

Like most parts of plastic, it will not break down for hundreds of years and can leach out into the surrounding environments for decades. It's known to cause birth defects, cancer, and immune system damage among other side effects. And due to their chemical structure, they are not easily expelled by humans or animals. Unfortunately, PVC is somewhat necessary for soft plastic lures. It is what gives the plastics their stretchy, soft feel that is required to give lifelike movements in the water. If a fish also bit a hard plastic lure they would let go immediately meaning you would lose out on hooking most of the fish that bite. It's extremely toxic, but to date has been extremely necessary for soft plastic lures.

To make matters worse, while fish don't often ingest hard baits that are sitting in the water, they do often ingest soft plastic lures. The fish may just eat soft plastics right off the hook, soft plastics that have fallen in the water or have been sitting for months. And when they do, they have a hard time passing them through their system. As mentioned previously, plastics don't degrade easily so there is no choice but for a soft plastic to pass its way through a fish's body. In most cases, there are complications because the plastics are too large to pass naturally. They create blockages which severely affect and most often end up killing the fish.

This can become even more problematic because many different species eat dead fish. If a small fish like a normal bluegill eats a plastic worm, it may be fatal. That dead fish is then eaten by something like a catfish which will have the plastic inside it. It may then kill the catfish or live in its guts for years. If an unsuspecting human then catches the catfish and tries to eat it they will either find an unwelcome surprise or be susceptible to years of toxins the plastic worm has created in the catfish when it's digested. Point being, even one fish eating a plastic can cause tons of detrimental effects to predator species and the environment as a whole.

Just like the hard bait manufacturers, you will find California Prop 65 warning labels on the majority of soft plastic lures you see in the store. You can try to avoid them, but good luck. What about terminal tackle? It's not plastic. If you aren't using a plastic lure you are likely using some type of weighted jig head which includes fibers, silicone skirts, or some type of natural material meant to mimic natural species. These include hair jigs or things like spinnerbaits. The good news is that silicone and many of the fibers used on jigs are actually not toxic or harmful to the environment. So even if you lose your best jig at the bottom of the lake it is not likely to leach out harmful toxins for hundreds of years even if it will exist there for a long time. And the more natural fibers in hair jigs will actually only survive a short while.

The bad news is that almost all of these are weighted down by lead heads, which is toxic and harmful for the environment. Lead is quite widely known to be a harmful chemical, often cited in paint as causing harm in children and adults alike. Exposure to high levels of lead may cause anemia, weakness, and kidney and brain damage and even death in some cases. And because lead can live infinitely without degrading, it constantly leaches into our environment if left in water. The good news is many higher end lures and weights are now made with tungsten instead of lead but are considerably more expensive. It is denser and more sensitive, which actually makes it a better weight if you're really into fishing.



After several studies, tungsten has been determined to not be considered as toxic for humans. Whereas lead is very toxic, tungsten is not as bad. Studies are still underway and it is now believed tungsten may leach over time, but it is thought to be a better alternative to lead even if not perfect. If you want to be an environmentally conscious fisherman or just don't want to contribute to lead pollution you can switch to just using tungsten fishing products. Much like all plastic lures, you will find California Prop 65 warning labels on all jigheads, weights, or other fishing lures that contain lead as it is a known toxin.

Hence, after looking at all components that make up the majority of fishing lures, and the tackle that is associated with fishing, yes most fishing lures and the packaging are in fact toxic to fish and humans consuming the fish. You should not be leaving them in waterways, lakes, rivers or really anywhere in the environment as they will leach and cause harm over time. Will you kill all of the fish with a few lost baits? Of course not, but the buildup of plastics, lead, and other harmful contaminants over time can cause serious concerns.

**It is the intention of the BioZone Project to develop nontoxic biodegradable fishing lures and tackle inclusive of the packaging and associated recreational gear and tackle.**

## **Biozone Project Countermeasures & Mitigants**

The BioZone Project as defined herewithin, introduces Ecological and Environmental 'Biodefense' strategies which relates to necessary aggressive measures needed to preserve, manage, and restore the biosecurity of our planet's tree of life being subject to natural and or self-generated biological threats. Confronting these biological threats is now a requisite mandate in order to assure the survival of humanity and the planet ecosystems and the BioZone Project is fervently committed to doing above and beyond our share.

Our situation with environmental toxicity and climate change must be addressed in this regard in order to prevent permanent damage to our ecosystems which are rapidly approaching a level beyond the point of remediation. It is therefore imperative that awareness of the impacts of civilization onto the planet continues to be brought front and center and that we all must commit to doing our share to intervene in the current cause and effect vicious cycle. We must somehow persevere in order to maintain the fundamental relationships that sustain our planet's ecosystems, and in our pursuit of sustainability, we must address the biophysical environment and natural resources through an economic, social and institutional dimension.

Sustainable development is clearly one of the most difficult challenges that humanity has ever faced and achieving the goals and objectives of sustainability presents a great challenge for all segments of society. A core unit of sustainability is to improve human and ecosystem well-being and to sustain the improvements over time. Our proposal submission herein comprises the introduction of novel Innovations, countermeasures and mitigation measures organized through our BioZone project backgrounds, proposed solutions, and resulting evidence based social, health, and environmental impacts. The BioZone Project EHIA (Environmental and Health Impact Assessment) will systematically examine and define the unintended consequences with the objective to reduce or mitigate negative impacts while maximizing positive ones.

Through the project's C.E.O. (Collaborative Endeavor Opportunity) platform we seek to partner with kindred initiatives to jointly address and confront ecological discord. By means of controlled case studies, pilot projects, impact measure analysis and data reporting we hope to bring about meaningful policy reform that ultimately leads to permanent legislative introductions, revisions, and amendments. Before addressing the core project initiatives, we will define specific terms as relevant and intended for the BioZone Global Initiative.

**BioZone** is our mission derived reference to the symbiotic interface wherein life (BIO) interacts with specific 'Zones' of the planet. For our purpose we can further differentiate 'Zones' as spatial or geographical, elemental (land, water, fire, air, and space), and catalytic wherein our action(s) bring about specific reaction(s) in a measurable sense.

**Ecology** is defined as the branch of biology that deals with the relations of organisms to one another and to their physical surroundings. For our purposes, the physical surroundings are the environment and the organisms are the fauna and flora native to the specific zone and the human interactions thereof.

**Homeostasis** is defined as the tendency toward a relatively stable equilibrium between independent elements, especially as maintained by physiological processes.

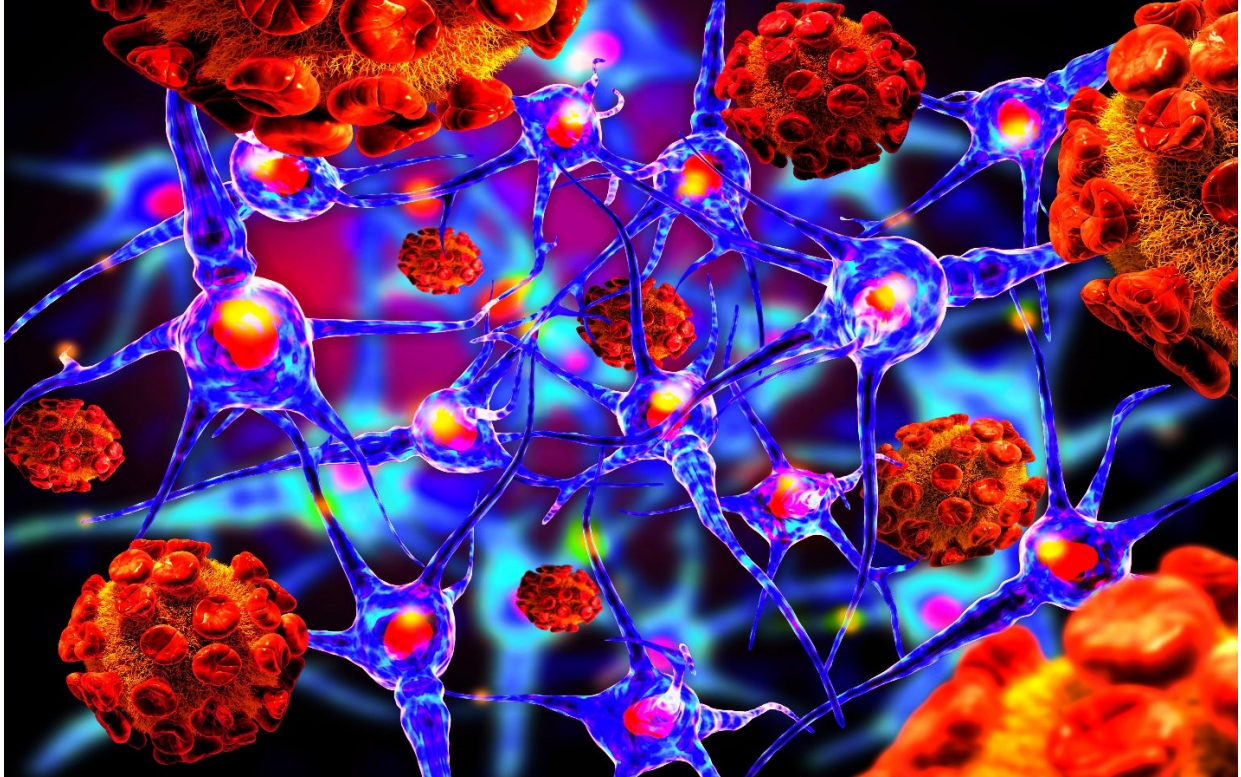
**Catalyst** for our purpose is defined as a person or thing that precipitates an event. It is therefore a stimulus and an impetus for causality.

**Causality** is the relationship between cause and effect. A cause therefore instigates or precipitates an effect with an effect being a condition, occurrence, or result generated by one or more causes. Furthermore, we are able to measure a causality and effectual relationships of society with evidence-based consequences of industrialization, modernization, and the under regulation of profit motivated business modeling.

**Countermeasures** are actions taken to counteract a danger or a threat.

**Mitigants** are the means to lessen or alleviate risk management conclusions.

**Biodefense** is defined as those actions designed to counter biological threats, reduce risks, and prepare for, respond to, and recover from bioincidents, whether naturally occurring, accidental, or deliberate in origin and whether impacting human, animal, plant, or environmental health. For our purposes Biodefense relates to the necessary aggressive measures needed to preserve, manage, and restore the biosecurity of our planet's tree of life being subjected to natural, accidental and or intentional self-generated biological threats.



## Pandemic Mitigation

With the onset of the Covid-19 pandemic, and working as a frontline healthcare provider, I have developed meaningful solutions to address the current pandemic as well as prevent a future pandemic. To accomplish this rather complex task I concluded that it would be essential to integrate and coordinate the various ecosystems of healthcare and ecology at the same time. In this format I determined that the following provisions would be needed:

- a field program to reduce wildlife disease and therefore the potential for zoonotic transmission of disease,
- develop an early recognition means to identify a transmitting vector and or specific species transmitting a zoonotic disease,
- develop a rapid alert notification system for public officials to respond to such a transmission,
- create a means to rapidly contain and isolate an infected species having a potentially harmful or contagious disease,
- protect against the direct and indirect spread of the disease to other similar species in the environment,
- provide a means for rapid detection of a transmitted zoonotic contagion at a point of care healthcare treatment center,

- provide a means to rapidly contain and isolate a patient having been infected with a serious contagious disease,
- provide a means for correlation of the infectious agent and the zone whereby the contagion originated by means of a communication mechanism between the field unit and the healthcare facility unit,
- provide a means for early warning and protocol activation of specific pathogen, chemical or otherwise toxic element detection,
- provide a means to treat an infected contagious patient at a point of care center or facility while protecting other people, staff, and healthcare providers,
- provide a safer and better working condition means permitting contagious disease treatment differing from that which was mandated with the Covid-19 pandemic.
- provide the means to reduce specific chemical from the environment and wildlife.
- Provide the means to treat specific wildlife diseases and disorders.

The essence of my work as described herein encompasses the development of a wildlife conservation and human interaction Biocontagion and Biodefense Strategy with a resultant complement of Biodefense projects. I decided to model the work with correlation to the 'One Health' CDC Initiatives and the United States strategic Biodefense strategies. In this manner I began to develop the technologies and devices needed to accomplish the objective goals.

## Core Objectives

The core objectives of the BioZone Project relate to the project provision of:

- A comprehensive system to identify, classify, register, and track wildlife and game in designated environments inclusive of acquiring the personnel to carry out the operations.
- A means to better detect toxic elements in specific land, air, or water zones.
- A means to rapidly contain and mitigate such toxic elements.
- A means to control undesirable organism colonization in specific 'Zones' through better land, air, and water management initiatives.
- A comprehensive system for the direct and indirect signal detection of specific organisms in the environment and or residing in or on specific mammals, reptiles, birds, and or fish.
- A means to make library comparisons and determinations as to whether such organisms are known, previously undetected, harmless, pathogenic, and or contagious.
- A means of rapid confinement and or isolation of such previously undetected, pathogenic, and or contagious organisms.
- A means for early notification and preestablished protocol activation in order to prevent the spread of harmful agents.
- A means to detect the spread of such harmful agents in the environment and to mammals upon arrival to treatment facilities.
- A means of correlating detected pathogens at the treatment point of care to prior exposure to registered wildlife.



- A means to rapidly confine and or isolate the pathogenic agent having been detected and related to the point of care identification.
- A means to rapidly confine and or isolate the mammal at the treatment point of care location found to be carrying or being infected with potentially harmful agents.
- A means for notification and activation of preestablished Biodefense protocols in order to appropriately manage and treat the mammal in a safe environment whereby other mammals, persons or providers are protected from such harmful agents.
- A means to coordinate all such previously mentioned objectives into a local, regional, national, and global 'Ecological and Environmental Symbiosis and Homeostasis System'.
- A means to coordinate all such previously mentioned objectives into a local, regional, national, and global 'Early Warning Biodefense and Prepandemic Biocontagion System'.
- A means to originate countermeasures and mitigants to prepare for any and all forthcoming Epidemic and or Pandemic in a less costly and humane fashion that better protects the public and healthcare providers that are obliged to respond to.
- A nutritional means to enhance the immune defenses of wildlife and fish against potentially toxic elements and or agents.
- A means to reduce and or eliminate potentially toxic elements or agents from the tissues of such wildlife and fish especially in the case that said wildlife and fish are consumed by humans and or other mammals.
- A means to provide an 'Innovation Network' the necessary software wherein such a network of research scientists and innovators are permitted to jointly and perpetually participate in defined ecological and environment studies and solutions. Furthermore, the provision guarantees the IP protection of individual or corporate meaningful input and provides a nonbiased system of reward and or royalty.
- A means to perpetually derive science and evidence based data in regard to the essence of the BioZone project, integrate AI (artificial intelligence), better protect the public from zoonotic transmission of disease(s), develop a better means for tissue and or blood sampling from wildlife in a noninvasive manner, institute a vaccination program for wildlife, better educate the public and encourage participation of the public in the BioZone endeavors, provide advanced biodegradable materials in order to prevent specific chemical toxicity to fish and wildlife, modify the intestinal microbial flora of wildlife and game for better health, manage wildlife populations through a humane contraceptive initiative, work toward remodeling the hunting of game to become a means for registering wildlife with the BioZone System parameters instead of killing the animals, develop a collaborative support funding mechanism in order to provide logistics and necessary equipment, faculty, and facilities, develop a working relationship with local, state, and national agencies with similar intent, lobby legislative bodies to remediate chemical use such as PFAS, endorse the mandatory usage of biodegradable materials for fishing in specific habitats, and better integrate the wildlife and fisheries programs with the medical and healthcare industries.

## **BioZone Project Means and Methods**

- 1.** Blockchain DApp software for a networked coordinated and collaborative problem and solutions platform relative to public and environmental health.
- 2.** Software to identify, track and locate, determine the condition of, and transmit and integrate data with the BioZone central CPU which utilizes AI to achieve the functional interoperability of logic interpretation and analysis. An example of the software ability to determine an animals condition is the software integrated monitor assessment of various movements and physiological assessments of the animal with AI comparisons to a normal animal. This technology is a derivative of the BioZone Healthcare software being able to detect early signs of a stroke or acute cardiac event, for example. With the project identification means, the software will be able to identify a registered mammal with specific disorders and track the position of the animal subsequent to identification and determination. In this way the animal can be attended to respective of the determined condition.
- 3.** Software to provide the BioZone project's networked coordination with on-site determinations with point of care treatment facility notification of identified known or unknown and potentially harmful contagions, ability to activate local, regional, and national project protocols, and record and transmit organized data to specific project libraries in order to better determine management pathways and future improved responses, for example.
- 4.** Project BioZone Field Stations equipped with Biosensors capable of identifying a specific registered mammals, directly and indirectly detecting the presence of infectious pathogens, chemicals, and other hazardous elements, or any such agent unknown to existing libraries.
- 5.** BioZone Station decontamination and or sterilization means comprising excimer lamp devices capable of rapid zone decontamination and sterilization without harming wildlife, harmonic resonating ultrasonic impulse devices capable of redundant decontamination and or sterilization of station zones safe to wildlife, and pulsed UV light devices capable of redundant decontaminating and or sterilizing station zones safe to wildlife.
- 8.** A comprehensive BioZone Ecological and Environmental Impact software that integrates with the healthcare BioZone software inclusive of the signal detection, physiological parameters to be studied, data collection, analysis, transfer and reporting of field data remotely, interpretation, intuitive deductions and specific recommendations, for example.
- 9.** The healthcare treatment point of care BioZone Apparatus and devices
- 10.** BioZone project biodegradable materials, equipment, and fishing tackle all environmentally safe and nontoxic to wildlife consumption.
- 11.** BioZone project nutritional supplements designed to improve the microbiota of wildlife in order to enhance immune system defense.
- 12.** BioZone project green energy pilot projects.

**13.** BioZone project hybrid feed and food crop pilot projects.

**14.** BioZone project's novel means and devices for PFA removal from water systems in Mississippi utilizing a hybrid modification of existing conventional technologies with a proprietary magnetic field elimination means.

**15.** Develop national no hunting safe zone areas for disseminated BioZone Station units in order to register wildlife into the BioZone Registry, identify and track diseased animals.

**16.** Develop training manual(s) for all staff members which will be designed and taught by expert personnel as to the disease identification, process, transmission of, treatment of, data collection, analysis, and field reporting.

### **17. BIOZONE FIELD STATION**

The BioZone Field Station is the project's mainstay innovation that will permanently house the equipment, devices, and technologies necessary to fulfill the project objectives and initiatives.

Trending recommendations are approaching the reinstatement and eventual reduction of close contact approximation of wildlife through feed stations. This is where the licking, excretions, and drinking from the same water sources are worried to be a significant causative factor in the spread of CWD and other infections amongst wildlife. It is the intention of the BioZone Project to offer a contrarian approach wherein through the use of BioZone Stations animals will need to be encouraged to develop habits of periodic visits whether alone or in groups. In this manner, the project technologies can be tested, results analyzed, and treatments rendered. It is recommended that an adequately contained privately owned area be the initial project domain.

The BioZone Field Station is designed to be a completely mobile, modular apparatus that communicates with one another as well as remotely transmits program data. The station will initially provide, yet is not limited to:

- countermeasures, mitigants, and technologies necessary to identify and register specific wildlife,
- determine through specific Biosensor technologies (air, water, and ground detection) as to whether the animal(s) is or are infected with a prion disease before exhibiting clinical symptoms and or evidence of wasting and or illness,
- rapidly and safely decontaminate a predetermined field 'Zone' surrounding the station,
- provide nutritional supplementation through advanced dietary nutrition,
- provide a means for aerial surveillance to ensure there is no hunting within a predetermined safe zone area,
- provide contraceptive alternatives to ensure humane population control in a predetermined area,
- eventually provide treatment to prion infected wildlife,
- provide accurate and real time data transmissions to a central station in order to conduct tests and analysis determinations,
- provide animal protective agents such as disinfectants and mosquito and horsefly deterrence,

- provide AI software to detect known pathogens by comparisons to predetermined libraries as well as detecting novel contagions previously unidentified,
- communicate and cooperatively integrate with the Healthcare POC BioZone Units in order to provide an Early Warning Detection and Notification means for the strategic Biodefense Initiative,
- facilitate and provide local and regional institutions a cooperative means to develop additional studies and technologies.

The BioZone Station is a truly revolutionary ‘Phase One’ countermeasure and mitigation innovation that will provide the environmental field location necessity for a valid local, regional, and National Biodefense Initiative to counter contagious biothreats and prevent any forthcoming escalation of an epidemic into a pandemic. The BioZone Field Station provides a multitude of novel technologies aimed at supplying the critical infrastructure and means to address the United States Strategic Biodefense Initiative requests as reported in a document October of 2022.

The BioZone Project and Initiative will develop and disseminate BioZone Stations throughout the state with aim to deliver the attributes discussed herein. The initial project serves as a prototyping means for joint collaborative input and further recommendations and or improvements.

## **Project Summary**

The BioZone Project is complex, multifaceted and challenging yet incumbent and essential to the survival of the future symbiotic and homeostatic relationship of mankind and nature. To quote Albert Einstein as he approached the end of a remarkable life, “We cannot solve our problems with the same mindset that created them”. As with any complex task we must organize and develop a logical action plan and then execute the development of the component construct. The BioZone Initiative and Project is now ready for the process and the product realization. Once again it will be shown that through initiative and innovation we will provide solutions to the never ending storms of life that often come unforeseen. Most important is that we weather these storms calmly and collectively with virtuous intent and perseverance and by endeavoring the problems presented herein, we will once and for all be prepared for any and all forthcoming pathogen outbreaks and simply modify the equations accordingly. The following section will provide a brief review of the problems we are facing and then the solutions, as perceived through the Vertu Realities innovations provided here within.

### **PROBLEMS:**

**A.** Pathogenic and contagious agents are prevalent to our planet and are to date only minimally confronted. Millions of undetected organisms have yet to be identified and or encountered. With the continued invasion of mankind into the natural habitats of these unencountered existing organisms we must prepare a strategic early warning detection and Biodefense Plan. In this regard we discussed viruses and prion diseases.

**B.** In addition to this ‘Natural’ phenomenon and with the advent of technological breakthroughs in areas such as gain of function and intentional manipulation of organisms through genetic



modification, we now are faced with unintentional ‘Accidental’ exposures or lab leaks, and ‘Intentional’ release of harmful pathogens into the land, water, air and populations. In this regard we discussed Covid and pandemics.

C. The modernization and progress of civilization has come with significant unintentional consequences in the forms of pollutions, detriments to the health and well-being of humans and wildlife, and climate change. For our purposes, we discussed chemicals released into our environments and ecosystems such as PFAs, PFOs, and VOCs and the consequences thereof.

### **SOLUTIONS:**

- Early prevention, detection and warning, containment, and management program.
- Means and methods to mitigate and remediate environmental and ecosystems threats.
- Develop better management practices for our wildlife, habitats, and ecosystems.
- Integrate the environmental aspects of the mentioned problems with human healthcare aspects wherein the combined interactions serve to facilitate the efficacy and results.
- Preserve the natural habitats for wildlife and microbiological existence.
- Develop safer methods for public interactions with wildlife, coexist with the environment, and prevent further damage to the climate to assure the quality of life for generations to come.

## **Proposed BioZone Provisions**

1. Develop and implement a full-scale State, Regional, and National Strategic Biodefense Plan that integrates environmental concerns with human healthcare concerns.
2. Provide countermeasures and mitigants to prevent additional harm to the ecosystems of our planet by population expansion and depletion of natural resources.
3. Provide the means for remediation of the harmful unintentional consequences of mankind onto the environments and ecosystems of the planet.
4. Search for better ways, with less environmental impact, to grow food supplies, provide clean energy, and provide recreational coexistence between mankind and nature.
5. Create jobs and promote the economy in the State of Mississippi in a fair, equitable, and inclusive manner.

In regard to the BioZone Initiative for ecological homeostasis and remediation’ I have purchased land in a 1000-acre development near Poplarville, Mississippi with approximately 400 acres of lakes and ponds all stocked with bass and bream and catfish, bountiful wildlife inclusive of bald eagles, turkeys, white tailed deer, quail, squirrels, Canada geese, and various species of ducks.

Large tracts of the development remain undeveloped and have a significant ecological conservation, restoration, and natural resource sustainable value. This location is prime to initiate wildlife, toxicity, and mitigation studies.

Additionally, the development will support hybrid agricultural projects and become the permanent prototype and model headquarters for the BioZone Project. Here a diverse set of research institutions may perform studies and pilot projects, produce clean energy, initiate novel

